

Decision Support for Adults Considering COVID-19 Booster Vaccinations

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Preface

The doctoral student, Qian Zhang, was responsible for and participated in all aspects of this thesis, including the conceptualization, design, data collection, data analysis and interpretation, and writing manuscripts and chapters. This dissertation was under the supervision of Dr. Dawn Stacey, with committee members Dr. Krystina B. Lewis and Dr. J. Craig Phillips. The test of the patient decision aid, a part of the thesis, was approved by the University of Ottawa Research Ethics Board (H-11-23-9860). This thesis is comprised of three papers, of which one paper is under review and the other two are ready to be submitted.

Paper one is in preparation for publication as: Zhang, Q., Lewis, K. B., Phillips, J. C., Carley, M., Ludwig, C., Archambault, P., Smith, M., Taljaard, M., Légaré, F., & Stacy, D. Decisional needs of Canadians considering COVID-19 vaccination during the pandemic: sequential population-based cross-sectional surveys (Targeted journal: Vaccine). In this paper, Dr Stacey and I conceptualized the study. Dr. Lewis and Dr. Phillips guided the study design and methodology. Ludwig and Smith are knowledge users who are involved in the survey design and interpretation of findings. Carley and I conducted the data analysis with support from Dr. Taljaard. All authors met the international criteria for authorship.

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Abstract

Purpose

To develop and conduct preliminary testing of a decision support intervention to address the decisional needs of older adults considering COVID-19 booster vaccinations.

Methods

Multi-methods, guided by the Ottawa Decision Support Framework, were used. Study 1 identified decisional needs of Canadian adults who reported difficulty making COVID-19 vaccination decisions using data from two population-based cross-sectional surveys; Study 2 identified decisional needs of older adults considering COVID-19 booster vaccinations using a systematic review; Study 3 co-developed and iteratively tested a PtDA for older adults considering COVID-19 booster vaccinations.

Findings

In study 1, 490/1454 (33.7%) participants in Year 1 of the COVID-19 pandemic and 475/1718 (27.6%) in Year 2 identified COVID-19 vaccinations as the most difficult decision.

Respectively, 22.7% and 26.3% participants had a clinically significant decisional conflict.

Factors making vaccination decisions difficult were worry about choosing the ‘wrong’ option (45.5%, 32.0%), difficulty separating misinformation from scientific evidence (39.4%, 30.9%), and worry about getting COVID-19 (30.4%, 30.9%). For participants who made the vaccination decision, significant decision regret increased from 23.9% in Year 1 to 38.4% in Year 2.

In study 2, ten studies of older adults considering booster vaccination identified decisional needs including uncertainty about the decision (e.g., 32.3% vaccine hesitancy), inadequate knowledge about effectiveness, safety, and eligibility for booster vaccinations, and lack of resources to support decision-making.

In study 3, findings above were combined with evidence from clinical practice guidelines to co-develop a PtDA with researchers, a patient and a family caregiver. Three iterative rounds of testing were conducted with 14 older Canadians and 5 healthcare professionals. Participants reported the PtDA was acceptable and would help older Canadians prepare for making decisions about booster vaccinations.

Conclusion

During the COVID-19 pandemic, adults in Canada reported unmet decisional needs, including decisional conflict and decision regret about COVID-19 vaccination decisions. Unmet decisional needs were also identified from international literature. The PtDA was reported as useful for assisting older adults in Canada in making booster vaccination decisions. Further research could more rigorously evaluate the PtDA and determine ways to disseminate and implement it with people feeling hesitant about COVID-19 vaccinations.

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List of Abbreviations

CDC	Centers for Disease Control and Prevention
CHERRIES	Checklist for Reporting Results of Internet E-Surveys
CSDC	Clinically Significant Decision Conflict
CSDR	Clinically Significant Decision Regret
DCS	Decision Conflict Scale
DRS	Decision Regret Scale
FDA	Food and Drug Administration
IPDAS	International Patient Decision Aid Standards
MMAT	Mixed Methods Appraisal Tool
ODSF	Ottawa Decision Support Framework
PEMAT	Patient Education Materials Assessment Tool
PHAC	Public Health Agency of Canada
PtDA	Patient Decision Aid
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Chapter 1

Introduction

This first chapter provides an introduction to the research problem, the theoretical framework guiding this multi-methods research, the dissertation purpose and objectives, and the structure for this manuscript-based dissertation.

1.1 COVID-19 Pandemic

The SARS-CoV-2 virus, initially identified in Wuhan, China, in December 2019, instigated a worldwide health emergency known as the COVID-19 pandemic that adversely impacted the public, healthcare systems, and the economy worldwide (Clemente-Suárez et al., 2021; Tian et al., 2020) (Table 1.1). By March 2020, the world shut down, and prevention measures like social distancing restrictions were implemented to reduce COVID-19 transmission (Güner et al., 2020). Healthcare services struggled with the surge in patients with COVID-19, requiring delayed treatment for non-COVID-19 conditions, such as cancer screenings and surgeries (Kupcova et al., 2023). By the end of 2022, there were more than 650 million cases of COVID-19 and 6.7 million related deaths (World Health Organization, 2022). As variants of COVID-19 evolved and people became vaccinated, there was increased transmissibility with lower death rates. On May 3rd, 2023, the World Health Organization declared the COVID-19 pandemic was no longer a global emergency (Arabi et al., 2023; World Health Organization, 2023b). However, people worldwide continue to remain at risk of COVID-19 infection and reinfections with the emergence of new variants and waning immunity over time (Chen et al., 2024). Moreover, individuals who had a COVID-19 infection may experience “Long

COVID” characterized by persistent symptoms such as fatigue, cognitive dysfunction, and respiratory issues (Davis et al., 2023).

Canada’s first case of COVID-19 was detected on January 23, 2020, in Toronto (Marchand-Sénécal et al., 2020). From 2020 to 2024, Canada experienced sequential COVID-19 waves driven by the original and subsequent COVID-19 variants (Table 1.1). These waves were marked by rising cases, hospitalizations, and deaths (Public Health Agency of Canada, 2024b). Public health measures included strict lockdowns (e.g., mandates for remote work, online schooling, and restrictions on public gatherings) and mandatory wearing of masks to mitigate virus transmission (Canadian Institute for Health Information, 2022; Public Health Agency of Canada, 2024f). Currently, the COVID-19 pandemic continues, and case trends vary, highlighting the need for public health attention and adaptive strategies to address emerging threats.

1.2 COVID-19 Vaccination

Governments and public health organizations in Canada and around the world have implemented vaccination campaigns to control the spread of COVID-19 (see Table 1.1) (Bundgaard et al., 2021; Detsky & Bogoch, 2020; Public Health Agency of Canada, 2023d). COVID-19 vaccinations are one of the most effective measures to reduce the spread of the virus, provide long-term protection, and protect individuals and communities from severe illness and death (Fiolet, 2022). COVID-19 vaccinations protect against both the original COVID-19 strain and emerging variants (World Health Organization, 2023a).

Vaccination efforts in Canada have been ongoing since December 2020, with priority given to vulnerable populations, including older adults, healthcare workers, and

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those with underlying health conditions (Kholina et al., 2022). To facilitate vaccination, the government of Canada has provided free vaccinations to all eligible individuals aged six months and older, accessible vaccination sites, and guidance for vaccination procedures (Public Health Agency of Canada, 2024a). Initially, free vaccinations were mainly administered by nurses and other healthcare professionals at pop-up public health vaccination clinics and hospitals. Pharmacies also started to offer free COVID-19 vaccinations in March 2021 (Carter et al., 2022). To prevent the transmission of COVID-19, Canadians were required to show proof of vaccination when entering public places such as hospitals, travelling (by airline or train), or engaging in indoor gatherings and sports activities (Detsky & Bogoch, 2021). Employees were required to be fully vaccinated to continue working. Non-compliance could lead to loss of employment (Canadian Human Rights Commission, 2021). Enforcing requirements and restrictions helped control the spread of the virus and prevented or minimized the intensity of new outbreaks (Prem et al., 2020; Tabari et al., 2020).

The Public Health Agency of Canada (PHAC) has provided regular updates on policies and practices for COVID-19 vaccinations (Public Health Agency of Canada, 2022, 2023c, 2024e, 2025). The *primary series* refers to the initial set of COVID-19 vaccinations (first dose for 1-dose series and the second dose for 2-dose series); whereas a *booster dose* continues to be an additional dose after the primary series to strengthen and prolong immunity, given that vaccine effectiveness wanes over time (Public Health Agency of Canada, 2021). The first booster vaccination for COVID-19 was approved for use in Canada in September 2021 to target new variants. Administration of the first booster dose is recommended at least six months after the initial primary series or

COVID-19 infection, and every six months thereafter (Detsky & Bogoch, 2021). The booster vaccinations have also been available free of charge for Canadians (Public Health Agency of Canada, 2023b). Studies conducted in 2021 and 2022 have shown that most Canadians (62 to 89%) intended to receive the COVID-19 booster vaccination (Lazarus et al., 2023; Ogilvie et al., 2021). By the end of 2021, 76.5% of Canadians had completed the primary series, and by the end of 2022, 49.8% of Canadians had received at least one COVID-19 booster dose (Detsky & Bogoch, 2022; Public Health Agency of Canada, 2022). Despite high coverage of the primary series and the strong willingness to receive booster vaccinations, only 3.9% of Canadians had received the COVID-19 booster vaccination in the fall of 2024 (Public Health Agency of Canada, 2024d). The decline in booster updates may be influenced by less urgency as the pandemic evolved and the belief that prior vaccination offers enough protection (Benham et al., 2021; Corsten et al., 2023). Vaccination fatigue, lower perceived risk of severe illness, and reduced trust in public health messages may contribute to reduced booster acceptance (Young et al., 2024).

1.3 COVID-19 Booster Vaccination for Older Adults

Individuals 60 years and older accounted for over 80% of global COVID – 19 related deaths between 2020 and 2021 (Wong, 2023). In Canada, adults 60 years and above comprised 65% of ICU admissions and 85% of deaths due to COVID-19 infection (Public Health Agency of Canada, 2023a). Older adults are more vulnerable to COVID-19 because their immune systems naturally weaken with age, they have a reduced ability to fight infections, and are more likely to have a lower effectiveness response to COVID-19 vaccines (Mueller et al., 2020; Shahid et al., 2020). COVID-19 vaccination coverage

is high among adults 60 and older, with more than 94.9% having received at least 1 dose, but only 10.5% had received the recommended booster dose by June 2024 (Public Health Agency of Canada, 2024c). COVID-19 booster vaccination hesitancy among older adults was influenced by fear of side effects, exposure to misinformation, and concern about the impact on chronic disease (Alomar et al., 2023; Law & Chiu, 2024).

1.4 Canadians' Vaccination Intention and Hesitancy about Booster Vaccination

Factors that influence Canadians' intention to receive the booster vaccination include fear of COVID-19 infection, increasing and prolonging immunity against the virus, belief in the effectiveness and safety of booster doses, protection of family members and friends, suggestions from doctors, and access to vaccination services (Young et al., 2024). The overall intentions of booster vaccination have decreased in Canada since August 2023 (Canadian Pharmacists Association, 2023).

Vaccine hesitancy is a delay in acceptance or refusal of vaccination despite the availability of vaccination services (MacDonald, 2015). Hesitancy maps directly onto the concept of decisional conflict, which refers to the personal uncertainty about which course of action to take when a choice among options involves risk, loss, regret, or challenge to one's personal values (Hoefel et al., 2020b). Canadians' hesitancy about COVID-19 booster vaccination included fears about the safety, efficacy and side effects; perception that the booster dose is unnecessary; receiving misinformation and conflicting recommendations; vaccine fatigue of repeated doses; and distrust in health policies and governments (Leigh et al., 2024; Young et al., 2024). As the pandemic continues to evolve and vaccination policies are updated, vaccination hesitancy remains a persistent challenge for Canadians and other national contexts.

1.5 Decisional Needs and Decision Regret for Canadians During COVID-19

Pandemic

A survey of 1454 Canadians about healthcare decisions during the first year of the COVID-19 pandemic found that the most frequent difficult decisions were COVID-19 vaccination, managing a health condition, social COVID-19 decisions, mental health care, medication treatments, and caregiver decisions about moving family members to or from residential facilities (Stacey et al., 2023). In total, 323 (22.2%) people had clinically significant decisional conflict, indicating unmet decisional needs. Decisional needs are a deficit that can adversely affect the quality of a decision, defined as informed and matching the most valued characteristics of the health options (e.g., benefits, harms, other outcomes and features) (Hoefel et al., 2020b). Examples of features include the type of vaccine, frequency of treatment/vaccination, and the number of doses required. The factors making the decision difficult were worrying about choosing the wrong option (38.3%), worrying about getting COVID-19 (34.8%), public health restrictions (29.4%), information overload (20.6%), difficulty separating misinformation from scientific evidence (20.4%), and difficulty discussing decisions with clinicians (15.4%) (Stacey et al., 2023). Among 1318 Canadians who made a decision during the first year of the pandemic, 353 (26.8%) had clinically significant decisional regret (Stacey et al., 2023). People who have decisional needs and decision regret can be supported by using decision support interventions (Stacey. et al., 2020). Despite COVID-19 vaccination being identified as the most difficult decision, little is known about the decisional needs and decision regret of COVID-19 booster vaccination among Canadians.

1.6 Gaps in Decision Support for COVID-19 Booster Vaccination

Decision support interventions are structured assistance in deliberating about the decision and communicating with others (Stacey. et al., 2020). These interventions should be tailored to the patients' decisional needs and aim to achieve decisions that are informed and based on characteristics of options that patients value most (Stacey. et al., 2020). The most well-tested decision support intervention is patient decision aids (PtDAs) (Stacey et al., 2024). A systematic review of 209 randomized controlled trials comparing PtDAs to usual care showed that PtDAs increase knowledge, accurate risk perceptions, encourage active role in decision-making and help adults make informed, values-aligned choices (Stacey et al., 2024). The review included five studies that evaluated vaccination-related PtDAs, covering flu shots, hepatitis B vaccination, rotavirus vaccination, and the measles-mumps-rubella vaccination in infants (Chambers et al., 2012; Clancy et al., 1988; Lin et al., 2022; Saunier et al., 2020; Shourie et al., 2013). Findings suggest that PtDAs can support informed decision-making and may help increase vaccine uptake (Stacey et al., 2024). By August 2022, there were 12 publicly available PtDAs related to COVID-19, nine of which were about the primary series of COVID-19 vaccinations (Kiss et al., 2023). These included two PtDAs addressing the choice of vaccine type, one for the timing of vaccination, one on whether or not to receive the primary series, four focused on vaccination during pregnancy and/or breastfeeding, and one designed for people with rheumatoid arthritis. None of the PtDAs were about the COVID-19 booster vaccination decision (Kiss et al., 2023).

1.7 Problem Statement

In summary, COVID-19 continues to circulate, and variants are evolving which pose an ongoing threat to public health. COVID-19 vaccination remains an effective measure to reduce the risk of severe illness, hospitalization, and death. As the virus keeps evolving, the focus of vaccination has shifted from primary series to booster dose to maintain protection over time. Despite public health recommendations and the availability of free COVID-19 vaccinations in Canada, 33.7% ($n = 490$) of Canadians identified COVID-19 vaccinations as the most difficult decision in the first year of the pandemic, and 22.2% ($n = 323$) experienced clinically significant decisional conflict, indicating unmet decisional needs. Unmet decisional needs adversely affect the quality of a decision and may lead to delayed decision making and decision regret.

Older adults, as a high-risk group, require ongoing protection due to age-related declines in immune function and a heightened risk of severe outcomes from COVID-19 infection. Consequently, public health authorities strongly recommend that older adults receive COVID-19 booster doses. Despite the older adults' intention for a booster dose being high, overall booster vaccination coverage remains low, and vaccine hesitancy persists. There is a lack of focus on what older adults need to make informed and value-based decisions regarding booster doses. This inconsistency highlights a critical gap in understanding the specific decisional needs of older adults when considering booster vaccinations.

Interestingly, during the first year of the pandemic, 58.0% ($n = 843$) of Canadians made the healthcare decision alone without the involvement of healthcare professionals (Stacey et al., 2023). As a result, interventions such as PtDAs could be a more feasible

approach to support decision-making early in a pandemic, when access to healthcare professionals for clinical counselling or decision coaching is limited. Current PtDAs for the COVID-19 vaccination focused on the primary series, or target people who are pregnant, breastfeeding or have rheumatoid arthritis. No PtDA currently focuses on supporting older adults in making COVID-19 booster vaccination decisions.

1.8 Guiding Theoretical Framework

To choose a guiding theoretical framework for my dissertation, I reviewed synthesis papers that critically analyzed theories, frameworks, and conceptual models of shared decision-making or patient involvement in decision making (Légaré et al., 2011; Lewis et al., 2016; Lewis et al., 2018; Pacheco-Brousseau et al., 2023; Stacey et al., 2008). The Ottawa Decision Support Framework (ODSF) was selected as the guiding theoretical framework because it has been extensively used, and it is the only theory, framework, or conceptual model that includes the concept of decisional needs. The ODSF has been used for over 100 types of decisions in at least 18 countries (Stacey. et al., 2020). Also, it has been used to assess decisional needs in 45 studies and develop and evaluate over 50 PtDAs, indicating their effectiveness in resolving decisional needs (Hoefel et al., 2020b).

The ODSF asserts that decision support interventions that address patients' decisional needs will lead to improved decisional outcomes (e.g., quality of the decision and decision process), which may favorably impact the implementation of the chosen option and appropriate use of health services (Figure 1.1). The ODSF consists of three main constructs: decisional needs, decision support interventions, and decisional outcomes (Stacey. et al., 2020). A *decisional need* is a deficit that can adversely affect the quality of a decision and requires tailored decision support (Hoefel et al., 2020b). The

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systematic review synthesized evidence from 45 studies reporting 101 unique decisions (85 health-related and 16 social) (Hoefel et al., 2020b). Although none of these studies focused specifically on vaccine-related decisions, the review identified a comprehensive range of decisional needs, including decisional conflict, inadequate knowledge, unrealistic expectations, unclear values, inadequate support/resources, complex decision characteristics and personal and clinical needs (Hoefel et al., 2020b). Their findings underscore the ODSF's adaptability to diverse health contexts, including vaccination decisions.

Decision support interventions are structured assistance in deliberating about the decision and communicating with others. Decision support involves: 1) establishing rapport and facilitating interactive communication, 2) clarifying the decision and inviting participation, 3) assessing the patient's decisional needs, and 4) addressing decisional needs with tailored support. Interventions for delivering decision support are clinical counselling, which may be supplemented with patient decision aids and/or decision coaching. *Clinical counselling* is decision support provided by health professionals who have the disciplinary competence, legal authority, and accountability to identify or diagnose a health condition, identify options, provide decision support and facilitate implementation of the final decision (Stacey. et al., 2020). *Decision coaching* is supplementary, non-directive guidance by trained health professionals to develop patients' deliberation and implementation skills in preparation for their final deliberations with the health professional who identified the options (Stacey et al., 2008). A systematic review of 28 studies showed that people who received decision coaching had improved knowledge and increased participation in decision making compared to usual care. The

most well-tested decision support intervention based on the ODSF is the PtDA (Hoefel et al., 2020a). PtDAs are pamphlets, videos, or web-based resources that state the decision, describe the options, and help people think about which characteristics of the options are most important to them (Stacey et al., 2024). A review of 24 randomized controlled trials showed that PtDAs developed based on the ODSF were more effective than usual care in improving decision quality, decreasing decision delay, and reducing decisional needs (Hoefel et al., 2020a). One of these trials focused on a PtDA for flu vaccinations in Ottawa, Canada (Chambers et al., 2012). Findings showed that healthcare professionals who used the PtDA felt more confident, less uncertain, and more patients chose flu vaccinations compared to the control group.

Primary *decisional outcomes* in the ODSF are related to the quality of the decision and the decision making process (Stacey et al., 2024; Stacey. et al., 2020). The quality of the decision is defined as informed and consistent with patients' values for outcomes of options (Sepucha et al., 2013; Stacey et al., 2024). The quality of the decision making process is defined as a reduction in decisional needs, the proportion who are undecided and perceptions of uninformed, unclear values, and unsupported feelings (Stacey. et al., 2020). The secondary outcomes are the implementation of the chosen option and the appropriate use/costs of health services (Trenaman et al., 2016). Validated measurement instruments include the decisional conflict scale used in over 375 studies, the SURE test and decision regret used in 59 studies (Becerra Pérez et al., 2016; Brehaut et al., 2003; Garvelink et al., 2019; Légaré et al., 2010; O'Connor, 1993; Ottawa Patient Decision Aids Research Group, 2016).

The ODSF was used to design the Canadian survey (Chapter 2) and guided the identification and classification of the decisional needs regarding COVID-19 vaccination. (Chapters 2 and 3). Also, the ODSF directly informed the co-development and testing of the PtDA for Canadian older adults about the booster vaccination (Chapter 4).

1.9 Purpose of the Dissertation

The overall aim of this dissertation was to identify the decisional needs of adults considering the COVID-19 booster vaccination decision and develop a PtDA for older Canadian adults considering the booster vaccination. Using multiple methods, this dissertation aimed to address the following objectives:

1. To identify Canadian adults' decisional needs and decision regret about COVID-19 vaccination and determine factors associated with clinically significant decisional conflict and clinically significant decision regret.
2. To identify the decisional needs of older adults (60 years and older) considering the COVID-19 booster vaccination.
3. To co-develop and test a PtDA to help Canadians 65 years old and older make the decision about getting or not getting a COVID-19 booster vaccination.

1.10 Structure of the Manuscript-Based Dissertation

First, I conducted a secondary analysis of sequential surveys during the COVID-19 pandemic to assess the decisional needs and decision regret of Canadian adults who reported the COVID-19 vaccination as a difficult decision. Then I identified factors linked to higher decisional conflict and decision regret (Chapter 2). Concurrently, I conducted a systematic review to identify the decisional needs of older adults 60 years

and older regarding COVID-19 booster vaccination and to identify gaps in the literature (Chapter 3). Findings from the first two studies were used to co-develop a PtDA with target users to help Canadians 65 years old and older make a decision about the COVID-19 booster vaccination. This PtDA was iteratively tested and revised with potential users to determine its acceptability and usability (Chapter 4). The integrated discussion integrates the findings from all three studies with the broader literature and discusses implications for nursing practice, research, and policy (Chapter 5).

Table 1.1: COVID-19 Infection Waves and Vaccination Timeline in Canada

Canadian waves	Time Period	Variant	Confirmed cases-cumulative	Deaths-cumulative	Key Events/Prevention Measure	Vaccine Availability	Vaccination coverage
First case (Marchand-Sénécal et al., 2020)	January 23, 2020	Original strain (SARS-CoV-2)	1	0	First case confirmed in Toronto, travel history from Wuhan, China.	None	N/A
First wave (Canadian Institute for Health Information, 2020; Detsky & Bogoch, 2020; Public Health Agency of Canada, 2020b)	January to June 2020	Original strain (SARS-CoV-2, Alpha)	104,000	8,839	- Early outbreaks concentrated in high density urban areas - Nationwide lockdowns (March to May–July 2020). - Non-essential businesses and schools closed - Public health campaigns about mask use, hygiene, testing, travel restrictions - Hospital admissions rose, especially in ICUs	None	N/A
Second wave (Canadian Institute for Health Information, 2020; Detsky & Bogoch, 2021; Public Health Agency of Canada, 2020a, 2021c)	September 2020 to February 2021	Original strain (SARS-CoV-2)	~800,000	~20,000	- New surge in cases - Regional lockdowns implemented (September 2020 to February–March 2021). - Continued public health campaign - Healthcare systems pressures, particularly in high-density urban areas	First vaccinations available (December 2020) priority for long-term care facilities, front-line healthcare workers, and Indigenous communities	2.86% of Canadian received at least one dose

COVID-19 Booster Vaccination Decision Support

Canadian waves	Time Period	Variant	Confirmed cases-cumulative	Deaths-cumulative	Key Events/Prevention Measure	Vaccine Availability	Vaccination coverage
Third wave (Canadian Institute for Health Information, 2020; Detsky & Bogoch, 2021; Public Health Agency of Canada, 2021a)	March 2021 to June 2021	Delta variant (B.1.617.2)	~1,400,000	~26,000	- Another surge in cases - Provinces reintroduced lockdowns (April to June 2021) - Continued public health campaign - Healthcare system strained by increased hospitalizations	- Vaccine campaign accelerated for all adults - Vaccination for youth (for age 12-15) approved on May 5, 2021	- 65.89% received at least one dose, - 19.30% completed the primary series
Fourth wave (Detsky & Bogoch, 2022; Public Health Agency of Canada, 2021b, 2021d)	July to November 2021	Delta variant (B.1.617.2)	~1,700,000	~29,000	- Proof of full COVID-19 vaccination was required for: all air and rail passengers, and access to non-essential services. - Continued public health campaign - Healthcare system strained by increased hospitalizations	First Booster dose available in Canada (November 2021) for adults aged 18 and older six months after the primary vaccination series	- 78.44% received at least one dose - 75.50% completed the primary series
Fifth wave (Detsky & Bogoch, 2022; Wikipedia, 2025)	November 2021 to February 2022	Omicron variant (B.1.1.529)	~3,300,000	~36,000	- Emergence of the Omicron variant with high transmission lower severity - Several provinces planned to slowly ease restrictions and return to normal while monitoring COVID-19 trends - Continued public health campaign	- Ongoing rollout of primary vaccine series - Promoted booster vaccinations	- 79.3% completed the primary series - 44.9% received a booster dose

COVID-19 Booster Vaccination Decision Support

Canadian waves	Time Period	Variant	Confirmed cases-cumulative	Deaths-cumulative	Key Events/Prevention Measure	Vaccine Availability	Vaccination coverage
Sixth wave (Detsky & Bogoch, 2022; Wikipedia, 2023)	March to June 2022	Omicron subvariants (BA.1, BA.2)	~4,000,000	~42,000	- Public health measures were starting to be more relaxed - Continued emphasis on vaccination, including second booster doses for specific groups (e.g., adults aged 65 and older, residents of long-term care homes, and individuals with underlying medical conditions)	Ongoing booster vaccination for eligible people	- 81.72% completed the primary series - 48.60% completed first booster dose - 7.06% completed second booster dose
Seventh wave (Detsky & Bogoch, 2022; Public Health Agency of Canada, 2022)	July to September 2022	Omicron subvariant (BA.4, BA.5)	~4,300,000	~44,000	- Public health measures were largely relaxed - Mask mandates limited to high-risk settings like healthcare facilities and public transit - Authorities used wastewater surveillance to track COVID-19	- Canada expanded booster eligibility and introduced fifth doses for high-risk people every six months*	- 82.08% fully vaccinated - 49.84% completed first booster dose - 13.32% completed second booster dose
Eighth Wave(Public Health Agency of Canada, 2024a, 2024b, 2024c)	October 2022 to Early 2023	Omicron subvariants (BA.4/B A.5, later XBB)	~4,650,000	~51,900	- Cases increased due to emerging Omicron subvariants. - Expansion of booster campaigns, including bivalent vaccines.	- Recommendations on an additional COVID-19 booster dose in the spring of 2023 for high-risk people every six months	- 19.0% received booster dose in last 6 months

COVID-19 Booster Vaccination Decision Support

Canadian waves	Time Period	Variant	Confirmed cases-cumulative	Deaths-cumulative	Key Events/Prevention Measure	Vaccine Availability	Vaccination coverage
					- Public health measures remained largely voluntary - Canada had no COVID-19 border rules (no vaccine or test needed to enter) from October 1st, 2022		
No formally reported waves (Public Health Agency of Canada, 2024a)	Fall 2023 to spring 2024	Omicron subvariants (XBB, XBB.1.5)	No official report	No official report	- Vaccination focus shifted to high-risk people - Public health measures remained largely voluntary	- Since fall of 2023, booster dose was recommended for all adults (>18 years old) and particularly important for high-risk people every six months	- 15% received XBB.1.5 vaccination
No formally reported waves (Public Health Agency of Canada, 2024a, 2024c, 2025)	Spring 2024 to 2025	Omicron subvariants (JN.1, KP.3)	No official report	No official report	- PHAC stopped reporting daily updates on new COVID-19 case counts and shifted on indicators like hospitalizations, deaths, and wastewater data in May 2024	- Spring of 2024, booster dose was recommended for high-risk people every six months Since 2025, Recommend older adults 65 years of age or older, residents long-term care homes and 6 months and older with underlying medical conditions per year	- 18.2% received XBB.1.5 vaccination

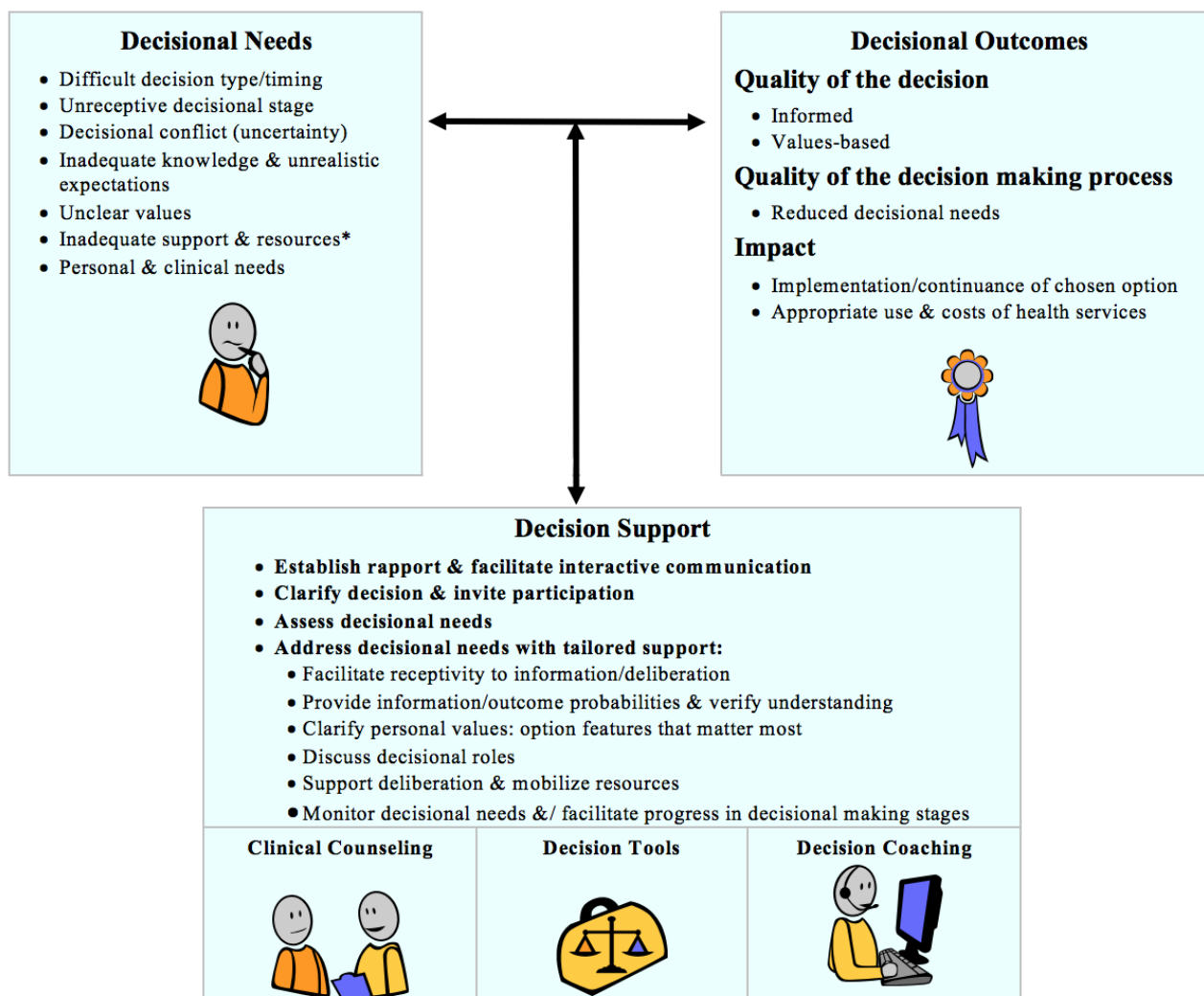
COVID-19 Booster Vaccination Decision Support

* High risk people include those (1) aged 65 years and older, (2) residents of long-term facilities, (3) aged 12 years and older with underlying medical conditions.

N/A: Not Applicable.

PHAC: Public Health Agency of Canada

Figure 1.1: Ottawa Decision Support Framework (ODSF)



*Inadequate support and resources to make or implement the decision include: information inadequacy/overload; inadequate perceptions of others' view or practice; social pressure; different decisional roles; inadequate experience, self-efficacy, motivation, skills; inadequate emotional support, advice, instrumental help; and inadequate financial assistance, health or social service.

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Chapter 2

Decisional Needs of Canadians Considering COVID-19 Vaccination During the Pandemic: Sequential Population-Based Cross-Sectional Surveys

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Abstract

Objective: We sought to identify Canadian adults' decisional needs and decision regret about COVID-19 vaccination and determine factors associated with clinically significant decisional conflict (CSDC) and clinically significant decision regret (CSDR).

Methods: We conducted two sequential cross-sectional online surveys during the first two years of the COVID-19 pandemic and reported according to the Checklist for Reporting Results of Internet E-Surveys guidelines. Eligible participants were Canadians (aged ≥ 18) who reported that COVID-19 vaccination was the most difficult decision they faced during the last 12 months. Survey questions were informed by the Ottawa Decision Support Framework and included the Decisional Conflict Scale (DCS) and Decision Regret Scale (DRS). Independent *t*-tests were used to compare the DCS and DRS scores between the two years. We used multivariable logistic regression analysis with stepwise backward elimination to identify factors associated with CSDC (DCS scores > 37.5 out of 100) and CSDR (DRS scores > 25 out of 100) for both years combined.

Results: From May to June 2021 (Year 1 [Y1]) and June to July 2022 (Year 2 [Y2]), 490/1454 and 475/1718 respondents reported that COVID-19 vaccination was the most difficult decision they had faced. The mean score of DCS was 25.8 in Y1 and 27.1 in Y2 ($p=0.25$). CSDC was reported by 111 respondents (22.7%) in Y1 and 125 (26.3%) in Y2 and was significantly associated with being aged 30 to 59, female, single, disabled, or a

caregiver of a person with a disability. In Y1 and Y2, 440/490 and 463/475 made a COVID-19 vaccine decision. The mean score of DRS increased from 16.9 in Y1 to 23.6 in Y2 ($p < 0.001$). CSDR was reported by 105 respondents (23.9%) in Y1 and 178 (38.4%) in Y2 and was significantly associated with being younger than 60, single, black and house income of CA\$ 50,000 to 99,999.

Conclusion: As the pandemic progressed, CSDC about COVID-19 vaccination remained stable, and decision regret significantly increased in Canadian adults. Targeted decision support interventions are needed to address unmet decisional needs and to reduce subsequent decision regret.

Keywords: decisional needs, COVID-19 vaccination, cross-sectional survey, decisional conflict, decision regret

2.1 Background

The COVID-19 pandemic had a devastating effect on public health and the healthcare system (Clemente-Suárez et al., 2021). COVID-19 vaccinations are an effective intervention for reducing virus transmission, severe illness and hospitalizations (Fiolet, 2022; Rosenblum et al., 2021). In Canada, COVID-19 vaccinations began on December 9, 2020, with initial priority given to healthcare workers, Indigenous people, and older adults (Detsky & Bogoch, 2021). The rapid mutation of COVID-19 has increased the virus's transmissibility and severity, prompting the development of updated vaccines. Since 2021, the Public Health Agency of Canada (PHAC) has recommended the primary vaccine series followed by updated vaccination every 6 months (Public Health Agency of Canada, 2025). These vaccines, including boosters, were available free of charge to the public.

A global survey conducted in 23 countries in June 2022 found that 21% of people hesitated to receive a COVID-19 vaccine, and 12% of vaccinated individuals expressed hesitancy about booster doses (Lazarus et al., 2023). In a systematic review of Canadian studies, the prevalence of COVID-19 vaccine hesitancy was 42% from 2021 to 2022 and rates did not differ across the years of evaluation (Cénat et al., 2023). Canadians were hesitant about the COVID-19 vaccination due to misinformation on social media, doubt about its effectiveness, concern about side effects and insufficient support from health authorities (Cénat et al., 2023; Leigh et al., 2023; Rotolo et al., 2022). A survey of 1,454 Canadian adults found that 34% identified the COVID-19 vaccination decision as the

most difficult health-related decision during the first year of the pandemic (Stacey et al., 2023).

When facing options with uncertain outcomes, people commonly experience decisional needs (Hoefel et al., 2020). A decisional need is a deficit that can adversely affect the quality of a decision and requires tailored decision support (Jacobsen et al., 2013). Common decisional needs are decisional conflict (uncertainty about the choice), inadequate knowledge, unrealistic expectations, unclear values, inadequate support and resources, and complex decision characteristics (Hoefel et al., 2020). People with unmet decisional needs are more likely to have decision regret (Stacey et al., 2020). Decision regret is a negative emotion involving distress or remorse following a decision (Brehaut et al., 2003). For respondents who made any healthcare decision during the first year of the COVID-19 pandemic, a third of Canadians had clinically significant decision regret (CSDR) (Stacey et al., 2023).

In this study, we aimed to assess and compare the decisional needs, decision regret, and trusted sources of information of Canadian adults during the first two years of the COVID-19 pandemic (2020 to 2022). We also aimed to identify factors associated with clinically significant decisional conflict (CSDC) and CSDR.

2.2 Method

2.2.1 Study Design and Setting

We conducted a sub-analysis of two separate population-based sequential cross-sectional online surveys that were conducted during the first two years of the COVID-19 pandemic (Stacey et al., 2023). These surveys were designed by a team of researchers

and knowledge users (patients and clinicians) with respondents from across all Canadian provinces and territories. We reported the study using the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Eysenbach, 2004). The University of Ottawa Research Ethics Board approved our study (H-03-21-6752).

2.2.2 Procedures

In brief, the original study recruited respondents from Leger’s consumer panel, which includes about 400,000 Canadians across 10 provinces and three territories (Stacey et al., 2023). Participants were invited via personalized emails with a unique survey link. Invitees provided study consent at the start of the online survey and only initiated the survey questions after clicking the link consenting to participate. Respondents voluntarily answered questions and were guaranteed confidentiality. Respondents received 1 question per screen and pressed “continue” to proceed. They could not return to previous screens to change responses. To avoid missing responses, no questions could be skipped. For sociodemographic variables, participants were given the option to choose “Prefer not to say”. Up to 3 reminders were sent to those who did not complete the survey. Leger offered an incentive of 2000 points (equivalent to CA\$ 1.60) to complete the survey. Detailed information about procedures was reported in the original study (Stacey et al., 2023).

2.2.3 Survey Instrument

The 32-item survey, available in both English and French, was developed from prior population studies conducted in Canada (Haesebaert et al., 2019; Lognon et al., 2022; Toi, 2021) and based on the Ottawa Decision Support Framework (Stacey et al., 2020). It

included validated instruments: Decisional Conflict Scale (O'Connor, 1995), Decision Regret Scale (Brehaut et al., 2003), and Control Preferences Scale (Degner et al., 1997; Strull et al., 1984). PROGRESS-Plus was used to collect sociodemographic information of respondents (i.e. Sex/Gender, Age, Income, Education, Provinces/Territories, Race/ethnicity/culture/language, and personal characteristics associated with discrimination (e.g., age, disability)) (Bauer & Scheim, 2019; O'Neill et al., 2014). The same survey was used in Year 1 (Y1) and Year 2 (Y2), with one new question added in Y2: "Have you had COVID-19 in the last 2 years?"

The Decisional Conflict Scale (DCS) has 16 items and 5 response categories of decision-making (feeling: uncertain, uninformed, unclear about values, unsupported; ineffective decision-making) (O'Connor, 1993). For the DCS, we classified respondents as having CSDC based on a cutoff of >37.5 out of 100 (Garvelink et al., 2019a). The scale had a high test-retest reliability coefficient of 0.80 and internal consistency ranging from 0.78 to 0.92 (Garvelink et al., 2019a; Garvelink et al., 2019b; O'Connor, 1993). The Decision Regret Scale (DRS) is a 5-item Likert-type instrument to assess regret or remorse after making a healthcare decision. For the DRS, we classified respondents as having CSDR based on a cutoff of >25 out of 100 (Becerra et al., 2016; Brehaut et al., 2003). The scale had a good internal consistency, ranging from 0.81 to 0.92 (Becerra et al., 2016; Brehaut et al., 2003). The Control Preferences Scale is a single item to assess an individual's preferred level of involvement in decision making and has moderate test-retest reliability of 0.70 and good internal consistency (Cronbach's $\alpha = 0.94$) (De Las Cuevas & Peñate, 2016; Degner et al., 1997; Strull et al., 1984).

2.2.4 Sample

For the original study, the sample size of 1500 adults was determined to be sufficient to estimate the proportion of participants with CSDC with a margin of error of +1.80% or +3.85%, assuming an anticipated prevalence of decision conflict of 15% or 26% (Stacey et al., 2023). With an expected 10% response rate, the original surveys targeted 15,000 adults. For this sub-analysis, we included respondents who identified the COVID-19 vaccination as the most difficult decision during the last 12 months.

2.2.5 Statistical Analysis

We used descriptive statistics to report decisional needs. Data were analyzed using IBM SPSS Statistics (Version 29.0.2.0). Categorical variables were presented as frequencies and percentages, while continuous variables were summarized as means $\pm$ standard deviations ($M \pm SD$). Independent *t*-tests were used to compare DCS and DRS scores from Y1 to Y2. Chi-square tests were used to compare the changes in trustworthy information sources from Y1 to Y2. Multivariable logistic regression analyses were conducted to identify factors associated with CSDC and CSDR using combined data for both years. CDCS was dichotomized into two groups based on DCS scores (>37.5 vs. ≤ 37.5 out of 100), and CSDR was dichotomized based on DRS scores (>25 vs. ≤ 25 out of 100) for subsequent analyses. Candidate predictors for each outcome included all sociodemographic variables, including age (five categories), province (five categories), geographical area (urban/rural), sex (male/female), language (three categories), education (four categories), ethnicity/culture (five categories), disability status (yes/no), gender-diverse/LGBTQ+/intersex status (yes/no), racialized/Indigenous status (yes/no), neurodivergent status (yes/no), civil status (married/single), and annual household income (three categories). Variables were grouped to ensure at least 10 respondents per

independent variable. We first conducted bivariate unadjusted analyses for each candidate predictor variable. Only variables with a significance level of <0.05 were entered into the multivariate model. To arrive at a more parsimonious model, we used a manual stepwise backward elimination method with level of significance set at $p>0.05$ for variable removal. Odds ratios (ORs) and 95% confidence intervals (CIs) were reported for unadjusted and adjusted models.

2.3 Results

Surveys were conducted in two phases: May 18 to June 4, 2021 (Y1), and June 9 to July 4, 2022 (Y2). In Y1, 14,459 were invited to participate, and 2236 (15.5%) viewed the survey. Of these, 1454 adults who completed the survey, 490 (33.7%) identified the COVID-19 vaccinations as the most difficult decision they faced. In Y2, 23,974 were invited to participate, and 2430 (10.1%) viewed the survey. Of 1718 adults who completed the survey, 475 (27.6%) identified the COVID-19 vaccinations as the most difficult decision they faced.

Respondents varied in age, education, civil status, ethnicity, and annual household income (Table 2.1). For both years, the typical respondents were white people, married, living in urban areas from Ontario and Quebec, with a household income between \$50,000 and \$99,999, had a below bachelor's education level and reported no lived experience as a member of a marginalized group. In Y2, a total of 64.3% of respondents ($n = 272$) reported that they had not had COVID-19 in the past two years. Missing data (i.e. "prefer not to say") for sociodemographic variables was less than 1.3% for most items (sex, education, cultural background, civil status), 2.7% for members of a marginalized group, and 9.9% for household income.

2.3.1 Unmet Decisional Needs

There was no statistically significant difference in mean scores of the DCS between Y1 and Y2 (mean difference 1.33; 95% CI -0.93 to 3.59, $p=0.25$) (Table 2.2). The uncertainty subscale had the highest mean (SD) score of 31.0 ± 23.7 and 30.3 ± 22.8 . The unsupported subscale had the greatest increase from Y1 to Y2 (Mean $\pm$ SD: 26.9 ± 20.6 vs. 29.7 ± 21.7).

Respondents' CSDC increased from Y1 ($n=111$, 22.7%) to Y2 ($n=125$, 26.3%), however, the difference was not statistically significant ($p=0.19$). After stepwise backward elimination, independent variables significantly associated with CSDC were age, sex, province of residence, disability status, and civil status (Table 2.3). Younger adults aged 30-39 (OR: 1.96, 95% CI: 1.22 - 3.15), 40-49 (OR: 1.76, 95% CI: 1.11 - 2.78) and 50-59 (OR: 1.67, 95% CI: 1.05 - 2.67) had significantly higher odds of CSDC than adults aged 60 and above. Females had significantly higher odds of CSDC compared to males (OR: 1.38, 95% CI: 1.02 - 1.88). People with disability or caregivers of people with disability (OR: 1.90, 95% CI: 1.07 - 3.39) had higher odds of CSDC. Also, single, divorced, or widowed people (OR: 1.59, 95% CI: 1.15 - 2.18) had higher odds of CSDC.

Respondents reported that the most frequent reasons for difficulty making COVID-19 vaccination decisions included: worry about choosing the 'wrong' option (Y1: 45.5%; Y2: 32.0%); difficulty separating fake news from scientific evidence (Y1: 39.4%; Y2: 30.9%); and worry about getting COVID-19 (Y1: 30.4%; Y2: 30.9%) (Table 2.2).

2.3.2 Decision Regret

In Y1 and Y2, 440 (89.8%) and 465 (97.8%) respondents had made a COVID-19 vaccine decision (Table 2.4). The mean score of DRS significantly increased from $16.9 \pm$

17.9 in Y1 to 23.6 ± 22.1 in Y2 with a mean difference of 6.72 (95% CI: 4.09 to 9.35, $p < 0.001$).

CSDR was reported by 105 (23.9%) in Y1 and 178 (38.4%) in Y2. CSDR was significantly associated with age, province of residence, ethnicity, civil status, and household income (Table 2.5). Younger adults aged 18–29 had the highest decision regret (OR: 2.69, 95% CI: 1.59–4.56) compared to people aged 60 and older. Respondents from Quebec (OR: 0.65, 95% CI: 0.43–0.99), the Prairie Provinces (Alberta, Saskatchewan, and Manitoba) (OR: 0.360, 95% CI: 0.22–0.60), and the West Coast (British Columbia) (OR: 0.52, 95% CI: 0.32–0.85) were less likely to have CSDR than those in Ontario and Atlantic Provinces. Respondents who were more likely to have CSDR were Black (OR: 2.98, 95% CI: 1.07–8.27), those who were single, divorced, or widowed (OR: 1.53, 95% CI: 1.09–2.15) and those with an annual household income between \$50,000 and \$99,999 (OR: 1.76, 95% CI: 1.22–2.55).

2.3.3 Trusted Sources of Information

In Y1 and Y2, the most trusted sources of information were health professionals (e.g., doctors, nurses, social workers) (Y1: 70.4%, Y2: 68.4%), Health Canada (Y1: 69.2%, Y2: 46.1%) and provincial health departments (Y1: 53.7%, Y2: 43.6%) (Figure 2.1). The least trusted provider of information was health insurance companies. From Y1 to Y2, there was a significant decrease in trust in federal health departments ($\chi^2 = 55.67$, $p < 0.001$), provincial health departments ($\chi^2 = 9.84$, $p = 0.002$), companies that produce health information ($\chi^2 = 4.97$, $p = 0.026$).

2.4 Discussion

In the first and second years of the pandemic, the most frequent difficult decision identified by Canadians was whether or not to have COVID-19 vaccinations. A number of respondents had unmet decisional needs, as indicated by 24.5% having CSDC about COVID-19 vaccinations, and for those who made a decision, 31.3% had CSDC. The prevalence of CSDR was significantly increased in Y2. There was also significantly decreased trust in information provided by Health Canada and provincial health departments, and companies that produce health information. The results led to the following discussion points.

As the pandemic evolved and booster doses became available, Canadians continued to experience unmet decisional needs, including CSDC, regarding COVID-19 vaccination decisions. Factors making COVID-19 vaccination decisions more difficult were worry about choosing the “wrong” option and worry about getting COVID-19. A systematic review of 21 Canadian studies also found that concerns about side effects (short and long-term), safety, and efficacy were the main reasons for hesitancy about COVID-19 booster vaccination (Young et al., 2024). Our findings showed that younger age (30 to 59) had a higher prevalence of CSDC than older adults (60+). This aligns with previous research showing that older adults tend to have a higher intention to have the booster vaccination (Young et al., 2024). This difference is likely due to age-related risk perception, as older adults recognize their higher risk of severe COVID-19 outcomes (Mueller et al., 2020). Our findings also showed that females had a higher prevalence of CSDC. This is consistent with another systematic review that reported vaccine hesitancy was higher in females than males (Cénat et al., 2023). One explanation for this hesitancy

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is the widespread concern among women, particularly those of childbearing age, about the potential impact of COVID-19 vaccines on fertility and infant health (Nikpour et al., 2022). These continued unmet decisional needs could be addressed by providing clear communication about benefits and side effects and offering targeted decision support interventions for those who have CSDC.

More Canadians experienced CSDR in Y2 after having made the COVID-19 vaccination decision. This is an important finding given that Canadians were encouraged to continue with COVID-19 boosters in subsequent years after the primary COVID-19 vaccinations (Public Health Agency of Canada, 2023, 2024, 2025). Other studies reported that higher decision regret was associated with side effects from previous COVID-19 vaccinations and those with greater concerns about the safety of the booster dose (Brera et al., 2024; Luo et al., 2022). The original study reported that Canadians who had decisional regret for any healthcare decision during the first year of the pandemic had lower levels of trust in the information provided by Health Canada and provincial organizations (Stacey et al., 2023). For the vaccination decision, our survey also found a significant decline in the trust of the information provided by Health Canada and provincial health departments. These findings were consistent with another Canadian study, conducted from March 2020 to February 2022, that reported the sharpest decline in trust for information provided by public health officials and government institutions (McAndrews et al., 2023). Furthermore, shifting government messages and recommendations increased distrust in Health Canada's guidance (McAndrews et al., 2023; Theivendrampillai et al., 2023). Support is needed to reduce CSDR and maintain public trust in evidence-based COVID-19 vaccination information. Although there was a

loss of trust in information from governments, healthcare professionals remained a highly trusted source of information. The increase in CSDR and decreased trust for some information sources highlighted the need for careful consideration and planning for how vaccination information should be delivered during pandemics to support decision making.

Decision support interventions could be designed to address identified decisional needs. Patient decision aids (PtDAs) are evidence-based tools designed to help people make specific and deliberate choices among healthcare options (Stacey et al., 2024). An environmental scan identified nine publicly available COVID-19 patient decision aids to help people choose the type of primary COVID-19 vaccination (Kiss et al., 2023; Trevena, 2021a, 2021b) or make a decision about COVID-19 vaccination when they have a specific health condition, including being pregnant or having arthritis (Hazlewood, 2021; Nova Scotia Vaccine Expert Panel, 2021). However, no decision aid for the COVID-19 booster vaccination was found. Since the COVID-19 virus continues to evolve and boosters are recommended after the primary series, a current decision aid about the booster dose could be used to guide Canadians to make informed decisions, lower their decisional conflict, and minimize decision regret. PtDAs combined with decision coaching could be used to improve the decisional outcomes (Stacey. et al., 2020). Decision coaching is non-directive support delivered by healthcare professionals to help patients prepare to actively participate in making a health decision (Jull et al., 2021; Stacey et al., 2012; Stacey. et al., 2020). Healthcare professionals remain the most trustworthy information source during the first two years of the pandemic. Therefore, developing an up-to-date PtDA for COVID-19 boosters, integrated with decision

coaching by healthcare professionals, could help address Canadians decision making needs.

Strengths and Limitations

The sequential surveys were conducted in the first and second years of the COVID-19 pandemic to compare changes in vaccination decisional needs and decision regret. We also benefited from involving knowledge users (patients and clinicians) to guide the survey design, interpret findings, and draft the results; a process of which was intended to enhance knowledge dissemination and mobilization (Stacey et al., 2023). The original study has a good invitation view rate (Y1: 15.5%, and Y2: 10.1%) compared to other online surveys of 10%-20% (Aitken et al., 2008; Lognon et al., 2022; Martinez et al., 2017; Surdam et al., 2020). There were limitations to consider. There was the potential for recall bias given respondents were asked to respond to questions about a difficult decision made within the previous year (Prince, 2012). Additionally, there was a potential for sample selection bias since data collection primarily relied on online surveys and respondents required access to an electronic source (e.g., smartphone, computer).

2.5 Conclusion

COVID-19 vaccination was the most difficult decision for Canadians surveyed during the first two years of the pandemic. Decision regret was significantly increased in the second year. Unmet decisional needs included decisional conflict, worry about choosing the ‘wrong’ option, difficulty in identifying scientific evidence and worry about getting COVID-19. While trust in Health Canada and provincial health departments declined, healthcare professionals remained a highly trusted source of information among Canadians. Targeted decision support interventions could be used to help Canadians

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make COVID-19 vaccination decisions for ongoing booster doses and in future pandemics.

Table 2.1: Sociodemographic Characteristics of Respondents

Variable	Year 1 (n=490)	Year 2 (n=475)	Total n=965
Age range, n (%)			
18-29	75 (15.3)	75 (15.8)	150 (15.5)
30-39	95 (19.4)	66 (13.9)	161 (16.7)
40-49	104 (21.2)	85 (17.9)	189 (19.6)
50-59	84 (17.1)	99 (20.8)	183 (19.0)
60-69	88 (18.0)	89 (18.7)	177 (18.3)
70+	44 (9.0)	61 (12.8)	105 (10.9)
Provinces/Territories, n (%)			
Ontario	186 (38.0)	177 (37.3)	363 (37.6)
Quebec	85 (17.3)	132 (27.8)	217 (22.5)
Prairie Provinces	93 (19.0)	67 (14.1)	160 (16.6)
West Coast	89 (18.2)	66 (13.9)	155 (16.1)
Atlantic Provinces	37 (7.6)	33 (6.9)	70 (7.3)
Northern Territories	0 (0.0)	0 (0.0)	0 (0.0)
Geographical area, n (%)			
Urban	428 (87.3)	421 (88.6)	849 (88.0)
Rural	62 (12.7)	54 (11.4)	116 (12.0)
Sex, n (%)			
Male	245 (50.0)	259 (54.5)	504 (52.2)
Female	244 (49.8)	216 (45.5)	460 (47.7)
Prefer not to say	1 (0.2)	0 (0.0)	1 (0.1)
Gender, n (%)			
Man	245 (50.0)	259 (54.5)	504 (52.2)
Women	241 (49.2)	216 (45.5)	457 (47.4)
Other or prefer not to say ¹	4 (0.8)	0 (0.0)	4 (0.4)
Language first learned and still understood, n (%)			
English	346 (70.6%)	285 (60.0%)	631 (65.4)
French	89 (18.2%)	128 (26.9%)	217 (22.5)
Mandarin or Cantonese	20 (4.1%)	24 (5.1%)	44 (4.6)
Other ²	35 (7.1%)	38 (8.0%)	73 (7.6)
Highest level of education, n (%)			
High school or less	100 (20.4%)	89 (18.7)	189 (19.6)
Certificate below bachelor's level	175 (35.7)	121 (25.5)	296 (30.7)
Bachelor's degree	139 (28.4)	151 (31.8)	290 (30.1)
University degree above bachelor's level	76 (15.5)	82 (17.3)	158 (16.4)
Prefer not to say	0 (0.0)	1 (0.2)	1 (0.1)

Variable	Year 1 (n=490)	Year 2 (n=475)	Total n=965
Cultural/ethnic background³, n (%)			
White	373 (76.1)	364 (76.6)	737 (76.4)
Asian	85 (17.3)	76 (16.0)	161 (16.7)
North American Indigenous	20 (4.1)	9 (1.9)	29 (3.0)
Black	11 (2.2)	15 (3.2)	26 (2.7)
Other ⁴	16 (3.3)	14 (2.9)	30 (3.1)
Prefer not to say	8 (1.6)	5 (1.1)	13 (1.3)
Lived experience as member of a marginalized group³, n (%)			
Disabled/caregiver of disabled person	31 (6.3)	27 (5.7)	58 (6.0)
LGBTQ+ ⁵	38 (7.8)	30 (6.3)	68 (7.0)
Gender-diverse ⁶	9 (1.8)	4 (0.8)	13 (1.3)
Racialized as person of color	42 (8.6)	53 (11.2)	95 (9.8)
Neurodivergent ⁷	15 (3.1)	15 (3.2)	30 (3.1)
Indigenous	10 (2.0)	7 (1.5)	17 (1.8)
Other ⁸	9 (1.8)	11 (2.3)	20 (2.1)
None of the above	364 (74.3)	331 (69.7)	695 (72.0)
Prefer not to say	10 (2.0)	16 (3.4)	26 (2.7)
Civil status, n (%)			
Married or common law	302 (61.6)	253 (53.3)	555 (57.5)
Single, Divorced or separated	177 (36.1)	203 (42.7)	380 (39.4)
Widowed	8 (1.6)	17 (3.6)	25 (2.6)
Prefer not to say	3 (0.6)	2 (0.4)	5 (0.5)
Annual household income (CA \$), n (%)			
<50,000	93 (19.0)	99 (20.8)	192 (19.9)
50,000-99,999	197 (40.2)	189 (39.8)	386 (40.0)
>100,000	156 (31.8)	135 (28.4)	291 (30.2)
Prefer not to say	44 (9.0)	52 (10.9)	96 (9.9)
Quality of life out of 7, mean (SD) ⁹	5.0±1.3	4.8±1.4	4.9±1.3

1. e.g., bisexual, demiboy, gender fluid, transgender, and 2-spirited.

2. e.g., Arabic, Bengali, Croatian, Dutch, Filipino, Finnish, German, Greek, Hindi, Korean, Latvian and Russian, Polish, Portuguese, Romanian, Russian, Spanish, Ukrainian, Urdu, Yoruba, Zulu.

3. Respondents could select more than one category.

4. e.g., African, Ashkenazi Jewish, Austrian, Canadian, Caribbean, English, “European descent – Italian, German/Dutch (Mennonite), French, Ukrainian”, Italian, Latin American, Malaysian/Guyanese/Chinese, Sephardic, West Indian.

5. e.g., lesbian, gay, bisexual, pansexual, transgender, queer, two-spirited, questioning.

6. e.g., Agende, non-binary, transgender, cisgender

7. e.g., ADHD (attention deficit hyperactivity disorder), autistic, dyslexic

8. e.g., Intersex, Religion (Christian, Jehovah’s Witness, Muslim), “A woman”, “Immigrant”, “White straight males”.

9. Overall quality of life was measured on a 7-point scale: from 1 (life is very distressing, and it is difficult

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to imagine how it could get much worse) to 7 (life is great, and it is difficult to imagine how it could get much better); 4, life is so-so, neither good nor bad.

Table 2.2: Decisional Needs and Factors Influencing COVID-19 Vaccination**Decision Making**

	Year 1 n1=490	Year 2 n2=475	Total n=965
Decisional conflict	n1 (%)	n2 (%)	n (%)
≤ 37.5/100	379 (77.3)	350 (73.7)	729 (75.5)
> 37.5/100	111 (22.7)	125 (26.3)	236 (24.5)
Decisional Conflict Scale* (Mean ± SD)			
Total score	25.8±17.7	27.1±18.1	26.5±17.9
Uncertainty subscale	31.0±23.7	30.3±22.8	30.6±23.2
Uninformed subscale	25.9±19.3	25.7±18.2	25.8±18.7
Unclear values subscale	24.8±19.5	27.0±21.0	25.9±20.3
Unsupported subscale	26.9±20.6	29.7±21.7	28.3±21.2
Ineffective decision subscale	21.8±18.8	24.0±20.8	22.9±19.8
What made the decision more difficult for you? n (%)			
Worried about choosing the ‘wrong’ option	223 (45.5)	152 (32.0)	375 (38.9)
Difficulty separating fake news/fake science results from real scientific evidence	193 (39.4)	147 (30.9)	340 (35.2)
Worry about getting COVID-19	149 (30.4)	147 (30.9)	296 (30.7)
Overloaded with information	146 (29.8)	123 (25.9)	269 (27.9)
Difficulty in believing scientific evidence	107 (21.8)	101 (21.3)	208 (21.6)
Public health restrictions due to COVID-19	85 (17.3)	93 (19.6)	178 (18.4)
No or limited access to information on the decision or options	64 (13.1)	57 (12.0)	121 (12.5)
Difficulty discussing the decision with important others (e.g., spouse, family, friends)	47 (9.6)	41 (8.6)	88 (9.1)
Difficulty discussing the decision with health care providers	37 (7.6)	30 (6.3)	67 (6.9)
No skills or ability for making this type of decision	24 (4.9)	23 (4.8)	47 (4.9)
Other ^{&}	55 (11.2)	57 (12.0)	112 (11.6)

* Decisional Conflict Scale: 0 (no decisional conflict) to 100 (high decisional conflict), scores lower than 25 are associated with implementing decisions; scores exceeding 37.5 are associated with decision delay or feeling unsure about implementing the chosen option.

[&] e.g., unable to see the doctor in person to manage the health condition, side effects of the COVID-19 vaccine

Table 2.3: Factors Associated with Clinically Significant Decision Conflict (DCS >37.5 Vs ≤37.5) in Combined Year 1 and Year 2:**Results from Logistic Regression Analysis with Stepwise Backward Elimination**

Independent variables	n	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age range			
60+	282	1.0	1.0
50-59	183	1.73 (1.10 - 2.73)	1.674 (1.05 - 2.67)
40-49	189	2.00 (1.29 - 3.11)	1.761 (1.11 - 2.78)
30-39	161	1.95 (1.23 - 3.10)	1.956 (1.22 - 3.15)
18-29	150	1.71 (1.06 - 2.77)	1.494 (0.90 - 2.48)
Province			
Ontario	363	1.0	1.0
Quebec	217	0.87 (0.59 - 1.28)	0.83 (0.55 - 1.25)
Prairie Provinces	160	0.60 (0.37 - 0.96)	0.56 (0.35 - 0.92)
West Coast	155	0.92 (0.59 - 1.41)	0.90 (0.57 - 1.41)
Atlantic Provinces	70	1.47 (0.85 - 2.54)	1.44 (0.82 - 2.55)
Geographical area			
Urban	849	1.0	
Rural	116	1.20 (0.78 - 1.86)	
Sex			
Male	504	1.0	1.0
Female	460	1.57 (1.17 - 2.11)	1.38 (1.02 - 1.88)
Language first learned			
English	631	1.0	
French	217	1.01 (0.71 - 1.45)	
Other	117	1.08 (0.69 - 1.70)	
Highest education			
High School diploma or less	189	1.0	
College, CEGEP, non-university certificate or diploma, or university certificate or diploma below bachelor's level	327	0.882 (0.59 - 1.32)	

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Independent variables		n	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Bachelor's degree (e.g., B.A., B.A. (Hons), B.Sc., LL.B.)		290	0.84 (0.55 - 1.27)	
University certificate or diploma or degree above the bachelor's level		158	0.70 (0.41 - 1.11)	
Cultural background/Ethnicity				
White		712	1.0	
Asian		154	0.96 (0.64 - 1.46)	
North American Indigenous		15	1.15 (0.36 - 3.66)	
Black		18	0.63 (0.18 - 2.21)	
Other/Mixed Race		53	1.25 (0.67 - 2.33)	
Lived experience marginalized group				
Disabled, or caregiver of a person with a disability	Yes	58	1.84 (1.05 - 3.21)	1.90 (1.07 - 3.39)
	No	881	1.0	1.0
Gender-diverse, LGBTQ+, Intersex	Yes	79	1.39 (0.84 - 2.31)	
	No	860	1.0	
Racialized (i.e., person of color), Indigenous	Yes	106	1.26 (0.80 - 1.98)	
	No	833	1.0	
Neurodivergent	Yes	30	0.77 (0.31 - 1.91)	
	No	909	1.0	
None of the above	Yes	706	0.76 (0.54 - 1.06)	
	No	233	1.0	
Civil status				
Married or living common law		555	1.0	1.0
Single, Divorced or separated, Widowed		405	1.59 (1.18 - 2.14)	1.59 (1.15 - 2.18)
Annual household income				
Less than \$50,000		192	1.0	
\$50,000 to less than \$99,999		386	0.83 (0.56 - 1.23)	
\$100,000 or more		291	0.74 (0.48 - 1.12)	

Table 2.4: Decision Regret for Respondents Who Made a Decision

	Year 1 n1=440	Year 2 n2=463	Total n=903
Decision Regret Score (DRS) (Mean $\pm$ SD)	16.9 $\pm$ 17.9	23.6 $\pm$ 22.08	21.3 $\pm$ 20.6
Decision Regret Score	n1 (%)	n2 (%)	n (%)
DRS = 0	145 (33.0)	119 (25.7)	264 (29.2)
DRS 1 to $\leq$ 25	190 (43.2)	166 (35.9)	356 (39.4)
DRS Greater than 25	105 (23.9)	178 (38.4)	283 (31.3)
The decision was made alone	325 (73.9)	367 (79.3)	692 (76.6)
Option chosen was the preferred option	368 (83.6)	348 (75.2)	716 (79.3)

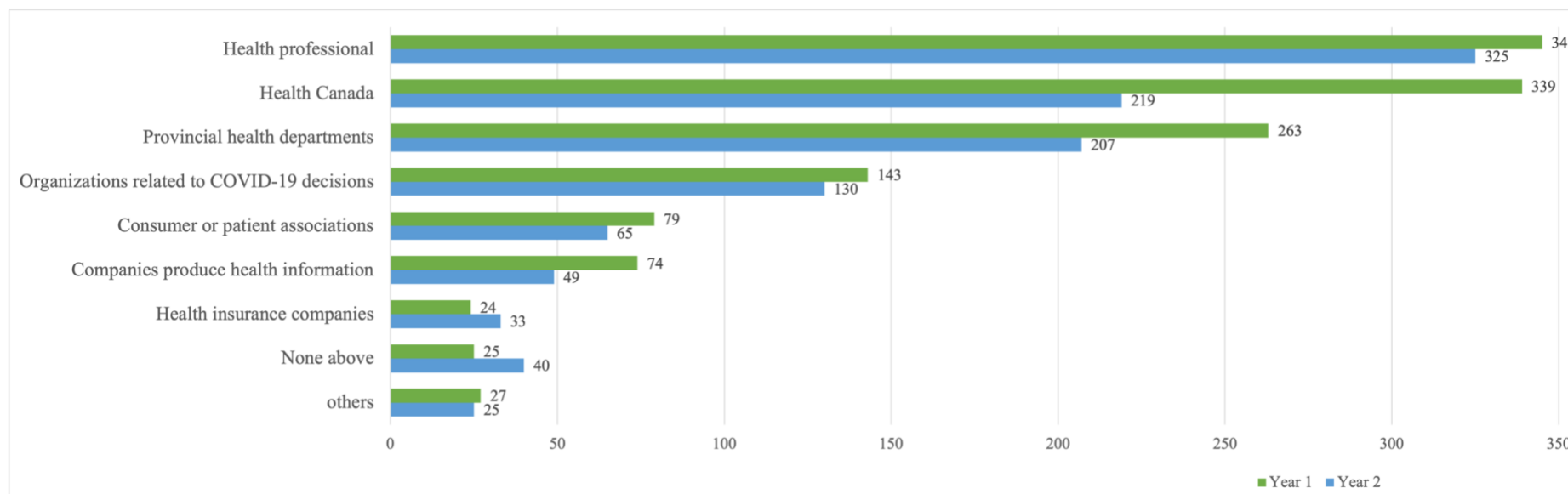
Table 2.5: Factors Associated with Clinically Significant Decision Regret (DRS >25 vs ≤25) in Combined Year 1 and Year 2:**Results from Logistic Regression Analysis with Stepwise Backward Elimination**

Independent variables	n	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age range			
60+	273	1.0	1.0
50-59	170	1.89 (1.22 - 2.93)	1.99 (1.23 - 3.23)
40-49	174	2.30 (1.50 - 3.54)	2.33 (1.45 - 3.76)
30-39	147	2.43 (1.55 - 3.79)	2.62 (1.56 - 4.38)
18-29	139	2.82 (1.80 - 4.42)	2.69 (1.59 - 4.60)
Province			
Ontario	341	1.0	1.0
Quebec	205	0.69 (0.48 - 0.99)	0.65 (0.43 - 0.99)
Prairie Provinces	151	0.38 (0.24 - 0.60)	0.36 (0.22 - 0.60)
West Coast	142	0.52 (0.33 - 0.80)	0.52 (0.32 - 0.85)
Atlantic Provinces	64	1.02 (0.59 - 1.76)	1.06 (0.57 - 1.97)
Geographical area			
Urban	794	1.0	
Rural	109	0.77 (0.49 - 1.21)	
Sex			
Male	482	1.0	
Female	421	1.21 (0.91 - 1.60)	
Language first learned			
English	587	1.0	
French	207	0.83 (0.59 - 1.18)	
Other	109	0.95 (0.61 - 1.47)	
Highest education			
High School diploma or less	172	1.0	

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Independent variables		n	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
College, CEGEP, non-university certificate or diploma, or university certificate or diploma below bachelor's level		301	1.28 (0.85 - 1.94)	
Bachelor's degree (e.g., B.A., B.A. (Hons), B.Sc., LL.B.)		275	1.47 (0.97 - 2.23)	
University certificate or diploma or degree above the bachelor's level		154	0.93 (0.57 - 1.53)	
Cultural background/Ethnicity				
White		671	1.0	1.0
Asian		144	1.69 (1.17 - 2.46)	1.46 (0.94 - 2.28)
North American Indigenous		12	0.49 (0.11 - 2.25)	0.55 (0.11 - 2.66)
Black		17	3.49 (1.31 - 9.29)	2.98 (1.07 - 8.27)
Other/Mixed Race		48	1.01 (0.53 - 1.91)	0.91 (0.44 - 1.90)
Lived experience marginalized group				
Disabled, or caregiver of a person with a disability	Yes	49	1.54 (0.86 - 2.78)	
	No	829	1.0	
Gender-diverse, LGBTQ+, Intersex	Yes	74	1.55 (0.95 - 2.52)	
	No	804	1.0	
Racialized (i.e., person of color), Indigenous	Yes	96	1.10 (0.70 - 1.73)	
	No	782	1.0	
Neurodivergent	Yes	28	0.87 (0.38 - 2.00)	
	No	850	1.0	
None of the above	Yes	665	0.78 (0.56 - 1.07)	
	No	213	1.0	
Civil status				
Married or living common law		519	1.0	1.0
Single, Divorced or separated, Widowed		379	1.62 (1.22 - 2.16)	1.53 (1.09 - 2.15)
Annual household income				
Less than \$50,000		177	1.38 (0.91 - 2.09)	1.46 (0.92 - 2.33)
\$50,000 to less than \$99,999		362	1.73 (1.22 - 2.44)	1.76 (1.22 - 2.55)
\$100,000 or more		273	1.0	1.0

Figure 2.1:Trusted Information Source[#]



[#] Respondents were allowed to select multiple options for the “Trusted Information Source” question.

Other: research studies (Y1=5; Y2=10); specific news sources (Y1=3; Y2=4); certain professionals (Y1=3; Y2=3); own research (Y1=4; Y2=1); friends and family (Y1=3; Y2=1); people not sponsored (Y1=1; Y2=2); all sources (Y1=1; Y2=2), God (Y1=2; Y2=0); the Centres for Disease Control/ Food and Drug Administration (Y1=2; Y2=0), personal experiences of others (Y1=1; Y2=0), local health departments (Y1=1; Y2=0), and online sources (Y1=1; Y2=0).

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Chapter 3

Decisional Needs of Older Adults Considering COVID-19 Booster

Vaccinations: A Systematic Review

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Abstract

Introduction: Older adults are at high risk of severe COVID-19 outcomes. Despite the fact that COVID-19 booster vaccinations reduce disease severity and hospitalizations, many older adults are hesitant about receiving them. Our study aimed to identify the decisional needs of older adults considering COVID-19 booster vaccination.

Methods: We conducted a systematic review and used PRISMA reporting guidelines. Eligible studies reported decisional needs about the COVID-19 booster vaccination of people 60 years or older. We searched Ovid MEDLINE, Embase, CINAHL, APA PsycINFO, and Joanna Briggs Institute Evidence-Based Practice from December 2019 to October 2024. Two reviewers independently screened studies, extracted data, and assessed study quality using the Mixed Methods Appraisal Tool. We used the Ottawa Decision Support Framework coding manual to guide data extraction and descriptive analysis. We analyzed qualitative findings using content analysis.

Results: Of 5,156 citations screened, 10 studies were eligible. Studies were conducted in seven countries and involved 8,759 adults aged 60 to 94 years old, with 53.0% female, and 72.1% having at least one chronic health condition. All studies reported the vaccine hesitancy among older adults (median 26.1%), indicating decisional conflict. All studies identified limited knowledge regarding the effectiveness and necessity of booster vaccination and the negative influence of widespread misinformation. Seven studies reported concerns about the side effects and safety of the booster vaccination. Four studies reported inadequate support and resources from healthcare authorities, governments, healthcare professionals and family members. Five studies reported

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personal and health-related characteristics that adversely affect the COVID-19 booster vaccination decision among older adults.

Discussion: One-third of older adults were hesitant about the COVID-19 booster vaccination. Common decisional needs were limited knowledge, inadequate support, and being unclear about the influence of vaccines on their chronic health conditions. These decisional needs of older adults considering COVID-19 vaccination could be addressed using decision support tools.

Funding: None

Registration: This study was registered in PROSPERO (CRD42023433825).

Keywords: COVID-19 booster vaccination, decisional needs, older adults

3.1 Background

Although the emergency phase of COVID-19 is over, the virus continues to mutate, spread and endanger people's lives (World Health Organization, 2024). People 60 years and older are especially vulnerable to COVID-19 infection, with significantly higher morbidity, mortality, and hospitalizations compared to younger populations (O'Driscoll et al., 2021). In fact, more than 81% of COVID-19 deaths occurred in older adults (Centers for Disease Control and Prevention, 2025).

COVID-19 primary series vaccination became available in December 2020, and the COVID-19 booster vaccinations were introduced in November 2021 (Detsky & Bogoch, 2021; Prüß, 2021). COVID-19 booster vaccinations are effective in reducing the risks of infection, hospitalization, and COVID-19-related mortality, particularly among older adults (Grewal et al., 2023; Wan et al., 2022). Despite the proven benefits, older adults remain hesitant about the COVID-19 booster vaccination decision. The global vaccine hesitancy rate for the COVID-19 primary series among older adults was 27.7%, and the hesitancy increased as the vaccination campaign progressed (Law & Chiu, 2024). A Canadian survey of 1,454 adults, including 445 adults 60 years and older, revealed that the COVID-19 vaccination was the most frequent and difficult health-related decision they faced during the pandemic (Stacey et al., 2023).

Decisional needs arise when people experience more than one healthcare option, uncertain outcomes, or known outcomes that people value differently (Hoefel et al., 2020b). Unmet decisional needs lead to poor quality health decisions. To achieve quality health decisions, patients and families may be given effective decision support interventions that are tailored to their needs (Stacey. et al., 2020). A review of 45 studies

reported common health-related decisional needs were decisional conflict, inadequate knowledge, unrealistic expectations, unclear values, inadequate support/resources, and complex decision characteristics that were influenced by individuals' personal and clinical characteristics (Hoefel et al., 2020b). None of these studies were conducted with people considering vaccine decisions. Decision conflict is defined as personal uncertainty about which course of action to take when a choice among options involves risk, regret, or challenge to personal life values (LeBlanc et al., 2009). Vaccination hesitancy refers to the delay in acceptance or refusal of vaccination despite the availability of vaccination services (MacDonald, 2015). Decisional conflict and vaccination hesitancy are closely related and often overlap in the context of COVID-19 vaccination decisions. Older adults who experience decisional conflict may not be definitely opposed to the vaccination but may feel uncertainty or unsure and delay the vaccination decision.

Given that older adults are hesitant about accepting the COVID-19 booster vaccination, identifying their specific decisional needs is important for planning how best to support them with this decision. Our study aim was to determine the decisional needs of older adults considering the COVID-19 booster vaccination decision.

3.2 Methods

A systematic review was conducted according to the Cochrane Handbook (Higgins et al., 2023) and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page et al., 2021). The eligibility criteria, data extraction and analysis were guided by the Ottawa Decision Support Framework (ODSF) (Stacey. et al., 2020). The study protocol was registered on PROSPERO (CRD42023433825).

3.2.1 Eligibility Criteria

Inclusion and exclusion criteria were organized using the SPIDER (Sample, Phenomenon of Interest, Design, Evaluation, and Research type) framework (Cooke et al., 2012) (Table 3.1). Eligible studies reported on the decisional needs of people 60 years and older considering the COVID-19 booster vaccination. Studies focused on the primary series of COVID-19 vaccinations were excluded. For studies that reported vaccine hesitancy, participants who definitely refused the booster vaccination were excluded, as the decision was made, and no decisional needs were reported. Quantitative, qualitative, and mixed methods studies were eligible. There were no language restrictions, and non-English articles were translated to determine whether they met the inclusion criteria. Only studies published after December 2019 (the start of the COVID-19 pandemic) were eligible.

3.2.2 Information Sources

An academic librarian (TR) designed and conducted the searches based on the eligibility criteria. Five databases were searched: Ovid MEDLINE, Embase, CINAHL, APA PsycINFO, and Joanna Briggs Institute Evidence-Based Practice from December 2019 to June 2023 and updated in October 2024. Key search terms included “COVID-19 booster vaccination” and “decision making.” Detailed search strategies are presented in Appendix I. We also searched government websites (Public Health Agency of Canada and Centers for Disease Control and Prevention) and reference lists of relevant review articles to identify eligible studies in October 2024.

3.2.3 Selection Process

All studies were imported into Covidence (<https://www.covidence.org/>). After removing duplicates, two of three reviewers (QZ, HKM, AK) independently evaluated the eligibility of each citation in a two-stage screening process: a) titles and abstracts; and b) the full text. All citations were screened with the option of “Yes” (included) and “No” (excluded). Disagreement at each stage was resolved in consensus discussion or consultation with a third reviewer (DS), if necessary. Reasons for exclusion were documented at full-text screening.

3.2.4 Data Collection Process

Data extraction was based on the Cochrane data collection checklist (Cochrane, 2022) and ODSF, including (1) study identification: publication date, country, first author and funding support; (2) methods: study design, sample size, data collection period and methods; (3) characteristics of participants using PROGRESS Plus that included age, sex, gender, provinces/territories, language, education, cultural/ethnic background, marital status (Karran et al., 2023), (4) decisional needs based on ODSF decisional needs coding manual (Hoefel et al., 2020b). Two of three reviewers (QZ, HKM, SG) independently extracted the data for each included study and disagreements were resolved by a third reviewer (DS).

3.2.5 Quality Assessment

The Mixed Methods Appraisal Tool (MMAT) was used to assess the quality of the included studies (Hong et al., 2018). The MMAT has good content validity and includes two screening questions along with 25 criteria. These criteria are organized into five core criteria for each of the following five study designs: qualitative research, randomized

controlled trials, non-randomized studies, quantitative descriptive studies, and mixed methods studies. We presented the ratings of each criterion to describe the quality of the included studies. Two of three reviewers (QZ, HKM, SG) conducted the quality assessment independently and disagreements were resolved by a third reviewer (DS).

3.2.6 Data Synthesis

The quantitative and qualitative findings were mapped onto the ODSF Decisional Needs Coding Manual and descriptively reported. Continuous data for decisional needs were presented as a median rate, and categorical data were presented as frequencies and percentages. We used content analysis for the quantitative and qualitative results to categorize findings into seven types of decisional needs: (1) decisional conflict, (2) inadequate knowledge or feeling uninformed, (3) unrealistic expectations, (4) unclear values for outcomes or features of options, (5) inadequate support/resources, and (6) complex decision characteristics, and (7) personal and clinical needs (Hoefel et al., 2020b). Coding was performed independently by two of three reviewers (QZ, HKM, SG), and disagreements were resolved by a third reviewer (DS).

3.3 Results

3.3.1 Study Selection

After removing 1,217 duplicates, we screened 5,156 individual records (Figure 3.1). Of the 408 full texts screened, 395 were excluded (Appendix II), and 10 eligible studies were included, with findings reported in 13 articles.

3.3.2 Study Characteristics

Of the ten studies included, nine were quantitative studies using cross-sectional designs. Data were collected through online surveys ($n=3$), telephone interviews ($n=3$), or in-person surveys ($n=3$) (Table 3.2). One study used a qualitative design with face-to-face interviews. Studies were conducted from August 2021 to March 2024 in seven countries (e.g., China [$n=4$]; and one study each from England, Israel, Turkey, Saudi Arabia, United States, Malaysia). In total, 8,759 older adults aged 60 to 94 years were included. Of these participants, 53.0% ($n=4,828$) were female, 63.3% ($n=5,096$) had higher school education and above, 73.2% ($n=6,020$) were married, and 72.1% ($n=5,017$) reported having a chronic health condition. Participants with a history of COVID-19 infection ranged from 4.5% to 25.4%.

3.3.3 Risk of Bias

Of the ten studies included in this systematic review, three cross-sectional studies and one qualitative study were rated as having a low risk of bias (Ben-David, 2022a; Wang(a) et al., 2022; Wang(b) et al., 2022; Wu & Brennan-Ing, 2023) (see Table 3.3). Four studies lacked sufficient information to assess non-response bias (Alomar et al., 2023; Lee et al., 2024; Meyer et al., 2023; Qin et al., 2022b). Two studies had a response rate of less than 60%, indicating a higher potential risk of bias (Chan et al., 2023; Sezerol & Davun, 2023). Two studies did not use a well-tested questionnaire in the cross-sectional study design (Lee et al., 2024; Sezerol & Davun, 2023).

3.3.4 Decisional Needs

All ten studies reported that older adults have *vaccine hesitancy* (Table 3.4). Eight studies reported that the median vaccine hesitancy rate is 26.1% (range 7.75% to 66.6%).

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Lee (2024) used the Vaccine Hesitancy Scale (total score 7 to 35): Mean $\pm$ SD (21.6 ± 7.2), indicating moderate hesitancy. The qualitative study found that “*participants were observed to express more suspicion and hesitancy towards boosters*” and “*some individuals expressed their desire to delay their booster reception, which had been available for months*” (Wu & Brennan-Ing, 2023).

All 10 studies reported that older adults had *limited knowledge* regarding the effectiveness, necessity, safety, and eligibility of the booster vaccination. Seven studies reported a median of 26.6% (range: 10.1% to 52.2%) of older adults had limited knowledge about the booster vaccine effectiveness (Alomar et al., 2023; Chan et al., 2023; Meyer et al., 2023; Qin et al., 2022b; Sezerol & Davun, 2023; Wang(a) et al., 2022; Wang(b) et al., 2022). Five studies reported a median of 17.8% (range: 2.4% to 33.1%) of older adults thought the booster vaccine was unnecessary (Ben-David, 2022a; Meyer et al., 2023; Qin et al., 2022b; Sezerol & Davun, 2023; Wang(b) et al., 2022). Common reasons included confidence in their own health and immune system, believing previous doses were sufficient, and the perception that the risk of infection was low due to effective pandemic control. Three studies reported that participants had misinformation, including false claims that boosters cause COVID-19 infection (Qin et al., 2022b), and vaccines did not have Food and Drug Administration (FDA) approval (Ben-David, 2022a).

Eight studies reported that older adults’ *personal values* affected their booster vaccination decision. Six studies reported that a median of 16.1% (range: 8.3% to 32.2%) of older adults were concerned about COVID-19 booster vaccination side effects, including fears of immediate reactions (e.g., pain, fever), long-term health risks, and

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beliefs that side effects worsen with age (Ben-David, 2022b; Chan et al., 2023; Lee et al., 2024; Meyer et al., 2023; Sezerol & Davun, 2023; Wang(b) et al., 2022). Other studies reported that older adults were concerned about the safety of the vaccination (Qin et al., 2022a), and those with negative attitudes toward the booster dose were associated with higher uncertainty about whether or not to receive it (Wang(a) et al., 2022).

Five studies reported that older adults *lacked adequate support and resources* related to the COVID-19 booster vaccination (Alomar et al., 2023; Lee et al., 2024; Wang(a) et al., 2022; Wu & Brennan-Ing, 2023). Three studies reported lacking support in making the booster vaccination decision from the health system, government or family doctors (Alomar et al., 2023; Ben-David, 2022b; Wang(a) et al., 2022). Two studies reported a lack of support from family members and friends (Lee et al., 2024; Wang(a) et al., 2022). One study reported that information overload eroded trust in authority and consequently led to vaccine hesitancy (Wu & Brennan-Ing, 2023).

Five studies reported that older adults *had personal and clinical needs*. Being female, unemployed and/or having language barriers as immigrants were associated with having vaccine hesitancy (Chan et al., 2023; Sezerol & Davun, 2023; Wu & Brennan-Ing, 2023). Three studies reported that participants were concerned about the impact of chronic health on booster vaccination's protection time and effectiveness (median rate 20.4%, range 3.1% to 34.1%) (Chan et al., 2023; Sezerol & Davun, 2023; Wang(a) et al., 2022). Limited physical mobility and disability were barriers to getting the booster vaccination (Qin et al., 2022b; Sezerol & Davun, 2023).

3.4 Discussion

Our systematic review identified ten studies reporting on the decisional needs of older adults considering COVID-19 booster vaccination. One-third of participants had vaccine hesitancy, indicating the presence of decision conflict. Older adults' unmet decisional needs about COVID-19 booster vaccination were limited knowledge, the impact of personal values, inadequate support, and worried about the impact of the vaccination on their chronic health condition. Our results lead to the following points for discussion.

An important decisional need of older adults was the limited knowledge about the necessity and effectiveness of booster vaccination. This knowledge gap is worsened by misinformation and limited health literacy among older adults. Older adults are particularly likely to experience repeated exposure to COVID-19 misinformation (Weng et al., 2024). Misinformation about severe side effects or lack of vaccine efficacy can erode trust in evidence-based information and create confusion for older adults considering the risks and benefits of COVID-19 booster vaccinations (Wu & Brennan-Ing, 2023). As well, older adults with lower general or digital health literacy are more likely to struggle with interpreting public health information, especially when the vaccination guidelines change over time (Dadaczynski et al., 2021; Wu & Brennan-Ing, 2023). One study reported that most older adults in Hong Kong found government-produced health promotional materials were unhelpful because they did not address their concerns about COVID-19 booster vaccination (Wang(a) et al., 2022). A recent systematic review found that individuals with lower levels of vaccine literacy, defined as the ability to access, understand, and apply credible immunization information, were

more likely to express vaccine hesitancy (Limbu & Huhmann, 2023). To address this decisional need, public health authorities and governments should provide plain language information materials that target their informational needs to enhance knowledge on how booster vaccines work, why their efficacy wanes over time, and their effectiveness in reducing hospitalization and deaths among older adults.

A unique decisional need of older adults was their concerns about the effect of the COVID-19 booster vaccination on their chronic health conditions. A systematic review of 3,211 older adults with chronic health conditions found that 47% were hesitant to get the COVID-19 vaccine (Zhao et al., 2023). Another study reported that older adults with chronic health conditions had limited knowledge about vaccine safety specific to their health condition (Hacker et al., 2021). Hence, older adults faced increased complexities when balancing the benefits of vaccination against concerns about side effects or potential interactions with their existing treatments (Chan et al., 2023; Qin et al., 2022b). The presence of chronic health conditions (e.g., hypertension, chronic cardiovascular diseases and chronic lung diseases) had not led to more side effects from COVID-19 vaccinations, and there was no evidence showing COVID-19 vaccinations would interfere with chronic health condition management (Wang(a) et al., 2022). Clinical practice guidelines also recommend COVID-19 booster vaccination for patients with well-controlled or medically stable chronic health conditions (Mohseni et al., 2022; Qin et al., 2022a).

The decisional needs of older adults identified in our review can be addressed with effective decision support interventions. Based on ODSF, patient decision aids (PtDA) are an effective intervention for addressing patients' decisional needs and improving the

quality of the decision making process and decision (Hoefel et al., 2020a). A Cochrane review that included 209 studies showed that PtDA decreased decisional conflict, improved knowledge and helped patients make value-based informed decisions (Stacey et al., 2024). A systematic review of the effectiveness of PtDA for vaccination decisions showed that compared to the control group, the PtDA group had less decisional conflict, decreased perceived risks of vaccination and decreased beliefs about misinformation (Vujovich-Dunn et al., 2021). Several PtDAs were available for the COVID-19 vaccination primary series and some condition-specific PtDAs for pregnant people and those with autoimmune rheumatic diseases (Kiss et al., 2023). Although older adults are a priority group for the COVID-19 booster vaccination (Liang et al., 2022; Public Health Agency of Canada, 2025), no PtDAs are available to specifically address the decisional needs of this target group.

Strengths and Limitations

This study has several strengths and limitations. Our search strategy was strengthened by having a team with expertise in library sciences and OSDF decisional needs. We used the well-validated OSDF decisional needs coding manual to systematically analyze and code the decisional needs identified in the studies. However, grey literature was not searched, which may limit the comprehensiveness of the findings. In addition, there is a possibility that we missed decisional needs assessments that were embedded in PtDA development studies, particularly if it was not explicitly listed as a study objective.

3.5 Conclusions

The decisional needs for older adults considering the COVID-19 booster vaccinations were decision conflict, inadequate knowledge, personal value concerns, worry about the impact of vaccination on chronic health condition management, and insufficient support from health departments. Addressing the decisional needs of older adults is essential for achieving informed, value-aligned and evidence-based options about the booster dose. Decision support interventions like PtDAs are needed to address decisional needs and support better decision making.

Figure 3.1: PRISMA Flow Diagram

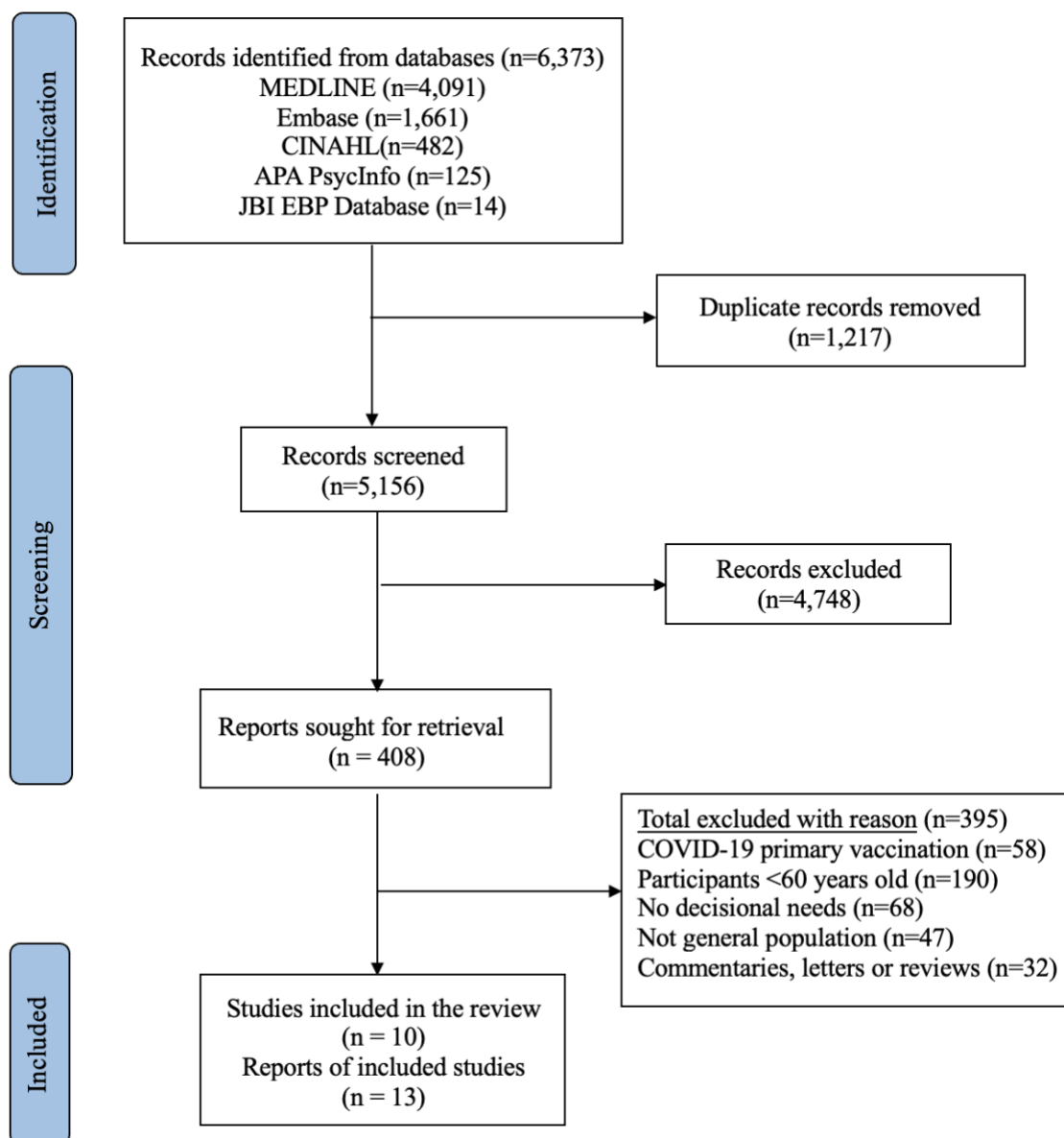


Table 3.1: Eligibility Criteria

	Inclusion	Exclusion
Sample	Older adults (aged 60 years and older) making the COVID-19 booster vaccination decision for themselves	COVID-19 vaccination decision for family members or others
Phenomenon of Interest	Decisional needs of the COVID-19 booster vaccination	COVID-19 vaccination clinical trial decisions
Design	All study designs with original data	-
Evaluation	Decisional needs of COVID-19 booster vaccination based on ODSF decisional needs coding manual	-
Research type	Qualitative, quantitative, and mixed methods	Reviews, editorials, theses, commentaries, news, letters, conference abstracts

ODSF: Ottawa Decision Support Framework

Table 3.2: Basic Characteristics of Studies and Participants

Author, year	Country	Study design	Sample size	Data collection period	Age Mean $\pm$ SD	Female n (%)	Education ¹ n (%)	Married n (%)	Chronic health condition n (%)	COVID-19 infection n (%)	COVID-19 vaccinated n (%)	Vaccination hesitancy rate	Funding support
AlOmar 2023	Kingdom of Saudi Arabia	Cross-sectional face-to-face	502	August 2023	70.34 $\pm$ 5.85	256 (51.0%)	356 (71.1%)	NR ²	378 (75.3%)	NR	486 (96.8%)	58.6%	NR
Ben, 2022(a, b)	Israel	Cross-sectional -online survey	400	2021 August - 2022 March	69.19 $\pm$ 6.1	194 (48.5%)	212 (53%)	286 (71.5%)	225 (56.3%)	18 (4.5%)	NR	7.75%	No
Chan, 2023	China	cross-sectional telephone	370	May-July, 2022	Range 65-75+	225 (60.8%)	213 (57.5%)	276 (74.6%)	223 (60.3%)	94 (25.4%)	NR	52.4%	Government
Lee, 2024	Malaysia	cross-sectional face-to-face	401	April 2023 to September 2023	70.5 $\pm$ 8.1	162 (40.4%)	201 (50.1%)	NR	322 (80.3%)	83 (20.7%)	100%	NR	University
Meyer, 2023	England	Cross-sectional -online survey	2004	October 2021	63.61 $\pm$ 8.45	1022 (51%)	1848 (92.2%)	NR	NR	216 (10.78%)	100%	20.0%	Government
Qin, 2022(a, b, c)	China	Cross-sectional -online survey	3321	May, 2022	Range 60-70+	1731 (52.1%)	1334 (40.2%)	2,290 (69.0%)	2750 (82.8%)	NR	1,002 (30.2%)	17.2%	Government
Sezerol, 2023	Turkey	Cross-sectional telephone survey	1075	April-May 2022	69.33 $\pm$ 2.88	690 (64.2%)	516 (48%)	709 (66.0%)	748 (69.6%)	NR	NR	66.6%	No
Wang(a), 2022	China	cross-sectional, telephone	395	February -April, 2022	Range 65-75+	238 (60.3%)	228 (57.7%)	298 (75.4%)	298 (75.4%)	42 (10.6%)	91.9%	32.2%	Government

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Author, year	Country	Study design	Sample size	Data collection period	Age Mean $\pm$ SD	Female n (%)	Education ¹ n (%)	Married n (%)	Chronic health condition n (%)	COVID-19 infection n (%)	COVID-19 vaccinated n (%)	Vaccination hesitancy rate	Funding support
Wang(b), 2022	China	Cross-sectional, face-to-face	214	March-April, 2022	Range 60-80+	110 (51.4%)	188 (87.8%)	179 (83.6%)	175 (81.7%)	NR	100%	9.3%	Government
Wu, 2023	United States	Qualitative	77	October 2021 and January 2022	Range 65 to 94	NR	NR	NR	NR	NR	NR	NR	Foundation

1. Education: High school and above

2. NR: Not reported

Table 3.3: Risk of Bias of Included Studies

Author, year	Are there clear research questions?	Do the collected data allow to address the research questions?	Is the sampling strategy relevant to address the research question?	Is the sample representative of the target population?	Are the measurements appropriate?	Is the risk of non-response bias low? *	Is the statistical analysis appropriate to answer the research question?
AlOmar, 2023	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes
Ben, 2022 a, b	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chan, 2023	Yes	Yes	Yes	Yes	Yes	No	Yes
Lee, 2024	Yes	Yes	Yes	Yes	No	Can't tell	Yes
Meyer, 2023	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes
Qin, 2022 (a, b, c)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes
Sezerol, 2023	Yes	Yes	Yes	Yes	No	No	Yes
Wang (a), 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wang (b), 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Qualitative study							
			1.1. Is the qualitative approach appropriate to answer the	1.2. Are the qualitative data collection methods	1.3. Are the findings adequately derived from the data?	1.4. Is the interpretation of results sufficiently	1.5. Is there coherence between qualitative data sources,

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			research question?	adequate to address the research question?		substantiated by data?	collection, analysis and interpretatio n?
Wu, 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Cut off 60% response bias rate

Table 3.4: Decisional Needs Summary

Decisional needs (studies)	Themes	Findings
Decisional conflict (n=10)	Vaccine hesitancy	7.75% to 66.6% (median 26.1%) experienced vaccine hesitancy
Inadequate knowledge (n=10)	Lack information about the effectiveness	• 52.2% agree a second booster dose is not effective in protecting from the Omicron variant (Chan) • 40.0% do not believe the vaccine could effectively protect them from COVID-19 variants (Wang(a)) • 26.6% will not take if have doubts about the vaccine efficacy (Wang(b)) • 26.2% agree booster dose does not prevent severe consequences of COVID-19 (Chan) • 23.9% think the booster dose is ineffective (Sezerol) • 10.1% agreed the efficacy of the COVID-19 vaccine is not clear (Qin) • 8.7% strongly disagree or disagree that vaccines can help control the spread of COVID-19 (Alomar) • Less perceived knowledge about effectiveness of the booster vaccine (Meyer)
	Lack information about the safety	• Less perceived knowledge about the safety (Meyer)
	Think the booster dose is unnecessary	• 33.1% think one or two doses of COVID-19 vaccines is already sufficient (Qin) • 19.8% think COVID-19 in China is under great control and there is no need to vaccinate (Qin) • 10.3% believing that they are healthy enough to fight COVID-19(Qin) • 2.4% think the third dose was unnecessary (Sezerol) • Own immune system strong enough were positively associated with undecided (Meyer) • COVID-19 booster vaccine is not necessary because I am in good health and the risk of infection is low (Wang(b)) • Vaccination is not necessary, since COVID-19 is not as dangerous as people say it is (Ben)
	Lack sufficient information	• Do not receive the sufficient information about the third dose (Ben) • Lack of clarity information for older adults (Wu)

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Decisional needs (studies)	Themes	Findings
	Misinformation	• A booster dose of COVID-19 vaccine can cause infection (Qin) • Encounters with Misinformation Led to Vaccine Uncertainty (Wu) • Booster vaccine is not safe as it has not been approved by the FDA (Ben)
Personal values affecting their choice (n=8)	Worry about the side effects	• 32.2% think the possible adverse reactions of COVID-19 booster vaccine will cause my inner worries and fears (Wang(b)) • 17.0% think the level of side effects of the second booster dose is more severe among people with older age (Chan) • 15.2% concerned that it may cause serious long-term side effects (Lee) • 8.3% Fear of side effect (Sezerol) • I am concerned about immediate negative side-effects and long-term damage due to the vaccine (Ben) • Concern about the possible side effects of a COVID-19 booster vaccine (Meyer) • have negative attitude of the vaccination due the level of side-effects of COVID-19 vaccine booster dose is more severe among people with older age (Wang(a))
	Concern about the safety	• 32.0% Concern about the vaccine safety (Qin)
	Complicated vaccination process	• 17.3% believing that the vaccination process is complicated and time-wasting (Qin)
	Time limited protective effect	• 2.7% concerned that its protective effects will not last that long (Lee)
4. Inadequate support/resources (n=5)	Inadequate information from the government	• Information provided by the government cannot address the concern related to booster dose and are not helpful to make decision (Wang (a))
	Lack of trust	• Lack of trust in healthcare (Ben)
	Lack of recommendation from authorities	• 23.6% lack recommendation about the booster from my family physician (Alomar) • 14.4% lack recommendation about the booster from the Ministry of Health (Alomar)
	Inadequate support from family members/friends	• 34.9% lack family members' support to receive COVID-19 vaccine booster dose (Wang (a))

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Decisional needs (studies)	Themes	Findings
		received negative messages (indicating that taking a booster dose is harmful from caregivers, friends, or family members (Lee)
	Information overload	Information overload eroded trust in authority and consequently seeded vaccine hesitancy during primary series rollout (Wu)
5. Personal and clinical needs (n=5)	Personal characteristics	17.7% unemployed participants did not receive the booster dose (Sezerol) - Females had a higher level of hesitancy than males to receive the second COVID-19 vaccine booster dose (Chan) - Language is a barrier for immigrant older adults to get booster dose (Wu)
	Health status	38.8% participants reported severe illness is the reason for vaccine hesitancy(Qin) 28% participants reported limited physical mobility is the reason for vaccine hesitancy (Qin) 6.9% participants reported have a disability is the reasons for vaccine hesitancy (Sezerol)
	Existing chronic health condition	34.1% were concerned that the presence of chronic health conditions would decrease the protection of the second booster dose (Chan) 3.1% participants reported chronic health condition is the reason for vaccine hesitancy (Sezerol) - concern about the presence of chronic diseases would weaker and shorter duration of protection, and more severe side-effects of the booster dose (Wang (a))

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Chapter 4

Co-Development and Alpha Testing of a Patient Decision Aid about COVID-19 Booster Vaccinations for Adults 65 Years and Older

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Abstract

Background: Canadians 65 years and older feel uncertain about COVID-19 booster vaccinations and have low vaccination rates. Patient decision aids (PtDAs) are effective interventions for supporting vaccination decisions. This study aimed to use best practice approaches to co-develop and test a PtDA to help older Canadians considering the COVID-19 booster vaccination.

Methods: The PtDA was co-developed by a team that included a patient, a caregiver partner, healthcare professionals, and researchers. The co-development process, based on the Ottawa Decision Support Framework, included (1) identifying decisional needs, (2) finding evidence, (3) co-creating the PtDA, and (4) iteratively alpha testing/revising the PtDA. To test the PtDA, we invited Canadians 65 years and older and healthcare professionals to complete an online survey with questions on acceptability, usability and items from the Preparation for Decision-Making Scale. Descriptive analyses were conducted. The final PtDA was quality appraised using the International Patient Decision Aids Standards (IPDAS) criteria and the Patient Education Materials Assessment Tool for understandability and actionability.

Results: The COVID-19 booster vaccination PtDA was co-developed using a well-tested PtDA template and evidence from clinical practice guidelines. Three iterative rounds of alpha testing were conducted with 14 older Canadians and 5 healthcare professionals. Based on the feedback received, the research team clarified the information on options and updated references. In Round 3, all participants found the presentation of information was balanced, would recommend it, and indicated the PtDA would help them prepare for making a decision about the booster vaccination. The PtDA met all IPDAS criteria to be

defined as a PtDA and had good understandability (85.7%) and good actionability (100%).

Conclusions: The PtDA about the COVID-19 booster vaccination for Canadians 65 years and older was acceptable, usable, and would help them make this decision. The PtDA is publicly available in the international inventory of PtDAs for any individual, health professional or organization to use. Changes in the COVID-19 vaccination evidence need to be monitored for timely PtDA updates.

Keywords: COVID-19 booster vaccination, patient decision aid, shared decision making

4.1 Background

The COVID-19 pandemic had a profound and widespread global impact on health and healthcare (Clemente-Suárez et al., 2021; Mofijur et al., 2021). Adults 65 years and older, including those in congregate living settings with or without chronic medical conditions, had and continue to have a higher chance of infection, more severe outcomes, longer hospitalizations, and higher rates of mortality (Shahid et al., 2020; Xu et al., 2023). The COVID-19 vaccination is one of the most effective interventions to reduce the chance of infection and lower the severity of illness (Fiolet, 2022). The evolving nature of COVID-19 variants and waning protection over time from previous vaccinations and natural immunity requires periodic booster doses of the vaccination (Public Health Agency of Canada, 2024).

The COVID-19 vaccination primary series and booster doses have been available free of charge in Canada since December 2020. The current priority for booster doses is older adults 65 years and older, residents in congregate living settings (e.g., long-term care homes), and people with medical conditions that place them at higher risk of severe COVID-19 (Public Health Agency of Canada, 2023). As of June 2024, 10.5% of all Canadian adults followed the Canada Public Health Agency's recommended COVID-19 booster vaccination schedule (Public Health Agency of Canada., 2024). A Canadian survey conducted during the pandemic revealed that the COVID-19 vaccination was the most frequent and difficult health-related decision (Stacey et al., 2023). Of adults who identified the COVID-19 vaccination as a difficult decision, 24.5% had a significant decisional conflict, and 31.3% who had been vaccinated had clinically significant decision regret (Zhang et al., 2024). Those who are hesitant or choose not to get the

booster vaccination often have concerns about vaccination safety, hold false beliefs influenced by misinformation, are concerned about the vaccine safety, worry about choosing the “wrong” option, and lack trust or disagree with vaccination policies (Ben-David et al., 2022; Wang et al., 2022; Zhang et al., 2024)

Since the introduction of COVID-19 vaccinations, there has been an explosion of fake and anti-vaccination information online (De Giorgio et al., 2022). The infodemic has led to information overload regarding COVID-19 vaccinations (Rotolo et al., 2022). People facing difficult decisions can be supported to participate in decision making by using patient decision aids (PtDAs) that are designed to address factors influencing their decision. PtDAs are written materials, videos, or online resources designed to help people become involved in making decisions by providing information about the options and outcomes (including benefits and harms) for a specific decision and helping them clarify their values associated with outcomes and features of options (Hoefel et al., 2020a). A Cochrane review of 209 randomized controlled trials showed that compared to usual care, people who used PtDA had improved knowledge, better informed values-congruent choices, more accurate expectations of outcomes, and enhanced involvement in the decision making process (Stacey et al., 2024). However, there are no publicly available PtDAs for the COVID-19 booster vaccination (Kiss et al., 2023).

4.2 Objectives

The overall aim was to co-develop and test a PtDA to help Canadians 65 years and older make the decision about getting or not getting a COVID-19 booster vaccination.

4.3 Methods

We established a research team with experts in PtDAs and public health, a patient partner aged 65 or older, and a caregiver partner to family members aged 65 or older. The research team met every one to two weeks to co-develop the PtDA and monthly to review feedback from the iterative alpha testing. The University of Ottawa's Research Ethics Board provided approval for conducting this study (H-11-23-9860) (Appendix III).

We co-developed the PtDA following the Ottawa Patient Decision Aid Development eTraining (O'Connor et al., 2015). The eTraining is based on the Ottawa Decision Support Framework (ODSF) and International Patient Decision Aids Standards (IPDAS) (Hoefel et al., 2020b; Stacey & Volk, 2021). According to the hypothesis underlying the Ottawa Framework, when PtDAs are designed to address decisional needs (e.g., decisional conflict, lack of knowledge, unclear values), patients have improved decision outcomes (e.g., informed, less decisional conflict, low decision regret) (Stacey. et al., 2020). A meta-analysis of 24 trials evaluating PtDAs based on the ODSF showed improved patient outcomes (Hoefel et al., 2020a). IPDAS provides comprehensive criteria for enhancing the quality of the content, development, evaluation, and implementation of PtDAs (Stacey & Volk, 2021; Witteman et al., 2021).

According to the PtDA eTraining (O'Connor et al., 2015), our co-development included the following 4 steps:

4.3.1 Assess the Decisional Needs

We identified the decisional needs of adults 65 years and older facing the decision of whether or not to get the COVID-19 booster vaccination from two sources: a sub-analysis of a Canadian survey and a systematic review (Zhang et al., 2024; Zhang. et al., 2024).

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Common decisional needs of adults 65 years and older considering the COVID-19 booster vaccination were: a) decisional conflict as indicated by feeling hesitant or uncertain of the booster vaccination decision; b) inadequate knowledge about the pros and cons of the booster vaccination; c) unrealistic expectations that their immune system was strong enough to protect them against COVID-19; and d) inadequate support from family doctors and family members in helping them make a decision; and e) messages from government are hard to understand.

4.3.2 Find the Evidence for the Options

We searched PubMed for evidence of the efficacy and side effects of the COVID-19 booster vaccination for older adults using the following keywords: “COVID-19 booster vaccination”, “effect,” “side effect,” and “old adults” in November 2023. We also searched government websites for clinical practice guidelines on COVID-19 booster vaccinations (Centers for Disease Control and Prevention, 2022; Public Health Agency of Canada, 2023).

4.3.3 Co-develop the PtDA

We co-developed the PtDA using the well-tested ODSF PtDA template (Stacey et al., 2016). The template sub-headers prompt PtDA developers to a) identify the specific decision; b) describe the health problem, target audience, options, and pros and cons of each option; c) prepare a values clarification exercise; and d) ask the users to select their preferred option. Evidence-based information was used to complete the sections in the PtDA and to ensure knowledge related to decisional needs were addressed. The PtDA was paper-based to easily facilitate iterative changes.

4.3.4 Test the Acceptability and Usability of the PtDA

We conducted an online survey on the SurveyMonkey platform to iteratively test the acceptability and usability of the PtDA according to the IPDAS PtDA development guidance (Coulter et al., 2013; Witteman et al., 2021). Methods are reported following the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) reporting guidelines (Eysenbach, 2004).

Participants: We recruited two groups of participants. People aged 65 years and older who lived in Canada and had at least one dose of the COVID-19 vaccination. We also recruited healthcare professionals (e.g., physicians, nurses, pharmacists) in Canada who typically assist people 65 and older in making the COVID-19 vaccination decision. Eligible participants had to provide consent, were 18 years of age or older, and were able to read and respond to an online survey question in English.

Sampling size: We used convenience sampling following a first-come, first-served approach (Thompson, 2012). We aimed to recruit 3 to 5 individuals in each group per round for a total of 18 to 30 participants.

Procedures: For each round of alpha testing, we published the recruitment poster on research team members' Facebook pages (QZ, DS) and the International Shared Decision Making Society, with guidance to contact QZ for the survey link (Appendix IV). As well, the survey link was sent by members of the team (MS, DS, KL) to eligible participants. Participants were asked to review the 2-page PtDA online and then proceeded to a three-part survey. First, participants were shown a section of the PtDA and asked to rate the clarity of information on a 5-point scale (1 poor to 5 very good), with the option to provide comments in a free-text box (Appendix V). Second, participants were asked

questions about the usability and acceptability of the PtDA overall. Finally, participants were asked to complete sociodemographic questions. The survey consisted of 27 questions for healthcare professionals and 32 questions for older adults, presented in groups of 2 to 8 questions. On average, participants spent 15 minutes completing the survey. To proceed throughout the survey, all questions had to be answered (e.g., ‘prefer not to answer’ was a response item).

After recruiting several participants, we paused the recruitment and synthesized the findings. The synthesized findings were discussed with the research team to agree on changes to the PtDA. The revised PtDA was used with subsequent participants. Iterative cycles were planned until no further changes to the PtDA were necessary (Witteman et al., 2021) (see Figure 4.1).

Survey questions: The research team designed the survey using valid and reliable instruments and three open questions based on the IPDAS development guidance and previous studies (Stacey et al., 2016; Witteman et al., 2021). The questions were the Preparation for Decision Making Scale (Bennett et al., 2010), the acceptability questionnaire (Barry et al., 1997) and the usability questionnaire (Kushniruk & Patel, 2004). The three open-ended questions were: (1) At first glance, what do you think of this decision aid about the updated COVID-19 vaccination? (2) What did you like or not like about this decision aid? (3) What suggestions do you have to improve this decision aid? For characteristics of participants, we used PROGRESS Plus questions (e.g., age, sex, gender, provinces/territories, language, education, cultural/ethnic background, marital status, and lived experience as a marginalized group member) (Karran et al., 2023;

O'Neill et al., 2014). As well, we asked participants how many COVID-19 vaccinations they had received (Appendix VI and Appendix VII).

The Preparation for Decision Making Scale has seven items about getting ready to discuss decisions with their healthcare professionals (Bennett et al., 2010). The scale had two validated versions: one for the public and another for healthcare professionals. Previous studies showed high internal consistency, with alpha coefficients of 0.92 to 0.96 (Bennett et al., 2010). The acceptability questionnaire had nine items to assess users' feedback on content (7 items), clarity of presented information (1 item) and the likelihood of recommending it to others (1 item) (Barry et al., 1997). Two items from the usability questionnaire were to assess the usefulness in making the decision (1 item) and utility in helping discussions with healthcare professionals (1 item) (Kushniruk & Patel, 2004).

Data analysis: All quantitative survey results were imported into Microsoft Excel. Descriptive analyses were conducted to summarize the characteristics of the participants and other quantitative data. Two authors (QZ, DS) analyzed qualitative comments using content analysis in preparation for discussing the findings with the team during the iterative alpha testing cycles (Downe-Wamboldt, 1992). All the responses to the synthesized feedback were documented for changes or no changes to the PtDA for each iterative alpha testing cycle.

4.3.5 PtDA Appraisal

Two team members (QZ, DS) quality appraised the final version of the PtDA using the IPDAS criteria (Joseph-Williams et al., 2013) and assessed for health literacy using the Patient Education Materials Assessment Tool (PEMAT) (Shoemaker et al., 2014). The IPDAS criteria include 6 qualifying criteria and 6 criteria for lowering the risk of

making a biased decision (Joseph-Williams et al., 2014; Martin et al., 2021). Each of the IPDAS criteria was scored as present (yes), absent (no), and “not reported” (Stacey & Volk, 2021). The PEMAT includes items to assess whether information is presented in a way that patients can easily understand and use (Vishnevetsky et al., 2018). We evaluated the PtDA to measure understandability (17 items) and actionability (7 items). We scored the items as 0 (disagree), 1 (agree), or N/A (not applicable) according to the PEMAT User’s Guide (Shoemaker. et al., 2014). PEMAT scores >70% indicate adequate for understandability and actionability.

4.4 Results

4.4.1 Co-Development

The PtDA was co-developed during three research team meetings held every one to two weeks (October to November 2023). Initially, we referred to the index decision as the "booster vaccination" based on the term used in the literature, but this was changed to "updated vaccination" to be consistent with Canadian guidelines and to be able to refer to the constantly updated vaccination (Public Health Agency of Canada, 2023). The target audience was initially all adults aged 18 years and older considering COVID-19 booster vaccinations. However, after discussions with our research team informed by the Canadian COVID-19 vaccination guidelines released in the fall of 2023 (Public Health Agency of Canada, 2023), we agreed to focus on Canadians aged 65 years and older given their low vaccination rates and being a priority population.

The two options in the PtDA were to get or not to get the COVID-19 booster vaccination. Evidence-based information about the updated vaccination and options was based on national government guidelines (Centers for Disease Control and Prevention,

2022; Public Health Agency of Canada, 2023), systematic review (Ogunjimi et al., 2023), cohort study (Català et al., 2024) and case-control study (Carazo et al., 2023). The values clarification exercise invites participants to rate eight common reasons for or against getting the vaccination on a scale from 0 (not at all important) to 5 (extremely important) and options for adults to add additional items. To ensure the PtDA complied with IPDAS criteria, we reported the development date, co-development team members, and references with superscript numbers in the text. During the co-development process, the length of the PtDA was shortened from 4 pages to 2 pages to make it more succinct. The research team was cautious about the images used to avoid inciting fear about needles. The research team revised the wording and layout of the PtDA to use plain language.

4.4.2 Iterative Alpha Testing

Three rounds of iterative alpha testing were conducted. Thirty-four participants opened the survey, and 19 completed it (14 older adults and five healthcare professionals) (see Table 4.1). Of the older adults, five were in Round 1, six in Round 2, and three in Round 3. For healthcare professionals, zero were in Round 1, three in Round 2, and two in Round 3.

The 14 older adults were 65 to over 85 years old from Ontario, British Columbia, and Saskatchewan provinces in Canada. Their educational backgrounds varied from high school diplomas only to post-bachelor's degrees, and they lived alone or in households of two or three people with a range of income levels (under CA\$50,000 to more than \$100,000). Four nurses and one allied healthcare professional from Ontario and Quebec participated. All older adults and healthcare professionals received 3 or more doses of the

COVID-19 vaccination, and none reported lived experience as members of marginalized groups.

Overall, from Round 1 to Round 3, participants reported improved acceptability, usability, and balanced presentation of information in the PtDA (see Table 4.2). All participants except one older adult were willing to recommend the PtDA to others. Most participants thought the PtDA was useful. Older adults felt there was slightly more information than needed in Round 3.

From Round 1 to Round 3, participants reported increased clarity of the PtDA (Figure 4.2). Over 80% of participants rated the “Introduction,” “Facts about the Vaccination,” “Value Clarification,” and “Preferred Option” sections as good clarity for all rounds. Based on participants’ feedback in Round 1, the research team revised the “Pros and Cons” section by removing redundant information, resulting in 88.9% of participants in Round 2 rating the section as having good clarity. However, in Round 3, only 20% of participants provided similar ratings. No changes were made, as there was no specific feedback on how to further clarify this section (see Table 4.3).

From Round 1 to Round 3, older adults reported improvements in how the PtDA could prepare them for the booster vaccination decision (Figure 4.3). In Rounds 2 and 3, the participants reported the PtDA helped them better understand the pros and cons and what was most important to them. Healthcare professionals thought the PtDA could improve the relationship with older adults. In Rounds 2 and 3, healthcare professionals rated the PtDA as being helpful for tailoring their counselling to align with older adults' preferences for participation in the booster vaccination decision.

4.4.3 PtDA Quality Appraisal

The PtDA met all six IPDAS criteria to be defined as a PtDA and five out of six certification criteria with one point lost because the 2-page PtDA did not report an update policy. According to the PEMAT, the PtDA had good understandability (85.7%) and actionability (100%). The PtDA lost points for understandability because it lacked a summary and did not use visual aids to make content more easily understood. The final PtDA (Figure 4.4) and IPDAS results were published online in the international A to Z inventory (<https://decisionaid.ohri.ca/AZsumm.php?ID=2086>).

4.5 Discussion

Our team co-developed a PtDA for helping Canadians 65 years and older make the COVID-19 booster vaccination decision. Canadians aged 65 years and older and healthcare professionals were engaged in the iterative alpha testing of the PtDA. By the third round of alpha testing, participants reported good usability and acceptability of the PtDA. Their comments were used to strengthen the content and layout of the PtDA. The final version of the PtDA met all IPDAS qualifying criteria. The results led us to the following discussion points.

Our study benefited by having a person 65 years or older and a caregiver of older adults on our research team to co-develop the PtDA and be involved in decisions about changes to the PtDA from the iterative alpha testing cycles. Our research team agreed on changes to the PtDA that included simplifying the language, making it easier for end-users to understand. Our co-development process also incorporated the decisional needs identified from published studies conducted in the context of the COVID-19 booster vaccination (Zhang et al., 2024). Feedback received during the iterative alpha testing was redundant after three cycles. Previous research has shown that iterative alpha testing

takes from two to four cycles (Wittman et al., 2021). The importance of involving patient and caregiver partners in PtDA projects is underscored by the IPDAS recommendations of involving patients and the public at every stage of the project, including design and iterative alpha testing cycles (Wittman et al., 2021). However, the extent of patient and caregiver involvement in previous PtDA projects has been limited. Of the 607 published studies, only 50% of PtDA projects reported involving patients or the public in at least one step for understanding their needs (Vaisson et al., 2021). A recent network meta-analysis reported that when patients were involved in the PtDA development, there were greater improvements in knowledge scores for people who used the PtDA compared to PtDA which was only developed by healthcare professionals (Volk et al., 2024)

In co-developing the PtDA, there was a tension between providing too much information and not providing enough. We had chosen the usual four-page PtDA template because the decision needs of people aged 65 and older considering COVID-19 booster vaccination showed a lack of knowledge on the eligibility, safety, efficacy, and side effects (Meyer et al., 2023; Qin et al., 2022; Wang et al., 2022). However, our Canadian survey revealed one in three Canadians reported information overload about the COVID-19 vaccine that interfered with making the decision (Zhang et al., 2024). Given this finding and after discussions of our research team, we shortened the PtDA to two pages to include essential information only. This will be important if used by adults on their own or within pharmacies and health centres where time is often limited. Most participants during the iterative alpha testing commented the PtDA information was “just right” and only one reported the information is less than they wanted. Furthermore,

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Canadians prefer to obtain trusted information from healthcare professionals, Health Canada and provincial health departments (Zhang et al., 2024). Our research team gathered evidence from the most recent national guidelines and systematic reviews to ensure that the PtDA provided information based on the best available evidence and was aligned with the latest Canadian public health recommendations (Public Health Agency of Canada, 2024). Given the rapidly emerging evidence and frequent updates of these clinical practice guidelines, the research team has to monitor for changes in the evidence to provide ongoing updates to the PtDA content. The topic of this PtDA lends itself to adopting a "living" format similar to "living systematic reviews" to monitor for emerging evidence and establish a process for routinely updating the content in the PtDA (Elliott et al., 2017; Michelen et al., 2021).

It was challenging to recruit healthcare professionals during the alpha testing process. Only five healthcare professionals (26.3%) participated in the second and third iterative alpha testing rounds despite our efforts to recruit them through social media. Previous research has shown that healthcare professionals are more likely to engage in the decision-making process when they believe it will lead to better patient outcomes and enhance healthcare processes (Légaré et al., 2008). A review of 283 PtDA development studies showed that 73% reported changing the tools based on healthcare professionals' feedback (Vaisson et al., 2021). It is not clear the reasons for the low participation of healthcare professionals, but this could be related to the topic of COVID-19 vaccinations. The initial information on COVID-19 vaccination was primarily provided by the national and provincial governments in Canada with regular communications recommending vaccination. Hence, it is not clear the extent to which healthcare professionals consider

this a decision for the public. Instead, they may expect the public to follow government recommendations (Centers for Disease Control and Prevention, 2024). This expectation was likely strengthened by the strong public health focus on achieving widespread vaccination coverage to control the pandemic (Detsky & Bogoch, 2021; Detsky & Bogoch, 2022). As a result, healthcare professionals might prioritize adherence to these recommendations over engaging in a more nuanced discussion with the public about their individual preferences regarding booster vaccination.

Strengths and limitations

Strengths of the study include co-development of the PtDA and iterative alpha testing with a patient partner and a caregiver. As well, the PtDA was developed using the well-tested ODSF template to ensure comprehensive content and clear steps in decision-making. The changes resulting from each round of the iterative alpha testing process were transparently reported. There is a potential participant selection bias as some people may not have access to Facebook/Internet to be recruited for the PtDA iterative testing. Furthermore, fewer healthcare professionals were recruited, which may have limited the diversity of perspectives in the alpha testing of the PtDA. Interestingly, none of the participants reported lived experiences as members of marginalized groups, potentially overlooking important insights related to equity and access in healthcare decision-making. These limitations highlight the need for more inclusive recruitment strategies and the involvement of diverse populations in future studies to ensure that the PtDA is developed to address decision making needs of a broader range of people.

4.6 Conclusion

The research team co-developed the PtDA followed a rigorous, well-established process and using the best available evidence to support Canadian adults 65 years and older to make decisions that aligned with their values about the COVID-19 booster vaccinations. Co-development with a patient partner and caregiver on the team ensured use of plain language to clearly communicate evidence in the PtDA. Participants during alpha testing rated the PtDA as acceptable and usable. Given the use of a well-tested PtDA template and development process, the final version was published in the international inventory of PtDAs to facilitate public access to this evidence-based resource. Further research is needed to evaluate the PtDA effectiveness and implementation within health services providing COVID-19 booster vaccinations.

4.7 Declarations

Ethics approval and consent to participate: This study was conducted in accordance with the ethical principles of the Declaration of Helsinki and was approved by the University of Ottawa's Research Ethics Board (H-11-23-9860). Written informed consent was obtained from all participants involved in the alpha testing of the PtDA.

Consent for publication: Not applicable.

Availability of data and materials: The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests: The authors declare no competing interests.

Funding: The project received no funding.

Authors' contributions: Qian and Dawn conceptualized the study and led the development of the patient decision aid. Qian Zhang, Maureen Smith, Krystina B. Lewis,

Sheri McCready, J Craig Phillips, Justin Presseau, and Dawn Stacey conducted the alpha testing and analysis. Qian and Dawn contributed to the drafting of the manuscript. All authors reviewed and approved the final manuscript.

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Figure 4.1: Flowchart of the Co-Development and Iterative Testing Process

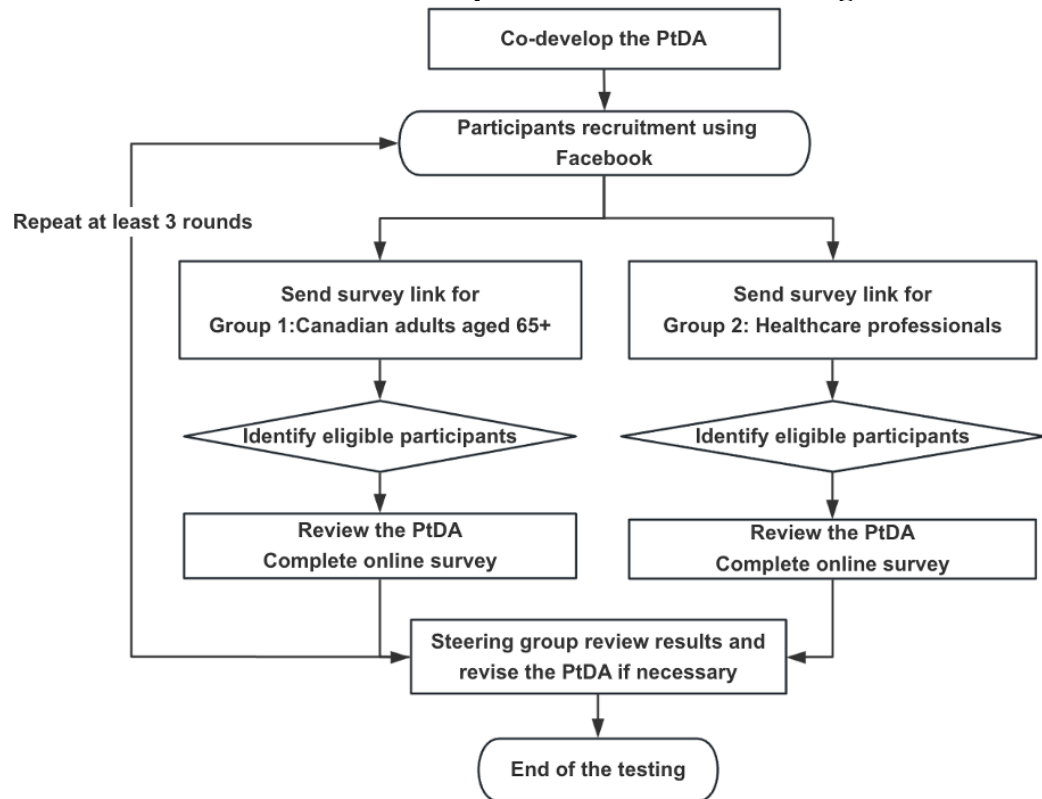


Table 4.1: Basic Characteristics of Participants

Participants		Older adults n=14	Healthcare Professionals n=5
Age	65-74	10	-
	75-84	2	
	85+	2	
Province	Ontario	12	3
	Others	2 BC	1 SK, 1 QC
Sex/gender	Male/Man	8	1
	Female/Woman	6	4
Language	English	12	2
	French	2	3
Education	High School diploma	2	-
	College diploma	2	-
	Bachelor's degree	5	2
	Post bachelor's degree	5	3
Ethnicity	White	12	4
	Black	-	1
	Other	2	-
Marital status	Married	10	-
	Single	3	
	Widowed	1	
Number in household	1 (live alone)	4	-
	2	9	
	3	1	
Annual household income	<\$50,000	2	-
	\$50,000-\$59,999	1	
	\$80,000-\$89,999	1	
	>\$100,000	7	
	Prefer not to respond	3	
Lived experience as a marginalized group member	No	14	-
Number of COVID-19 vaccination received	3 or more	14	5

“-” means no data, BC: British Columbia, SK: Saskatchewan, QC: Quebec

Figure 4.2: Clarity of the Information Presented in the Patient Decision Aid

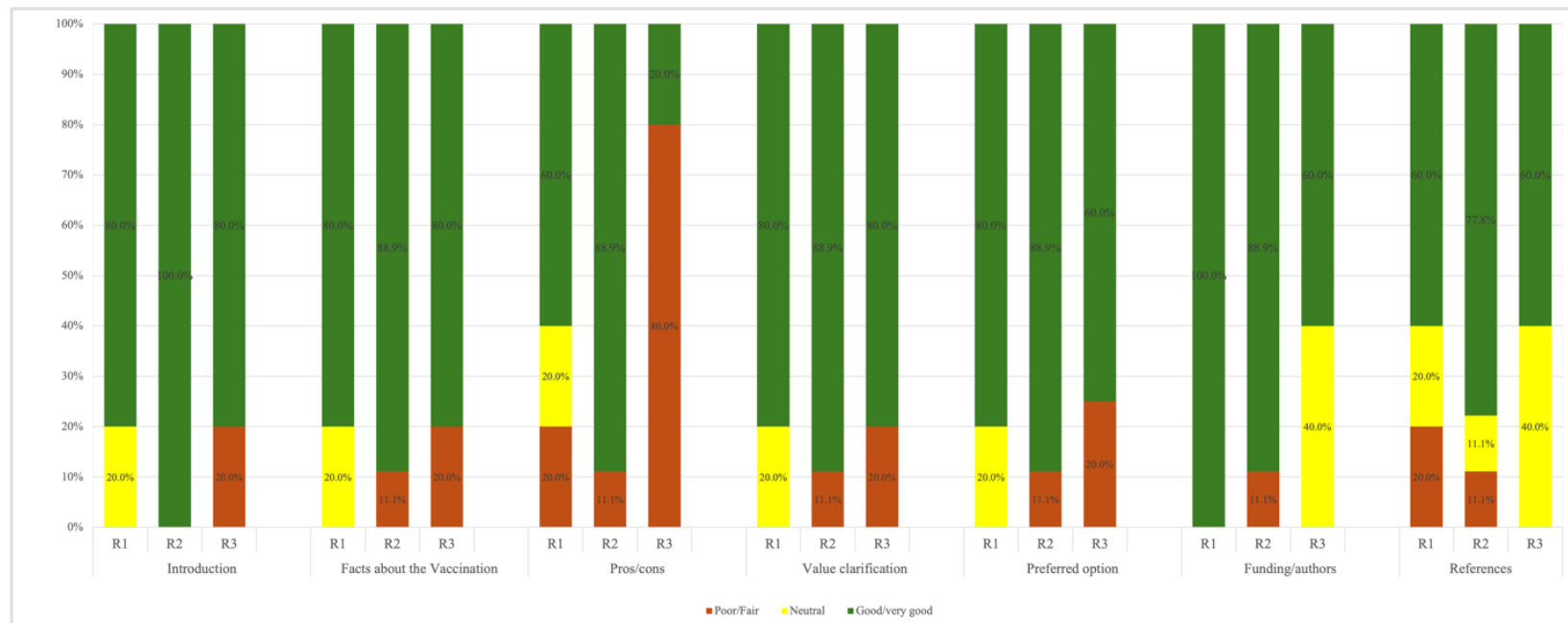


Figure 4.3: Preparation for Decision Making Scale Results

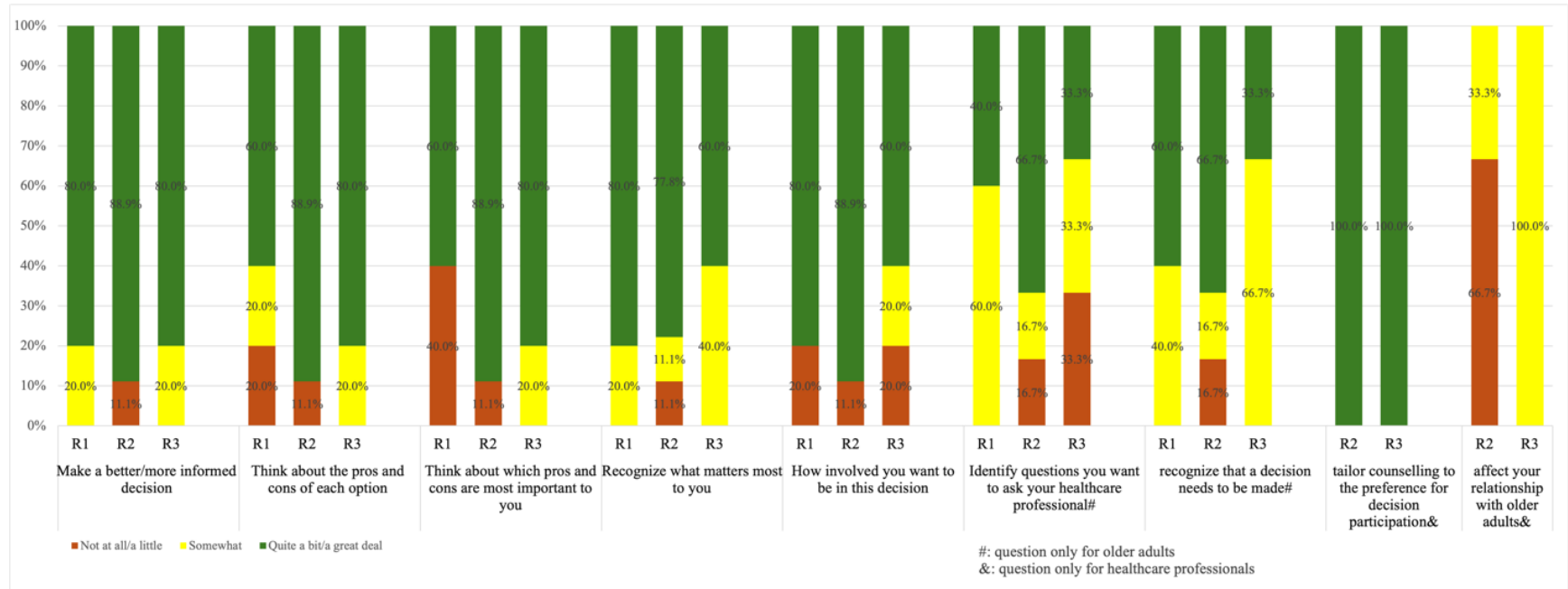


Table 4.2: Acceptability and Usability Testing Results

	Older adults (n=14)			Healthcare Professionals n=5	
	R1 n=5	R2 n=6	R3 n=3	R2 n=3	R3 n=2
Amount of information in the PtDA					
A little less than I wanted	0	1	0	0	0
About right	4	4	1	3	1
Little more than I wanted	1	1	2	0	1
Balanced presentation of information in the PtDA					
Clearly slanted towards taking the latest COVID-19 vaccination	1	0	0	0	0
Slightly slanted towards taking the latest COVID-19 vaccination	2	1	0	1	0
Completely balanced	2	4	3	2	2
Prefer not to respond	0	1	0	0	0
The PtDA is useful					
Yes	4	5	2	3	2
No	1	1	1	0	0
Willing to tell someone about this decision aid					
Yes	5	5	3	3	2
No	0	1	0	0	0
Would the PtDA help you in your discussions with healthcare professional? #					
Yes, as it is	3	5	2	-	
Yes, but with some changes	2	0	1		
No	0	1	0		

R1: Round 1, R2: Round 2, R3: Round 3

#Question only for adults 65 years and older

Table 4.3: Changes to the PtDA Based on Feedback Received During Iterative Rounds of Testing

Section	Participants' Feedback	Changes by research team	Justification for changes/no changes
Round 1 (R1) (Jan 13 -Feb 13, 2024)			
Introduction	OA: The date should be removed since Fall 2023 is in the past. You could simply say "Latest COVID-19 vaccine"	Changed "Fall 2023" to latest COVID-19 vaccine	"latest" will ensure reference to the current vaccine
	OA: I was allowed to have the new vaccine 5 months after having COVID and was told by the public health nurses that any time after 3 months is acceptable	Changed 6 months to 3-6 months	Verified with the PHAC COVID-19 guideline(Public Health Agency of Canada, 2024)
Facts about the vaccination	OA: Why include fatigue and headaches if already in the pros/cons table P: Second bullet confusing, suggestion: Some people feel unwell after getting the vaccine, which means their immune system is responding and will be better able to protect them from the COVID-19 virus.	Kept fatigue and headaches as examples of feeling unwell Changed to "Some people feel unwell (e.g., fatigue, headaches, chills)"	To clarify information presented
Pros/cons of vaccination	OA: "Feeling unwell" is clearer and "reactions" is a loaded term	No changes	Kept "reaction" because it is a response to the vaccination
Value clarification	OA: Re-word first option: "To take the new COVID-19 vaccine at a pharmacy or public health.". Re-word second option: "Not to take the new COVID-19 vaccine"	Reworded as suggested	To clarify information presented
Round 2 (R2) (Feb 15-26, 2024)			
Introduction	HP: helpful and people would use	N/A	
Facts about the vaccination	HP: helpful OA: Reword as "Protection from past vaccines and natural immunity wear off over time"	Changed as suggested	To clarify information presented

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Section	Participants' Feedback	Changes by research team	Justification for changes/no changes
	OA: The document does not list protection to others in the community if you get vaccinated	Added: The protective effect on your family and community increases with the number of immunized people	Added missing information
Pros/cons of vaccination	HP: Clear, no changes	N/A	
	OA: Difficult to understand chart. Create two columns - Pros and Cons.	No changes	Revised chart as suggested but information became more difficult to understand
	OA: repetition of "people had" simply say "injection site reactions".	Delete "people had"	Fewer words
	OA: Get rid of the empty box in the top left	Changed as suggested	Empty box was not necessary
Value clarification	OA: "avoid the new COVID-19 vaccine" to me means not being able to take vaccine for medical reasons...	No changes	Values statements kept consistent with pros/cons
	OA: Circle around number be bigger or changed to a box, change check mark to "area goes dark when pressed".	Changed as suggested	To make it fillable version of the PtDA
	OA: Needs something about contributing to others' health.	Added: I want to protect my family, friends, and/or community against the current COVID-19 infection	To ensure values statements consistent with pros/cons
Preferred option	OA: Remove "at a pharmacy or public health" because there are other options (i.e. primary care).	Changed as suggested	To be inclusive of vaccination locations
	OA: Not sure why "prefer" is included in a decision aid.	No changes	PtDA is expected to help people identify a preferred option.

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Section	Participants' Feedback	Changes by research team	Justification for changes/no changes
Round 3 (R3) (Mar 1 – Mar 25, 2024)			
Introduction	HP: Cut the words back to be more concise	No changes	No specific suggestion on what to cut. Committee felt all information was important to include
	OA: captures the essentials, avoids confusing information about the differences in the booster. Too much reading	No changes	No suggestions provided on how to reduce reading
Pros/cons of vaccination	HP: Information is clear, but would benefit from a pictogram and maybe adding different colors for the pros vs cons columns to help visual clarity	No changes	Pictograms would increase length of PtDA >2 pages and numeric data is equally good for sharing probabilities. Printed PtDA usually in black and white
	OA: Too much reading.... Too much info. Needs to be compressed into a few salient points.	No changes	No specific suggestion on what to cut and all content was important to include
Preferred option	HP: Rephrase the question to "Which statement below best represents your intention to get the latest COVID-19 vaccine"	No changes	The PtDA is designed to help people reach a preferred option without providing biased information to get the vaccine.
References	HP: Start each reference on a new line at left side of the screen...	No changes	Formatted to fit into 2-pages
	OA: Few persons will spend much time looking them up unless they are against boosters.	No changes	References are needed based on IPDAS minimizing risk of bias criteria

OA: Original Answer; HP: Healthcare Professionals

Figure 4.4: Patient Decision Aid - Should I Get or Not Get the Latest COVID-19 Vaccine?

Should I get or not get the latest COVID-19 vaccine?

1. This decision aid is for people:

- 65 years or older;
- thinking about getting the latest COVID-19 vaccine (the booster);
- who got a COVID-19 vaccine 3 to 6 months ago, OR had, OR think they had a COVID-19 infection.^[1]

2. What are facts people may not be aware of?

- The latest COVID-19 vaccine protects people against the current strain of the virus and may help their immune systems be ready to respond to new strains.^[1,2]
- After getting the vaccine, some people have symptoms (e.g. fatigue, headaches, chills), which means their immune system is responding and will be better able to protect them if exposed to the COVID-19 virus.
- People are less protected over time. Protection from past vaccines and natural immunity from having COVID-19 infection wears off over time.^[2]
- The protective effect on family, friends, and the community increased as more people were immunized.^[3]
- The latest COVID-19 vaccine is available free of charge in Canada.^[2]

3. What are the pros and cons of getting or not getting the vaccine?

Data is based on research findings from people aged 50 years and older. Some data is from previous Pfizer or Moderna COVID-19 vaccines	What happened to people who had the latest COVID-19 vaccine? (Pfizer; Moderna)	What happened to people who did not have the latest COVID-19 vaccine?
Pros of having the latest COVID-19 vaccine		
Fewer people had a COVID-19 infection (for 6 months after the vaccine) ^[4,5]	5 out of 100 people had a COVID-19 infection	9 out of 100 people had a COVID-19 infection
Fewer people had severe illness from a COVID-19 infection (for 6 months after the vaccine) ^[5,6]	8 out of 100 people had a severe illness from a COVID-19 infection	25 out of 100 people had severe illness from a COVID-19 infection
Fewer people stayed in hospital due to COVID-19 infection (for 6 months after the vaccine) ^[5,7]	7 out of 100 people had hospital stays	33 out of 100 people had hospital stays
Fewer people had long-COVID symptoms after having a COVID-19 infection ^[8,9]	6 out of 100 people had long-COVID symptoms after having a COVID-19 infection	17 out of 100 people had long-COVID symptoms after having a COVID-19 infection
Cons of having the latest COVID-19 vaccine		
People had injection site reactions: sore, red, swelling (for up to 1 day after the COVID-19 vaccine) ^[10]	62 out of 100 people had injection site reactions	This does not apply because there was no injection.
People had symptoms: headache, fatigue, chills, joint pain, fever, diarrhea, muscle aches (for up to 1 week after the COVID-19 vaccine) ^[10]	52 out of 100 people had symptoms	This does not apply because there was no vaccine given.
Feeling unable to do usual daily or leisure activities (for up to 1 week after the COVID-19 vaccine) ^[10]	17 out of 100 people had limited activities after having the vaccine	This does not apply because there was no vaccine given.
Very few people had rare reactions after the COVID-19 vaccine ^[11,12]	Less than 2 out of 10,000 people had inflammation of the heart. 8 out of 1,000,000 people had Guillain-Barré syndrome after getting the COVID-19 vaccine	This does not apply because there was no vaccine given.



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4. What matters most to you?

Circle how much each reason matters **to you** on a scale from 0 to 5.

'0' means it is **not** important to you. '5' means it is **very** important to you.

Reasons to get the latest COVID-19 vaccine	Not Important					Very important				
I want to do whatever I can to protect myself against the current COVID-19 infection.	0	1	2	3	4	5				
I want to reduce my chances of getting a severe illness or hospital stay due to COVID-19 infection.	0	1	2	3	4	5				
I want to reduce my chances of getting long-COVID.	0	1	2	3	4	5				
I want to protect my family, friends, and/or community against the current COVID-19 infection.	0	1	2	3	4	5				
Other: (please specify)	0	1	2	3	4	5				
Reasons not to get the latest COVID-19 vaccine	Not Important					Very important				
I do not want to have the injection site reaction and more common reactions.	0	1	2	3	4	5				
I do not want to have a very rare reaction.	0	1	2	3	4	5				
I do not want to disrupt my usual activities due to potential reactions to the latest vaccine for up to 1 week.	0	1	2	3	4	5				
I do not want to get a needle.	0	1	2	3	4	5				
Other: (please specify)	0	1	2	3	4	5				

5. Which option do you prefer?

- ☐ I plan to get the latest COVID-19 vaccine.
- ☐ I do not plan to get the latest COVID-19 vaccine.
- ☐ I plan to discuss the options with _____ (pharmacist, doctor, public health, family).
- ☐ Other, please specify. _____

This information is not intended to replace the advice of a healthcare provider.

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Chapter 5

Integrated Discussion

The purpose of this chapter is to integrate and discuss the findings from the three dissertation studies and place them within the broader literature. First, I summarized the findings from my three studies. Then, I focused on three main points of discussion. Finally, I indicated the implications for nursing practice, education, and further research.

5.1 Summary of the Studies

In the first study, we conducted a secondary analysis of data collected from two sequential population-based surveys to determine the decisional needs and decision regret of people who reported the COVID-19 vaccination as a difficult decision (Chapter 2). The original surveys were conducted in spring 2021 and spring 2022 to determine difficult decisions and decisional needs during the previous year of the COVID-19 pandemic (Stacey et al., 2023). In both surveys, the decision about COVID-19 vaccination (primary series and booster doses) was identified as the most difficult decision, reported by 490 out of 1,454 participants (33.7%) in 2021 and 475 out of 1,718 participants (27.6%) in 2022. Our secondary analysis found that 236 out of 965 (24.5%) experienced clinically significant decisional conflict in both years. Three factors contributing to decisional conflict were being worried about choosing the ‘wrong’ option, difficulty separating fake news from scientific evidence, and being worried about getting COVID-19. Of those who made the COVID-19 vaccination decision (Year 1: 440/490, Year 2: 463/475), 283 (31.3%) reported having decision regret, which was significantly increased from Year 1 (23.9%) to Year 2 (38.4%) ($p < 0.001$). Younger (< 60 years of age)

and single participants were more likely to have clinically significant decisional conflict and clinically significant decision regret. Trust in Health Canada and provincial health departments significantly decreased in Year 2, while healthcare professionals remained the most trustworthy sources of information.

Concurrently, we conducted a systematic review to identify the decisional needs of older adults considering the COVID-19 booster vaccination (Chapter 3). This study was stimulated by evidence of unmet decisional needs in study 1 (Chapter 2), dropping vaccination rates, and the COVID-19 vaccination priority given to people aged 60 years and older in Canada. We identified 10 eligible studies conducted across seven countries, involving 8,759 participants aged 60 to 94 years, of whom 72.1% reported having at least one chronic condition. Across all studies, a median of 26.1% of older adults were hesitant about receiving booster vaccinations, indicating the existence of decision conflict. Other reported decisional needs included limited knowledge (about vaccine effectiveness, necessity, and safety) and having encountered misinformation. Personal values about avoiding side effects and ensuring the safety of the booster vaccination also influenced their decision. Other decisional needs were inadequate support and resources from healthcare authorities/government, healthcare professionals and family members. Personal characteristics that were associated with not getting the booster included having limited movement, being disabled and diagnosed with a chronic health condition. These findings provided details on the unmet decisional needs that could be addressed using decision support interventions.

In the third study, we co-developed and tested a patient decision aid (PtDA) to help Canadians 65 years and older decide whether or not to get the COVID-19 booster

vaccination (Chapter 4). For the co-development, I established a research team that included a patient in the target age group, a caregiver for older adults, behavioral implementation scientists, decision scientists, and disciplinary expertise in nursing and public health. We co-developed a two-page PtDA using the Ottawa Decision Support Framework (ODSF) PtDA template, evidence from clinical practice guidelines, and decisional needs identified in our previous studies (Chapters 2 and 3). Three iterative rounds of testing were conducted with 19 Canadians (14 older adults and 5 healthcare professionals). Feedback led to revisions that improved the clarity and readability of the PtDA content. In the final round, all participants agreed that the PtDA presented balanced information and would help them prepare for making the booster vaccination decision and would recommend it to others. The tool met all six International Patient Decision Aid Standards (IPDAS) defining criteria (Witteman et al., 2021) and had good scores for understandability (78.5%) and actionability (75%) using the Patient Education Materials Assessment Tool (PEMAT) (Shoemaker. et al., 2014; Vishnevetsky et al., 2018). The final version is publicly available in the international inventory of PtDAs (Ottawa Hospital Research Institute, 2023; Zhang et al., 2024). .

5.2 Discussion Within the Broader Literature

5.2.1 Unmet Decisional Needs Can Influence Subsequent COVID-19 Vaccinations

Adults considering COVID-19 vaccinations, whether primary series or booster, have decisional conflict, which leads to a delay in making decisions and decision regret. In the survey, one in four participants reported clinically significant decisional conflict, and the rate remained stable in the first two years (2020 to 2022) of the pandemic (Chapter 2). In the systematic review, a median of 26% of older adults had decisional conflict as

evidenced by vaccination hesitancy (2021 to 2024) (Chapter 3). These findings are consistent with other international studies. A study conducted in 23 countries, including Canada, reported high levels of vaccine hesitancy of the primary COVID-19 vaccinations, with global hesitancy rates of 24.8% in 2021 and 20.9% in 2022 (Lazarus et al., 2023; Lazarus et al., 2022). For booster doses, Canada ranked 5th highest in hesitancy with a rate of 17.6% (ranging from 1.1% in China to 28.9% in Russia) (Lazarus et al., 2023). The national-level systematic review found that the booster vaccine hesitancy rate in China was low (Lazarus et al., 2023). However, our systematic review focusing on older adults included four studies conducted in China, where the booster vaccine hesitancy rates ranged from 9.3% to 52.4% (Chan et al., 2023; Qin et al., 2022; Wang et al., 2022a; Wang et al., 2022b). The discrepancy might be because of the different age groups included. The Chinese survey included in the national systematic review focuses on adults aged 18 years and older, whereas our systematic review only focuses on older adults aged 60 years and older (Chapter 3). Although our Canadian survey found the younger age had higher decisional conflict, the decisional conflict still exists in older adults (Chapter 2). Also, vaccine hesitancy remained as the COVID-19 pandemic evolved and booster vaccination emerged. A review of Canadian hesitancy of COVID-19 booster doses found that between 2021 to 2023, the intention to get a booster dose in the general population decreased (Young et al., 2024). Also, in China, COVID-19 vaccine hesitancy for adults aged 18 years and older increased from 8.39% in 2021 to 29.72% in 2023 (Shen et al., 2024). Our Canadian survey documented persistent decisional conflict from 2020 to 2022 (Chapter 2). These results underscore that decisional conflict is not confined to a specific age demographic, and it is widespread and continuing.

Decisional conflict interferes with people making decisions about COVID-19 vaccinations. Previous research shows that people who have decisional conflict are 59 times more likely to waver, 23 times more likely to delay the decision, 5 times more likely to experience decision regret, and 3 times more likely to fail knowledge tests (Sun, 2005). Our survey of adults in Canada showed decision regret significantly increased in the second year of the pandemic and participants reported unmet decisional needs related to inadequate knowledge (Chapter 2). Although COVID-19 booster vaccinations are recommended for people aged 65 years and older in Canada, current coverage is 10.5%, which is a dramatic decrease from over 90% during the peak of the pandemic (Public Health Agency of Canada, 2024a). This is of particular concern given older adults have the highest risk of hospitalization, intensive care unit admission and death due to COVID-19 infection (Centers for Disease Control and Prevention, 2022; Schultz et al., 2023). It is not clear if older adults are currently making informed decisions or delaying the decision.

5.2.2 Too Much Versus Not Enough Information about the Booster Dose

Older adults face a paradox of “information overload” and “limited information” regarding the COVID-19 booster vaccination. Information overload (infodemic) refers to an overabundance of information, some accurate and some misleading, in digital and physical environments during a disease outbreak (Islam et al., 2020; World Health Organization, 2025). Findings from our Canadian survey in 2022 showed that one in four participants reported being overloaded with information about the booster vaccination (Chapter 2). Similarly, our systematic review found information overload eroded trust in authority and consequently led to booster vaccine hesitancy among older adults (Wu &

Brennan-Ing, 2023) (Chapter 3). During our co-development of the PtDA, we started with the four-page original template based on the ODSF (O'Connor et al., 2015).

Feedback from the steering group members indicated that it had too much content (Chapter 4). When we adapted the content into the two-page consult decision aid template based on the ODSF (Stacey et al., 2016), the steering group members and participants in the alpha testing reported that the information of the PtDA was about the right amount and helpful (Chapter 4).

Information overload creates an environment where misinformation can thrive. From 2012 to 2018, vaccination was the most widespread health-related misinformation on social media (Wang et al., 2019). The COVID-19 pandemic intensified this issue. A review of 2,322 COVID-19 social media reports in 25 languages from 87 countries found 89% of them were rumors (Islam et al., 2020). False claims—such as vaccines altering DNA, causing infertility, or containing microchips—have been widely circulated on social media (Islam et al., 2020). A systematic review of 45 studies found that the volume and spread of misinformation on social media had a negative effect on COVID-19 vaccine hesitancy and uptake (Skafle et al., 2022). Our Canadian survey also found that 35.2% of participants have difficulty separating fake news from real scientific evidence (Chapter 2). Being older has generally been associated with higher susceptibility to misinformation (Hu et al., 2024; Roozenbeek et al., 2020). Older adults are particularly vulnerable to information overload due to lower digital literacy and limited access to filtered health sources (Choukou et al., 2022). During booster rollouts, Canadian public health agencies released frequent guideline updates, detailed press conferences, and dense reports (Public Health Agency of Canada, 2023, 2024b, 2025). While well-intentioned,

the volume and frequency of messaging led to message fatigue about the booster dose (Zhao et al., 2024). Qualitative studies found that older Canadians were overwhelmed by the sheer quantity of information about COVID-19 that they received daily (Corsten et al., 2023; Vivion et al., 2024). This finding underscores the importance of balancing the frequency and clarity of public health messages to avoid information overload during the booster vaccination campaigns.

Despite the overload of information, older adults still report inadequate information about the COVID-19 booster vaccination. Our Canadian survey found that 12.5% of respondents have no or limited access to information (Chapter 2). Moreover, our systematic review found that older adults have limited information about the effectiveness, necessity, and safety of the booster dose (Chapter 3). A global literature review of 17 studies from eight countries found that a lack of safety information was one of the most common reasons for booster vaccine hesitancy (Shah & Coiado, 2023). In Canada, studies on the COVID-19 booster vaccination also highlighted the lack of scientific information regarding the booster's safety and efficacy (Cénat et al., 2023; Corsten et al., 2023; Leigh et al., 2024). Only 43% of Canadians (aged 50 years and older) have awareness of the current COVID-19 vaccine guideline (International Federation on Ageing, 2024). These findings highlight a persistent disconnect between public health recommendations and older adults' knowledge of the booster dose.

To address the dual challenge of “information overload” and “limited information,” a clear and direct focus on evidence-based information resources for older adults is needed. To co-develop a PtDA, our steering group used up-to-date government guidelines and published systematic reviews that only focus on older adults to ensure

targeted and evidence-based content (Chapter 4) (Public Health Agency of Canada, 2023). To ensure clarity and accessibility, the PtDA includes a clear comparison table to present the benefits and harms of getting versus not getting a booster dose. This approach to presenting balanced information is recommended by the International Patient Decision Aid Standards (IPDAS) (Martin et al., 2021). More specifically, IPDAS recommends PtDAs be developed to reduce cognitive burden by keeping information clear, simple and writing in plain language to help people make informed decisions (Muscat et al., 2021). Our PtDA is presented in plain language with a 7.1 Flesch Kincaid (7th grade), which is appropriate for general public materials (Paasche-Orlow et al., 2003).

5.2.3 Gaps in the Ottawa Decision Support Framework related to COVID-19

Vaccination Decisions

The ODSF is the only theoretical framework focused on decisional needs and the most commonly used for guiding PtDA development (Durand et al., 2008; Stacey et al., 2024; Stacey. et al., 2020). The hypothesis underlying this framework is that if decision support interventions are designed to address decisional needs, the population will achieve higher quality decisional outcomes and be more likely to implement the chosen option. To assist with operationalizing the ODSF, there is a coding manual with key elements of the ODSF and definitions (Hoefel et al., 2020). Based on the findings from the Canadian survey (Chapter 2) and the decisional needs systematic review (Chapter 3), the ODSF decisional need focused on “unclear values” could be expanded. The current ODSF defines “unclear values” as lacking clarity regarding desirability or personal importance of the characteristics of options (e.g., benefits, harms/risks, other outcomes or features) (Hoefel et al., 2020). However, this definition may overlook deeper belief-driven or emotion-

based values that influence decisions. In our survey and systematic review (Chapters 2 and 3), many participants expressed value-based concerns that were not unclear, but rather indicated strong personal beliefs that negatively influenced their decision and need further exploration of how it may have influenced their understanding. The personal values include worry/concern about the vaccine safety, effectiveness, and the process of receiving a booster dose. These personal values were shaped by prior experiences, social context, and evolving public health messaging. They indicated deliberate value conflicts and belief-driven skepticism, often rooted in fatigue or mistrust of information. When involving patients in decision making, their personal health beliefs and values are recognized as multifaceted and shaped by life experience and culture (Barratt, 2008; Kurasz et al., 2022). A systematic review on decisional needs of prenatal testing for Down syndrome modifies the “unclear values” to “personal values or beliefs” to more accurately reflect the underlying factors influencing decision-making (St-Jacques et al., 2008). Another umbrella review for young women considering contraceptive options revised the “unclear values” to “features of the contraception option that young women valued” to better conclude the decisional needs related to personal values (Bortoli et al., 2024). Older adults’ values in healthcare decision making are shaped by personal health beliefs (Kurasz et al., 2022). The category of “unclear values” in the ODSF appears to be insufficient to capture deliberate value conflicts or skepticism that arise not from lack of knowledge, but from distrust, fatigue, or deeply held personal convictions. The ODSF could be enhanced by adding personal health beliefs in the description of “unclear values” to further enrich the understanding of the influence of values on decision making.

Second, the ODSF includes “inadequate support and resources” as a category of decisional needs (Hoefel et al., 2020). However, it does not distinguish between simply lacking support or lacking trust in the sources of information resources. In fact, the concept of trust in the ODSF is limited to trust in the relationship with the practitioner and trust within the family relationships (Hoefel et al., 2020). During the COVID-19 booster rollout, people had access to information or advice from health agencies, online social media, healthcare providers and family members. However, those who doubted the trustworthiness of those information sources continued to have unmet decisional needs. Trust in the source of information is a key factor in vaccination decisions across the world (Jennings et al., 2023). It was not just what information people received, but whether they trusted the messenger. Our Canadian survey found a significant decrease in trust of information provided by Health Canada and provincial health authorities (Chapter 2). Another global study in 2023 revealed that “trust challenges remain” in public health communication, and the public's trust in official information sources is only moderate (Lazarus et al., 2023). This gap between the availability of support and the credibility of sources of information support can help explain why simply providing more information or recommendations did not always meet people’s decisional needs. The ODSF could be improved by enhancing the concept of trust in the support and resources.

We found that the rapid evolution of the COVID-19 vaccination evidence was challenging for the development of a PtDA following the ODSF eTraining module (O’Connor et al., 2015). During the pandemic, public health guidelines, vaccine formulations, eligibility criteria, and scientific evidence were continuously evolving and required an ongoing re-synthesis of evidence on the COVID-19 vaccination rather than a

one-time synthesis to inform PtDA development. For example, during our co-development of the PtDA process, we had to change our target audience from “adults (18 years and older)” to “adults (65 years and older)” due to the updated Public Health Agency of Canada policy that older adults were prioritized for the booster vaccination dose (Chapter 4). Since January 2025, the Public Health Agency of Canada has updated the COVID-19 booster recommendation for older adults from every six months to once a year (Public Health Agency of Canada, 2025). In response, we also updated the PtDA content based on this new recommendation to provide up-to-date and evidence based information. Concurrently, there was pressure to get the PtDA disseminated to support the public having difficulty making this decision. Previous research has shown that it was possible to rapidly develop and disseminate PtDAs when there was an experienced team with access to a well-tested PtDA template and synthesized evidence (Stacey et al., 2021). However, the last rapid development and dissemination was done on a decision topic of relatively stable evidence. Our study highlighted the need for “living” evidence synthesis to inform the PtDA in our rapidly changing context of the COVID-19 pandemic (Elliott et al., 2017). Adding this type of ‘living’ PtDA approach to the ODSF eTraining would ensure that the PtDA remains accurate and up-to-date in fast-changing contexts like the COVID-19 pandemic.

5.3 Implications for Nursing Practice, Education, and Further Research

As frontline healthcare providers during the COVID-19 pandemic, nurses played a key role in delivering direct patient care, supporting vulnerable populations (including older adults), and facilitating public health interventions (Jackson et al., 2020; Liu et al., 2020). These interventions included promoting mask use, tracking contacts for positive

cases, enforcing physical distancing measures, encouraging limited public gatherings and delivering vaccinations. Nurses were identified as being the centre of the COVID-19 vaccination program (Evans, 2021). This section discusses the implications of the dissertation findings for nursing practice, education, and further research (Table 5.1).

5.3.1 Nursing Practice

Nurses could identify and understand older adults' decisional needs about COVID-19 booster vaccinations. Within their role of facilitating public health interventions, nurses can monitor for vaccine hesitancy, assess knowledge of the public, clarify personal values and beliefs influencing vaccination decisions, and provide support and resources tailored to their decisional needs (Glenton et al., 2021). Within their various roles, nurses can monitor for vaccine hesitancy and initiate supportive dialogues during any encounter, whether in clinics, during home visits, or via community events. Studies have shown that interventions such as home visits, telephone calls, letters, postcards or text messages to communicate or educate are effective measures to help vulnerable groups, including older adults, take the COVID-19 vaccination (Norman et al., 2024).

Nurses could support older adults in making informed booster vaccination decisions by incorporating the PtDA developed in this dissertation with decision coaching. A decision coach is a trained healthcare provider, often nurses, who provide a non-directive, evidence-informed process that helps people clarify their values, understand available options, and prepare for active participation in healthcare decision making (Stacey et al., 2013; Zhao et al., 2022). Nurses can promote trust in the necessity and efficacy about the booster vaccination through open and supportive communication (Abdi et al., 2023; Agnew, 2022). Communication aids and evidence-based guidance are lacking for nurses

to support the conversation with the vaccine hesitant people (Cassidy et al., 2021).

Identified decisional needs and PtDA could facilitate nurses helping older adults make COVID-19 booster vaccination decision

Given nurses' public health roles within pandemics, they should recognize the dynamic public health situation that affects the decisional needs of people, including older adults. During COVID-19, public trust in Health Canada and provincial health departments declined, while healthcare professionals including nurses remains the most trustworthy sources of information for Canadian adults (Chapter 2). Nurses should stay informed about the emerging evidence and changing recommendations to provide up-to-date and evidence-informed information. This would enable them to adapt and deliver timely decision support to address the decisional needs of older adults.

5.3.2 Nursing Education

Findings from this dissertation highlight the implications for continuing education programs to enhance nurses' evidence-based knowledge about COVID-19 booster vaccination (e.g., options, benefits, side effects) and build their skills in recognizing and addressing the decisional needs of older adults. Furthermore, the findings indicate a need to strengthen nurses' skills in building trust relationships with patients, given that older adults felt inadequate support from healthcare professionals (Chapter 3). A realist review indicated the importance of a trusting relationship for health professionals, including nurses, who provide decision coaching (Zhao et al., 2022). A trusting relationship was also relevant in the peak of the COVID-19 pandemic, where misinformation was shown to increase older adults' mistrust of healthcare professionals (Perlis et al., 2024).

Nurses could be encouraged to enroll in effective programs to enhance their knowledge and skills in providing decision support. The online Ottawa Decision Support Tutorial offers evidence-based training that equips healthcare professionals to support patients in making informed, value-based health decisions (Boland et al., 2019). This study describing use of the training showed that nurses were the main professional group, accounting for 39% ($n=4276$) of completers. Furthermore, those who completed the tutorial had significantly improved knowledge of shared decision making and increased confidence in guiding others making decisions.

The dissertation also highlighted the need for enhancing nurses' ability to assess and respond to older adults' evolving decisional needs during dynamic situations of pandemics. Public health emergencies, like the COVID-19 pandemic, have frequent updates of recommendations (Public Health Agency of Canada, 2022, 2023, 2024b, 2024c). The rapid emergence of evidence requires flexible thinking and ongoing professional development for nurses. Nursing education needs to pay attention to the changing decision environments and changing educational needs of nurses to ensure they have the necessary knowledge and skills. Effective educational strategies include virtual simulations, case-based learning, online training modules, and team-based scenarios, which help improve nurses' responsiveness and communication during public health emergencies (Foronda et al., 2020; Orr et al., 2021; Turale et al., 2020).

5.3.3 Future Research

There are several areas for future research. First, future research should focus on determining efficient processes for the ongoing updating and dissemination of the COVID-19 booster vaccination PtDA for older adults. This includes timely checking and

integration of emerging evidence and following the update of public health recommendations about the booster vaccination for older adults. In Canada, the COVID-19 booster vaccination remains available, and the most recent recommendations from PHAC are that older adults (65 years and older) should receive a booster vaccination once per year (Public Health Agency of Canada, 2025). Although “living” systematic reviews have been created to monitor emerging evidence in rapidly evolving situations (Elliott et al., 2017), little is known about the use of “living” decision support interventions such as the COVID-19 booster vaccination PtDA. Ideally, the PtDA should be a ‘living’ document that is updated as vaccination guidelines and emerging scientific evidence, enabling both healthcare providers and patients to make timely, informed decisions.

Second, in future pandemics, it is essential to evaluate the decisional needs and decision regret of Canadian adults to inform the timely development of decision support interventions for difficult health decisions. In the example of booster vaccination decisions, it is also important to evaluate and reduce decision regret that negatively influences decisions about subsequent vaccinations. In this dissertation, research used two national surveys (Chapter 2) and a systematic review of 10 studies using qualitative, quantitative, and mixed methods (Chapter 3). However, there was no qualitative research done within this dissertation to develop a deeper understanding of the decisional needs beyond those reported in the systematic review. Research in future pandemics should consider more timely collection of qualitative and quantitative data to determine unmet decisional needs. For example, rather than waiting until the end of Year 1, they could be monitoring at the start of the pandemic.

Third, further research is required to validate the proposed updates to the ODSF with expanding unclear values to “personal values” and adding “trust” in the decisional needs coding manual. The proposal of a ‘living’ PtDA could also enhance the use of the ODSF in a dynamic decision environment in the future. To validate the proposed updates to the ODSF, a similar method to the validation of the Interprofessional Shared Decision-Making model can be applied (Légaré et al., 2011). First, qualitative interviews and focus groups could be conducted with key knowledge users, including healthcare professionals, medical and nursing educators and public health policy makers; patients and caregivers; and clinicians from primary health care teams who were either familiar or unfamiliar with the concepts of ODSF. Then, a theory appraisal questionnaire could be used to assess how well these new concepts are understood, perceived as relevant, and useful by the knowledge users. Next, thematic analysis of interview data could identify the common themes and differences in the knowledge users’ perspectives.

5.4 Conclusion

The COVID-19 booster vaccination remains a difficult decision for older people and current vaccination rates are low. Unmet decisional needs exist and could influence decisions about subsequent booster doses. The coexistence of both information overload and information gaps highlights the urgent need to establish quality evidence-informed information that is presented in ways that can facilitate older adults’ involvement in making COVID-19 vaccination decisions. The ODSF could be enhanced for pandemic-related decisional needs by expanding upon belief-driven values, trust in support and resources, and the influence of a dynamic decision-making environment.

Table 5.1: Implications for Nursing Practice, Education, and Future Research

Category	Implications
Nursing practice	• Help nurses identify and understand the unique decisional needs of older adults considering COVID-19 booster vaccination • Facilitate nurses to provide decision support interventions to help older adults making COVID-19 booster vaccination decision • Support nurses to recognize the dynamic public health situation that will be influencing older adults decisional needs and decision support interventions
Nursing education	• Enhance nurses' knowledge of COVID-19 vaccinations, older adults' decisional needs and effective decision support interventions • Strengthen nurses' skills in building trusting relationships with patients • Invest in training for nurses and other healthcare professionals on shared decision making and value-based communication to address decisional needs of people considering vaccinations during pandemic including specific tailoring required for older adults
Future research	• Determine efficient processes to continue to update and disseminate the COVID-19 vaccination PtDA for older adults • Identify the decisional needs and decision regret of Canadian adults during future pandemics so appropriate interventions can be developed to support them making difficult decisions • Co-develop and test a 'living' PtDA to address identified decisional needs of Canadian adults during pandemics • Explore creation of "living" decision support interventions that adapt to evolving vaccination guidelines and evidence • Validate the proposed changes to the ODSF: values-based, trust in support and resources, and livign PtDAs

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Appendix

Appendix I: Electronic Search Strategies for the Systematic Review

Database: Ovid MEDLINE (R) ALL <1946 to, October 28, 2024>

Step	Search Terms
1	exp COVID-19 Vaccines/
2	(vaccin* adj3 (COVID* or COVID 19* or COVID19* or "SARS CoV 2" or "SARS CoV2" or SARSCoV2 or "SARSCoV 2" or "coronavirus disease 2019" or nCoV 19)).tw,kf.
3	(vaxzevria* or AZD1222* or AZD 1222 or covishield* or ChAdOx1*).af. or AstraZeneca.tw,kf. or (oxford adj2 vaccin*).tw,kf.
4	(biontech* or pfizer*).tw,kf. or (comirnaty* or BNT162b2* or BNT 162b2* or tozinameran*).af.
5	(moderna* or spikevax* or mRNA 1273* or mRNA1273* or TAK 919* or TAK919* or modernatx*).af.
6	(JNJ 78436735* or JNJ78346735* or "Ad26.COV2.S*" or Ad26COVS1).af. or ("Johnsons&Johnson" or Janssen).tw,kf.
7	(coronaVac* or "corona Vac*" or sinovac* or "sino vac*" or PiCoVacc* or "PiCo Vacc*" or "vero adj1 cell?").af.
8	(gamaleya* or "Gam-COVID-Vac*" or rAd26* or "recombinant adenovirus type 26 vector" or rAd5* or "recombinant adenovirus type 5 vector" or "adenoviral vector5").af. or sputnik*.tw,kf.
9	or/1-8
10	immunization, secondary/
11	immunization schedule/
12	(third adj2 dos*).tw,kf.
13	(addition* adj2 dos*).tw,kf.
14	boost*.tw,kf.
15	or/10-14
16	Decision Making/
17	(factor* or enable* or barrier* or attitude* or decide or decision* or intent* or intend).tw,kf.
18	(value* or certain* or uncertain* or inform* or uninform* or support* or know* or satisf* or conflict or prefer*).tw,kf.
19	or/16-18
20	9 and 15 and 19
21	exp animals/ or related animal subject headings
22	exp humans/ or human subject headings
23	Exclude non-human studies: 20 not (animal set not human set)
24	Limit to publication years 2021–Current

Appendix II: Excluded Studies of the Systematic Review

First author	Year	Title
Participants < 60 years old (n=190)		
Abed, M.	2022	Cross-sectional study of the knowledge, perception and attitude of first-year university students in Iraq towards SARS-CoV-2 Omicron variant and COVID-19 vaccines
Abi Zeid, B.	2023	Predictors and barriers to vaccination among older Syrian refugees in Lebanon: a cross-sectional analysis of a multi-wave longitudinal study
Abouzeid, M.	2022	Attitudes toward Receiving COVID-19 Booster Dose in the Middle East and North Africa (MENA) Region: A Cross-Sectional Study of 3041 Fully Vaccinated Participants
Abuhammad, S.	2022	The attitude of fully vaccinated individuals towards COVID-19 vaccine booster dose: a transverse study from Jordan
Abuhammad, S.	2022	The public's attitude to and acceptance of periodic doses of the COVID-19 vaccine: A survey from Jordan
Abullais, S. S.	2022	Perceptions, motivation factors, and barriers to a COVID-19 booster immunization in a subpopulation of KSA: A cross-sectional study
Achrekar, G. C.	2022	Assessing COVID-19 Booster Hesitancy and Its Correlates: An Early Evidence from India
Alhasan, K.	2021	COVID-19 Delta Variant: Perceptions, Worries, and Vaccine-Booster Acceptability among Healthcare Workers
Al-Kassab-Cordova, A.	2023	Factors associated with not receiving the primary series and booster dose of the COVID-19 vaccine among Venezuelan migrants in Peru: A population-based cross-sectional study
Allen, K.	2022	Factors associated with COVID-19 booster vaccine willingness among migrants from the Eastern Mediterranean living in Australia: a cross-sectional study
Al-Mugheed, K.	2022	Acceptance, attitudes, and barriers of vaccine booster dose among nursing students: A multicounty survey
Alobaidi, S.	2022	Predictors of the Third (Booster) Dose of COVID-19 Vaccine Intention among the Healthcare Workers in Saudi Arabia: An Online Cross-Sectional Survey
Al-Qerem, W.	2022	Willingness of the Jordanian Population to Receive a COVID-19 Booster Dose: A Cross-Sectional Study
Al-Qerem, W.	2022	Knowledge, Attitudes, and Practices of Adult Iraqi Population Towards COVID-19 Booster Dose: A Cross-Sectional Study

COVID-19 Booster Vaccination Decision Support

First author	Year	Title
Alshahrani, N. Z.	2022	Uptake of COVID-19 Booster Dose among Saudi Arabian Population
Arham, A. F.	2022	Dataset on Young People's Intention Towards Covid-19 Booster Vaccines in Malaysia
Arshad, M. S.	2022	COVID-19 Vaccine Booster Hesitancy (VBH) among Healthcare Professionals of Pakistan, a Nationwide Survey
Attia, S.	2022	Prevalence and Drivers of COVID-19 Vaccine Booster Hesitancy Among German University Students and Employees
Babicki, M.	2022	Attitudes of Poles towards the COVID-19 Vaccine Booster Dose: An Online Survey in Poland
Barattucci, M.	2022	Trust in Science as a Possible Mediator between Different Antecedents and COVID-19 Booster Vaccination Intention: An Integration of Health Belief Model (HBM) and Theory of Planned Behavior (TPB)
Barnes, K.	2022	Drivers of the Intention to Receive a COVID-19 Booster Vaccine: Insights from the UK and Australia
Barnes, K.	2022	The impact of side effect framing on COVID-19 booster vaccine intentions in an Australian sample
Ben-David, B. M.	2022	Vaccine and Psychological Booster: Factors Associated with Older Adults' Compliance to the Booster COVID-19 Vaccine in Israel
Bennett, N. G.	2022	Factors underlying COVID-19 vaccine and booster hesitancy and refusal, and incentivizing vaccine adoption
Burrowes, S. A. B.	2022	Healthcare workers' perspectives on the COVID-19 vaccine and boosters for themselves, their patients, and their communities: a mixed methods study
Chamon, Q.	2022	Persistence of Vaccine Hesitancy and Acceptance of the EU Covid Certificate Among French Students
Chang, C. T.	2022	Preferences and willingness of accepting COVID-19 vaccine booster: Results from a middle-income country
Chen, L.	2023	The association between adverse events of COVID-19 vaccination and anxiety and willingness to receive a booster dose
Chrissian, A. A.	2022	Impact of COVID-19 vaccine-associated side effects on health care worker absenteeism and future booster vaccination
Corea, F.	2022	The Impact of COVID-19 Vaccination in Changing the Adherence to Preventive Measures: Evidence from Italy

COVID-19 Booster Vaccination Decision Support

First author	Year	Title
Cuschieri, S.	2023	A cross-sectional study exploring the Covid-19 vaccination landscape in Malta through social media: An insight into experiences, attitudes, and perspectives
De Giorgio, A.	2022	Willingness to Receive COVID-19 Booster Vaccine: Associations between Green-Pass, Social Media Information, Anti-Vax Beliefs, and Emotional Balance
Della Polla, G.	2022	Willingness to accept a second COVID-19 vaccination booster dose among healthcare workers in Italy
Della Polla, G.	2023	Bivalent second booster dose of the COVID-19 vaccine: Eligible populations' reasons for receiving in Italy
Deng, X.	2023	Assessing COVID-19 Vaccine Booster Hesitancy Using the Modified 5C Scale in Zhejiang Province, China: A Cross-Sectional Study
Dziedzic, A.	2022	COVID-19 vaccine booster hesitancy (VBH) of healthcare professionals and students in Poland: Cross-sectional survey-based study
Farah, W.	2023	Who is getting boosted? Disparities in COVID-19 vaccine booster uptake among health care workers
Farhat, M.	2022	Study of the Side Effects of Pfizer and Oxford COVID-19 Vaccines in the Eastern Province of Saudi Arabia
Folcarelli, L.	2022	Intention to Receive the COVID-19 Vaccine Booster Dose in a University Community in Italy
Galanis, P.	2022	COVID-19-Related Burnout and Intention of Fully Vaccinated Individuals to Get a Booster Dose: The Mediating Role of Resilience
Galanis, P.	2022	Predictors of second COVID-19 booster dose or new COVID-19 vaccine hesitancy among nurses: a cross-sectional study
Galanis, P.	2022	Predictors of Willingness of the General Public to Receive a Second COVID-19 Booster Dose or a New COVID-19 Vaccine: A Cross-Sectional Study in Greece
Gao, W.	2022	Identifying conditions for a third dose intention of COVID-19 vaccination in college students: A fuzzy-set qualitative comparative analysis
Geers, A. L.	2022	Do Side Effects to the Primary COVID-19 Vaccine Reduce Intentions for a COVID-19 Vaccine Booster?
George, G.	2022	South African University Staff and Students' Perspectives, Preferences, and Drivers of Hesitancy Regarding COVID-19 Vaccines: A Multi-Methods Study
Ghazy, R. M.	2022	Acceptance of COVID-19 Vaccine Booster Doses Using the Health Belief Model: A Cross-Sectional Study in Low-Middle- and High-Income Countries of the East Mediterranean Region

COVID-19 Booster Vaccination Decision Support

First author	Year	Title
Gu, F.	2023	Future COVID-19 Booster Vaccine Refusal in Healthcare Workers after a Massive Breakthrough Infection Wave, a Nationwide Survey-Based Study
Hao, Feng	2022	Multilevel determinants on COVID-19 booster intention among Americans
Harapan, H.	2022	Drivers of and Barriers to COVID-19 Vaccine Booster Dose Acceptance in Indonesia
Harapan, H.	2022	Willingness to Pay (WTP) for COVID-19 Vaccine Booster Dose and Its Determinants in Indonesia
Hu, D.	2022	Exploring the Willingness of the COVID-19 Vaccine Booster Shots in China Using the Health Belief Model: Web-Based Online Cross-Sectional Study
Hu, T.	2022	An Analysis of the Willingness to the COVID-19 Vaccine Booster Shots among Urban Employees: Evidence from a Megacity H in Eastern China
Huang, C. Y.	2022	The Willingness of Elderly Taiwanese Individuals to Accept COVID-19 Vaccines after the First Local Outbreak
Huang, M.	2023	COVID-19 vaccine booster dose hesitancy among key groups: A cross-sectional study
Huang, W.	2022	COVID-19 Vaccine Attitudes among a Majority Black Sample in the Southern US: Public Health Implications from a Qualitative Study
Huizi Lim, E.	2023	Factors of COVID-19 Vaccine Perception among Transport Drivers in Singapore: A Cross-Sectional Pilot Study
Jairoun, A. A.	2022	Assessing public knowledge, attitudes and determinants of third COVID-19 vaccine booster dose acceptance: current scenario and future perspectives
Jiang, N.	2022	Changes of COVID-19 Knowledge, Attitudes, Practices and Vaccination Willingness Among Residents in Jinan, China
Khan, M. S. R.	2022	Hesitancy towards the Third Dose of COVID-19 Vaccine among the Younger Generation in Japan
Kleitman, S.	2023	The Psychology of COVID-19 Booster Hesitancy, Acceptance and Resistance in Australia
Klugar, M.	2021	COVID-19 Vaccine Booster Hesitancy (VBH) of Healthcare Workers in Czechia: National Cross-Sectional Study
Koh, S. W. C.	2022	COVID-19 Vaccine Booster Hesitancy among Healthcare Workers: A Retrospective Observational Study in Singapore
Kunno, J.	2022	The Relationship between Attitudes and Satisfaction Concerning the COVID-19 Vaccine and Vaccine Boosters in Urban Bangkok, Thailand: A Cross-Sectional Study

COVID-19 Booster Vaccination Decision Support

First author	Year	Title
Kunno, J.	2022	Satisfaction with COVID-19 Vaccines in Health Care Workers and the General Population: A Cross-Sectional Study in Urban Bangkok, Thailand
Kwok, K. O.	2022	The way forward to achieve high COVID-19 vaccination and revaccination coverage in a city amid a period of tranquility
Lai, X.	2021	Public perceptions and acceptance of covid-19 booster vaccination in china: A cross-sectional study
Lee, K. W.	2023	COVID-19 Vaccine Booster Hesitancy in Malaysia: A Web-Based Cross-Sectional Study
Lee, R. C.	2022	COVID-19 booster vaccine attitudes and behaviors among university students and staff in the United States: The USC Trojan pandemic research Initiative
Li, X. A.	2023	Information-Seeking Behavior for COVID-19 Boosters in China: A Cross-Sectional Survey
Lin, C.	2023	Vaccinated Yet Booster-Hesitant: Perspectives from Boosted, Non-Boosted, and Unvaccinated Individuals
Lin, Y.	2022	Multi-dimensional psychosocial factors influencing the willingness to receive a COVID-19 vaccine booster: A survey among the public in Mainland China
Liu, J.	2022	What Motivates People to Receive Continuous COVID-19 Vaccine Booster Shots? An Expectation Confirmation Theory Perspective
Long, S.	2022	Changes of factors associated with vaccine hesitancy in Chinese residents: A qualitative study
Lounis, M.	2022	COVID-19 Vaccine Booster Hesitancy (VBH) and Its Drivers in Algeria: National Cross-Sectional Survey-Based Study
Lubad, M. A.	2023	Willingness of Healthcare Workers to Recommend or Receive a Third COVID-19 Vaccine Dose: A Cross-Sectional Study from Jordan
Luo, C.	2022	COVID-19 Vaccination in China: Adverse Effects and Its Impact on Health Care Working Decisions on Booster Dose
Luo, C.	2022	Post-vaccination adverse reactions, decision regret, and willingness to pay for the booster dose of COVID-19 vaccine among healthcare workers: A mediation analysis
Machida, M.	2022	Individual-level social capital and COVID-19 vaccine hesitancy in Japan: a cross-sectional study
Maria, S.	2022	COVID-19 Booster Vaccine Intention by Health Care Workers in Jakarta, Indonesia: Using the Extended Model of Health Behavior Theories
Miao, Y.	2022	The Psychological Experience of COVID-19 Vaccination and Its Impact on the Willingness to Receive Booster Vaccines among the Chinese Population: Evidence from a National Cross-Sectional Study

COVID-19 Booster Vaccination Decision Support

First author	Year	Title
Moeed, A.	2022	Willingness and Perceptions Regarding COVID-19 Vaccine Booster Dose in Pakistani Vaccinated Population: A Cross-Sectional Survey
Monfared, I. G.	2022	The connection between COVID-19 vaccine abundance, vaccination coverage, and public trust in government across the globe
Motta, M.	2022	The Correlates & Public Health Consequences of Prospective Vaccine Hesitancy among Individuals Who Received COVID-19 Vaccine Boosters in the U.S
Neely, S. R.	2022	Receptiveness of American adults to COVID-19 vaccine boosters: A survey analysis
Noh, Y.	2022	Predictors of COVID-19 booster vaccine hesitancy among fully vaccinated adults in Korea: a nationwide cross-sectional survey
Orellana, D.	2023	Psychosocial factors associated with the intention to get a COVID-19 booster vaccine: evidence from a low-income country
Ouni, P. D.	2023	COVID-19 vaccine hesitancy among health workers in rural Uganda: A mixed methods study
Pal, S.	2021	COVID-19 Vaccine Hesitancy and Attitude toward Booster Doses among US Healthcare Workers
Pan, S. J.	2022	Willingness to pay for booster dose of COVID-19 vaccine among healthcare workers in Taizhou, China
Paridans, M.	2022	The Dynamic Relationship between the Intention and Final Decision for the COVID-19 Booster: A Study among Students and Staff at the University of Liege, Belgium
Paris, C.	2022	Determinants of the willingness to get the third COVID-19 vaccine dose among health care workers
Paudel, K.	2023	Knowledge and attitude toward COVID-19 booster dose among health care professionals in Nepal: a cross-sectional study
Paul, E.	2021	Predictors of uncertainty and unwillingness to receive the COVID-19 booster vaccine: an observational study of 22,139 fully vaccinated adults in the UK
Peruch, M.	2022	Did Italy Really Need Compulsory Vaccination against COVID-19 for Healthcare Workers? Results of a Survey in a Centre for Maternal and Child Health
Purvis, R. S.	2023	Factors Associated with Marshallese and Hispanic Adults' Willingness to Receive a COVID-19 Booster Dose
Rababa'h, A. M.	2021	Jordanians' willingness to receive heterologous prime-boost COVID-19 vaccination and vaccine boosters
Ramamurthy, S.	2023	Knowledge, attitude, practice, and acceptability towards COVID-19 vaccination among medical professionals in Puducherry - A cross-sectional study

COVID-19 Booster Vaccination Decision Support

First author	Year	Title
Raman, S.	2022	COVID-19 booster uptake among US adults: Assessing the impact of vaccine attributes, incentives, and context in a choice-based experiment
Ramot, S.	2023	Attitudes of Healthcare Workers in Israel towards the Fourth Dose of COVID-19 Vaccine
Raut, A.	2023	Acceptance, hesitancy and refusal towards COVID-19 vaccination
Rehman, S.	2022	Uptake of COVID-19 booster shot among healthcare workers: A mediation analysis approach
Reifferscheid, L.	2022	Transition to endemic: acceptance of additional COVID-19 vaccine doses among Canadian adults in a national cross-sectional survey
Roy, D. N.	2023	Multi-dimensional potential factors influencing COVID-19 vaccine booster acceptance and hesitancy among university academic community in Bangladesh: A cross-sectional comparative study
Ryalat, S.	2022	Attitudes towards COVID-19 Booster Vaccines, Vaccine Preferences, Child Immunization, and Recent Issues in Vaccination among University Students in Jordan
Rzymiski, P.	2021	Willingness to Receive the Booster COVID-19 Vaccine Dose in Poland
Shao, H.	2023	Willingness of college students to receive COVID-19 heterologous vaccination in Taizhou, China
Sinclair, A. H.	2023	Reasons for Receiving or Not Receiving Bivalent COVID-19 Booster Vaccinations Among Adults - United States, November 1-December 10, 2022
Sonderskov, K. M.	2021	COVID-19 booster vaccine willingness
Steffens, M. S.	2023	Testing persuasive messages about booster doses of COVID-19 vaccines on intention to vaccinate in Australian adults: A randomised controlled trial
Stevens, C. W.	2023	Breakthrough infections and acceptance of COVID-19 vaccine boosters: A survey analysis
Storoph, R. P.	2023	Willingness to receive COVID-19 booster dose and its associated factors in Ghana: A cross-sectional study
Sugawara, N.	2021	Attitudes of medical students toward COVID-19 vaccination: Who is willing to receive a third dose of the vaccine?
Sun, Y.	2022	Will People Accept a Third Booster Dose of the COVID-19 Vaccine? A Cross-Sectional Study in China
Tan, K. Y. K.	2022	Determining the Prevalence and Correlates of COVID-19 Booster Vaccine Hesitancy in the Singapore Population Following the Completion of the Primary Vaccination Series

COVID-19 Booster Vaccination Decision Support

First author	Year	Title
Thaivalappil, A.	2022	A qualitative study exploring healthcare providers' and trainees' barriers to COVID-19 and influenza vaccine uptake
Tian, C. Y.	2023	Associations between Health Literacy, Trust, and COVID-19 Vaccine Hesitancy: The Case of Hong Kong
Tokiya, M.	2022	Acceptance of Booster COVID-19 Vaccine and Its Association with Components of Vaccination Readiness in the General Population: A Cross-Sectional Survey for Starting Booster Dose in Japan
Toro-Ascuy, D.	2022	Factors Influencing the Acceptance of COVID-19 Vaccines in a Country with a High Vaccination Rate
Tran, B. X.	2023	Preference and Willingness to Pay for the Regular COVID-19 Booster Shot in the Vietnamese Population: Theory-Driven Discrete Choice Experiment
Tung, T. H.	2022	Willingness-to-pay for a booster dose of inactivated SARS-CoV-2 vaccine in Taizhou, China
Umer, A.	2022	COVID-19 Vaccine Hesitancy Among Health care Workers and Medical Students
van Bilsen, C. J. A.	2023	Differences in non-positive intention to accept the COVID-19 booster vaccine between three countries in the cross-border region Meuse-Rhine Euroregion: The Netherlands, Belgium, and Germany
Vellappally, S.	2022	Perception of COVID-19 Booster Dose Vaccine among Healthcare Workers in India and Saudi Arabia
Wang, R.	2022	The association between social media use and hesitancy toward COVID-19 vaccine booster shots in China: A web-based cross-sectional survey
Wang, X.	2022	Willingness of the General Public to Receive A COVID-19 Vaccine Booster - China, April-May 2021
Weitzer, J.	2022	Willingness to receive an annual COVID-19 booster vaccine in the German-speaking D-A-CH region in Europe: A cross-sectional study
Williams, L.	2022	Barriers and facilitators to the future uptake of regular COVID-19 booster vaccinations among young adults in the UK
Wirawan, G. B. S.	2022	Health Beliefs and Socioeconomic Determinants of COVID-19 Booster Vaccine Acceptance: An Indonesian Cross-Sectional Study
Wong, L. P.	2022	Intention to receive a COVID-19 vaccine booster dose and associated factors in Malaysia
Wu, J.	2023	The pattern from the first three rounds of vaccination: declining vaccination rates
Wu, J.	2021	COVID-19 Vaccine Hesitancy Among Chinese Population: A Large-Scale National Study

COVID-19 Booster Vaccination Decision Support

First author	Year	Title
Yadete, T.	2021	Assessing acceptability of covid-19 vaccine booster dose among adult americans: A cross-sectional study
Ye, X.	2023	Effects of Negative Attitudes towards Vaccination in General and Trust in Government on Uptake of a Booster Dose of COVID-19 Vaccine and the Moderating Role of Psychological Reactance: An Observational Prospective Cohort Study in Hong Kong
Yoshida, M.	2022	Factors Associated with COVID-19 Vaccine Booster Hesitancy: A Retrospective Cohort Study, Fukushima Vaccination Community Survey
Zhang, K.	2022	Behavioral Intention to Get a Booster Dose of COVID-19 Vaccine among Chinese Factory Workers
Zhang, M.	2023	Status of and perspectives on COVID-19 vaccination after lifting of the dynamic zero-COVID policy in China
Zhang, R.	2023	Policy Endorsement and Booster Shot: Exploring Politicized Determinants for Acceptance of a Third Dose of COVID-19 Vaccine in China
Zhang, X. R.	2023	The coverage of SARS-CoV-2 vaccination and the willingness to receive the SARS-CoV-2 variant vaccine among employees in China
Zhou, H. J.	2022	Willingness to pay for and willingness to vaccinate with the COVID-19 vaccine booster dose in China
Zhu, P.	2023	Examining an Altruism-Eliciting Video Intervention to Increase COVID-19 Vaccine Intentions in Younger Adults: A Qualitative Assessment Using the Realistic Evaluation Framework
Lee, Yubin	2023	Factors Affecting the Public Intention to Repeat the COVID-19 Vaccination: Implications for Vaccine Communication.
Miraglia del Giudice G.	2023	Investigating the Reasons for Receiving the Second Booster Dose of the COVID-19 Vaccine in Adults and in People with Chronic Medical Conditions in Southern Italy
Songthap, Archin	2024	Factors influencing the third COVID-19 vaccine booster dose acceptance among older adults in northern Thailand.
Totzkay, Dan	2024	Healthcare provider Communication and Data-Informed Message Strategies for Encouraging Older Adults to Stay up to Date on COVID-19 Vaccination.
Carnalla, Martha	2024	Who is getting COVID-19 boosters? A latent class analysis in a nationally representative sample of Mexican adults 60 years and over.
van Roekel, Caren	2024	Factors associated with COVID-19 autumn 2022 booster uptake in the Netherlands among older adults aged ≥ 60 years and younger adults with chronic conditions.

COVID-19 Booster Vaccination Decision Support

First author	Year	Title
Wei, Lu	2023	COVID-19 vaccination coverage and its cognitive determinants among older adults in Shanghai, China, during the COVID-19 epidemic.
Viskupic, Filip	2023	Trust in physicians predicts COVID-19 booster uptake among older adults: Evidence from a panel survey.
Shirama A.	2024	Factors Associated with COVID-19 Vaccination Hesitancy and Most Frequently Vaccinated Status in a Japanese Population-Based Sample
Camacho-Neciosup R.	2024	Factors associated with intention to be vaccinated with the COVID-19 booster dose: a cross-sectional study in Peru
Bouloukaki I.	2024	The Prevalence and Determinants of Hesitancy for Regular COVID-19 Vaccination among Primary Healthcare Patients with Asthma or COPD in Greece: A Cross-Sectional Study
Houle S.K.D.	2024	Co-Administration of Influenza and COVID-19 Vaccines: A Cross-Sectional Survey of Canadian Adults' Knowledge, Attitudes, and Beliefs
Neely S.R.	2024	Belief in misinformation and acceptance of COVID-19 vaccine boosters: A survey analysis
Guo Z.	2024	Young adults' intention to encourage COVID-19 vaccination among their grandparents: A nationwide cross-sectional survey of college students in China
Corsten C.	2023	Understanding COVID-19 vaccine hesitancy in Canada
Al-Taie A.	2023	Exploring the intention and hesitancy to receive a booster dose of COVID-19 vaccine among patients with comorbid disease conditions using a health belief model
Dominguez-Ramirez L.	2023	Age and Comorbidities as Risk Factors for Severe COVID-19 in Mexico, before, during and after Massive Vaccination
Nair P.K.	2023	Postvaccination breakthrough SARS-CoV-2 infections among adults in Malaysia and attitudes towards future vaccination
Sepehrian E.	2023	The relationship between risk communication and willingness to receive booster doses of covid-19 vaccines
NeJhaddadgar N.	2023	Investigation of the influencing factors with the uptake of the COVID-19 vaccine booster dose among the general population of Ardabil, Iran: A cross-sectional study
Storph R.P.	2023	Willingness to receive COVID-19 booster dose and its associated factors in Ghana: A cross-sectional study
Lee K.W.	2023	COVID-19 Vaccine Booster Hesitancy in Malaysia: A Web-Based Cross-Sectional Study
Galanis P.	2023	COVID-19-Related Burnout and Intention of Fully Vaccinated Individuals to Get a Booster Dose: The Mediating Role of Resilience

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First author	Year	Title
Wu, Shishi	2024	Protection of prior SARS-CoV-2 infection, COVID-19 boosters, and hybrid immunity against Omicron severe illness: A population-based cohort study of five million residents in Canada.
Roy, Debendra Nath	2023	Acceptance of COVID-19 vaccine booster dose among the people of Bangladesh: A cross-sectional study.
Yang, Meng	2024	Pandemic Fatigue and Preferences for COVID-19 Public Health and Social Measures in China: Nationwide Discrete Choice Experiment.
Yang, Bo	2024	COVID-19 Vaccines #ForYou: Analyzing COVID-19 Vaccine Videos on TikTok During the Early Phase of the Vaccine Rollout in the U.S.
Gupta, Shibaji	2024	Perception and Acceptance of the Newly Introduced COVID-19 Precaution (THIRD) Vaccination Dose among Health Workers at an Indian Medical College.
Zhao, Xiaoquan	2024	Message Fatigue and COVID-19 Vaccine Booster Uptake in the United States.
Ventonen, Milja	2024	Predicting the intention to receive the COVID-19 booster vaccine based on the health belief model.
Aggarwal, Sumit	2024	COVID-19 vaccine hesitancy among adults in India: A primary study based on health behavior theories and 5C psychological antecedents model.
Marini, Marco	2024	I want to be safe: understanding the main drivers behind vaccination choice throughout the pandemic.
Kotronia, Eftychia	2023	Willingness to vaccinate among adults, and factors associated with vaccine acceptance of COVID-19 vaccines in a nationwide study in Poland between March 2021 and April 2022.
Pavela, Gregory	2024	Using behavioral theory to understand partisan differences in COVID-19 vaccination and booster intentions.
Leigh, Jeanna Parsons	2024	Factors affecting hesitancy toward COVID-19 vaccine booster doses in Canada: a cross-national survey.
Dionne, Maude	2024	Change in intention and hesitancy regarding COVID-19 vaccines in a cohort of adults in Quebec during the pandemic.
Mubarak, Sawsan	2023	Assessing the acceptability of COVID-19 vaccine and its booster dose.
Fasehun, Oyinlola O	2024	COVID-19 Vaccination Rates and Predictors of Vaccine Uptake Among Adults with Chronic Obstructive Pulmonary Disease: Insights From the 2022 National Health Interview Survey.

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First author	Year	Title
Orangi, Stacey	2024	A qualitative inquiry on drivers of COVID-19 vaccine hesitancy among adults in Kenya.
Rola, K. Debora	2023	Knowledge is an important aspect of COVID-19 vaccine hesitancy.
Andrejko, K. L.	2023	Receipt of COVID-19 and seasonal influenza vaccines in California (USA) during the 2021-2022 influenza season
Chu, Dinh-Toi	2022	Willingness to receive covid-19 vaccine booster doses for adults and their children in vietnam
Qin, C.	2022	Association Between Risk Perception and Acceptance for a Booster Dose of COVID-19 Vaccine to Children Among Child Caregivers in China
Tan, C. M.	2022	Improving vaccination intent among skeptics through confidence in governments' handling of the COVID-19 pandemic
Zhou, Y.	2023	Parents' willingness to vaccinate themselves and their children with the booster vaccine against SARS-CoV-2: A cross-sectional study in Puyang city, China.
Freeman, Esther E	2024	The impact of COVID-19 vaccine reactions on secondary vaccine hesitancy
Krasner H.	2024	Community Level Correlates of COVID-19 Booster Vaccine Hesitancy in the United States: A Cross-Sectional Analysis
Paulus, Kirsten	2024	Using cluster analysis to explore COVID-19 vaccine booster hesitancy by levels of medical mistrust in fully vaccinated US adults
Takamatsu, A	2023	Factors associated with COVID-19 booster vaccine hesitancy: a nationwide, cross-sectional survey in Japan.
Frankenthal, D.	2022	COVID-19 vaccine hesitancy among Israeli adults before and after vaccines' availability: A cross-sectional national survey
Review, comment, letter (n=32)		
Abdelmoneim , S. A.	2022	COVID-19 Vaccine Booster Dose Acceptance: Systematic Review and Meta-Analysis
Ackah, M.	2022	COVID-19 vaccine acceptance among health care workers in Africa: A systematic review and meta-analysis
Alrabadi, N.	2022	COVID-19 Vaccination Hesitancy: A Review of the Literature and Recommendations
Ayyalasomay	2023	A Systematic Review on Sociodemographic, Financial and Psychological Factors Associated with

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First author	Year	Title
ajula, S.		COVID-19 Vaccine Booster Hesitancy among Adult Population
Ayyalasomayajula, S.	2023	A Systematic Review on Sociodemographic, Financial and Psychological Factors Associated with COVID-19 Vaccine Booster Hesitancy among Adult Population
Barello, S.	2023	Looking inside the 'black box' of vaccine hesitancy: Unlocking the effect of psychological attitudes and beliefs on COVID-19 vaccine acceptance and implications for public health communication
Batteux, E.	2022	The Effectiveness of Interventions for Increasing COVID-19 Vaccine Uptake: A Systematic Review
Dropkin, G.	2022	Variation in English Covid booster uptake
Galanis, P.	2022	First COVID-19 Booster Dose in the General Population: A Systematic Review and Meta-Analysis of Willingness and Its Predictors
Hamna, S.	2022	Personal Beliefs and Attitudes of Covid-19 Infected People with About The covid-19 Vaccination
Hong, S. A.	2023	COVID-19 vaccine communication and advocacy strategy: a social marketing campaign for increasing COVID-19 vaccine uptake in South Korea
Hubert, J.	2022	Intent and hesitancy about the COVID-19 booster vaccination in NYC
Kherabi, Y.	2021	COVID-19 vaccine boosters: What do we know so far?
Lazarus, J. V.	2023	A survey of COVID-19 vaccine acceptance across 23 countries in 2022
Limbu, Y. B.	2023	Why Some People Are Hesitant to Receive COVID-19 Boosters: A Systematic Review
Murewanhemba, G.	2022	Hesitancy, ignorance or uncertainty? The need for effective communication strategies as Zimbabwe's uptake of COVID-19 vaccine booster doses remains poor
Ndishimye, P.	2023	COVID-19 vaccination coverage and linkages with public willingness to receive vaccination prior to vaccine roll-out: Evidence from Rwanda
Schaenman, J.	2023	Cowpox to COVID: History of vaccination in the immunocompromised host
Shah, A.	2022	COVID-19 vaccine and booster hesitation around the world: A literature review
Shah, A.	2023	COVID-19 vaccine and booster hesitation around the world: A literature review
Stone, T. D.	2023	Intentions for uptake of the coronavirus disease 2019 (COVID-19) vaccine booster in healthcare workers
Tzenios, N.	2023	Combining Influenza and COVID-19 Booster Vaccination Strategy to Improve Vaccination Uptake Necessary for Managing the Health Pandemic: A Systematic Review and Meta-Analysis
Viswanath,	2021	Coronavirus disease 2019 vaccination drive: The perceptions and acceptance of vaccination

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First author	Year	Title
K.		among health care workers
Roy D.N.	2024	Global disparities in COVID-19 vaccine booster dose (VBD) acceptance and hesitancy: An updated narrative review
Shah A.	2023	COVID-19 vaccine and booster hesitation around the world: A literature review
Young, Kaitlin M	2024	Evidence brief on facilitators, barriers and hesitancy of COVID-19 booster doses in Canada.
Liao, Qiuyan	2024	Motivators and Demotivators for COVID-19 Vaccination Based on Co-Occurrence Networks of Verbal Reasons for Vaccination Acceptance and Resistance: Repetitive Cross-Sectional Surveys and Network Analysis.
McKinley, Christopher J	2024	Promoter or barrier? Assessing how social media predicts Covid-19 vaccine acceptance and hesitancy: A systematic review of primary series and booster vaccine investigations.
McCartney, Peter R	2023	Covid-19 boosters: improving patient information leaflets.
Bian, Junye	2023	College students' influence on COVID-19 vaccination uptake among seniors in China: a protocol of combined cross-sectional and experimental study.
Josiah, Blessing Osagumwendia	2023	Efficacy, safety, and public attitude toward COVID-19 vaccines: A systematic review
Ratnayake, Aneeka	2023	COVID-19 vaccine effectiveness, hesitancy, incentives, and mandates in the deep south
Primary series (n=58)		
Alam, M. D.	2022	Psychological effects and associated factors among vaccinated and unvaccinated general population against COVID-19 infection in Bangladesh
AlHefdhhi, H. A.	2023	COVID-19 Vaccine Uptake and Hesitancy among Pregnant and Lactating Women in Saudi Arabia
Attwell, K.	2022	Western Australian health care workers' views on mandatory COVID-19 vaccination for the workplace
Attwell, K.	2022	Western Australian health care workers' views on mandatory COVID-19 vaccination for the workplace
Bennett, M.	2022	Attitudes and personal beliefs about the COVID-19 vaccine among people with COVID-19: a

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First author	Year	Title
M.		mixed-methods analysis
Boing, A. F.	2023	Uncovering inequities in Covid-19 vaccine coverage for adults and elderly in Brazil: A multilevel study of 2021-2022 data
Capurro, G.	2022	When good messages go wrong: Perspectives on COVID-19 vaccines and vaccine communication from generally vaccine accepting individuals in Canada
Carlson, S. J.	2022	'Corona is coming': COVID-19 vaccination perspectives and experiences amongst Culturally and Linguistically Diverse West Australians
Cartanya-Hueso, A.	2022	Relationship between double COVID-19 vaccine uptake and trust in effectiveness and safety of vaccination in general in 23 Member states of the European Union: an ecological study
Chen, S.	2023	Understand Delegates Risk Attitudes and Behaviour: The Moderating Effect of Trust in COVID-19 Vaccination
Dextre-Vilchez, S. A.	2022	Factors associated with COVID-19 vaccination in medical students from a Peruvian university. [Spanish]
Domnich, A.	2022	Acceptance of COVID-19 and Influenza Vaccine Co-Administration: Insights from a Representative Italian Survey
Dou, K.	2022	Theory of planned behavior explains males' and females' intention to receive COVID-19 vaccines differently
El Hassan, E. L. W.	2022	Public Knowledge, Beliefs and Attitudes toward the COVID-19 Vaccine in Saudi Arabia: A Cross-Sectional Study
Fadda, Marta	2022	Why vaccinate against COVID-19? A population-based survey in Switzerland
Fung, L. W. Y.	2022	COVID-19 Vaccination Preferences of University Students and Staff in Hong Kong
Geniole, S. N.	2022	Preliminary evidence that brief exposure to vaccination-related internet memes may influence intentions to vaccinate against COVID-19
Grech, L.	2023	COVID-19 Vaccine Status, Intent, Hesitancy, and Disease-Related Beliefs in People with Multiple Sclerosis
Hou, Z.	2021	Assessing COVID-19 Vaccine Hesitancy, Confidence, and Public Engagement: A Global Social Listening Study
Huang, N.	2022	Change in willingness to COVID-19 vaccination in China: Two online surveys during the pandemic
Ilesanmi, O.	2021	Missed first dose of the COVID-19 vaccine: a qualitative study on vaccine hesitancy among

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First author	Year	Title
S.		healthcare workers in Nigeria
Jaber, M. A.	2023	COVID-19 Vaccine Acceptance among Ajman Undergraduate Dental Students: A Cross-Sectional Study
Juin, J. C. Y.	2022	Knowledge, Attitudes, and Practices of COVID-19 Vaccination among Adults in Singapore: A Cross-Sectional Study
Kalam, M. A.	2021	Exploring the behavioral determinants of COVID-19 vaccine acceptance among an urban population in Bangladesh: Implications for behavior change interventions
Kheil, M. H.	2022	COVID-19 Vaccine Hesitancy among Arab Americans
Koh, S. W. C.	2022	COVID-19 vaccine acceptance and hesitancy among primary healthcare workers in Singapore
Kollamparambil, U.	2023	Mental distress, COVID19 vaccine distrust and vaccine hesitancy in South Africa: A causal mediation regression analysis
Kulmi, M.	2022	Assessment of Knowledge, Attitude & Behavior towards COVID-19 Vaccination: A Cross-Sectional Survey among Medical Students from Central India
Kumar, R.	2021	COVID-19 vaccine acceptability, determinants of potential vaccination, and hesitancy in public: A call for effective health communication
Kwok, K. O.	2021	Editor's Choice: Influenza vaccine uptake, COVID-19 vaccination intention and vaccine hesitancy among nurses: A survey
Lee, H.	2022	Influencing factor of COVID-19 vaccination trust and hesitancy in Wonju city, South Korea
Leng, A.	2021	Individual preferences for COVID-19 vaccination in China
Lobinska, G.	2022	Evolution of resistance to COVID-19 vaccination with dynamic social distancing
Lockyer, B.	2022	Compliant citizens, defiant rebels or neither? Exploring changing COVID-19 vaccine attitudes and decisions in Bradford, UK: Findings from a follow-up qualitative study
Lu, L.	2023	The Effects of Vaccine Efficacy Information on Vaccination Intentions Through Perceived Response Efficacy and Hope
Lu, P. J.	2023	COVID-19 Booster Dose Vaccination Coverage and Factors Associated with Booster Vaccination among Adults, United States, March 2022
Luo, S.	2021	Behavioural intention of receiving COVID-19 vaccination, social media exposures and peer discussions in China
Manasa, C. R.	2023	Perception and Practice on Different COVID-19 Vaccines and Precautionary Dose: A Study among Health Care Workers
Marques-	2023	Attitudes and Behaviors towards Vaccination in Portuguese Nursing Students

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First author	Year	Title
Vieira, C. M. A.		
Muthoni, J.	2023	COVID-19 Vaccination Hesitancy among Youths in Soweto, South Africa
Oberleitner, L. M. S.	2022	COVID-19 Vaccination Concerns and Reasons for Acceptance Among US Health Care Personnel
Oyekale, A. S.	2022	Indicators of Mental Health Disorder, COVID-19 Prevention Compliance and Vaccination Intentions among Refugees in Kenya
Peterson, C. J.	2021	2019 Novel Coronavirus Vaccination Among Medical Students
Salazar-Fernandez, C.	2022	Predictors of COVID-19 Vaccine Intention: Evidence from Chile, Mexico, and Colombia
Schmidt, H.	2022	US adults' preferences for race-based and place-based prioritisation for COVID-19 vaccines
Shah, S.	2022	Factors associated with COVID-19 vaccination intent in Singapore, Australia and Hong Kong
Shearn, C.	2023	Reasons for COVID-19 vaccine hesitancy in ethnic minority groups: A systematic review and thematic synthesis of initial attitudes in qualitative research
Shearn, C.	2023	Reasons for COVID-19 vaccine hesitancy in ethnic minority groups: A systematic review and thematic synthesis of initial attitudes in qualitative research
Sulub, S. A.	2022	Determinants of COVID-19 Vaccine Uptake and Acceptability in the Horn of Africa: Evidence from Somaliland
Tefera, Z.	2022	A Mixed-Methods Study of COVID-19 Vaccine Acceptance and Its Determinants Among Pregnant Women in Northeast Ethiopia
Thier, K.	2023	Understanding the psychological antecedents of COVID-19 vaccine acceptance among Black Americans: implications for vaccine communication
Vandeweerd, C.	2022	Virtual reality reduces COVID-19 vaccine hesitancy in the wild: a randomized trial
Wu, J.	2023	Acceptance and Preference for COVID-19 Vaccine among Japanese Residents at Early Stage of the Epidemic in Japan
Wu, J.	2023	Acceptance and Preference for COVID-19 Vaccine among Japanese Residents at Early Stage of the Epidemic in Japan
Wu, J.	2023	How urban versus rural residency relates to COVID-19 vaccine hesitancy: A large-scale national Chinese study

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First author	Year	Title
Wu, J.	2022	The association between lifestyle and COVID-19 vaccine hesitancy in China: A large-scale cross-sectional survey
Xiao, J.	2022	Temporal changes in factors associated with COVID-19 vaccine hesitancy and uptake among adults in Hong Kong: Serial cross-sectional surveys
Xiao, J.	2022	Temporal changes in factors associated with COVID-19 vaccine hesitancy and uptake among adults in Hong Kong: Serial cross-sectional surveys
No decisional needs reported (n=68)		
An, J. X.	2023	Relationship between COVID-19 vaccine hesitancy and willingness to pay for the booster dose of COVID-19 vaccine of oncology patients in Taizhou, China
Barnes, K.	2022	Positive Attribute Framing Increases COVID-19 Booster Vaccine Intention for Unfamiliar Vaccines
Beccia, F.	2022	Medical Residents' Behaviours toward Compulsory COVID-19 Vaccination in a Tertiary Hospital in Italy
Bedston, S.	2023	COVID-19 booster vaccination uptake and infection breakthrough amongst health care workers in Wales: A national prospective cohort study
Bendezu-Quispe, G.	2022	Factors Associated with Not Receiving a Booster Dose of COVID-19 Vaccine in Peru
Burger, M. N.	2022	Repeated information of benefits reduces COVID-19 vaccination hesitancy: Experimental evidence from Germany
Chen, Z.	2022	Global diversity of policy, coverage, and demand of COVID-19 vaccines: a descriptive study
Davidov, Y.	2022	High Immune Response Rate to the Fourth Boost of the BNT162b2 Vaccine against the Omicron Variants of Concern among Liver Transplant Recipients
DeJonge, P. M.	2023	Assessment of Anti-SARS-CoV-2 antibody levels among university students vaccinated with different COVID-19 primary and booster doses - fall 2021, Wisconsin
Delcea, C.	2022	New Wave of COVID-19 Vaccine Opinions in the Month the 3rd Booster Dose Arrived
Dubov, A.	2022	Racial/Ethnic Variances in COVID-19 Inoculation among Southern California Healthcare Workers
Ghazy, R. M.	2023	The Effect of Combining the COVID-19 Vaccine with the Seasonal Influenza Vaccine on Reducing COVID-19 Vaccine Rejection Among Libyans
Hagger, M. S.	2022	Predicting COVID-19 booster vaccine intentions
Hansen, B. T.	2023	Coverage of primary and booster vaccination against COVID-19 by socioeconomic level: A

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First author	Year	Title
		nationwide cross-sectional registry study
Hassan, Y. A. M.	2022	A retrospective evaluation of side-effects associated with the booster dose of Pfizer-BioNTech/BNT162b2 COVID-19 vaccine among females in Eastern Province, Saudi Arabia
Hoffman, Y. S. G.	2022	Vaccine hesitancy prospectively predicts nocebo side-effects following COVID-19 vaccination
Jin, Q.	2023	Can Risk Communication Surveillance Prompt COVID-19 Vaccine Acceptance among Internet users? Applying the Situational Theory of Problem Solving: A Cross-Sectional Study
Johnson, R.	2023	The societal value of SARS-CoV-2 booster vaccination in Indonesia
Jovanovic, V.	2023	Mandatory and seasonal vaccination against COVID-19: Attitudes of the vaccinated people in Serbia
Juarez, R.	2022	Dynamics of Trust and Consumption of COVID-19 Information Implicate a Mechanism for COVID-19 Vaccine and Booster Uptake
Lecce, M.	2021	2020-21 Influenza vaccination campaign strategy as a model for the third COVID-19 vaccine dose?
Lee, R. C.	2021	COVID-19 booster vaccine attitudes and behaviors among university students and staff: the USC Trojan Pandemic Research Initiative
Lennon, R. P.	2022	Underserved population acceptance of combination influenza-COVID-19 booster vaccines
Niu, Q.	2022	Public Opinion and Sentiment Before and at the Beginning of COVID-19 Vaccinations in Japan: Twitter Analysis
Oh, D. L.	2023	Neighborhood-level COVID vaccination and booster disparities: A population-level analysis across California
Ong, S. Q.	2022	Text Mining and Determinants of Sentiments towards the COVID-19 Vaccine Booster of Twitter Users in Malaysia
Russo, A. G.	2022	Boosters and time from the last anti-COVID-19 vaccine dose: lead public health choices by real-time epidemiological assessment
Santi, T.	2022	Heterologous prime-boost with the mRNA-1273 vaccine among CoronaVac-vaccinated healthcare workers in Indonesia
Schmidt, J.	2022	COVID-19 among Czech Dentistry Students: Higher Vaccination and Lower Prevalence Compared to General Population Counterparts
Stamm, T. A.	2023	Determinants of COVID-19 vaccine fatigue
Wang, L.	2022	The public information needs of COVID-19 vaccine: A study based on online Q&A communities

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First author	Year	Title
		and portals in China
Winkler, E. L.	2023	COVID-19 Booster Vaccination in the U.S. Military, August 2021-January 2022
Zhu, P.	2023	Demographic Differences in Compliance with COVID-19 Vaccination Timing and Completion Guidelines in the United States
Fast, Hannah E.	2021	Booster and Additional Primary Dose COVID-19 Vaccinations Among Adults Aged ≥ 65 Years - United States, August 13, 2021-November 19, 2021.
Agaku, Israel T.	2022	Geographic, Occupational, and Sociodemographic Variations in Uptake of COVID-19 Booster Doses Among Fully Vaccinated US Adults, December 1, 2021, to January 10, 2022.
Park H.J.	2023	Comparing frequency of booster vaccination to prevent severe COVID-19 by risk group in the United States
Prabaningtyas A.D.	2024	Implementation Model of Acceptance of Covid-19 Booster Vaccine in Elderly in Bogor City
Falkenbach M.	2024	Denmark, the United States and Canada: Before, during and post vaccination rollout
Dadari I.	2024	Key Learnings from the Development and Early Use of Global Guidance on the Integration of COVID-19 Vaccination into Broader Health Systems
Machado R.R.G.	2024	Immune Evasion of SARS-CoV-2 Omicron Subvariants XBB.1.5, XBB.1.16 and EG.5.1 in a Cohort of Older Adults after ChAdOx1-S Vaccination and BA.4/5 Bivalent Booster
McLeod, C	2024	The Platform Trial In COVID-19 Priming and BOOsting (PICOBOO): The immunogenicity, reactogenicity, and safety of different COVID-19 vaccinations administered as a second booster (fourth dose) in AZD1222 primed individuals aged 50-<70 years old.
Liu, Shijun	2024	Covid-19 vaccination coverage and associated factors among older hypertensive patients in Hangzhou, China.
Jacobs, Elizabeth T	2023	Understanding low COVID-19 booster uptake among US adults.
Batra, Rachita	2024	Influencing Canadian young adults to receive additional COVID-19 vaccination shots: the efficacy of brief video interventions focusing on altruism and individualism.
Poukka, Eero	2024	Relative effectiveness of bivalent boosters against severe COVID-19 outcomes among people aged ≥ 65 years in Finland, September 2022 to August 2023.
Lee, Yi-Cheng	2024	Enhancing COVID-19 booster vaccination among the elderly through text message reminders.

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First author	Year	Title
Harris, Daniel A	2024	COVID-19 and Influenza Vaccine Coadministration Among Older U.S. Adults.
Nagano, Mitsuhiro	2024	Cost-effectiveness analysis of COVID-19 booster vaccination with BNT162b2 in Japan.
Grewal, Ramandip	2024	Effectiveness of mRNA COVID-19 Monovalent and Bivalent Vaccine Booster Doses Against Omicron Severe Outcomes Among Adults Aged ≥ 50 Years in Ontario, Canada: A Canadian Immunization Research Network Study.
Shoaibi, Azadeh	2023	Evaluation of potential adverse events following COVID-19 mRNA vaccination among adults aged 65 years and older: Two self-controlled studies in the U.S.
Li, Rui	2023	mRNA-based COVID-19 booster vaccination is highly effective and cost-effective in Australia.
Dauria, Emily	2023	Increasing availability of COVID-19 vaccine to older adults under community supervision.
Johnson, Amelia G.	2023	Comparison of COVID-19 Mortality Rates Among Adults Aged ≥ 65 Years Who Were Unvaccinated and Those Who Received a Bivalent Booster Dose Within the Preceding 6 Months — 20 U.S. Jurisdictions, September 18, 2022–April 1, 2023.
El-Menyar, A.	2022	A quick scoping review of the first year of vaccination against the COVID-19 pandemic: Do we need more shots or time?
Ntziora, F.	2021	Vaccination Hesitancy among Health-Care-Workers in Academic Hospitals Is Associated with a 12-Fold Increase in the Risk of COVID-19 Infection: A Nine-Month Greek Cohort Study
Pakki, T. R.	2022	Side Effects after mRNA COVID-19 Vaccine as a Booster in Health Workers
Nagano M.	2024	Public Health and Economic Impact of Periodic COVID-19 Vaccination with BNT162b2 for Old Adults and High-Risk Patients in an Illustrative Prefecture of Japan: A Budget Impact Analysis
Beirakdar, S.	2023	Attitudes of Swedish Language Twitter Users Toward COVID-19 Vaccination: Exploratory Qualitative Study
Casey, S. M.	2022	Healthcare workers' attitudes on mandates, incentives, and strategies to improve COVID-19 vaccine uptake: A mixed methods study
Gaffney, A.	2023	Community Health, Health Care Access, And COVID-19 Booster Uptake in Massachusetts
Goren, T.	2022	How to boost the boosters? A survey-experiment on the effectiveness of different policies aimed at enhancing acceptance of a "Seasonal" vaccination against COVID-19
Kapoor, R.	2023	Identification of an Optimal COVID-19 Booster Allocation Strategy to Minimize Hospital Bed-Days with a Fixed Healthcare Budget
Keyel, A. C.	2022	SARS-CoV-2 Vaccine Breakthrough by Omicron and Delta Variants, New York, USA

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First author	Year	Title
Moore, D.	2022	The Role of Black Pastors in Disseminating COVID-19 Vaccination Information to Black Communities in South Carolina
Rehman, T.	2022	Willingness to pay for a COVID-19 vaccine for oneself and one's child among individuals attending a tertiary care centre in West Bengal, India
Bartsch, Sarah M	2024	What Is the Economic Benefit of Annual COVID-19 Vaccination from the Adult Individual Perspective?
Subramaniam, M.	2023	Sociodemographic and psychosocial factors associated with vaccine hesitancy - results from a longitudinal study in Singapore
Gupta, H.	2023	Vaccine hesitancy in the post-vaccination COVID-19 era: a machine learning and statistical analysis driven study
Not general population (n=47)		
Abdulaziz, H. M. M.	2023	Egyptian hemodialysis patients' willingness to receive the COVID-19 vaccine booster dose: a multicenter survey
Abdullah, N. S.	2023	Willingness to receive a COVID-19 booster vaccine and its associated factors among adults with chronic disease: A cross-sectional study in Putrajaya, Malaysia
Abullais, S. S.	2022	Knowledge, perception, and acceptance toward the booster dose of COVID-19 vaccine among patients visiting dental clinics in Aseer region of KSA
Alobaidi, S.	2022	COVID-19 Booster Vaccine Hesitancy among Hemodialysis Patients in Saudi Arabia Using the Health Belief Model: A Multi-Centre Experience
Blahut, R.	2023	A scoping review on the decision-making dynamics for accepting or refusing the COVID-19 vaccination among adolescent and youth populations
Bulusu, A.	2023	Analysis of COVID-19 vaccine uptake among people with underlying chronic conditions in 2022: A cross-sectional study
Chotiyarnwong, C.	2023	COVID-19 vaccination status in people with spinal cord injury: Results from a cross-sectional study in Thailand
Colciago, E.	2022	Women's attitude towards COVID-19 vaccination in pregnancy: A survey study in northern Italy
Costiniuk, C. T.	2023	Understanding COVID-19 Vaccine Confidence in People Living with HIV: A pan-Canadian Survey
Cummings, P. E.	2023	Understanding COVID-19 Vaccine Uptake and Hesitancy Among People with HIV in Freetown, Sierra Leone: A Cross-sectional Study
Eberhardt, J.	2023	A qualitative study exploring attitudes and perceptions of the COVID-19 booster vaccine in

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First author	Year	Title
		minority ethnic individuals in Northeast England
Ezeh, N.	2023	Understanding Stakeholders' Perspectives to Increase COVID-19 Vaccine and Booster Uptake among Black Individuals with Rheumatic Conditions
Galanis, P.	2023	COVID-19-related burnout reduces COVID-19 vaccination intention in cardiac patients: a cross-sectional study in Greece
Hosokawa, Y.	2022	The Prevalence of COVID-19 Vaccination and Vaccine Hesitancy in Pregnant Women: An Internet-based Cross-sectional Study in Japan
Jaweed, L.	2022	Assessment of COVID-19 vaccine booster dose acceptance, reluctance and concerns among elderly diabetes patients in Pakistan
Kaufman, J.	2022	Factors influencing australian healthcare workers' covid-19 vaccine intentions across settings: A cross-sectional survey
Kowalski, E.	2022	Article How to Motivate SARS-CoV-2 Convalescents to Receive a Booster Vaccination? Influence on Vaccination Willingness
Lin, X. Q.	2022	Willingness of Older Adults with Chronic Diseases to Receive a Booster Dose of Inactivated Coronavirus Disease 2019 Vaccine: A Cross-Sectional Study in Taizhou, China
Liu, W.	2022	COVID-19 Vaccination Status and Hesitancy among Breast Cancer Patients after Two Years of Pandemic: A Cross-Sectional Survey
Lu, P. J.	2023	COVID-19 Bivalent Booster Vaccination Coverage and Intent to Receive Booster Vaccination Among Adolescents and Adults - United States, November-December 2022
Miraglia del Giudice, G.	2023	Investigating the Reasons for Receiving the Second Booster Dose of the COVID-19 Vaccine in Adults and in People with Chronic Medical Conditions in Southern Italy
Molina, M. F.	2023	COVID-19 Booster Vaccine Hesitancy in the Emergency Department
Praveen, S. V.	2023	The Perspectives of Individuals with Comorbidities Towards COVID-19 Booster Vaccine Shots in Twitter: A Social Media Analysis Using Natural Language Processing, Sentiment Analysis and Topic Modeling
Rakusa, M.	2022	COVID-19 vaccination hesitancy among people with chronic neurological disorders: A position paper
Scheiber, A.	2023	COVID-19 Vaccination Rates and Vaccine Hesitancy Among Spanish-Speaking Free Clinic Patients
Smith, B. A.	2023	COVID-19 risk perception and vaccine acceptance in individuals with self-reported chronic respiratory or autoimmune conditions

COVID-19 Booster Vaccination Decision Support

First author	Year	Title
Steffens, M. S.	2022	"I'm scared that if I have the vaccine, it's going to make my lung condition worse, not better." COVID-19 vaccine acceptance in adults with underlying health conditions - A qualitative investigation
Taybeh, E. O.	2022	Mothers' Impressions and Beliefs About Taking a Booster Dose for COVID-19 Vaccine During Pregnancy and Lactation
Tharwat, S.	2023	Attitudes and concerns regarding booster dose of COVID-19 vaccine among Egyptian patients with autoimmune and rheumatic diseases: a cross-sectional survey study
Tharwat, S.	2023	Attitudes and concerns regarding booster dose of COVID-19 vaccine among Egyptian patients with autoimmune and rheumatic diseases: a cross-sectional survey study
Vasilev, G.	2022	Effectiveness and safety of COVID-19 vaccines in patients with diabetes as a factor for vaccine hesitancy
Vasilev, G.	2022	Effectiveness and safety of COVID-19 vaccines in patients with diabetes as a factor for vaccine hesitancy
Wang, X.	2022	COVID-19 vaccine hesitancy and associated factors among infertile couples undergoing assisted reproductive treatment
Wang, Y.	2023	Hesitancy to Receive the Booster Doses of COVID-19 Vaccine Among Cancer Patients in China: A Multicenter Cross-Sectional Survey - Four PLADs, China, 2022
Ying, C. Q.	2022	Intentions of Patients with Hypertension to Receive a Booster Dose of the COVID-19 Vaccine: A Cross-Sectional Survey in Taizhou, China
Ying, C. Q.	2022	Intentions of Patients with Hypertension to Receive a Booster Dose of the COVID-19 Vaccine: A Cross-Sectional Survey in Taizhou, China
Zhang, E.	2022	Misconceptions Drive COVID-19 Vaccine Hesitancy in Individuals with Inflammatory Bowel Disease
Bian J.	2024	Influence of grandchildren on COVID-19 vaccination uptake among older adults in China: a parallel-group, cluster-randomized controlled trial
Berrios H.	2023	COVID-19 Vaccine Booster Hesitancy among Hispanic Adults: A Cross-Sectional Study from the Puerto Rico Community Engagement Alliance against COVID-19 Disparities (PR-CEAL)
Zhang, Liangyuan	2024	Willingness to receive the second booster of COVID-19 vaccine among older adults with cancer: a stratified analysis in four provinces of China.
Chai, Ruiyu	2024	Low uptake of COVID-19 booster doses among elderly cancer patients in China: A multicentre cross-sectional study.
Legg, Nicole	2024	Prevalence, Correlates, and Drivers of COVID-19 Vaccine Hesitancy Among Canadians.

COVID-19 Booster Vaccination Decision Support

First author	Year	Title
K.		
Iguacel, I.	2022	Citizen Stance towards Mandatory COVID-19 Vaccination and Vaccine Booster Doses: A Study in Colombia, El Salvador and Spain
Seegers, Valérie	2022	COVID-19 Vaccination Campaign in Cancer Patients and Healthcare Workers-Results from a French Prospective Multicenter Cohort (PAPESCO-19).
Miao, Y.	2024	How urban versus rural population relates to COVID-19 booster vaccine hesitancy: A propensity score matching design study.
Luo, C.	2024	Hesitation towards COVID-19 booster vaccination among dialysis patients: a cross-sectional study in Taizhou, China
Peng, X.	2021	Prevalence and Impact Factors of COVID-19 Vaccination Hesitancy Among Breast Cancer Survivors: A Multicenter Cross-Sectional Study in China

Appendix III: Ethics Approval of Patient Decision Aid Test Study

18/01/2024

Université d'Ottawa

Bureau d'éthique et d'intégrité de la recherche

University of Ottawa

Office of Research Ethics and Integrity

CERTIFICAT D'APPROBATION ÉTHIQUE | CERTIFICATE OF ETHICS APPROVAL

Numéro du dossier / Ethics File Number

H-11-23-9860

Titre du projet / Project Title

The alpha testing of a decision aid for the new COVID-19 vaccine

Type de projet / Project Type

Thèse de doctorat / Doctoral thesis

Statut du projet / Project Status

Approuvé / Approved

Date d'approbation (jj/mm/aaaa) / Approval Date (dd/mm/yyyy)

18/01/2024

Date d'expiration (jj/mm/aaaa) / Expiry Date (dd/mm/yyyy)

17/01/2025

Équipe de recherche / Research Team

**Chercheur /
Researcher**

Affiliation

Role

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École des sciences infirmières / School of Nursing

Chercheur Principal / Principal Investigator

Dawn STACEY

École des sciences infirmières / School of Nursing

Superviseur / Supervisor

Krystina LEWIS

École des sciences infirmières / School of Nursing

Autre / Other

J. Craig PHILLIPS

École des sciences infirmières / School of Nursing

Autre / Other

Justin PRESSEAU

Département d'épidémiologie et santé publique / Department of Epidemiology and Public Health

Co-chercheur / Co-investigator

Conditions spéciales ou commentaires / Special conditions or comments

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www.recherche.uottawa.ca/deontologie | www.recherche.uottawa.ca/ethics

Appendix IV: Recruitment Poster for the Test of the Patient Decision Aid



DECISION AID for the NEW COVID-19 VACCINE

We are conducting a study to test a draft decision aid to help people aged 65 years and older make a decision about the new COVID-19 vaccine.

The draft decision aid is a **2-page** document that provides balanced information on reasons for **taking or not taking the new COVID-19 vaccine.**

It will take about **15-20 minutes** to review the decision aid and answer the survey



Are you **65 years of age and older, live in Canada and previously had a COVID-19 vaccine?**



Are you a **healthcare professional, who works in Canada and discusses the new COVID-19 vaccine with people aged 65 and older?**

The selection of participants will be first come, first served. To participate, contact Qian (Vicky) Zhang, a doctoral student.

Appendix V: Screenshot of the Web-Based Survey for the Test of Patient Decision Aid

 This question requires an answer.

* 3. How clear is the information presented in **section 1: This decision aid is for you if:**

1. This decision aid is for you if:

- You are 65 years or older;
- You are thinking about getting the latest COVID-19 vaccine (the booster);
- It has been 3 to 6 months since you got a COVID-19 vaccine, OR you had, OR think you had a COVID-19 infection.^[1]



☒ Poor

☐ Fair

☐ Neutral

☐ Good

☐ Very good

☐ I prefer not to respond

Comments:

 This question requires an answer.

* 4. How clear is the information presented in **section 2: What are facts people may not be aware of?**

2. What are facts people may not be aware of?

Appendix VI: Survey Question for The Test of Patient Decision Aid (adults 65 years and older)

Thanks for your interest in helping us create a decision aid about the new COVID-19 vaccine. The following questions will help us gather your feedback to enhance the decision aid. Let's begin!

1. Which age group do you belong to?

- ☐ 24 years of age or younger
- ☐ 25-34 years of age
- ☐ 35-44 years of age
- ☐ 45-54 years of age
- ☐ 55-64 years of age
- ☐ 65 to 74 years of age
- ☐ 75 to 84 years of age
- ☐ 85 years of age or older
- ☐ Prefer not to respond

[It will not appear in the survey if the answer is age less than 65 or prefer not to respond, the volunteer will be thanked, and the survey will end.]

(Thanks for your interest in the decision aid. Following is the decision aid for people aged 65 years or older.)

2. Have you received a COVID-19 vaccine in the past? (one option)

- ☐ Yes
- ☐ No

[Logic: If the answer is “yes”, then move to the next. If the answer is “No”, the survey will end, and the volunteer will be thanked.]

Thank you for answering the above questions.

CONSENT FORM HERE ()

Following is the decision aid that could help you make the new COVID-19 vaccine decision. You may need about 15 minutes to go through the decision aid. We encourage you to review the decision aid and answer the questions for step 4 and step 5.
[Then present the 2-pages of the decision aid]

Now that you have had time to review the decision aid about the new COVID-19 vaccine, we would like to know what you think about it.

1. What did you **like** about the decision aid?

2. What did you **do not like** about the decision aid?

3. Please rate the amount of information in the decision aid

- ☐ Much less than I wanted
- ☐ A little less than I wanted
- ☐ About right
- ☐ Little more than I wanted
- ☐ Much more than I wanted

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4. Please rate how balanced the information was in the decision aid

- ☐ Clearly slanted toward taking the new COVID-19 vaccine
- ☐ Slightly slanted toward taking the new COVID-19 vaccine
- ☐ Completely balanced
- ☐ Slightly slanted towards not taking the new COVID-19 vaccine
- ☐ Clearly slanted towards not taking the new COVID-19 vaccine

5. Was there enough space for answering the questions?

- ☐ Yes, enough
- ☐ Not enough
- ☐ Not necessary

6. Do the words in the decision aid make sense?

- ☐ Yes
- ☐ No

7. Would the decision aid help you in your discussions with a physician, nurse or pharmacist?

- ☐ Yes, as it is
- ☐ Yes, but with some alteration
- ☐ No

8. Are you willing to tell someone about it?

- ☐ Yes
- ☐ No

9. How clear is the information presented in **section 1: This decision aid is for you if:**

(Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair
- ☐ Good
- ☐ Very good

10. How clear is the information presented in **section 2: What are facts people may not be aware of?** (Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair
- ☐ Good
- ☐ Very good

11. How clear is the information presented in **section 3. What are the pros and cons of taking or not taking the vaccine?** (Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair
- ☐ Good
- ☐ Very good

12. How clear is the information presented in **section 4. What matters most to you?**

(Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair
- ☐ Good
- ☐ Very good

13. How clear is the information presented in **section 5. Which option do you prefer?**

(Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair
- ☐ Good
- ☐ Very good

14. How clear is the information presented in **the information on funding and authors**

(Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair

COVID-19 Booster Vaccination Decision Support

- ☐ Good
- ☐ Very good

15. How clear is the information presented **in the references?** (Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair
- ☐ Good
- ☐ Very good

16. Would you have found this decision aid **useful** when you were making your decision about the new COVID-19 vaccine?

- ☐ Yes
- ☐ No
- ☐ Comments: _____

17. Did the new COVID-19 vaccine decision aid help you **recognize that a decision needs to be made?**

- ☐ Not at all
- ☐ A little
- ☐ Some-what
- ☐ Quite a bit
- ☐ A great deal

18. Did the new COVID-19 vaccine decision aid **prepare you to make a better decision?**

- ☐ Not at all
- ☐ A little
- ☐ Some-what
- ☐ Quite a bit
- ☐ A great deal

19. Did the new COVID-19 vaccine decision aid help you think about the **pros and cons of each option?**

- ☐ Not at all
- ☐ A little
- ☐ Some-what
- ☐ Quite a bit
- ☐ A great deal

20. Did the new COVID-19 vaccine decision aid help you **think about which pros/cons are most important?**

- ☐ Not at all
- ☐ A little
- ☐ Some-what
- ☐ Quite a bit
- ☐ A great deal

21. Did the new COVID-19 vaccine decision aid **help you know that the decision depends on what matters most to you?**

- ☐ Not at all
- ☐ A little
- ☐ Some-what
- ☐ Quite a bit
- ☐ A great deal

22. Did the new COVID-19 vaccine decision aid **prepare you for the next step?**

- ☐ Not at all
- ☐ A little
- ☐ Some-what
- ☐ Quite a bit
- ☐ A great deal

23. Did the new COVID-19 vaccine decision aid **help you think about how involved you want to be in this decision?**

- ☐ Not at all
- ☐ A little
- ☐ Some-what
- ☐ Quite a bit
- ☐ A great deal

24. Did the new COVID-19 vaccine decision aid **help you identify questions you want to ask your healthcare professional?**

- ☐ Not at all
- ☐ A little
- ☐ Some-what
- ☐ Quite a bit
- ☐ A great deal

25. What **suggestions do you have to improve** the decision aid?

Please take a moment to provide some information about yourself.

26. In which **province or territory** do you live?

- ☐ Newfoundland and Labrador
- ☐ Prince Edward Island
- ☐ Nova Scotia
- ☐ New Brunswick
- ☐ Quebec
- ☐ Ontario
- ☐ Manitoba
- ☐ Saskatchewan
- ☐ Alberta
- ☐ British-Colombia
- ☐ Nunavut

COVID-19 Booster Vaccination Decision Support

- Northwest Territories
- Yukon
- Other, please specify _____

27. What was your **sex at birth**?

- Male
- Female
- Prefer not to respond

28. What is your **gender**? Refers to current gender, which may be different from the sex assigned at birth and may be different from what is indicated on legal documents.

- Man
- Woman
- Non-binary
- Other, please specify _____
- Prefer not to respond

29. What **language you first learned** at home in childhood and can still understand?

- French
- English
- An Indigenous language
- Spanish
- Mandarin
- Arabic
- Others, please specify _____

30. What is your **highest level of education** received?

- Less than a high school diploma or its equivalent
- High School diploma or equivalency certificate
- College, CEGEP or other non-university certificate or diploma (other: trades certificates or diplomas)
- University certificate or diploma below bachelor's level
- Bachelor's degree (e.g., B.A., B.A. (Hons), B.Sc., LL.B.)
- University certificate or diploma or degree above the bachelor's level
- Other, please specify _____
- Prefer not to respond

31. People living in Canada come from many different **cultural and ethnic backgrounds**. Are you? First Nations

- ☐ Métis
- ☐ Inuk
- ☐ White
- ☐ Black
- ☐ Latin American
- ☐ South Asian (East Indian, Pakistani, Sri Lankan)
- ☐ Southeast Asian (Vietnamese, Cambodian, Laotian, Thai)
- ☐ West Asian (Afghan, Iranian)
- ☐ Chinese
- ☐ Japanese
- ☐ Korean
- ☐ Filipino
- ☐ Arab
- ☐ Other, please specify _____
- ☐ Prefer not to respond

32. Have you lived experience as a member of any of the following groups who may feel marginalized? *Please select all that apply.*

- ☐ Gender-diverse (e.g., agender, non-binary, transgender, cisgender)
- ☐ Intersex
- ☐ LGBTQ+ (lesbian, gay, bisexual, pansexual, transgender, queer, two-spirited, questioning)
- ☐ Indigenous
- ☐ Racialized (i.e., the person of colour)
- ☐ Neurodivergent (e.g., ADHD, autistic, dyslexic)
- ☐ Disabled, or caregiver of a person with a disability
- ☐ Member of a marginalized group not listed, please specify _____
- ☐ None of the above
- ☐ Prefer not to respond

33. What is your **marital status**?

- ☐ Never legally married
- ☐ Legally married
- ☐ Separated, but still legally married
- ☐ Divorced
- ☐ Widowed
- ☐ Living common law

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- ☐ Other, please specify _____
- ☐ Prefer not to respond

34. How many people are currently living in your household, including yourself?

- ☐ 1 (I live on my own)
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5 or more

35. Which of the following categories best describes your **household income**, before taxes and other deductions, for the last 12 months?

- ☐ Less than \$50,000
- ☐ \$50,000 to less than \$59,999
- ☐ \$60,000 to less than \$69,999
- ☐ \$70,000 to less than \$79,999
- ☐ \$80,000 to less than \$89,999
- ☐ \$90,000 to less than \$99,999
- ☐ \$100,000 or more
- ☐ Prefer not to respond

36. How many COVID-19 doses did you receive?

- ☐ 1 dose
- ☐ 2 doses
- ☐ 3 doses
- ☐ More than 4 doses
- ☐ Prefer not to say

Thank you for participating in our survey. Your insights are valuable to us. If you have any other questions related to the decision aid and survey, please contact

Appendix VII: Survey Question for The Test of Patient Decision Aid (Healthcare Professionals)

Thank you for volunteering your time to provide feedback on this draft decision aid for adults aged 65 years and older considering the new COVID-19 vaccine. We need your help to make sure the decision aid is understandable and useful for people in this age group.

Decision aids are resources that present evidence-based information on options in a balanced way to inform people about the available options and help them make choices that reflect their values and preferences.

The first 3 questions verify your eligibility for the study.

1. What is your primary healthcare profession?

- ☐ Physician
- ☐ Nurse
- ☐ Pharmacist
- ☐ Allied Health Professional (please specify) _____
- ☐ Other (please specify)
- ☐ Prefer not to respond

Logic: [If the answer is “prefer not to respond” the survey will end, and the volunteer will be thanked]

2. In which **province or territory** do you live in Canada?

- ☐ Newfoundland and Labrador
- ☐ Prince Edward Island
- ☐ Nova Scotia
- ☐ New Brunswick

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- Quebec
- Ontario
- Manitoba
- Saskatchewan
- Alberta
- British Columbia
- Nunavut
- Northwest Territories
- Yukon
- I do not live in Canada
- I prefer not to respond

Logic: [If the answer is the listed province or territory in the options then move to the next. If the answer is “I do not live in Canada” or “prefer not to respond” the survey will end, and the volunteer will be thanked]

3. Have you helped adults aged 65 years or older make any decisions about COVID-19 vaccinations in the past? (one option)

- Yes
- No
- I prefer not to respond

Logic: [If the answer is “No” or “Prefer not to respond” the survey will end, and the volunteer will be thanked]

Thank you for answering the above questions.

CONSENT FORM HERE ()

Following is the drafted version of the decision aid that was created to help people aged 65 and older decide whether to take or not take the new COVID-19 vaccine.

We expect that most people would have access to it online or possibly in a clinic. It

COVID-19 Booster Vaccination Decision Support

will take you about 15-20 minutes to review the decision aid and complete the survey.

[Then present the 2-pages of the decision aid]

We would like to know what you think about the decision aid.

Please answer the following two open questions about the decision aid on the new COVID-19 vaccine. Then, we will ask more specific questions on the next screen.

1. At first glance, what do you think of this decision aid about the new COVID-19 vaccine?

2. What did you **like or not like** about this decision aid?

[save and move to the next set of questions]

3. How clear is the information presented in **section 1: This decision aid is for you if:**

(Attach the screenshot of this part)

- ☐ Poor

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- ☐ Fair
- ☐ Neutral
- ☐ Good
- ☐ Very good
- ☐ I prefer not to respond

4. How clear is the information presented in **section 2: What are facts people may not be aware of?** (Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair
- ☐ Neutral
- ☐ Good
- ☐ Very good
- ☐ I prefer not to respond

5. How clear is the information presented in **section 3. What are the pros and cons of taking or not taking the vaccine?** (Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair
- ☐ Neutral
- ☐ Good
- ☐ Very good
- ☐ I prefer not to respond

6. How clear is the information presented in **section 4. What matters most to you?**
(Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair
- ☐ Neutral
- ☐ Good
- ☐ Very good
- ☐ I prefer not to respond

7. How clear is the information presented in **section 5. Which option do you prefer?**
(Attach the screenshot of this part)

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- ☐ Poor
- ☐ Fair
- ☐ Neutral
- ☐ Good
- ☐ Very good
- ☐ I prefer not to respond

8. How clear is **the information on funding and authors** (Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair
- ☐ Neutral
- ☐ Good
- ☐ Very good
- ☐ I prefer not to respond

9. How clear are **the references?** (Attach the screenshot of this part)

- ☐ Poor
- ☐ Fair
- ☐ Neutral
- ☐ Good
- ☐ Very good
- ☐ I prefer not to respond

10. Overall, the amount of information in this decision aid was:

- ☐ Much less than I wanted
- ☐ A little less than I wanted
- ☐ About right
- ☐ Little more than I wanted
- ☐ Much more than I wanted
- ☐ I prefer not to respond

11. Overall, how balanced was the information in this decision aid?

- ☐ Clearly slanted toward taking the new COVID-19 vaccine
- ☐ Slightly slanted toward taking the new COVID-19 vaccine
- ☐ Completely balanced
- ☐ Slightly slanted towards not taking the new COVID-19 vaccine

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- ☐ Clearly slanted towards not taking the new COVID-19 vaccine
- ☐ I prefer not to respond

12. Would you have found this decision aid **useful** when you discuss the new COVID-19 vaccine with people aged 65 or older?

- ☐ Yes
- ☐ No
- ☐ Comments: _____
- ☐ I prefer not to respond

13. Would this decision aid help people aged 65 or older **fully understand the pros/cons of each option?**

- ☐ Not at all
- ☐ A little
- ☐ Some-what
- ☐ Quite a bit
- ☐ A great deal
- ☐ I prefer not to respond

14. Would this decision aid help people aged 65 or older **think about which pros/cons are most important?**

- ☐ Not at all
- ☐ A little
- ☐ Some-what
- ☐ Quite a bit
- ☐ A great deal
- ☐ I prefer not to respond

15. Would this decision aid help people aged 65 or older be **involved in the decision making process as they would desire?**

- ☐ Not at all
- ☐ A little
- ☐ Some-what
- ☐ Quite a bit

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- A great deal
- I prefer not to respond

16. Would this decision aid help people aged 65 or older **make a more informed decision?**

- Not at all
- A little
- Some-what
- Quite a bit
- A great deal
- I prefer not to respond

17. Would this decision aid help you **more fully understand the issues that are most important to a person aged 65 or older?**

- Not at all
- A little
- Some-what
- Quite a bit
- A great deal
- I prefer not to respond

18. Would this decision aid help you **tailor your counseling to the preference for decision participation of people aged 65 or older?**

- Not at all
- A little
- Some-what
- Quite a bit
- A great deal
- I prefer not to respond

19. Would using this decision aid with people aged 65 or older affect **your relationship with them?**

- Not at all
- A little

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- ☐ Some-what
- ☐ Quite a bit
- ☐ A great deal
- ☐ I prefer not to respond

20. Are you willing to tell someone about this decision aid?

- ☐ Yes
- ☐ No
- ☐ I prefer not to respond

21. What **suggestions do you have to improve** this decision aid?

We will now ask you a few optional questions about yourself. We collect this information anonymously because we would like to receive feedback from a diverse group of healthcare professionals.

22. What was your **sex assigned at birth**?

- ☐ Male
- ☐ Female
- ☐ I prefer not to respond

23. What is your **gender identity**? Refers to current gender, which may be different from the sex assigned at birth and may be different from what is indicated on legal documents.

- ☐ Man
- ☐ Woman
- ☐ Non-binary
- ☐ Other, please specify _____
- ☐ I prefer not to respond

24. What **language did you first learn** at home in childhood and can still understand?

- ☐ English
- ☐ French
- ☐ An Indigenous language
- ☐ Spanish
- ☐ Mandarin
- ☐ Arabic
- ☐ Others, please specify _____
- ☐ I prefer not to respond

25. What is your **highest level of education** received? (check all that are applicable)

- ☐ College, CEGEP (Quebec) or other non-university certificate or diploma
- ☐ University certificate or diploma below bachelor's level
- ☐ Bachelor's degree (e.g., B.A., B.A. (Hons), B.Sc., LL.B.)
- ☐ Post Bachelor's degree (Masters, Doctoral, Medical)
- ☐ Other, please specify _____
- ☐ I prefer not to respond

26. People living in Canada come from many different **cultural and ethnic backgrounds**. Are you?

- ☐ First Nations
- ☐ Métis
- ☐ Inuk
- ☐ White
- ☐ Black
- ☐ Latin American
- ☐ South Asian (East Indian, Pakistani, Sri Lankan)
- ☐ Southeast Asian (Vietnamese, Cambodian, Laotian, Thai)
- ☐ West Asian (Afghan, Iranian)
- ☐ Chinese
- ☐ Japanese
- ☐ Korean
- ☐ Filipino
- ☐ Arab
- ☐ Other, please specify _____
- ☐ I prefer not to respond

27. How many COVID-19 doses did you receive?

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- 0 doses
- 1 dose
- 2 doses
- 3 or more doses
- I prefer not to respond

Thank you for participating in our survey. Your insights are valuable to us. If you have any other questions related to the decision aid and survey, please contact.