Brief Report

COVID-19 Vaccine Willingness among African, Caribbean, and Black People in Ottawa, Ontario

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Abstract: Vaccines have been identified as a crucial strategy to control the spread of COVID-19 and reduce its impact. However, there are concerns about the acceptance of vaccines within African, Caribbean, and Black (ACB) communities. Based on a community sample of ACB people in Ottawa, Ontario (n = 375), the current study aimed to use logistic regression analysis and identify factors associated with COVID-19 vaccine willingness. A multivariate analysis shows that ACB people who believed that the ACB population is at a higher risk for COVID-19 were more likely to be willing to receive the vaccine compared to those who did not (OR = 1.79, $p < 0.05$). ACB people who had received at least one dose of the COVID-19 vaccine were more likely to be willing to receive it in the future (OR = 2.75, $p < 0.05$), and trust in government COVID-19 information was also positively associated with vaccine willingness (OR = 3.73, $p < 0.01$). In addition, English-speaking respondents were more willing to receive the vaccine compared to French-speaking respondents (OR = 3.21, $p < 0.01$). In terms of socioeconomic status, ACB people with a post-graduate degree (OR = 2.21, $p < 0.05$) were more likely to report vaccine willingness compared to those without a bachelor's degree. Based on these findings, we discuss implications for policymakers and directions for future research.

Keywords: vaccine willingness; COVID-19; African, Caribbean, and Black; Ottawa; Ontario

1. Introduction

In May 2020, the 73rd World Health Assembly passed a resolution recognizing the significance of vaccines as a global strategy to prevent, control, and ultimately eradicate the spread of COVID-19 [1]. In Canada, several COVID-19 vaccines have received approval from Health Canada following clinical research that validated their safety and efficacy [2]. However, as the uptake of the vaccine is voluntary in Canada, vaccine hesitancy presents a significant challenge to the success of the vaccine program. Studies in Canada have identified safety concerns, risks, and side effects as common reasons for COVID-19 vaccine hesitancy. For example, Frank and Arim found that more than half of Canadians reported a lack of confidence in vaccine safety (54%) and fear of side effects (52%) as reasons for vaccine hesitancy [3]. Similarly, a recent qualitative analysis of Canadian Twitter users found that concerns about safety, conspiracy theories, and misinformation were the main drivers of vaccine hesitancy [4].

Research has revealed that vaccine hesitancy is a significant concern in Canada, with 23% of Canadians indicating they are unwilling to receive the COVID-19 vaccine, based on data from the Canadian Community Health Survey collected between September and December 2020 [5]. Vaccine willingness has been observed to be lower among some vulnerable groups, including members of African, Caribbean, and Black (ACB) communities. For instance, evidence suggests that 22% of nonvisible minority Canadians are not willing to

receive the vaccine, but this figure increases sharply to 45% among Black Canadians [5]. In British Columbia, Kaida et al. also found that ACB individuals (57%) are less likely to intend to be vaccinated than their White counterparts (81%) [6]. Moreover, studies have indicated that vaccine hesitancy scores are higher among Black Canadians than White Canadians, even after accounting for sociodemographic factors [7]. These findings are considered reflective of the historical and ongoing experiences of systemic racism and discrimination in healthcare, which have eroded trust in the healthcare system and significantly contributed to vaccine hesitancy among ACB individuals [8–10].

Research has identified a complex interplay of psychosocial, demographic, and socioeconomic factors that may influence people's vaccine willingness. For example, psychosocial factors, such as COVID-19 knowledge, risk perceptions, prior COVID-19 vaccine experience, and attitudes toward COVID-19 media messages, have been identified to shape vaccine willingness [11–13]. Demographic factors, such as age and gender, have also been understood as important predictors of vaccine willingness. Specifically, it has been shown that older and female individuals are more likely to report vaccine willingness compared to their younger and male counterparts [14,15]. In addition, income and education have been found as socioeconomic factors that may be associated with vaccine willingness, with research indicating that people with higher income and education are more likely to report higher levels of vaccine willingness [12,14].

Although these findings are important, very few studies have examined the factors associated with COVID-19 vaccine willingness among ACB people in Canada. This void in the literature is particularly concerning because ACB people in Canada have been disproportionately impacted by COVID-19 [16,17]. For example, Gupta and Aitken have shown that ACB communities have experienced a higher burden of COVID-19 cases, hospitalizations, and deaths compared to other racial/ethnic groups [18]. In this context, it is important to further pay attention to low levels of vaccine willingness among ACB people that have been previously documented. To this end, the current study aimed to identify psychosocial, demographic, and socioeconomic factors that are associated with COVID-19 vaccine willingness among ACB people in Ottawa, Ontario.

2. Materials and Methods

2.1. Data

The data were collected in May 2022 as part of the ACB Vaccine Acceptance Project, a two-year community-based participatory research initiative aimed at optimizing vaccine uptake in the ACB community in the Ottawa Capital Region. This context of Ottawa is critical for this study, considering that 37% of COVID-19 infection cases were reported by ACB people while representing only 7% of the population at the city level [19]. The study questionnaire was developed by the research team in collaboration with project partners and community stakeholders. We held three consultation meetings to solicit stakeholder input, which strengthened the various sections and specific questions of the questionnaire. The use of peer equity navigators (PENs) was instrumental in reaching difficult-to-reach areas of the community. PENs are individuals in ACB communities who have been trained by our research team using a 12-module didactic training program, accompanied by a six-week preceptor's hands-on practicum in community-based health organizations, such as community health centers and AIDs Service Organizations. PEN training curriculum is framed within critical health literacy and critical racial literacy discourses, covering topics such as the history of ACB people in Canada, social determinants of health, health inequities, racism, and racial analysis of the sociopolitical context of healthcare [20]. The project involved meaningful community and provider engagement in the design, implementation, and evaluation of vaccine promotion, as well as knowledge translation interventions. Due to the ACB community being considered a hard-to-reach population, we utilized a venue-based method to sample ACB individuals in Ottawa. Venue-based sampling is a systematic sampling approach used in public health research to collect information from hard-to-reach populations, which can reduce bias and increase homogeneity within a sample through

randomization procedures [21,22]. We selected several venues such as ethnic grocery stores, community centers, churches, and barber shops. We initially recruited 630 people and successfully interviewed 375 people, achieving a response rate of 60%. Ethics approval for this study was obtained from the University of Ottawa Research Ethics Board.

2.2. Dependent Variable

In this survey, respondents were asked whether they 'are willing to get vaccinated against COVID-19 in the future' with five possible outcomes: (1) completely agree, (2) somewhat agree, (3) neutral/no opinion, (4) somewhat disagree, and (5) completely disagree. Using this question, we constructed the dependent variable called 'vaccine willingness', where 'completely agree' and 'somewhat agree' were coded as 'yes' and 'neutral/no opinion', 'somewhat disagree', and 'completely disagree' were coded as 'no' (0 = no; 1 = yes).

2.3. Independent Variables

Informed by previous studies [23,24], we further introduced three sets of independent variables, namely, psychosocial, demographic, and socioeconomic factors. For psychosocial factors, for example, we constructed a variable called COVID-19 knowledge using responses to the following statements: (1) vaccinated people need not worry about COVID-19 at all, (2) vaccinated people need not maintain physical distancing, and (3) vaccinated people need not use PPEs. Considering that these variables are ordinal (0 = completely agree; 1 = somewhat agree; 2 = neutral/no opinion; 3 = somewhat disagree; 4 = completely disagree), we used principal component analysis to combine these variables to create a single scale (α = 0.79). For ease of interpretation, this variable was further divided into three categories, resulting in the variable being tercile (0 = low; 1 = middle; 2 = high). In addition, we included two other questions as psychosocial variables, asking respondents whether they (1) perceive the ACB population as having a higher COVID-19 risk and (2) trust information about COVID-19 from the government. While these questions were originally ordinal (0 = completely agree; 1 = somewhat agree; 2 = neutral/no opinion; 3 = somewhat disagree; 4 = completely disagree), we further dichotomized these variables by combining 'completely agree' and 'somewhat agree' into 'yes' and 'neutral/no opinion', 'somewhat disagree', and 'completely disagree' into 'no' (0 = no; 1 = yes). We also included another psychosocial variable that measures whether respondents have been vaccinated against COVID-19 at least once (0 = no; 1 = yes). Moreover, there are five demographic factors, including the age of respondents (0 = 55+; 1 = 35-54; 2 = 18-34), gender (0 = female; 1 = male), preferred language (0 = French; 1 = English), marital status (0 = formerly married; 1 = never married; 2 = currently married), and citizenship status (0 = citizen; 1 = noncitizen). Finally, we included two socioeconomic factors: education (0 = less than bachelor's degree; 1 = bachelor's degree; 2 = post-graduate degree) and income satisfaction (0 = dissatisfied; 1 = neutral; 2 = satisfied).

2.4. Statistical Analysis

We employed three separate analyses. First, we conducted a univariate analysis to describe sample characteristics. Second, bivariate analysis was used to describe the unadjusted relationship between the dependent and independent variables. Third, we further relied on multivariate analysis to estimate the net impacts while simultaneously accounting for psychosocial, demographic, and socioeconomic factors. For the bivariate and multivariate analyses, logistic regression was chosen as the most suitable approach, considering the binary nature of the dependent variable [25]. The results are shown in odds ratios (ORs). The ORs larger than 1 indicate that respondents were more likely to be willing to be vaccinated against COVID-19, while those smaller than 1 imply lower odds of doing so. In all analyses, $p < 0.05$ was set as the cut-off for statistical significance. All analyses were conducted using Stata 15 (StataCorp, College Station, TX).

3. Results

Table 1 presents sample characteristics. We found that 47% of ACB people in Ottawa were willing to receive the COVID-19 vaccine. In addition, 30% believed that the ACB population is at a higher risk for COVID-19 compared to other racial/ethnic groups, while 88% received at least one dose of the COVID-19 vaccine. Furthermore, 55% of respondents reported that they trust COVID-19 information from the government. The majority of the respondents were female (58%), currently married (53%), and non-temporary residents (85%). Finally, 45% did not have a bachelor's degree, while 40% reported satisfaction with their income.

Table 1. Sample characteristics.

	Percentage
COVID-19 vaccine willingness	
No	53
Yes	47
COVID-19 knowledge	
Low	36
Middle	31
High	33
ACB communities have a higher risk	
No	70
Yes	30
Prior COVID-19 vaccine	
No	12
Yes	88
Trust COVID-19 information from government	
No	45
Yes	55
Age	
55+	18
35-54	41
18-34	41
Gender	
Female	58
Male	42
Language	
French	46
English	54
Marital status	
Formerly married	9
Never married	38
Currently married	53
Citizenship status	
Citizen	85
Noncitizen	15
Education	
No bachelor's degree	45
Bachelor's degree	35
Post-graduate degree	20
Income satisfaction	
Dissatisfied	30
Neutral	31
Satisfied	39
Number of participants	375

Table 2 displays the results from bivariate and multivariate analyses. At the bivariate level, several psychosocial, demographic, and socioeconomic factors were significantly

associated with COVID-19 vaccine willingness. Respondents with a high level of COVID-19 knowledge were more likely to report vaccine willingness compared to those with lower knowledge levels (OR = 1.72, *p* < 0.05). Similarly, respondents who believed that the ACB population is at higher risk for COVID-19 were more likely to be willing to receive the vaccine compared to those who did not believe so (OR = 2.38, *p* < 0.01). Furthermore, respondents who had received at least one dose of the COVID-19 vaccine were more likely to be willing to receive it in the future (OR = 5.84, *p* < 0.01). Trust in government COVID-19 information was also positively associated with vaccine willingness (OR = 4.02, *p* < 0.01). The only significant demographic factor was language, with respondents who chose English being more willing to receive the vaccine compared to those who chose French (OR = 2.70, *p* < 0.01). For socioeconomic status, we found that respondents with a post-graduate degree were more likely to report vaccine willingness compared to those without a bachelor's degree (OR = 2.68, *p* < 0.01). Although only weakly statistically significant, we also found that ACB people with income satisfaction were more likely to report vaccine willingness compared to those with income dissatisfaction (OR = 1.60, *p* = 0.067).

Table 2. Unadjusted and adjusted logit models of 'COVID-19 vaccine willingness' among ACB people.

	Unadjusted				Adjusted			
	OR		95% CI		OR		95% CI	
COVID-19 knowledge								
Low	1.00				1.00			
Middle	0.96		0.58	1.58	0.77		0.42	1.40
High	1.72	**	1.05	2.82	1.12		0.61	2.05
ACB communities have a higher risk								
No	1.00				1.00			
Yes	2.38	***	1.51	3.73	1.79	**	1.05	3.05
Prior COVID-19 vaccine								
No	1.00				1.00			
Yes	5.84	***	2.53	13.45	2.75	**	1.04	7.27
Trust COVID-19 government information								
No	1.00				1.00			
Yes	4.02	***	2.60	6.21	3.73	***	2.20	6.35
Age								
55+	1.00				1.00			
35–54	1.38		0.78	2.45	1.53		0.75	3.14
18–34	1.16		0.65	2.07	1.80		0.83	3.89
Gender								
Female	1.00				1.00			
Male	1.14		0.75	1.71	1.25		0.75	2.09
Language								
French	1.00				1.00			
English	2.70	***	1.77	4.11	3.21	***	1.95	5.28
Marital status								
Formerly married	1.00				1.00			
Never married	1.84		0.85	3.98	1.20		0.45	3.22
Currently married	1.86		0.88	3.94	1.04		0.42	2.58
Citizenship status								
Citizen	1.00				1.00			
Non-citizen	0.99		0.56	1.76	1.55		0.74	3.27
Education								
No bachelor's degree	1.00				1.00			
Bachelor's degree	1.25		0.77	1.97	1.22		0.70	2.11
Post-graduate degree	2.68	***	1.52	4.72	2.21	**	1.12	4.38

Table 2. *Cont.*

	Unadjusted			Adjusted			
	OR		95% CI	OR			95% CI
Income satisfaction							
Dissatisfied	1.00				1.00			
Neutral	1.23		0.72	2.08	1.37		0.73	2.60
Satisfied	1.60	*	0.97	2.62	1.84	*	1.00	3.40

* $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

The multivariate results were largely consistent with the bivariate results, except for the relationship between COVID-19 knowledge and vaccine willingness. Specifically, respondents who believed that the ACB population is at a higher risk for COVID-19 were more likely to be willing to receive the vaccine compared to those who did not believe so (OR = 1.79, $p < 0.05$). Additionally, respondents who had received at least one dose of the COVID-19 vaccine were more likely to be willing to receive it in the future (OR = 2.75, $p < 0.05$), and trust in government COVID-19 information remained positively associated with vaccine willingness (OR = 3.73, $p < 0.01$). Notably, the significance observed for COVID-19 knowledge at the bivariate level was no longer significant when controlling for prior COVID-19 vaccine experience. Language remained a significant demographic factor, with English-speaking respondents more willing to receive the vaccine compared to French-speaking respondents (OR = 3.21, $p < 0.01$). Socioeconomic factors also remained significant, with respondents with a post-graduate degree being more likely to report vaccine willingness compared to those without a bachelor's degree (OR = 2.21, $p < 0.05$). Although only weakly statistically significant, we also found that ACB people with income satisfaction were more likely to report vaccine willingness compared to those with income dissatisfaction (OR = 1.84, $p = 0.051$).

4. Discussion and Conclusions

ACB communities in Canada have experienced a disproportionate impact of COVID-19, with higher rates of infection and mortality compared to other groups. Vaccines have been identified as a crucial strategy to control the spread of the virus and reduce its impact. However, there are concerns about vaccine hesitancy within ACB communities. Based on a community sample of ACB people in Ottawa, the current study aimed to identify psychosocial, demographic, and socioeconomic factors associated with vaccine willingness against COVID-19.

We identified several psychosocial factors associated with vaccine willingness against COVID-19 among ACB community members. For instance, those who believed that ACB people are at a higher risk of contracting COVID-19 were more likely to express willingness to be vaccinated. This finding aligns with previous research indicating that risk perception can shape attitudes toward health-related behaviors [26]. The recognition of unique vulnerabilities that ACB people face due to the fact of their social and economic circumstances may have influenced their perceived benefits of the vaccine, increasing their willingness to be vaccinated against COVID-19 [19,20]. We also found a positive association between trust in government COVID-19 information and vaccine willingness, which is consistent with previous research [27–29], indicating the significance of trust in government institutions and health authorities for vaccine acceptance. These findings should be contextualized within the historical and ongoing experiences of discrimination faced by ACB people in Canada [30,31]. It has been discussed that racial discrimination within the healthcare system and beyond can result in a lack of trust in government institutions [32,33]. In this context, it is possible that some ACB people may be viewing government information as biased and unfair, which may be further contributing to lower levels of vaccine willingness.

Furthermore, it was found that ACB people who had received at least one dose of the COVID-19 vaccine had higher odds of reporting vaccine willingness compared to

those who had not. This finding is largely consistent with previous research, showing that university students who received the COVID-19 vaccine reported more positive attitudes toward vaccine willingness [31]. Our result may point out that this trend can be extended to vulnerable populations such as ACB people, highlighting the importance of positive vaccine-related experiences [34,35]. In addition, we observed that the role of COVID-19 knowledge on vaccine willingness was no longer statistically significant once previous vaccine experience was added to the model. This observation may indicate that COVID-19 knowledge is an important intermediary factor that shapes people's behaviors related to COVID-19 including vaccine willingness [11].

As part of demographic factors, we observed that respondents who opted for English as their preferred language for the survey were more willing to get vaccinated in comparison to their French-speaking counterparts. This result is consistent with previous research by the Office of the Commissioner of Official Languages [36], which revealed that Francophone people outside of Quebec encountered more difficulties accessing COVID-19 information in their preferred language during the pandemic compared to Anglophone Canadians. Despite English and French being recognized as official languages in Canada, some COVID-19 public speeches and activities delivered by the Chief Public Health Officer were only accessible in English [36]. Additionally, Timony et al. have pointed to a shortage of French-speaking healthcare workers in Ontario that may limit opportunities for Francophone patients to receive COVID-19 vaccine information in their preferred language in a healthcare setting, particularly in linguistic minority environments [37]. These unique language and cultural barriers may be contributing to lower levels of willingness to get vaccinated among Francophone ACB people.

We also found that socioeconomic factors were significantly associated with vaccine willingness. Specifically, respondents with a post-graduate degree were more likely to report vaccine willingness compared to those without a bachelor's degree. This result is consistent with an earlier observation indicating that higher levels of education were associated with greater vaccine willingness among ACB communities in Toronto [34]. Moreover, although only weakly statistically significant, we also found that respondents who were satisfied with their income were more likely to report vaccine willingness compared to their dissatisfied counterparts. This finding is supported by the argument that ACB communities are more likely to experience low income, unemployment, and housing insecurity, all of which can serve as critical barriers to accessing healthcare and establishing trust in the healthcare system [35]. In addition, while the vaccine itself may be available free of charge, financial barriers, such as transportation costs and lost wages from taking time off work to get vaccinated, may contribute to lower vaccine willingness among ACB people [38]. These findings should be understood in the context of systemic discrimination in education and employment persistently experienced by ACB communities. The Canadian Race Relations Foundation [39] has noted that Black Canadians are less likely to have post-secondary education than non-Black Canadians and are overrepresented in precarious low-wage jobs.

Based on the findings of our study, there are several useful implications for policymakers. First, regarding the psychosocial impact on vaccine willingness, it may be crucial to address issues such as limited COVID-19 risk perception and knowledge, a lack of prior COVID-19 vaccine experience, and mistrust of government COVID-19 information about COVID-19. To address these concerns, it may be helpful to integrate culturally and linguistically sensitive messaging and outreach about COVID-19 and vaccines as part of media health communication interventions. In addition, providing culturally and linguistically accessible and sensitive healthcare services may increase vaccine willingness among ACB individuals. Therefore, policy initiatives that aim to promote diversity in healthcare services could be beneficial. In terms of socioeconomic factors, policymakers should continue to address systemic disparities faced by ACB communities in areas such as education, employment, and income. However, it may also be useful to establish policy programs that can reduce financial barriers, such as transportation costs and lost wages from taking time off work to get vaccinated.

Despite these policy recommendations, there are some limitations to this study. First, the use of a cross-sectional survey design limits the ability to identify the temporal order of the variables. Therefore, causal mechanisms cannot be determined and, therefore, our results are limited to statistical associations. Similarly, it is also critical to acknowledge a selection bias as a possible bias introduced in this study. For example, we explored the association between prior COVID-19 vaccine experience and vaccine willingness, indicating that people who have been vaccinated at least once were more likely to have higher levels of vaccine willingness. However, it is also possible that people with higher levels of vaccine willingness have selected themselves into receiving the COVID-19 vaccine. It is also important to note that vaccine willingness toward COVID-19 could be socially desirable, potentially leading to social-desirability bias, where respondents may overreport their willingness to receive the vaccine [40,41]. In addition, this study is based on a community sample of ACB individuals in Ottawa. Therefore, the findings of this study may not be generalizable to other ACB communities across Canada. It would be important to increase the sample size while implementing multisite research projects that concern COVID-19 vaccines among ACB people in Canada. Finally, it is also noteworthy that previous experiences such as prior COVID-19 infection, as well as COVID-19-related deaths in the family or close relatives, may be further impacting people's intention to receive vaccines against COVID-19. However, we were not able to explore this possibility due to the limitations of our data. To address these concerns, we recommend that future studies employ mixed-method approaches that integrate longitudinal quantitative techniques coupled with in-depth qualitative interviews and observations, which might be useful for capturing the unique decision-making processes that ACB individuals may undergo in deciding whether to receive the COVID-19 vaccine. This could provide a more comprehensive understanding of the factors that influence vaccine willingness among ACB populations in Canada.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

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