Emerging Evidence on COVID-19

Evidence Brief on Attitudes and Acceptance of COVID-19 Booster Doses

January 2022

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Introduction

What is the evidence on the knowledge, attitudes, and behaviors related to booster (third/additional) doses of the COVID-19 vaccine in Canada, Australia, New Zealand, UK, and the US?

Canada has one of the highest vaccination rates of the primary series (2 doses) of COVID-19 in the world, with 82.8% of those over the age of 5 fully vaccinated [1]. The UK and Australia approved COVID-19 booster doses for those over 18 years old in September and October 2021, respectively [2, 3]. In November 2021 booster doses of COVID-19 vaccines were approved for those over 18 in Canada, New Zealand, and the US [4, 5, 6].

Understanding the facilitators, barriers, and hesitancy to accept or refuse COVID-19 booster doses among those who have already accepted two doses is important for encouraging recommended vaccination among both partially vaccinated and unvaccinated populations in the face of waning immunity and more transmissible variants. This evidence brief summarizes literature on the intention to accept a booster dose of vaccine among the general population and factors associated with the intention to accept or reject additional doses. The focus of this evidence brief is on the Five Eyes countries (Canada, Australia, New Zealand, UK, and US) as these countries tend to have similar trends. This brief contains literature up to January 31, 2022.

Key points

There were 14 studies identified that evaluated attitudes and acceptance of a COVID-19 booster dose in Canada (n=4), UK (n=3), US (n=5), Canada and US (n=1) and globally (13 countries including Australia, Canada, UK, and US, n=1) (Table 1). Ten of the studies were conducted since the approval of the COVID-19 booster dose in their respective countries and the remaining 4 were conducted prior to the approvals in early to mid-2021.

- Intentions to accept COVID-19 booster doses have decreased between late 2021 and early 2022 in Canada and the UK [8, 11, 12].
- The most recent Canadian studies from January 2022 report those who intend to receive a COVID-19 vaccine booster currently varies between 70-77% in the general public [7, 8]. Three studies conducted between August-December 2021 show a range of intention to receive a booster between 62-89% [9, 10, 11]. Intention to accept a booster was highest in Atlantic Canada, Quebec, and Ontario and lowest in British Columbia and the Prairies [10].
- A longitudinal study in the UK showed that intention to receive a COVID-19 vaccine booster remained steady from 88-95% between August-December 2021 but decreased to 72% in January 2022 [12]. This study also demonstrated that 75% were likely to get a booster dose for COVID-19 at the same time as their flu shot, which has steadily decreased since Aug 2021 [12].
- The three most recent studies in the US conducted between August – November 2021 revealed that 79-81% of the general population and 96.2% of university students/staff intended to receive a booster [11, 13, 14].

Barriers and facilitators to accepting a COVID-19 booster were similar to accepting first and second doses of the vaccine [15].

- Three studies showed that hesitancy about initial COVID-19 vaccination may be a strong predictor for hesitancy about booster doses of the vaccine [16, 17, 40].
- Compared to White respondents, Black respondents were less likely (OR 0.67, $p<0.01$) and Asian respondents were more likely (OR 2.45, 95%CI: 1.46-4.18) to accept a COVID-19 booster [14, 18].
- The most common factors positively associated with intention to receive a booster were older age [7, 8, 9, 10, 12, 16, 17, 18, 19], higher education [7, 16, 17, 18], having longer-term physical health conditions [12, 16, 17], being a past voter for the Liberal/Democrat parties [9, 16, 18], living in a larger more populated area [7, 18], higher trust in science and COVID-19 information [14, 16], and male gender [10, 16].
- The main concerns for those unlikely to accept a COVID-19 booster vaccine includes concern about short and long term side-effects [8, 12, 13, 19], belief that a booster dose would not offer extra protection [12, 19], and the belief that the first and second dose would keep them safe [12, 19].

COVID-19 booster attitudes in the general public were explored in nine studies (Table 1). Six of the studies were conducted since the approval of booster doses in their respective countries.

- Across Canada, UK, and US, 63-89% believed that getting a booster dose (including receiving additional booster doses of the vaccine when necessary) was effective at providing protection from the virus or important to slowing the spread of virus [8, 12, 20].
- In January 2022, those who had received three doses in Canada believed the current restrictions were appropriate or that it was not yet time to reduce restrictions. The desire to keep restrictions was higher for those who had been vaccinated, particularly those with third doses, compared to those who had not been vaccinated [21].
- While both unvaccinated and third dose recipients in Canada believed they will be exposed to and infected by Omicron no matter what they do (53% vs 54%), third dose recipients were more likely than unvaccinated to believe that if they caught COVID-19 it could be severe/deadly (17% vs 7%) [21, 22].
- In a UK study in January 2022, 75% stated they would be likely to get a booster dose for COVID-19 at the same time as their flu shot. This has steadily decreased from 85% since August 2021 [12].

Overview of the evidence

Fourteen studies evaluating the attitudes of the general public toward booster doses (third doses) of COVID-19 vaccine were identified and included in this review. Of these, two are preprints and eight are reports which have not completed the peer-review process. The publications reporting on third dose vaccine attitudes are all observational studies (e.g., cross-sectional study using an online survey).

A formal risk of bias evaluation was not conducted. Across observational studies the reliability of the outcome is based on obtaining a representative sample of the target population that is sufficiently large to obtain a representative spectrum of results. Studies frequently did not demonstrate the representativeness of their samples to the target population in both grey literature or government reports published online (not indexed), preprints, and published journal articles. Longitudinal studies where a population was sampled more than one time to monitor changes in vaccine intentions and attitudes over time were the strongest observational study design identified. Most observational studies were cross-sectional online surveys at a single point in time. These study designs are at moderate/high risk of bias and thus, are considered medium-low quality depending on the sample size and whether the sample represents the target population as well as how well the survey tool can measure the outcome(s) of interest (e.g., was it informed by formative research, validated and pretested prior to implementation). For most of the included studies the outcomes are self-reported, which can be biased by response and social desirability biases. Other biases considered in these studies include response rate and missing data. While there are many studies that show similar trends, the conclusions could change with additional research, larger sample size, different sampling strategies, data collection tools, and progression through the pandemic.

A key knowledge gap in this research are studies that address booster dose intentions and reasons for hesitancy and refusal rates in high-risk and underserved populations, and studies which identify factors that would encourage individuals to receive a booster dose. The majority of studies used online surveys, and to a lesser extent telephone surveys, which may limit participation from segments of population due to lack of access. Given the variable access to booster doses, understanding intention to vaccinate and hesitancy for accepting a booster dose remains crucial to encouraging vaccination in the face of waning immunity and more transmissible variants.

COVID-19 booster intentions and attitudes of the general public

Attitudes and acceptance of a booster dose of the COVID-19 vaccine in the general public were explored in 14 studies. There were four studies specific to Canada, three in the UK, five in the US, one that looked at both Canada and the US, and one global study that included Australia, Canada, UK, and US. High level points from all studies are listed below followed by more detailed outcomes (Table 1).

Intention to accept COVID-19 boosters decreased between late 2021 and early 2022 [8, 11, 12].

- The most recent studies from January 2022 report those who intend to receive a COVID-19 vaccine booster currently varies between 70-77% in the Canadian general public [7, 8]. Three studies conducted between August-December 2021 show a range of intention to receive a booster between 62-89% [9, 10, 11]. In a December 2021 survey, intention to accept a booster was highest in Atlantic Canada (93.3%), Quebec (90.1%), and Ontario (90%), followed by British Columbia (85.2%) and the Prairies (82.5%) [10].
- In a global survey of 13 countries conducted in August 2021, the highest intentions to get a booster vaccine if it were available to respondents that day in the countries relevant to this review were in Australia (82%), UK (82%), US (81%), and Canada (77%) [11].
- A longitudinal study in the UK showed that intention to receive a COVID-19 vaccine booster remained steady from 88-95% between August-December 2021[12]. This decreased to 72% in the most recent study conducted in January 2022 [12]. This study also reported that 75% were likely to get a booster dose for COVID-19 at the same time as their flu shot, which has steadily decreased since Aug 2021 [12].
- The two most recent studies in the US conducted between August – September 2021 revealed that 79-81% of the general population intended to receive a booster [11, 13]. In California between August – November 2021, 96.2% of staff and students from a university were willing to receive a COVID-19 booster at least once per year, and 64% were willing to get boosters as often as necessary [14].
- A study conducted from May to June 2021 in the US reported that the overall acceptance for a combination influenza-COVID-19 vaccine was 50%. This was slightly higher than a stand-alone COVID-19 booster (45%) and lower than a stand-alone influenza vaccine (58%) [18].

Barriers and facilitators to accepting a COVID-19 booster were similar to accepting first and second doses of the vaccine [15].

- Three studies showed that hesitancy about initial COVID-19 vaccination may be a strong predictor for hesitancy about booster doses of the vaccine [16, 16, 17].

- In the UK, those who were initially uncertain about receiving a vaccine (first and second doses) were more likely to be uncertain or unwilling to receive a booster (uncertain: RR 4.92, 95%CI: 2.98-8.11; unwilling: RR 5.29, 95%CI: 3.07- 9.09) compared to those who were initially willing. Initial unwillingness about receiving a vaccine (first and second dose) was also associated with a higher risk of booster uncertainty and unwillingness (uncertain: RR 6.40, 95%CI: 3.94-10.41; unwilling: RR 11.29, 95%CI: 6.79-18.78) [17].
- In the US, those who had already received a primary dose of COVID-19 vaccine were more likely to accept booster doses (OR 3.32, 95%CI: 2.20–5.01) [16]. A second study showed that those who were booster hesitant were more likely to be unvaccinated (unvaccinated: 62.6%, 95% CI: 59.2–65.9% vs. vaccinated 12.9%, 95% CI: 11.1–14.8%; $p < 0.001$) [16].
- Compared to White respondents, Black respondents were less likely to accept a COVID-19 booster (OR 0.67, p<0.01) [18] and Asian respondents were more likely to accept a COVID-19 booster than White respondents (OR 2.45, 95%CI: 1.46-4.18) [14].
- The most common factors positively associated with intention to receive a booster were older age [7, 8, 9, 10, 12, 16, 17, 18, 19], higher education [7, 16, 17, 18], having longer-term physical health conditions [12, 16, 17], being a past voter for the Liberal/Democrat parties [9, 16, 18], living in a larger more populated area [7, 18], higher trust in science and COVID-19 information [14, 16], and male gender [10, 16].
- The main reasons for being unlikely to accept a COVID-19 booster vaccine includes concern about short and long term side-effects [8, 12, 13, 19], belief that a booster dose would not offer extra protection [12, 19], and belief that the first and second dose would keep them safe [12, 19].
- In a January 2022 study, 56% of Canadians were concerned about long term side-effects from a third dose and this concern was more prevalent among younger respondents compared to older respondents (66% among those aged 18-34, 57% in those aged 35-54, and 47% among those aged 55+) [8].
- In the UK, 63% reported that no vaccine incentives would increase their motivation to get a third dose. Among those who could be motivated, the top motivator was helping life get back to normal (34%) [19].

Attitudes towards COVID-19 boosters

- Across Canada, UK, and US, 63-89% believed that getting a booster dose (including receiving additional boosted doses of the vaccine when necessary) was effective at providing protection from the virus or important to slowing the spread of virus [8, 12, 20].
- In August 2021, 69% of Canadians, 68% of Americans, 70% of Australians, and 77% of those in the UK agreed that they will need a booster at least every year for COVID-19 [11]. Acceptance for a hypothetical yearly booster was lower in those who were vaccine-hesitant [23].
- In January 2022, those who had received three doses in Canada believed that current restrictions were appropriate or that it was not yet time to reduce restrictions. The desire to keep restrictions was higher for those who had been vaccinated, particularly those with third doses, compared to those who had not been vaccinated [21].

- While both unvaccinated and third dose recipients in Canada believed they will be exposed to and infected by Omicron no matter what they do (53% vs 54%), third dose recipients were more likely than unvaccinated to believe that if they caught COVID-19 it could be severe/deadly (17% vs 7%)[21, 22].
- In Canada, 63% would be in favor of sending vaccines to developing countries before offering third doses to Canadians [7].
- In a UK study in January 2022, 75% would be likely to get a booster dose for COVID-19 at the same time as their flu shot. This has steadily decreased from 85% since August 2021 [12].

Methods

Publications and Preprints

A daily scan of the literature (published and pre-published) is conducted by the Knowledge Synthesis team in the Emerging Science Group, Public Health Agency of Canada. The scan has compiled COVID-19 literature since the beginning of the outbreak and is updated daily. Searches to retrieve relevant COVID-19 literature are conducted in Pubmed, Scopus, BioRxiv, MedRxiv, ArXiv, SSRN, Research Square, and and cross-referenced with the COVID-19 information centers run by Lancet, BMJ, Elsevier, Nature and Wiley. The cumulative scan results are maintained in a Refworks database and an excel list that can be searched. Targeted keyword searching is conducted within these databases to identify relevant citations on COVID-19 and SARS-COV-2. Search terms used included: ("vaccin*" OR "immuni*") AND ("third dose*" OR "booster"). This review contains research published up to January 31, 2022.

Grey Literature

A grey literature search was conducted to compliment the database search. The grey literature search focused on targeted governmental and academic institutions. A detailed list of websites searched is available upon request. The grey literature search was last updated on January 31, 2022.

Each potentially relevant reference was examined to confirm it had relevant data and relevant data was extracted into the review.

Acknowledgements

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Editorial review, science to policy review, peer-review by a subject matter expert and knowledge mobilization of this document was coordinated by the Office of the Chief Science Officer: ocsoevidence-bcscdonneesprobantes@phac-aspc.gc.ca

Evidence tables

Table 1: Evidence of attitudes and acceptance of a booster dose of the COVID-19 vaccine in the general public (n=14)

Study	Method	Outcomes
Canada (n=5)		
INSPQ (2021) [7, 24] grey literature Longitudinal study Canada Jan 2022	Analysis of the acceptability of vaccination against COVID-19 was evaluated using an online survey of adults and HCWs in Quebec. Number of participants was not clearly stated (~3300 each collection period). Articles in French. There were multiple collection periods: Jan 11th, 2022 Jan 25th, 2022	• 42% of respondents have received three doses. • Most (70%) of respondents who have had two doses intend to get a third dose, 13% do not intend to, and 10% were unsure. • Not intending to receive a third dose among those with two doses was higher among men, those aged 25-44, those with less education (college or less), and those living in small towns (smaller than 10,000) compared to their counterparts. • 80% agreed that a third dose should be offered to all people aged 18+, 14% disagreed, and 6% were unsure. • 63% would be in favor of Canada sending vaccines to developing countries before offering third doses to Canadians, 29% disagreed, and 9% were unsure.
Ipsos (2022) [8] grey literature Cross-sectional study Canada Jan 2022	An online survey of 1001 adults across Canada (18+) were recruited from the Ipsos I-say panel as well as non-panel sources to understand vaccination in the time of Omicron.	• 77% would receive a third dose without hesitation (or have already received their third dose), and 23% were hesitant. This was up from a survey conducted in May 2021 where 34% of those aged 18-34 would not get a third dose, followed by 28% of those aged 35-54, and 10% of those aged 55+. • 68% and 76% agreed that getting a third dose will reduce the likelihood of getting COVID-19 and the likelihood of ending up in hospital, respectively. • 56% were concerned about long term side-effects from a third dose and this concern was more prevalent among younger respondents compared to older respondents (66% among those aged 18-34, 57% in those aged 35-54, and 47% among those aged 55+).
Angus Reid (2021) [9, 21, 22] grey literature Longitudinal study	Intentions for getting a third dose of the COVID-19 vaccine were analyzed in a sample of the general population using an online survey across a representative randomized	**Jan 2022** • 69% of those who have received three doses disagreed with the statement that it is time to end restrictions and let people self-isolate if they are at risk (5% unsure and 25% agreed). This was higher than those who have not been vaccinated yet (89%

Study	Method	Outcomes
Canada Sep 2021 – Jan 2022	sample who are members of the Angus Reid Forum. Sep 29 – Oct 3, 2021 (n=5011) Jan 7-1, 2022 (n=3375) Jan 7-12, 2022 (n=5002)	agreed) or the average across Canada (39% agreed). • Most respondents who received three doses felt that restrictions in their community were about right (44%) compared to the 85% of unvaccinated who felt restrictions were too strict. • 54% of third dose recipients believed that they will be exposed to and infected by Omicron no matter what they do. • 31% of those who received three doses thought if they got COVID-19 they would have relatively mild symptoms, 52% thought it would be serious but manageable, 13% thought it would be very severe, and 4% thought it may be deadly. In comparison only 6% of the unvaccinated and 14% of those with two doses believed if they caught COVID-19 it would be severe or deadly. **Sep-Oct 2021** • Among those who had already received at least one dose (n=4527), 62% reported they would get a booster vaccine as soon as it was available to them, 20% would get one but would prefer to wait, 9% would not get a booster, 8% were not sure, and 1% have already received a booster. • Canadians aged 18-24 (15%) and 35-44 (13%) were the least likely to get a booster compared to the average of 9%. In contrast, 75% of those aged 65+ would get a booster as soon as possible. • 15% of past voters for the Conservative Party of Canada and 10% of past voters for the Bloc Québécois report they will not get a booster compared to 2% of past Liberal voters and 3% of past NDP voters.
Leger (2021) [20, 25, 26] grey literature Longitudinal study Canada & US Aug 2021-Jan 2022	An online survey of Canadian and American adults (18+) was conducted to evaluate vaccine perceptions and intentions to vaccinate. Canadian data is summarized here and data from the US is found in the US section. Aug 2021, 1,515 Canadians, 1,005 Americans	**Jan 2022** • 81% believed that getting vaccinated, including receiving additional doses of the vaccine when necessary is effective for providing protection against COVID-19. • Belief in the effectiveness of vaccination including receiving booster doses was highest in those aged 55+, those living in sub-urban areas, and those already fully vaccinated (two doses). **Dec 2021**

Study	Method	Outcomes
	Dec 2021, 1,547 Canadian, 1,004 Americans Jan 2022, 1,547 Canadian, 1,014 American	• 78% were in favour of speeding up the introduction of third doses to certain populations and 22% were opposed. • Support for speeding up the introduction of third doses was higher in Quebec, in those aged 55+, and those already fully vaccinated (two doses). **Aug 2021** • 58% agreed that if studies show that a third dose is required for those that initially received AstraZeneca they would get a third dose, 7% felt comfortable as they were, and 35% did not receive AstraZeneca.
Nanos (2021) [10, 27] grey literature Longitudinal study Canada Sep-Dec 2021	A hybrid telephone and online survey of adults (18+) across Canada was conducted to evaluate interest in receiving a third dose of the COVID-19 vaccine. Sep-Oct 2021 (n=1017) Dec 2021 (n=1005)	**Dec 2021** • 89% would receive a third dose when it becomes available to them, 9% would not, and 2% were unsure. Intention to get a third dose is up from Sep-Oct 2021. • By province the highest level of interest to receive a third dose was found in the Atlantic Canada (93.3%), QC (90.1%), ON (90%), BC (85.2%), and the Prairies (82.5%). • Those aged 55+ (96.6%) were more interested in a third dose compared to those aged 35-54 (88.1%) and 18-34 (76.5%). • Men were slightly more interested in receiving a booster compared to women (89.7% vs 86.8%). **Sep-Oct 2021** • 84% were interested in getting a third dose, 10% were not interested, 3% were unsure, and 3% were unvaccinated. • By province the highest level of interest was found in BC (87.9%), ON (86.1%), QC (82.7%), Atlantic Canada (81.3%), and Prairies (78.5%). • Those aged 55+ (89.8%) were more interested in a third dose compared to those aged 35-54 (83.2%) and 18-34 (76.1%). • Men were slightly more interested in receiving a booster compared to women (84.2% vs 83.5%).
United Kingdom (n=3)		
Paul (2022) [17] preprint	Factors associated with COVID-19 booster vaccine intentions were evaluated in 22,139 fully vaccinated (two doses) adults in the UK.	• 4% of the weighted sample were unwilling to receive a COVID-19 booster vaccine and 4% were uncertain.

Study	Method	Outcomes
Cross-sectional study UK Nov-Dec 2021		• Those who were initially uncertain about receiving a vaccine (first and second doses) were more likely to be uncertain or unwilling to receive a booster (uncertain: RR 4.92, 95%CI: 2.98-8.11; unwilling: RR 5.29, 95%CI: 3.07- 9.09) compared to those who were initially willing. Initial unwillingness was also associated with a higher risk of booster uncertainty and unwillingness (uncertain: RR 6.40, 95%CI: 3.94-10.41; unwilling: RR 11.29, 95%CI: 6.79-18.78). • Low compliance with COVID-19 guidelines during strict restriction periods was a predictor of unwillingness (RR 2.45, 95%CI: 1.65-3.65) and uncertainty (RR 1.51, 95%CI: 1.04-2.19). Low levels of current stress about getting or becoming seriously ill from COVID-19 also predicted unwillingness (RR 1.91, 95%CI: 1.19-3.07) and uncertainty (RR 1.80, 95%CI: 1.19-2.72) about boosters. • Unwillingness to receive a booster was associated with being aged 18-29 (RR 5.74, 95%CI: 2.82-11.68), having less education (RR 2.50, 95%CI: 1.31-4.79), and being healthy (RR 1.52, 95%CI: 1.00-2.30) compared to those who were older, had more education, and longer-term physical health conditions. These trends were also seen with those who were uncertain about receiving a booster. • Three additional predictors of uncertainty were also identified. Those who were uncertain about receiving a booster were more likely to be unemployed (RR 3.25, 95%CI: 2.11-5.02) have lower levels of income (RR 2.43, 95%CI: 1.06-5.59), and have low self-reported knowledge of COVID-19 (RR 1.78, 95%CI: 1.19-2.67).
Office for National Statistics (2021)[19] grey literature Cross-sectional study UK	In this COVID-19 Vaccine Opinions Study (VOS) respondents who previously reported being vaccine hesitant in the Opinions and Lifestyle Survey (OPN) and consented to follow-up (n=2480) were asked about motivations and barriers to vaccination.	• 6% of all previously hesitant respondents reported that they were unlikely to receive a booster dose. • 50% of previously hesitant respondents who received two doses of the vaccine (n=750 total) were likely to get the booster, 11% were neither likely nor unlikely, 22% were fairly unlikely, 13% were unsure, and 4% did not want to say. • Those aged 30-49 were more unlikely (26%) to get a booster dose compared to 16% of those aged 18-29 and 17% of those aged 50-69.

Study	Method	Outcomes
Sep 2021		• The main reasons for being unlikely to accept a booster dose included believing that a booster dose would not offer more protection (60%), the first and second dose would keep them safe (47%), and worry about the long term effects (46%). • Those who were not likely to get a booster indicated they will not be motivated to get a booster (55% reported no potential informational and socio-psychological motivators, 44% reported no motivation to get access to daily activities, and 63% reported no interest in vaccines incentives for getting a booster dose). • Top motivators across all categories included helping life return to normal (34%), making it easier to go abroad (30%), to protect others from COVID-19 (26%), to protect themselves (23%), and vouchers or discounts (23%). • Of those that would be motivated by vouchers, 97% reported discounts for food or clothes would make them more likely to get a booster.
Office for National Statistics (2021) [12, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40] grey literature Longitudinal study UK Jul 2021-Jan 2022	Intention to accept a booster dose of the COVID-19 vaccine was collected as part of the online Opinions and Lifestyle Survey. **2021** Jul 28 – Aug 1 (n=3,860) Aug 11 – 15 (n=3,130) Aug 18 – 22 (n=2,900) Aug 25 – Sep 5 (n=3,170) Sep 8 – 19 (n=3,350) Sep 22 – Oct 3 (n= 3,140) Oct 6 – 17 (n= 3,760) Oct 20 – 31 (n= 4,210) Nov 3- 14 (n=1,860) Nov 18 – 28 (n= 1,390) Dec 1 – 12 (n=1080) Dec 15 – 19 (n= 670) Dec 15 - Jan 3 (n = 4,700) **2022** Jan 6 - 16 (n= 3,290)	**January 2022** • Among all respondents, 89% felt booster vaccines were important to slow the spread of COVID-19, 7% were undecided, and 4% believed they were not important. • Among those who have received two doses of vaccine, 72% were likely to get a booster dose (down 17% since December), 13% were unlikely (up 7%), 10% were neither unlikely or likely (up 6%), 4% were unsure (up 3%), and 2% preferred not to say (up 1%). • Top reasons among those who were unlikely to receive a booster dose were that the primary series will keep them safe (47%), the booster dose will not offer extra protection (39%), and worry about a bad reaction to a booster dose (27%). • 75% were likely to get a booster dose for COVID-19 at the same time as their flu shot, 13% were neither likely nor unlikely, and 5% were fairly unlikely. • Older respondents were more likely agree that booster vaccines are important to slow the spread of COVID-19 and to be likely to get a booster dose.

Study	Method	Outcomes
		• More men than women were likely to get a booster dose (77% vs 67%). • 87% of those who were clinically extremely vulnerable were likely to get a booster dose. **December 2021** • Among those who have already received two doses of vaccine, 89% were likely to get a booster dose (up 2% from November), 6% were unlikely (up 1%), 4% were neither unlikely to likely (down 2%), 1% were unsure (no change), and 1% preferred not to say (no change). • Major reasons for hesitancy included not believing a booster would offer more protection (55%), believing that the first and second dose will keep them safe (34%), and worry about a bad reaction to the booster (33%). **November** • Among those who have already received two doses of vaccine, 91% were likely to get a booster (down 1% from October), 5% were unlikely (down 1%), 4% were neither unlikely to likely (no change), 1% were unsure (no change), and 1% preferred not to say (no change). • Major reasons for being either very or fairly unlikely to get a booster included believing that the first and second dose will keep them safe (59%), not believing a booster would offer more protection (49%), and worry about long term effects (33%). • 83% would be likely or very likely to get a booster with their flu vaccine and 9% would be unlikely or very unlikely. **October** • Among those who have already received two doses of vaccine, 92% were likely to get a booster (up 1% since September), 4% were unlikely (no change), 2% were neither unlikely to likely (up 1%), 1% were unsure (down 1%), and less than 1% preferred not to say (no change). • Major reasons for being unlikely to get a booster included believing that the first and second dose will keep them safe (46%), not believing a booster

Study	Method	Outcomes
		would offer more protection (39%), and believing boosters should be offered to others first (31%). • 81% would be likely or very likely to get a booster with their flu vaccine and 9% would be unlikely or very unlikely. **September** • Among those who have already received two doses of vaccine, 91% are very likely to get a booster (up 3% since August), 4% were unlikely (down 2%), 3% were neither unlikely to likely (no change), 2% were unsure (down 2%), and less than 1% preferred not to say (no change). • Major reasons for being unlikely to get a booster included believing that the first and second dose will keep them safe (63%), not believing a booster would offer more protection (42%), and believing boosters should be offered to others first (28%). • 82% would be likely to get to get their booster at the same time as the flu vaccine. **August** • 88% were likely to get a booster vaccine if it was offered (down 1% from July/August), 3% were neither likely nor unlikely (no change), 6% were unlikely (up 1%), 4% were unsure (up 1%), and less than 1% preferred not to say (no change). • 85% would be likely to get a booster with their flu vaccine. **July - August** • 89% were likely to get a booster vaccine if it was offered, 3% were neither likely nor unlikely, 5% were unlikely, 3% were unsure, and 1% preferred not to say. • 85% would be likely get a booster with their flu vaccine.
US (n=6)		
Leger (2021) [20, 25, 26] grey literature Longitudinal study	An online survey of Canadian and American adults (18+) was conducted to evaluate vaccine perceptions and intentions to vaccinate. Data from the US is summarized here and Canadian data is in the Canada section.	**January 2022** • 63% believed that getting vaccinated (including receiving additional booster doses of the vaccine when necessary) was effective at providing protection from the virus. **December 2021**

Study	Method	Outcomes
Canada & US Aug 2021-Jan 2022	Aug 2021, 1,515 Canadians, 1,005 Americans Dec 2021, 1,547 Canadians, 1,004 Americans Jan 2022, 1,547 Canadians, 1,014 American	• 63% were in favor of speeding up the introduction of third doses to certain populations and 37% were opposed.
Lee (2021) [14] preprint Cross-sectional study US Aug-Nov 2021	COVID-19 booster vaccine attitudes and behaviors among 3,668 university students and staff at the University of Southern California were evaluated using an online survey. Willingness to receive a booster was coded as "unwilling" (never) and "willing" (any response other than "never").	• 96.2% were willing to receive a COVID-19 booster at least once per year, and 64% were willing to get boosters as often as necessary. • In bivariate analyses, those without prior COVID-19 infections had higher odds of booster willingness compared to those with self-reported prior COVID-19 infection (OR 1.99, 95%CI: 1.24-3.07). • In multivariate analyses, Asians had higher odds of booster willingness (at least one COVID-19 booster) compared to Whites (OR 2.45, 95%CI: 1.46-4.18). A higher trust in science was also associated with having higher odds of booster willingness (OR 8.73, 95%CI: 6.29-12.30).
Hahn (2022) [13] Longitudinal study US Nov 2020-Sep 2021	Residents from remote communities in Alaska participated in three online surveys to evaluate residents' early vaccine acceptance, vaccine uptake and motivations, risk perceptions and knowledge about COVID-19 vaccines, and likelihood of getting a booster vaccine. Survey 1: Nov-Dec 2020 (n=107) Survey 2: Mar 2021 (n=508) Survey 3: Sep 2021 (n=405) Only results on acceptability of a booster vaccine are captured from survey 3.	• Of those who had received two doses of a COVID-19 vaccine (n = 340), 79.7% said they would probably or definitely accept a COVID-19 booster when it became available. • Most respondents (68-75%) would probably or definitely encourage their parents, older family members, and friends to get the booster. • 88% did not have concerns about the COVID-19 booster. Of the 12% who did, the concerns included chronic health issues, unknown side effects, and side effects from previous COVID-19 vaccinations.
Yadete (2022) [16] Cross-sectional study	COVID-19 vaccine booster hesitancy and its associated factors were evaluated using an online survey. The survey included 2,138 adults from across the US.	• 61.8% were willing to take the booster dose and 38.2% were booster dose hesitant. • Those who had already received a primary dose of COVID-19 vaccine were more likely to accept booster doses (OR 3.32, 95%CI: 2.20–5.01).

Study	Method	Outcomes
US Jul 2021		• Parents who were willing to have their children vaccinated (OR 10.3, 95%CI: 6.78–15.77) and being a Democrat (OR 1.90, 95%CI: 1.17-3.10) were more likely to accept a booster dose. Other factors associated with booster dose acceptability included living with a vulnerable family member, having COVID-19 positive friends or family members, and having pre-existing conditions. • Significant factors for those who were hesitant to accept a booster included being younger, female, unvaccinated, having no religious affiliation, never been married, uninsured, being less educated, having little trust in COVID-19 vaccine information, and living in a southern region of the nation. • The mean scores of vaccine confidence index and vaccine literacy were lower among the hesitant group compared to the non-hesitant group. • Those who would accept a booster were more likely to agree (~85%) with the statements "vaccines are important for my health" and "vaccines are effective" compared to those who were hesitant (~47%).
Lennon (2022) [18] Cross-sectional study US May-Jun 2021	Attitudes towards COVID-19 booster, influenza, and a hypothetical combination influenza-COVID-19 booster vaccines were evaluated using an online survey of 12,887 adults from across the US.	• As a stand-alone vaccine, 45% of respondents would accept a COVID-19 booster and 58% would accept an influenza vaccine. For a combination influenza-COVID-19 vaccine, overall acceptance was 50%. • African Americans respondents were less willing to accept the COVID-19 booster alone (OR 0.67, $p<0.01$) or a combination influenza-COVID-19 booster (OR 0.60, $p<0.05$) compared to White respondents. • There was lower acceptance for the COVID-19 booster alone or a combination influenza-COVID-19 boosters among female, Black/African American, Native American/American Indian, and rural respondents. Higher acceptance was found among those who were older, identified as Democrat, had higher education, and those who have previously usually accepted the annual influenza vaccine.
Pal (2021) [23]	An online survey was used to assess vaccine hesitancy and attitudes toward a potential	• 63.6% were worried that current vaccination may not be effective against new strains and that additional booster doses or new vaccines may be

Study	Method	Outcomes
Cross-sectional study US Feb-Mar 2021	additional booster dose of COVID-19 vaccines among 1,358 healthcare workers (HCWs) across the US. Those who had received both doses or were planning to receive both doses of the vaccine were labelled as the vaccine non-hesitant group and those who did not accept either dose or were waiting or unsure, were labelled as the vaccine-hesitant group.	required. These concerns did not differ between the vaccine-hesitant and non-hesitant groups (68.8% vs 63.1%). • Overall acceptance for a hypothetical yearly booster vaccine to maintain immunity was 83.6%. Acceptance of a hypothetical annual booster dose was much lower among the vaccine-hesitant group (13.8%) compared to the non-hesitant group (89.9%).
Global (n=1)		
Ipsos (2021) [11] grey literature Cross-sectional study Global (Canada, Australia, Brazil, China, France, Germany, Italy, Japan, Mexico, Russia, Spain, US, UK) Aug 2021	Global attitudes towards COVID-19 booster doses of vaccine were evaluated across 13 countries using an online survey. Willingness to receive a third dose was measured in 1,000 adults aged 18-74 from Canada and the US, 1,000 adults aged 16-74 from the UK, France, Germany, and Japan, and 500 adults aged 16-74 in Australia, Brazil, China, Italy, Mexico, Russia, and Spain. Results specific to Australia, Canada, UK, and US.	• Highest intention to get a booster vaccine if it were available to respondents that day was in Brazil (96%), Mexico (93%), China (90%), Australia (82%), UK (82%), US (81%), Canada (77%), Spain (73%), Japan (72%), France (70%), Germany (70%), Italy (66%), and Russia (62%). **Canada** • 77% of Canadians agreed that if a third dose was available today they would get it, 15% disagreed, and 9% were unsure. Wanting a booster as soon as possible was more frequent among those aged 55+ (85%). • 69% agreed that they will need a booster at least every year for COVID-19, 15% were unsure, and 17% disagreed. • Most fully vaccinated Canadians disagreed (63%) with the statement that once their country returns to pre-COVID life there isn't a reason to get another booster shot. **US** • 82% agreed that if a booster was available today they would get it, 10% disagreed, and 8% were unsure. Wanting a booster as soon as possible was more frequent among those aged 55+ (91%). • 68% agreed that they will need a booster at least every year for COVID-19, 17% were unsure, and 15% disagreed. • Most (60%) fully vaccinated Americans disagreed (60%) with the statement that once their country returns to pre-COVID life there isn't a reason to

Study	Method	Outcomes
		get another booster shot. Agreement with not needing another booster if their country returns to pre-pandemic life was higher among those who were younger (<35) and among males. **Australia** • 82% agreed that if a booster was available today they would get it, 13% disagreed, and 6% were unsure. • 70% agree that they will need a booster at least every year for COVID-19, 14% were unsure, and 15% disagreed. • Most fully vaccinated individuals disagreed (76%) with the statement that once their country returns to pre-COVID life there isn't a reason to get another booster shot. Agreement with not needing another booster if their country returns to pre-pandemic life was higher among those who were younger (<35). **UK** • 82% agreed that if a booster was available today they would get it, 11% disagreed, and 6% were unsure. • 77% agreed that they will need a booster at least every year for COVID-19, 11% were unsure, and 12% disagreed. • Most fully vaccinated individuals disagree (70%) with the statement that once their country returns to pre-COVID life there isn't a reason to get another booster shot. Agreement with not needing another booster if their country returns to pre-pandemic life was higher among those who were younger (<35).

Abbreviations: CI, confidence interval; HCW, healthcare worker; OR, odds ratio; RR, risk ratio.

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