

RESEARCH ARTICLE



# COVID-19 vaccine confidence among parents of racially diverse children aged 0–12 years old in Canada: The role of major experience of racial discrimination, health literacy, and conspiracy beliefs

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## ABSTRACT

The success of COVID-19 vaccination is linked to trust, hesitancy, and confidence. Racial discrimination impacts vaccine hesitancy and trust, particularly in racialized groups. This study investigates factors influencing COVID-19 vaccine confidence among Canadian parents from different racial groups, addressing a gap in existing research. Data were collected in 2023 (October to November) included 2,528 parents of children aged 0–12. Findings showed significant mean differences between racial groups,  $F(7, 2520) = 9.92, p < .001$ , with Arabs presented lower means of confidence ( $M = 30.26, SD = 9.39$ ) compared to Asian ( $M = 35.71, SD = 8.14$ ), Black ( $M = 33.23, SD = 9.50$ ), and Indigenous parents ( $M = 35.07, SD = 9.45$ ). Multiple linear regression among White participants showed that conspiracy beliefs were negatively associated with COVID-19 vaccine confidence ( $\beta = -.60, p < .001$ ), whereas health literacy was positively associated with COVID-19 vaccine confidence ( $\beta = .09, p < .001$ ). Results among racialized groups showed that conspiracy beliefs ( $\beta = -.23, p < .001$ ) and racial discrimination ( $\beta = -.05, p = .049$ ) were negatively associated with COVID-19 vaccine confidence, while health literacy was positively associated with COVID-19 vaccine confidence ( $\beta = .31, p < .001$ ). This study highlights the complex factors influencing COVID-19 vaccine confidence among Canadian parents from racialized groups, suggesting that racial discrimination and conspiracy beliefs significantly reduce vaccine confidence, while health literacy plays a crucial role in increasing confidence. These results underscore the importance of addressing misinformation and systemic barriers to trust in vaccination efforts.

## ARTICLE HISTORY

Received 10 February 2025  
Revised 20 March 2025  
Accepted 24 March 2025

## KEYWORDS

Confidence in COVID-19 vaccine; racial diversity; racial discrimination; health literacy; conspiracy beliefs

## Introduction

Health-related researchers and public health authorities have been interested in studying factors associated with trust,<sup>1–4</sup> hesitancy,<sup>5–7</sup> and confidence<sup>8,9</sup> in COVID-19 vaccines due to their relationship with the success of vaccination campaigns.<sup>10</sup> Studies in Canada have shown that sociodemographic and psychosocial factors are associated with COVID-19 vaccine hesitancy, mistrust, confidence, and uptake.<sup>1,4,5,8,11,12</sup> For instance, Burns et al.<sup>5</sup> showed that being 34 years old and below, being Black, Indigenous, and having increased conspiracy beliefs toward COVID-19 is associated with higher vaccine hesitancy. Kaida et al.<sup>13</sup> showed that the intention to get vaccinated was negatively associated with being Indigenous, mixed/other racial identity, having a high school or less education, and having an income of 80K or lower. Cénat et al.<sup>1</sup> showed that education, religion, age, job status, language, and marital status were associated with vaccine mistrust among Black individuals. Additionally, Cénat et al.<sup>1</sup> showed that experience of racial discrimination in healthcare settings, health literacy, and conspiracy beliefs were associated with COVID-19 vaccine mistrust.<sup>1</sup>

While numerous studies have explored factors related to vaccine hesitancy, very few have examined those associated with Canadian parents' confidence in COVID-19 vaccine. Moreover, there is only one study that has focused on COVID-19 vaccine confidence among a Canadian sample. Cénat et al.<sup>8</sup> investigated factors related to COVID-19 vaccine confidence among Black individuals. The results showed that living in Quebec, having a post-secondary certificate or diploma below a bachelor's degree, an income between \$30,000 to \$74,999, higher experience of major discrimination, and conspiracy beliefs were negatively associated with COVID-19 vaccine confidence. Moreover, Cénat et al.<sup>8</sup> showed that province of residence (British Columbia, Alberta, Manitoba, and Nova Scotia), religion (Muslim), increased health literacy and experiences of traumatic events related to COVID-19 were positively associated with COVID-19 vaccine confidence. Studies among parents have shown that factors such as trust in healthcare providers (pharmacists, doctors, nurses),<sup>14</sup> risk perception, social norm about getting vaccinated,<sup>15</sup> religious or personal beliefs, safety concerns, and information about vaccination<sup>16</sup> are associated with vaccine

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hesitancy. Schellenberg et al.<sup>14</sup> investigated parents' trust in sources of information on vaccination among Canadian parents of 2-year-old children. Schellenberg et al.<sup>14</sup> showed that parents with lower levels of parental knowledge, attitudes, and beliefs regarding children's vaccines, trade/college education or high school education or less and those widowed/separated/divorced were less likely to trust information on COVID-19 vaccination. Besides, compared to territories, provinces were associated with higher trust in vaccination information sources. For instance, parents from the province of Quebec were more likely to trust all vaccination information sources (e.g., doctors, pharmacists, friends, and healthcare providers), while parents from the territories had less trust in doctors, nurses and pharmacists and more trust in information from family. Moreover, parents from the province of Ontario had more trust in the Provincial Ministry of Health, but less trust in family and friends. McKinnon et al.<sup>17</sup> showed that parents from racialized groups, with younger children, a lower income, and born abroad were less likely to accept COVID-19 vaccination. Hetherington et al.<sup>18</sup> showed a lower likelihood of vaccination for children among mothers with lower income, lower levels of education, and incomplete vaccination history. However, studies among parents from diverse racial groups in Canada are still lacking. To our knowledge, to date, no study was conducted on vaccine confidence among a Canadian sample of parents. In addition, none was conducted in different racial groups (e.g., Arab, Asian, Black, Indigenous).

Due to the impact of parental beliefs regarding the COVID-19 vaccines on their decision for their children's vaccination<sup>19–21</sup> and given the primary role of parents as decision-makers in their children's vaccination choices,<sup>22</sup> the current study focused on parents of children aged 0–12 years old. Given the importance of discovering the determinants of COVID-19 vaccine confidence among parents and the limited evidence regarding factors associated with COVID-19 vaccine confidence in diverse Canadian groups, the current study aims to investigate factors related to COVID-19 vaccine confidence among parents of Asian, Arab, Black, Indigenous, and White children in Canada. Understanding the factors associated with COVID-19 vaccine confidence among different parental groups is essential for tailoring public health strategies. The findings of this study will provide important insights into health equity, offering valuable implications for policymakers and the healthcare system. The current study expands the evidence base, providing a more comprehensive understanding of the determinants of COVID-19 vaccine confidence among racially diverse parents of children aged 0–12 years old.

## Material and methods

### Design and data collection

This study is a part of the “*perception of vaccine effectiveness among Canadians parents of children aged 0–12 and Canada's various ethnic communities*” project. The data were collected from October 2023 to November 2023. The population included parents of children aged 0–12. Recruitment of participants was conducted through an

online survey (Computer Assisted Web Interviewing (CAWI)) by Canada's largest research and marketing company, Léger (LÉO). This community currently has over 420,000 active members across Canada. A random number of 19,308 panel members were directly invited via e-mail to participate in the study. In addition, 1,210 panel members were invited through third parties or various partnership/advertising programs, as well as LÉO's social media platforms. A total of 4,158 people clicked on the survey, 1,522 were non-eligible. From the 2,636 people who were eligible, 108 refused to participate and 2,528 participants completed the survey (response rate: 95.90%). Each participant received a personalized invitation link by e-mail that can only be used once to prevent them completing the survey more than once or sharing it with others. The median survey length was 16 min and 21 s. Inclusion criteria consisted of 1) living in Canada; 2) parents of children aged 0–12; and 3) being able to complete the survey in English or French. This project was approved by the University of Ottawa Research Ethics Board (#H-04-23-9199) and all participants completed an electronic informed consent.

## Measures

### Sociodemographic

Participants completed a sociodemographic form that included information about gender, age, education, religion, province, race, language, place of birth, marital status, job status, and annual household income.

### COVID-19 vaccine confidence

The confidence of COVID-19 vaccine was measured using vaccine confidence subscale from COVID-19 vaccine confidence and mistrust beliefs scale.<sup>23</sup> This subscale includes nine items on a five-point Likert scale (from “*strongly disagree*” to “*strongly agree*”). Higher scores indicate greater levels of vaccine confidence. Bogart et al. reported a Cronbach's alpha of .90 for this subscale.<sup>23</sup> The internal consistency of this scale was .95 in the current study.

### Major experience of racial discrimination

The Major Racial Discrimination Scale (MRDS) was developed by Williams et al.<sup>24</sup> to measure major racial discrimination experiences in different domains such as health services, education, housing, job, justice system, and economics (i.e., “*have you ever been treated unfairly in a hospital or other health services?*”). The MRDS in the current study included seven items with a binary response option (“*yes*” or “*no*”). Previous studies have reported an internal consistency of .73 to .91.<sup>25,26</sup> The internal consistency of this scale was .78 in the current study.

### Everyday racial discrimination

Everyday racial discrimination was measured using the Everyday Discrimination Scale (EDS).<sup>27</sup> The EDS contains five items (e.g., “*You receive worse service than others at restaurants or stores.*”) each rated on a six-point scale, ranging from “*never*” to “*almost everyday.*” Higher scores indicate higher levels of everyday discrimination. Cénat

et al. reported a Cronbach's alpha of .90 for this scale.<sup>27</sup> The Cronbach's alpha of this scale was .94 in the current study.

### Health literacy

The health literacy scale (HLS) was used to measure health literacy.<sup>28</sup> The HLS includes eight items (e.g. "I can distinguish between high-quality and poor-quality health information on the Internet.") on a five-point scale (from "strongly disagree" to "strongly agree"). The HLS measures how individuals perceive their ability to locate and use health-related information online. Higher scores indicate greater levels of health literacy. Norman and Skinner reported a Cronbach's alpha of .88 for this scale.<sup>28</sup> The internal consistency of this scale was .92 in the current study.

### Conspiracy beliefs

The COVID-19 Conspiracy Belief scale was used to measure conspiracy beliefs about COVID-19.<sup>29</sup> This scale includes 10 items on a five-point Likert scale (from "strongly disagree" to "strongly agree"). This scale assesses the information on the origin of COVID-19, the number of fatalities associated with the virus, and vaccination (i.e., "a vaccine against COVID-19 already existed and was only made available once millions of people had been infected."). Increased scores on this scale indicate greater levels of conspiracy beliefs. Constantinou et al. reported a Cronbach's alpha of .89.<sup>29</sup> The internal consistency of this scale was .93 in the current study.

### Statistical analyses

Mean ( $M$ ) COVID-19 vaccine confidence was compared across sociodemographic factors using independent  $t$ -tests and one-way ANOVA. A set of post hoc analyses was conducted using Tukey's tests on significant results of  $F$ -tests. Two hierarchical multiple linear regression models among White participants and racialized groups were separately conducted using structural equation models. The analyses among racialized groups contained two models: Model 1 included racial discrimination as a latent factor (major experience of racial discrimination and everyday racial discrimination) and health literacy after controlling for gender, age, and province. Model 2 included predictors from Model 1 and conspiracy beliefs. Likewise, the analyses among White participants included two models: Model 1 included health literacy after controlling for gender, age, and province. Model 2 included predictors from Model 1 and conspiracy beliefs. Multicollinearity assumption was checked using a variance inflation factor (VIF). A significance level of  $\leq .05$  was used for all significance tests. The mean difference analyses were conducted using SPSS 29. Hierarchical multiple linear regression models were developed in Stata/SE 18, as Stata's structural equation modeling package allows researchers to create latent factors.

### Results

The current study included 2,528 parents (57.52% women). In total, 50.24% were White, 11.87% were Black, 11.39% were

Asian, 9.97% were Arab, 9.61% were Indigenous, 3.44% had mixed racial identity, 1.82% were Latin American, and 1.66% had other racial identity. Sociodemographic characteristics are presented in Table 1.

Mean differences across sociodemographic factors are presented in Table 2. Results showed significant mean differences between racial groups,  $F(7, 2520) = 9.92$ ,  $p < .001$ . Post hoc analysis showed that Asian ( $M = 35.71$ ,  $SD = 8.14$ ) and Indigenous parents ( $M = 35.07$ ,  $SD = 9.45$ ) had higher mean vaccine confidence compared to White ( $M = 31.87$ ,  $SD = 10.51$ ), Arab ( $M = 30.26$ ,  $SD = 9.39$ ), and people with other racial identity ( $M = 30.07$ ,  $SD = 9.87$ ). Asian parents had also higher mean vaccine confidence compared to parents with mixed racial identity ( $M = 31.11$ ,  $SD = 11.11$ ). Black parents ( $M = 33.23$ ,  $SD = 9.50$ ) had higher mean vaccine confidence compared to Arab parents. Results also showed higher mean COVID-19 vaccine confidence among men ( $M = 33.69$ ,  $SD = 9.77$ ) compared to women ( $M = 31.71$ ,  $SD = 10.23$ ),  $t(2358) = 4.93$ ,  $p < .001$ . This difference was also observed among White and parents with other racial identity (Table 2). However, no gender differences were found among Black, Arabic, Asian, and Indigenous parents. Other mean differences are presented in Table 2.

Multiple linear regression results are presented in Table 3. Regarding White participants, the final model showed that conspiracy beliefs were negatively associated with COVID-19 vaccine confidence ( $\beta = -.60$ ,  $p < .001$ ) and health literacy was positively associated with COVID-19 vaccine confidence ( $\beta = .09$ ,  $p < .001$ ). Among racialized groups, the final model showed that conspiracy beliefs were negatively associated with COVID-19 vaccine confidence ( $\beta = -.23$ ,  $p < .001$ ) and health literacy was positively associated with COVID-19 vaccine confidence ( $\beta = .31$ ,  $p < .001$ ). Racial discrimination was negatively associated with COVID-19 vaccine confidence ( $\beta = -.05$ ,  $p = .049$ ). As shown in Table 3, the strength of relation between racial discrimination and COVID-19 vaccine confidence did not change significantly after adding conspiracy beliefs to the model (Model 1:  $\beta = -.07$ ; Model 2:  $\beta = -.05$ ). These findings indicate that racial discrimination is an important factor in predicting COVID-19 vaccine confidence among racialized groups.

### Discussion

The aim of the current study was to investigate the confidence in COVID-19 vaccines among parents of children aged 0–12 years old from diverse racial groups in Canada. Results showed COVID-19 vaccine confidence differences between racial groups. Asian and Indigenous parents exhibited higher vaccine confidence compared to White, Arab, and parents with another racial identity, while Asian parents had higher vaccine confidence compared to parents with mixed racial identity. Moreover, Black parents presented higher vaccine confidence compared to Arab parents. The regression results confirmed that being Black, Asian, or Indigenous were positively associated with COVID-19 vaccine confidence. In contrast, McKinnon et al.<sup>17</sup> showed higher unwillingness to vaccine among racialized parents residing in Montreal compared to White parents. In another study in England, Bell et al.<sup>30</sup>

Table 1. Sociodemographic characteristics (N = 2,528).

	Total <sup>a</sup>		White		Black		Arab (Middle East or North Africa)		Asian (South, East or Southeast Asia)		Latin American		Indigenous		Other		Mixed	
	N	% <sup>b</sup>	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Total	2528		1270	50.24	300	11.87	252	9.97	288	11.39	46	1.82	243	9.61	42	1.66	87	3.44
Sex																		
Men	1069	42.29	540	42.52	113	37.67	123	48.81	164	56.94	25	54.35	55	22.63	18	42.86	31	35.63
Women	1454	57.52	727	57.24	187	62.33	129	51.19	123	42.71	21	45.65	188	77.37	24	57.14	55	63.22
Non-Binary	5	.20	3	.24					1	.35							1	1.15
Age																		
14–24	89	3.52	51	4.02	7	2.33	4	1.59	6	2.08	2	4.35	8	3.29	4	9.52	7	8.05
25–34	762	30.14	413	32.52	90	30.00	59	23.41	78	27.08	15	32.61	64	26.34	16	38.10	27	31.03
35–44	1173	46.40	523	41.18	160	53.33	129	51.19	143	49.65	18	39.13	152	62.55	12	28.57	36	41.38
45–54	401	15.86	219	17.24	41	13.67	52	20.63	45	15.63	9	19.57	14	5.76	8	19.05	13	14.94
55–64	84	3.32	53	4.17	2	.67	7	2.78	13	4.51	1	2.17	4	1.65	1	2.38	3	3.45
65–74	18	.71	10	.79			1	.40	3	1.04	1	2.17	1	.41	1	2.38	1	1.15
75 and above	1	.04	1	.08														
Province																		
Ontario	917	36.27	433	34.09	125	41.67	107	42.46	151	52.43	21	45.65	32	13.17	12	28.57	36	41.38
Quebec	712	28.16	397	31.26	80	26.67	98	38.89	16	5.56	12	26.09	75	30.86	17	40.48	17	19.54
British Columbia	298	11.79	131	10.31	9	3.00	12	4.76	68	23.61	5	10.87	55	22.63	4	9.52	14	16.09
Alberta	261	10.32	121	9.53	34	11.33	17	6.75	31	10.76	3	6.52	40	16.46	4	9.52	11	12.64
Saskatchewan	86	3.40	45	3.54	15	5.00	6	2.38	5	1.74	1	2.17	10	4.12	1	2.38	3	3.45
Manitoba	96	3.80	44	3.46	15	5.00	4	1.59	12	4.17	1	2.17	18	7.41			2	2.30
New Brunswick	66	2.61	44	3.46	7	2.33	5	1.98	3	1.04	3	6.52	4	1.65				
Nova Scotia	56	2.22	39	3.07	7	2.33	2	.79	1	.35			2	.82	2	4.76	3	3.45
Prince Edward Island	6	.24	3	.24	1	.33							2	.82				
Northwest Territories	23	.91	11	.87	6	2.00	1	.40					3	1.23	1	2.38	1	1.15
Yukon	2	.08							1	.35			1	.41				
Nunavut	4	.16	2	.16									1	.41	1	2.38		
Education																		
Primary/secondary/high school	471	18.63	284	22.36	38	12.67	29	11.51	31	10.76	7	15.22	54	22.22	11	26.19	17	19.54
College	622	24.60	401	31.57	55	18.33	49	19.44	33	11.46	7	15.22	45	18.52	13	30.95	19	21.84
University certificate/bachelor degree	913	36.12	422	33.23	121	40.33	113	44.84	163	56.60	22	47.83	26	10.70	15	35.71	31	35.63
Graduate degree (Master's/PhD)	522	20.65	163	12.83	86	28.67	61	24.21	61	21.18	10	21.74	118	48.56	3	7.14	20	22.99
Place of Birth																		
Canada	1813	71.72	1184	93.23	77	25.67	89	35.32	113	39.24	16	34.78	240	98.77	29	69.05	65	74.71
Abroad	715	28.28	86	6.77	223	74.33	163	64.68	175	60.76	30	65.22	3	1.23	13	30.95	22	25.29
Language																		
English	1446	57.20	779	61.34	169	56.33	79	31.35	143	49.65	12	26.09	197	81.07	19	45.24	48	55.17
French	543	21.48	366	28.82	65	21.67	39	15.48	4	1.39	3	6.52	38	15.64	15	35.71	13	14.94
Bilingual	399	15.78	97	7.64	50	16.67	92	36.51	110	38.19	18	39.13	8	3.29	8	19.05	16	18.39
Other	140	5.54	28	2.20	16	5.33	42	16.67	31	10.76	13	28.26					10	11.49
Job status																		
Employed (part-time/full-time/self-employed)	2124	84.02	1090	85.83	233	77.67	205	81.35	245	85.07	39	84.78	205	84.36	33	78.57	74	85.06
Unemployed	108	4.27	27	2.13	31	10.33	16	6.35	12	4.17	3	6.52	14	5.76	1	2.38	4	4.60
Student	49	1.94	14	1.10	18	6.00	7	2.78	3	1.04	2	4.35	4	1.65			1	1.15
Homemaker	223	8.82	120	9.45	18	6.00	24	9.52	25	8.68	2	4.35	19	7.82	8	19.05	7	8.05
Retired	24	.95	19	1.50					3	1.04			1	.41			1	1.15
Household income																		
Below \$10,000	56	2.22	20	1.57	17	5.67	10	3.97	4	1.39			4	1.65			1	1.15
\$10,000–\$19,999	65	2.57	25	1.97	12	4.00	11	4.37	4	1.39	1	2.17	7	2.88	2	4.76	3	3.45
\$20,000–\$39,999	187	7.40	63	4.96	46	15.33	19	7.54	22	7.64	6	13.04	21	8.64	5	11.90	5	5.75

(Continued)

Table 1. (Continued).

	Total <sup>a</sup>		White		Black		Arab (Middle East or North Africa)		Asian (South East or Southeast Asia)		Latin American		Indigenous		Other		Mixed	
	N	% <sup>b</sup>	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
\$40,000–\$59,999	285	11.27	118	9.29	47	15.67	34	13.49	38	13.19	5	10.87	21	8.64	8	19.05	14	16.09
\$60,000–\$79,999	352	13.92	172	13.54	48	16.00	48	19.05	38	13.19	8	17.39	22	9.05	5	11.90	11	12.64
\$80,000–\$99,999	388	15.35	202	15.91	47	15.67	50	19.84	52	18.06	11	23.91	10	4.12	7	16.67	9	10.34
\$100,000–\$124,999	378	14.95	228	17.95	35	11.67	29	11.51	45	15.63	7	15.22	13	5.35	5	11.90	16	18.39
\$125,000–\$149,999	249	9.85	139	10.94	22	7.33	19	7.54	33	11.46	2	4.35	20	8.23	6	14.29	8	9.20
\$150,000–\$199,999	317	12.54	183	14.41	18	6.00	24	9.52	34	11.81	2	4.35	37	15.23	3	7.14	16	18.39
\$200,000 and above	251	9.93	120	9.45	8	2.67	8	3.17	18	6.25	4	8.70	88	36.21	1	2.38	4	4.60
Religion																		
Christian	1329	52.57	679	53.46	240	80.00	57	22.62	88	30.56	33	71.74	160	65.84	25	59.52	47	54.02
Muslim	267	10.56	18	1.42	35	11.67	164	65.08	34	11.81			1	.41	7	16.67	8	9.20
Buddhist	29	1.15	2	.16	3	1.00	1	.40	19	6.60	2	4.35	1	.41			1	1.15
Jewish	29	1.15	16	1.26	4	1.33	4	1.59					1	.41	2	4.76	2	2.30
Hindu	61	2.41	1	.08			2	.79	51	17.71			1	.41	2	4.76	4	4.60
Other	110	4.35	48	3.78	8	2.67	4	1.59	22	7.64			16	6.58	4	9.52	8	9.20
No religion	703	27.81	506	39.84	10	3.33	20	7.94	74	25.69	11	23.91	63	25.93	2	4.76	17	19.54
Marital status																		
Sinlge	238	9.41	122	9.61	34	11.33	12	4.76	11	3.82			36	14.81	6	14.29	17	19.54
Married/common-law partner	2211	87.46	1097	86.38	263	87.67	231	91.67	271	94.10	45	97.83	202	83.13	35	83.33	67	77.01
Divorced/widowed	79	3.13	51	4.02	3	1.00	9	3.57	6	2.08	1	2.17	5	2.06	1	2.38	3	3.45

<sup>a</sup>Some N does not reach 2,528 due to having a response option "prefer not to answer."<sup>b</sup>Valid percentages were reported ("prefer not to answer" responses were treated as missing).



Table 2. COVID-19 vaccine confidence means differences across sociodemographic variables ( $N = 2,528$ ).

	Total		White		Black		Arab		Asian		Latin American		Indigenous		Other		Mixed		p-value <sup>a</sup>
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	
Total	32.57	10.08	31.87	10.51	33.23	9.50	30.26	9.39	35.71	8.14	32.39	11.00	35.07	9.45	30.07	9.87	31.11	11.11	<.001
Gender																			
Men	33.69	9.77	33.73	9.98	33.64	9.76	31.03	8.98	36.27	8.00	31.52	11.05	33.76	10.69	35.00	7.48	31.00	12.79	<.001
Women	31.71	10.23	30.46	10.69	32.98	9.36	29.53	9.75	34.88	8.27	33.43	11.11	35.45	9.05	26.38	9.94	30.93	10.11	<.001
p-value <sup>b</sup>	<.001		<.001		.281		.204		.150		.564		.290		.004		.978		<.001
Age																			
14–24	29.35	10.27	28.78	10.59															
25–34	31.44	9.71	30.83	9.89	32.54	9.57	29.37	8.79	34.94	7.93	34.27	8.24	32.06	10.50	28.69	9.60	30.22	10.59	.008
35–44	33.03	10.14	31.72	10.79	33.94	9.33	29.95	9.69	35.59	8.28	32.94	11.71	37.14	8.38			32.17	11.19	<.001
45–54	33.36	10.25	33.68	10.60	31.44	10.27	32.44	10.00	35.84	7.63									.195
55 and older	35.45	9.97	36.22	9.94					39.88	8.06									.177
p-value <sup>b</sup>	<.001		<.001		.250		.191		.173		.716		<.001				.488		<.001
Province																			
Ontario	32.64	10.14	31.99	10.79	33.09	9.55	30.13	9.34	35.70	8.27	35.24	8.95	32.97	11.75	28.35	11.53	32.42	10.51	<.001
Quebec	31.80	10.06	31.89	9.83	30.04	9.43	29.21	9.87	34.81	11.67			37.69	7.88			30.47	13.14	<.001
The Prairies and British Columbia	32.98	10.17	31.53	11.25	35.15	8.95	31.87	8.03	35.80	7.49			34.43	9.12			29.97	11.24	<.001
The Atlantic	33.63	9.38	32.32	9.38	38.95	6.92													.003
p-value <sup>b</sup>	.071		.901		<.001		.324		.902				.017				.660		<.001
Education																			
Primary/secondary/high school	28.52	10.65	27.31	10.87	31.18	8.00	28.34	8.61	34.87	8.79			30.15	10.91			28.18	12.76	.002
College	31.10	10.38	31.39	10.34	30.05	10.32	27.27	10.18	34.82	7.48			30.96	11.62			30.79	11.53	.037
University certificate/bachelor degree	33.76	9.41	34.02	9.76	34.58	8.84	29.68	9.05	36.09	7.93	30.45	11.33	34.88	8.35	33.13	7.43	31.32	10.64	<.001
Graduate degree (Master's/PhD)	35.90	8.75	35.47	9.27	34.26	9.98	34.66	8.32	35.59	8.79			38.93	5.69			33.60	10.14	<.001
p-value <sup>b</sup>	<.001		<.001		.009		<.001		.779				<.001				.536		<.001
Place of Birth																			
Canada	32.34	10.29	31.86	10.54	31.83	10.35	31.46	9.38	35.18	8.00	28.81	9.44	34.97	9.46	29.38	10.91	30.37	10.98	<.001
Abroad	33.16	9.53	32.07	10.24	33.71	9.16	29.61	9.37	36.05	8.23	34.30	11.43					33.32	11.48	<.001
p-value <sup>b</sup>	.055		.859		.135		.067		.374		.108						.285		<.001
Language																			
English	32.79	10.36	31.73	10.91	33.64	9.89	31.04	8.75	36.09	7.92			35.31	9.45	31.95	9.17	30.90	11.48	<.001
French	31.78	9.65	32.08	9.72	31.20	8.38	30.08	9.48					33.39	9.85	29.00	11.70			.390
Bilingual	32.80	9.65	32.27	10.25	34.54	9.42	29.50	9.53	35.52	8.28	34.33	9.97					29.56	11.16	<.001
Other	32.74	10.03	31.89	10.54	32.94	9.37	30.64	10.35	35.00	8.40									.305
p-value <sup>b</sup>	.235		.934		.236		.748		.738				.256		.416		.687		<.001
Job status																			
Employed (part-time/full-time/self-employed)	32.98	9.89	32.22	10.27	33.36	9.55	30.69	9.40	35.86	8.08	32.72	10.96	36.28	8.53	31.58	9.77	31.42	10.93	<.001
Unemployed	30.78	9.89	30.19	11.36	32.68	9.44	29.31	7.90											.468
Student	30.86	10.51			33.94	10.61													.119
Homemaker	29.52	11.18	28.63	11.85	31.67	8.32	27.54	9.67	34.56	8.82			28.79	12.78					
Retired	36.17	10.97	36.26	11.66															
p-value <sup>b</sup>	<.001		<.001		.865		.270		.448				.021						
Household income																			
Below \$10,000	30.30	9.62	28.25	10.82	32.59	8.30													.186
\$10,000–\$19,999	30.94	10.93	29.88	12.22															
\$20,000–\$39,999	30.96	10.44	30.17	11.02	32.74	10.18	30.11	7.96	34.32	8.54			28.43	10.88					.243
\$40,000–\$59,999	31.08	10.43	29.55	10.77	33.34	9.28	30.71	7.58	36.82	8.21			28.33	12.68					<.001
\$60,000–\$79,999	30.67	9.83	30.26	9.86	32.56	9.37	29.25	10.24	33.84	8.14			29.64	11.53					.125
\$80,000–\$99,999	32.47	9.63	32.00	9.89	33.36	8.21	29.58	9.75	35.96	8.30									.006
\$100,000–\$124,999	33.37	9.68	33.27	9.67	31.97	10.02	32.52	9.48	34.84	8.66			38.75	4.54			33.63	11.12	.730
\$125,000–\$149,999	34.49	9.25	33.80	10.06	36.77	10.09	29.16	8.25	35.67	7.70									.012
\$150,000–\$199,999	33.05	10.58	32.39	11.25	35.44	9.02	32.75	10.51	36.74	8.70			32.89	8.62			29.88	12.20	.209

(Continued)

(Continued)

Table 2. (Continued).

	Total		White		Black		Arab		Asian		Latin American		Indigenous		Other		Mixed		p-value <sup>a</sup>
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	
\$200,000 and above	35.53	10.01	32.52	11.68					37.44	6.76			40.31	4.34					<.001
p-value <sup>b</sup>	<.001		.004		.632		.610		.646				<.001				.371		
Religion																			
Christian	32.26	10.30	30.88	10.64	33.20	9.63	29.46	9.96	36.85	8.02	31.03	11.83	37.09	7.74	28.04	10.41	28.94	11.07	<.001
Muslim	31.73	8.99	30.39	7.74	33.74	9.01	30.24	9.02	35.79	8.32									
Buddhist	33.28	7.53							35.11	7.51									.004
Jewish	36.28	9.66	34.63	10.60															
Hindu	34.02	8.62							34.10	8.36									.517
Other	30.17	10.49	31.54	10.25					32.64	7.66			28.88	12.46					
No religion	33.54	10.12	33.22	10.33					36.49	8.18			31.32	10.91			34.29	10.39	.045
p-value <sup>b</sup>	.002		.003		.756		.184		.176				<.001				.087		
Marital status																			
Sinlge	29.45	10.40	29.41	10.61	28.32	9.89							28.69	10.21			31.65	10.75	.732
Married/common-law partner	32.98	9.95	32.24	10.44	33.77	9.29	30.48	9.39	35.74	8.03	32.67	10.96	36.24	8.75	30.29	9.56	31.31	11.09	
Divorced/widowed	30.51	11.17	30.00	11.04															<.001
p-value <sup>b</sup>	<.001		.008		.002								<.001				.912		

<sup>a</sup>p-values were obtained using independent t-tests (for variables with two categories) and ANOVAs (for variables with more than two categories).<sup>b</sup>This p-value is for the differences between racial groups.<sup>c</sup>This p-value is for total and mean differences within each racial group.

**Table 3.** Multiple linear regression for COVID-19 vaccine confidence among white and racialized groups.

	White participants						Racialized group					
	Model 1			Model 2			Model 1			Model 2		
	<i>B</i> (SE)	<i>z</i>	<i>p</i> -value	<i>B</i> (SE)	<i>z</i>	<i>p</i> -value	<i>B</i> (SE)	<i>z</i>	<i>p</i> -value	$\beta$	<i>z</i>	<i>p</i> -value
Gender	-.14 (.03)	-5.27	<.001	-.15 (.02)	-6.89	<.001	-.04 (.03)	-1.64	.100	-.02 (.03)	-.94	.345
Age	.12 (.03)	4.39	<.001	.03 (.02)	1.24	.215	.07 (.03)	2.48	.013	.06 (.03)	2.15	.032
Province	.01 (.03)	.42	.671	.02 (.02)	.73	.463	.05 (.03)	1.87	.061	.06 (.03)	2.52	.012
Health literacy	.20 (.03)	7.77	<.001	.09 (.02)	4.25	<.001	.31 (.03)	12.26	<.001	.31 (.02)	12.88	<.001
Racial discrimination <sup>a</sup>							-.07 (.03)	-2.89	.004	-.05 (.03)	-1.97	.049
Conspiracy beliefs				-.60 (.02)	-36.28	<.001				-.23 (.02)	-9.33	<.001

<sup>a</sup>Latent factor (everyday racial discrimination and major experience of racial discrimination).

showed that racialized parents/guardians were more likely to reject a COVID-19 vaccine for themselves and their children compared to White parents/guardians. Nonetheless, the outcome of the current study was different from previous studies' measures. For example, McKinnon et al.<sup>17</sup> measured intention to vaccinate against COVID-19 among parents for their children and Bell et al.<sup>30</sup> measured vaccine acceptability for parents and for their children.

Regarding the other sociodemographic factors, results showed lower confidence in COVID-19 vaccines among women compared to men. These findings can be explained by the beliefs among women who may have greater concerns about the risks associated with vaccines.<sup>31,32</sup> Thematic analysis of Hetherington et al.'s study<sup>18</sup> showed that the most concern in mothers residing in Calgary was safety and efficacy of vaccines such as adverse effects. Current study also showed that younger parents had lower levels of confidence in COVID-19 vaccines compared to older parents. This finding is consistent with previous studies that have shown more vaccine hesitancy among younger people.<sup>32</sup> Results also indicated higher levels of confidence in COVID-19 vaccines among parents with higher education (e.g., college, university certificate/bachelor's degree, and graduate degree) and those who were married/common-law partner. In fact, higher levels of education might be paired with enhanced literacy regarding the pandemic and COVID-19 vaccines which increases the confidence in COVID-19 vaccines. Similarly, Jansen et al.<sup>33</sup> showed that higher level of education attainment was associated with increased health literacy thus an increased confidence in COVID-19 vaccine.<sup>33</sup> Additionally, Szilagyi et al.<sup>34</sup> showed that there was higher child vaccine intention among parents with bachelor's degree or higher education. Moreover, more confidence in COVID-19 vaccines among parents who were married or had common-law partner could be associated with their higher levels of trust in vaccine information sources (e.g., doctors, nurses, and pharmacists).<sup>14</sup> However, further studies are needed to explain socio-cultural factors related to COVID-19 vaccine confidence among married parents or those who have a common-law partner.

Regarding regression analyses, results showed that conspiracy beliefs were negatively and health literacy was positively associated with COVID-19 vaccine confidence. Among racialized groups, health literacy was positively associated with COVID-19 vaccine confidence in both models. Racial discrimination was negatively associated with COVID-19 vaccine confidence in Model 1. After including conspiracy beliefs in

the model, the strength of this association did not change. These findings suggest that racial discrimination plays a key role in predicting COVID-19 vaccine confidence. Although conspiracy beliefs are a very strong predictor and usually make racial discrimination non-significant,<sup>1</sup> in this case, racial discrimination is strong enough to resist conspiracy beliefs. Results also showed that conspiracy beliefs were negatively associated with COVID-19 vaccine confidence.

Previous studies have indicated that parents' health literacy is associated with their attitudes toward vaccinating their children against COVID-19.<sup>35–39</sup> Moreover, studies have shown that parents' conspiracy beliefs play an important role in parents' attitudes/willingness to vaccine children.<sup>19–21</sup> As shown in previous studies, parents' main concerns and reasons for not getting vaccine are as follows: concerns about safety and efficacy, side effects, rushed process, long-term effects, being new, not enough information/evidence, and children hardly affected by COVID-19.<sup>18,30,34</sup> That is why increased health literacy through internet, social media, and other sources may increase parents' awareness about COVID-19 vaccines which in turn decreases conspiracy beliefs regarding COVID-19 vaccines. Hence, improving health literacy among parents is crucial for encouraging informed decision-making, increasing vaccine uptake, and protecting children's health during the pandemic.

### Implications

The current study provides insights into how racial discrimination, health literacy, and conspiracy beliefs play critical roles in COVID-19 vaccine confidence among racialized groups. One of the most important factors in COVID-19 vaccine confidence was racial discrimination. Racial discrimination might decrease trust in healthcare systems<sup>40</sup> and impact health behaviors.<sup>41</sup> To ensure a healthcare system free from racism, it is imperative to implement a multifaceted approach.<sup>42</sup> This includes comprehensive training for healthcare staff on anti-racist practices, the development and enforcement of policies aimed at eliminating racial discrimination, and the establishment of a system of positive and negative reinforcement. Moreover, training nurses to effectively address vaccine hesitancy among racialized parents, which is often rooted in experiences of racism, is essential for improving healthcare outcomes. This training should equip nurses with the cultural humility<sup>43</sup> and communication skills necessary to build trust,<sup>44</sup> acknowledge the historical and systemic factors contributing to vaccine mistrust, and engage in



empathetic dialogue. Moreover, public health agencies should develop strategies to mitigate the negative effects of racial discrimination on vaccine uptake. Due to the importance of vaccine confidence among parents in vaccine decision-making for their children, it is crucial to develop educational programs on vaccination to enhance parents' awareness while taking into account the needs of different communities. For example, public health agencies and healthcare services should focus on developing and testing interventions that improve health literacy. These interventions may reduce health disparities, particularly among marginalized and underserved populations, and contribute to more equitable health outcomes. Furthermore, to reduce conspiracy beliefs, such programs should be developed for creating a transparent communication and engagement with different communities. This approach aligns with the recommendation by the Royal Society of Canada Task Force on COVID-19, which advocates for tailoring interventions to enhance vaccine acceptance and reduce disparities in uptake by addressing local needs. It emphasizes the importance of actively engaging and collaborating with communities in the design and development of these interventions.<sup>17</sup> Additionally, communities should create factsheets about vaccination and promote them in social media and other digital platforms to increase awareness and knowledge about vaccines.

### Limitations

Although this study is the most important to date in Canada on COVID-19 vaccine confidence among parents, it still has some limitations. First, since the current research was a cross-sectional study, that prevented us to explore factors/events related to the outcome variable over time. Second, there were only five parents from non-binary gender which led us to exclude them from the analysis due to insufficient numbers of participants. Therefore, future studies should consider oversampling for non-binary gender to address this limitation. When attempting to compare with existing literature, the lack of previous studies on COVID-19 vaccine confidence in Canada may leave gaps. Most of them have focused on different outcome variables related to COVID-19 vaccine which are vaccine acceptance, uptake, intention, and willingness.

### Conclusions

The current research investigated factors related to COVID-19 vaccine confidence among parents from diverse racial groups in Canada. Findings indicate differences in COVID-19 vaccine confidence among race groups, with a higher confidence among Asian, and Indigenous parents compared to White parents. It was evident that the racial discrimination, health literacy, and conspiracy beliefs play a key role in COVID-19 vaccine confidence. The current study's findings help to better understand the underlying significant factors that influence parent's confidence in COVID-19 vaccine which can be useful in developing targeted interventions and policies intended to increase vaccine confidence among parents. This study contributes to the current literature by addressing the gaps in understanding COVID-19 vaccine confidence among racially diverse parental groups. While much of the existing studies

have focused on broader populations, this study specifically investigated COVID-19 vaccine confidence within Asian, Arab, Black, Indigenous, and White communities in Canada, offering valuable insights into the unique factors associated with COVID-19 vaccine confidence.

### Disclosure statement

No potential conflict of interest was reported by the author(s).

### Funding

This study was supported by the grant [# 2324-HQ-000162] and the grant [# 4500440446] from the Public Health Agency of Canada (PHAC).

### Author contribution

Drs. JMC and SMMM had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. *Concept and design:* JMC and SMMM. *Acquisition of data:* JMC. *Statistical analysis:* JMC and SMMM. *Interpretation of data:* JMC and SMMM. *Drafting of the manuscript:* JMC and SMMM, Beogo, and Dalexis. *Critical revision of the manuscript for important intellectual content:* Cénat, RDD, IB, and LG. *Supervision:* JMC.

### Data availability statement

Data that support the findings of this study are available from the corresponding author upon reasonable request.

### Ethical approval statement

This study was approved by the University of Ottawa Research Ethics Board (#H-04-23-9199).

### Notes on contributor

**Jude Mary Cénat**, Ph.D., M.Sc., C.Psych. is a Full Professor in the School of Psychology, the Director of the Interdisciplinary Centre for Black Health and of the Vulnerability, Trauma, Resilience & Culture Research Laboratory (V-TRaC Lab). Dr. Cénat also holds the University of Ottawa Research Chair on Black health. His research program explores factors associated with vulnerability, trauma, and resilience, with a particular interest in the role of cultural factors; racial disparities in health and social services; and global mental health. He conducts research in North America, Europe, Africa, and the Caribbean. He leads major projects on the mental health of Black communities in Canada that documented for the first-time prevalence and factors related to depression, anxiety, PTSD, psychosomatic symptoms, and other mental health problems among Black individuals in Canada. With his team, he also developed online trainings (via the bilingual platform <https://santementalpourtous.ca/>; <https://mentalhealthforveryone.ca>) which aims to equip mental health professionals with the knowledge to provide culturally appropriate and antiracist care. Dr. Cénat is also a member of the College of New Scholars, Artists and Scientists of the Royal Society of Canada.

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