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Examining Australian public perceptions and behaviors towards a future COVID-19 vaccine

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Abstract

Background: As immunisation program launches have previously demonstrated, it is essential that careful planning occurs now to ensure the readiness of the public for a COVID-19 vaccine. As part of that process, this study aimed to understand the public perceptions regarding a future COVID-19 vaccine in Australia.

Methods: A national cross-sectional online survey of 1420 Australian adults (18 years and older) was undertaken between 18 and 24 March 2020. The statistical analysis of the data included univariate and multivariable logistic regression model analysis.

Results: Respondents generally held positive views towards vaccination. Eighty percent ($n = 1143$) agreed with the statement that *getting myself vaccinated for COVID-19 would be a good way to protect myself against infection*. Females ($n = 614$, 83%) were more likely to agree with the statement than males ($n = 529$, 78%) (aOR = 1.4 (95% CI: 1.1–1.8); $P = 0.03$), while 91% of those aged 70 years and above agreed compared to 76% of 18–29-year-olds (aOR = 2.3 (95% CI:1.2–4.1); $P = 0.008$). Agreement was also higher for those with a self-reported chronic disease (aOR = 1.4 (95% CI: 1.1–2.0); $P = 0.04$) and among those who held private health insurance (aOR = 1.7 (95% CI: 1.3–2.3); $P < 0.001$). Beyond individual perceptions, 78% stated that their decision to vaccinate would be supported by family and friends.

Conclusion: This study presents an early indication of public perceptions towards a future COVID-19 vaccine and represents a starting point for mapping vaccine perceptions. To support an effective launch of these new vaccines, governments need to use this time to understand the communities concerns and to identify the strategies that will support engagement.

Keywords: Immunisation, Vaccination decisions, COVID-19, Pandemic, Acceptance, Attitudes, Communication

Background

Finding safe and effective vaccine candidates to control the spread of SARS-CoV-2 (COVID-19) is an urgent public health priority. There are an unprecedented number of agencies (including biotechnology companies, universities, military researchers, and pharmaceutical companies) aiming to identify and develop a COVID-19 vaccine at an accelerated approach and scale not previously seen [1, 2]. As of late 2020, there are 214 vaccine candidates, of which 47 have progressed to human clinical trials [3]. Based on the results and considering the safety profiles, two of the COVID-19 vaccines has been approved or received emergency use authorization in several countries (UK, US, Russia, Bahrain, and Canada).

To ensure community readiness, it is essential that governments determine levels of demand and acceptance

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of the COVID-19 vaccine to ensure the readiness of both the public and healthcare providers for a COVID-19 vaccine. It is likely that controlling COVID-19 with vaccination will require a critical proportion of the population to accept and receive the vaccine. A minimal target level may exceed 70% accounting for vaccine effectiveness and mechanism of protection, the size of the population in which the vaccine is contraindicated and other factors. However, having a COVID-19 vaccine available does not necessarily equate to people accepting it, as history demonstrates. For example, compliance with the influenza pandemic specific vaccine in 2009 was low, despite higher levels of reported 'willingness to vaccinate', which highlights the challenges with compliance and acceptance [4, 5]. To support the launch of a COVID-19 vaccine program and to ensure that communication efforts are attuned to factors affecting acceptance, it is critical that governments understand people's perceptions towards vaccination against COVID-19. This study expands on studies published by Dodd and colleagues and Rhodes et al., which also focus on the Australian public [6, 7]. The study by Dodd reported a significant association between reluctance to be vaccinated against COVID-19 and inadequate health literacy and lower education level, whilst Rhodes and colleagues identified a shift in the level of uncertainty towards the vaccine between the earlier work of Dodd (April) and when their study was conducted in June. It is important to note that the later study focused on Australian parents, as part of a Royal Children's Hospital National Child Health Poll. Moving beyond the published research, our study examined the demographic and health related factors, as well as the attitudinal aspects impacting on COVID-19 vaccine acceptance. In addition, we explored the Australian communities' attitudes towards the prioritisation process as well as their willingness to follow government recommendations.

Methods

The methods used for this study and the data collection tool have been previously published [8]. In summary, an online survey of Australian residents was undertaken via a market research company (Quality Online Research (QOR)) between 18 and 24 March 2020. A sample size of 1400 provided us with a sample error of ±3%. Proportional quota sampling was used to ensure that respondents were demographically representative of the Australian public, with quotas based on age, gender, and state/territory. Respondents were required to be 18 years or older and to speak English. After reading the respondent information, consent was implied if the person completed the survey and submitted it via the QOR website. Ethics approval for the study was obtained from the University of New South Wales (HC200190).

The questions for this survey were adapted from published studies by Holly Seale during the 2009 influenza H1N1/A pandemic [4, 9]. Questions captured: (1) perceptions of the effectiveness of vaccines in general; (2) priorities for COVID-19 vaccine roll out; and (3) social influences. As a measure of vaccine acceptance, respondents were asked if they agreed or disagreed with the following statement: '*Getting myself vaccinated for COVID-19 would be a good way to protect myself against infection*'. This item was measured on a 5-point Likert scale with 1 = strongly disagree to 5 = strongly agree. This variable was treated as the primary outcome with responses collapsed into strongly disagree/disagree/neutral = 0 and agree/strongly agree = 1. Risk perception of COVID-19 infection was measured via the following question 'indicate your level of risk of catching COVID-19 during this pandemic', on a scale of 1–5 with 1 = low risk and 5 = very high risk. Lastly data was collected on gender, age, education and employment status, children (including attendance at childcare/school), country of birth/language spoken at home, whether they identified as Aboriginal and/or Torres Strait Islander, international travel patterns since 1 January 2020, private healthcare insurance coverage, income protection insurance, the presence of any chronic illness and self-reported health status (very good, good, moderate, poor, very poor). Due to the uncertainty around vaccine development at the time of the survey, respondents were not directly asked whether they would receive a vaccine but rather whether they thought a COVID-19 vaccine would be a good way to protect against infection.

Descriptive statistical statistics were reported for sample demographics. Mean scores and standard deviations of the risk perception score and the vaccine acceptance response were calculated by demographic characteristic. Univariate associations were ascertained with each demographic variable and the outcome variable, vaccine acceptance. The risk perception score of those who would accept the vaccine was compared to those who would not using an independent samples t-test and ANOVA with Bonferroni correction. A multivariable logistic regression model was created with backward elimination model selection and a threshold P value of 0.25 for inclusion of predictor variables [10]. Receiver Operator Characteristics (ROC) analysis was also performed to estimate the predictive ability of significant factors (from the regression model) as estimated by Area Under the Curve (AUC). For all analyses, P values of less than 0.05 were considered statistically significant. Data were analyzed using the SPSS software version 26.0 (SPSS Science, Chicago, IL, USA).

Results

The demographic characteristics of the 1420 respondents by their risk perception and stated vaccine acceptance are presented in Table 1. In summary, 678 (48%)

were male, 829 (58%) were in some form of employment, 363 (25%) had a chronic health condition, while 830 (58%) had private health insurance. Respondents generally held positive views towards vaccination, with 1188 (83%) agreeing with the statement that 'vaccines are effective at preventing diseases', while 305 (21%) indicated that 'diseases provide better immunity than vaccines do'. Among all respondents, 88% ($n = 1252$) had heard that a COVID-19 vaccine was being developed. Of those who were not aware, 129/168 (77%) were aged under 50 years (lowest awareness levels were in the youngest age group i.e., 18–29 years ($n = 62/168$, 37%)). One thousand one hudred ninety-five respondents (84%) agreed that they generally do what their healthcare professional recommends.

Eighty percent ($n = 1143$) agreed with the statement that *getting myself vaccinated for COVID-19 would be a good way to protect myself against infection*, while a further 194 (14%) were uncertain, leaving 83 (5.8%) to disagree with the sentiment (Table 2). Beyond individual perceptions, respondents were asked to comment on perceived support from family and friends towards receipt of a COVID-19 vaccine, of which 1118 (78%) agreed that they would be supported. A similar level of support was given to the statement 'to protect the health of the community, we should follow government guidelines about vaccines' with 1190 (84%) agreeing.

When it came to prioritization of target groups for a future COVID-19 vaccine, respondents were strongly in favour of healthcare workers being the first ones to get the vaccine ($n = 1198$, 84%). Only 51 (3.5%) respondents disagreed with that sentiment, while the remaining respondents were neutral ($n = 171$, 12%). The same level of support was shown to the prioritization of patients with risk factors, with 1211 (85%) agreeing that they should be the first ones to get the COVID-19 vaccine. Again only 58 (4.1%) respondents disagreed. Interestingly, there was equal distribution across age groups and chronic health conditions for both variables.

The median score for risk perception of COVID-19 infection amongst those who would not accept the vaccine was 3 (IQR: 2–4) compared to a median of 4 (IQR: 3–4) among those who would accept the vaccine ($P < 0.001$). Mean risk perception scores was significantly higher among Aboriginal and/or Torres Strait Islander respondents ($P = 0.03$) compared to non-Indigenous respondents, those who were working full time/part time ($P < 0.001$) compared to unemployed people. Respondents who had a trade/apprenticeship/certificate or a University degree had significantly higher mean risk score compared to respondents with educational level year 12 or below ($P = 0.02$ and $P = 0.009$ respectively). Similarly, respondents having private health insurance ($P = 0.01$) and those with chronic health conditions ($P = 0.02$) perceived their mean risk score higher than those without.

There was variation in the proportion of people who agreed that getting *vaccinated against COVID-19 would be a good way to protect myself against infection* by demographic characteristics. These differences were significant for gender, Indigenous status, educational attainment, private health insurance, international travel in 2020 and self-reported chronic health condition (Table 3). Overall, 83% of females agreed with the statement compared to 78% of males (aOR = 1.4 (95% CI: 1.1–1.8); $P = 0.03$). Those above 70 years of age (91%) compared to those between 18 and 29 years of age (77%) reported higher level of agreement (aOR = 2.3 (95% CI 1.2–4.1); $P = 0.008$) Agreement was also higher for those who self-reported having a chronic disease (aOR = 1.4 (95% CI: 1.1–2.0); $P = 0.04$) and who had private health insurance (aOR = 1.7 (95% CI: 1.3–2.3); $P < 0.001$) (Table 3). These significant variables combined together had a high predicting ability for vaccine acceptance (AUC = 0.748, 95% CI: 0.720–0.776, $P < 0.001$). Figure 1 shows the ROC curve for the ability of significant predictors in predicting the vaccine acceptance.

Discussion

The survey was conducted in March 2020, at a time when the first wave of COVID-19 cases was increasing in Australia, there was intense media coverage and community members were being encouraged to adopt hygiene and physical distancing strategies. At that point, there was no lockdown enforced in Australia. From our survey, we found that 80% agreed that receiving the COVID-19 vaccine would be a good way to protect themselves. The level of agreement amongst our respondents varied in comparison to other studies. An online survey of the French population conducted in May found that 74% would use a vaccine [11]. A similar acceptance rate was reported in other surveys (conducted between March and May) of residents in the United States (67–69%) [12, 13], Indonesia (67 to 95% depending on the effectiveness of the vaccine) [14] and 73% for parts of Europe (Denmark, France, Germany, Italy, Portugal, the Netherlands, and the UK) [15]. The difference in acceptance rate documented in this study may be due to a single or combination of factor(s) including: (1) the variation in the wording of the question; (2) high level of confidence and trust in the Australian government [8] or (3) due to concerns about increasing local transmission which were high at the time. However, our results align with other Australian studies, which have reported willingness levels between 76 to 86% [6, 7]. Both studies collected the data in April 2020. Since those early studies, a recent online survey has documented that intentions to get vaccinated have dropped in some countries including Australia (88 to 79%), China (97 to 85%), Spain (72 to 64%) and Brazil (88 to 81%) [16]. However, this data was also captured prior to the administration of any of the

Table 1 Covid-19 risk perception across sociodemographic characteristics

	Total $n = 1420$ n (%)	Risk perception score Mean (SD)	*P* value
Gender			
Male	678 (47·7)	3.5 (1.1)	0.79
Female	740 (52·1)	3.5 (1.1)	
Other[a]	2 (0.2)	2.5 (0.7)	
Age (years)			
18–29	295 (20.8)	3.5 (1.1)	Ref
30–49	508 (35.8)	3.6 (1.1)	0.15
50–69	419 (29.5)	3.4 (1.1)	0.86
70+	198 (13.9)	3.4 (1.1)	0.88
Aboriginal and/or Torres Strait Islander			
Yes	47 (3·3)	3.8 (1.2)	**0.03**
No	1373 (96·7)	3.5 (1.1)	
Country of birth			
Australia	1096 (77·2)	3.5 (1.1)	0.07
Other	324 (22·8)	3.6 (1.1)	
Employment status			
Not working	591 (41·6)	3.3 (1.2)	**< 0.001**
Working full/part time	829 (58·4)	3.6 (1.1)	
Educational attainment			
Year 10 or below	161 (11.3)	3.3 (1.3)	Ref
High school	235 (16·5)	3.3 (1.1)	0.25
Trade/apprenticeship/cert	483 (34.0)	3.4 (1.1)	**0.02**
University degree	541 (38.1)	3.6 (1.1)	**0.009**
Children in household			
Attending childcare/school	212 (14·9)	3.4 (1.1)	**< 0.001**
Not attending childcare/school or no children	1208 (85·1)	3.8 (1.1)	
Travelled internationally in 2020			
Yes	222 (15·6)	3.7 (1.1)	**0.001**
No	1198 (84·4)	3.4 (1.1)	
Have private health insurance			
Yes	830 (58·5)	3.5 (1.1)	**0.01**
No	590 (41·5)	3.4 (1.2)	
Health rating			
Very good/good	1009 (71·1)	3.5 (1.1)	0.82
Moderate	294 (20·7)	3.5 (1.1)	0.42
Poor/very poor	117 (8·2)	3.6 (1.3)	Ref
Chronic health condition			
Present	363 (25·6)	3.7 (1.1)	**< 0.001**
None	1057 (74·4)	3.4 (1.1)	

[a]Not included in comparison due to small numbers
Numbers in bold are statistically significant

Table 2 Perceptions towards vaccination in general and the COVID-19 vaccine

Question	Agree (%)	Disagree (%)	Neutral
Vaccines are effective at preventing diseases.	1188 (83.7)	69 (4.9)	163 (11.5)
Diseases provide better immunity than vaccines do.	305 (21.5)	550 (38.7)	565 (39.8)
I generally do what my health care professional recommends	1195 (84.2)	62 (4.4)	163 (11.5)
Getting myself vaccinated for COVID-19 would be a good way to protect myself against infection	1143 (80.5)	83 (5.8)	194 (13.7)
My family and friends would probably think that getting a COVID-19 vaccine is a good idea.	1118 (78.7)	93 (6.5)	209 (14.7)
To protect public health, we should follow government guidelines about vaccines.	1190 (83.8)	62 (4.1)	168 (11.8)
Patients with risk factors should be the first ones to get the COVID-19 vaccine when available.	1211 (85.3)	58 (4.1)	151 (10.6)
Healthcare workers should be the first ones to get the COVID-19 vaccine	1198 (84.4)	51 (3.6)	171 (12.0)

vaccines outside of a clinical trial setting and so it is critical that efforts are made to not only map variations in willingness but to qualitatively drill down into the factors contributing to them.

It has been well documented that the same psychological factors that influence acceptance of national immunisation program vaccines apply during pandemics [17]. Studies conducted in 2009 examining the acceptance of the pandemic influenza A/H1N1 vaccine found that perceptions of risk and severity played a key role in whether people agreed with the necessity of vaccination [4, 18]. At the time that the H1N1 pandemic immunisation programs were commenced in Australia, it was well after the peak of the pandemic (which was already deemed as 'moderate' by governments and other agencies). This affects the perceived personal risk of infection, as well as how people perceived the severity of the infection, which resulted in low levels of vaccine uptake [4, 19–21]. While the characteristics of the COVID-19 pandemic are vastly differently to the H1N1 influenza pandemic in 2009, it is important that we consider how we are going to engage and communicate with those in the community who perceive their personal risk as low. In mid-March, we identified that 74% of our study respondents ranked their personal risk of acquiring COVID-19 as 'intermediate' to 'very-low' [8]. With this group, it may be necessary to draw on the influence of anticipated regret, which has been found to be an important determinant of intention to vaccinate [22, 23]. While the expectation of anticipated regret is primarily cognitive, it also likely has an affective component, as imagining an unpleasant future may elicit emotion in the present [24]. People may act to reduce what they expect to experience by acting. Examples could be: (1) anticipated regret of not getting the COVID-19 vaccine, as a family member gets infected, encourages vaccination; and (2) anticipated regret of not getting the COVID-19 vaccine, as a person is unable to travel abroad to visit friends and relatives (hypothetical situation of COVID-19 vaccination operating in the same manner as yellow fever vaccination), which encourage vaccination.

To translate early willingness into actual vaccine receipt, we will need to draw on key behavioural insights from past studies. For example, a recommendation from a healthcare provider is a key driver of routine immunisation uptake [25–28]. Amongst our respondents, the majority agreed that they follow the advice of their healthcare professionals. To support this action, there is a need to equip healthcare professionals with the understanding about the COVID-19 vaccine (including how it was developed, safety profiles), the skills to take a presumptive approach to recommending the vaccine and the confidence to answer questions. For example, there may be a need to support peoples understanding around the rational for receiving the COVID-19 vaccine, especially amongst those who believe that they may have been already infected during the pandemic. Around a quarter of our respondents agreed with the statement that 'diseases provide better immunity than vaccines do', while a further 40% were neutral about the statement. Health professionals will have a strong effect on uptake since they both recommend, and in this case, are likely to be the first eligible for the vaccine.

In settings like Australia where vaccines are delivered predominately in primary care settings, the focus will be on supporting General Practitioners and Practice Nurses. However, given the adult risk groups likely targeted with a COVID-19 vaccine, other providers will need to be considered. For example, hospital and private practice specialists (medical and nursing) may be a trusted source of information about the COVID-19 vaccine for those people with chronic medical conditions [29]. There may be high levels of confidence in vaccine information being provided by these specialists, as they are experts in a specific chronic medical condition [29]. This may be especially important if the vaccine has any contraindications or precautions for people with any chronic conditions or who are immunosuppressed. There may be other providers that need to be supported to effectively communicate about this vaccine. Given that not all adults regularly connect with primary care, there will be a need to support community-controlled health organisations to promote uptake among their local communities. Public health

Table 3 Univariate analysis and multivariate logistic regression model of Covid-19 vaccine acceptance and demographic variables

	Covid-19 vaccine acceptance n (%)	Unadjusted ORs (95% CI)	*P* value	Adjusted ORs (95% CI)	*P* value
Gender					
Male	529 (78.0)	REF		REF	
Female	614 (83.0)	**1.4 (1.1–1.8)**	**0.02**	**1.4 (1.1–1.8)**	**0.03**
Other*	0 (0.0)	–		–	
Age (years)					
18–29	226 (76.6)	REF		REF	
30–49	401 (78.9)	1.1 (0.8–1.6)	0.44	1.0 (0.7–1.3)	0.89
50–69	336 (80.2)	1.2 (0.9–1.8)	0.25	1.0 (0.7–1.5)	0.84
70+	180 (90.9)	**3.1 (1.8–5.3)**	**< 0.001**	**2.3 (1.2–4.1)**	**0.008**
Aboriginal and/or Torres Strait Islander					
Yes	32 (68.1)	**2.0 (1.1–3.7)**	**0.03**	0.7 (0.3–1.3)	0.20
No	1111 (80.9)	REF		REF	
Country of birth					
Australia	871 (79.5)	REF	0.07	1.3 (0.9–1.8)	0.18
Other	272 (84.0)	1.4 (1.0–1.9)			
Employment status					
Not working	488 (82.6)	REF	0.09	REF	0.77
Working full/part time	655 (79.0)	0..8 (0.6–1.0)		0.9 (0.7–1.3)	
Educational attainment					
Year 10 or below	122 (75.8)	REF		REF	
High school	192 (81.7)	1.4 (0.9–2.3)	0.15	1.5 (0.9–2.5)	0.12
Trade/apprenticeship/cert	396 (82.0)	1.5 (0.9–2.2)	0.08	1.5 (1.0–2.4)	0.07
University degree	433 (80.0)	1.3 (0.8–1.9)	0.24	1.3 (0.8–2.1)	0.25
Employment status					
Not working	488 (82.6)	REF		REF	
Working full/part time	655 (79.0)	0.8 (0.6–1.0)	0.09	1.0 (0.7–1.3)	0.84
Children in household					
Attending childcare/school	167 (78.8)	0.9 (0.6–1.3)	0.49	Not included in the model	
Not attending childcare/ school or no children	976 (80.8)	REF			
Travelled internationally in 2020					
Yes	166 (74.2)	REF		REF	
No	977 (81.6)	**1.5 (1.1–2.1)**	**0.02**	1.5 (1.0–2.1)	0.05
Have private health insurance					
Yes	693 (83.5)	**1.6 (1.2–2.0)**	**0.001**	**1.7 (1.3–2.3)**	**< 0.001**
No	450 (76.3)	REF		REF	
Health rating					
Very good/good	809 (80.2)	1.1 (0.7–1.8)	0.69	Not included in the model	
Moderate	242 (82.3)	1.3 (0.7–2.2)	0.38		
Poor/very poor	92 (78.6)	REF			
Chronic health condition					
Present	307 (84.6)	**1.4 (1.1–2.0)**	**0.02**	**1.4 (1.1–2.0)**	**0.04**
None	836 (79.1)	REF		REF	

Values in bold are statistically significant ($P < 0.05$)
*Not included in comparison due to small numbers

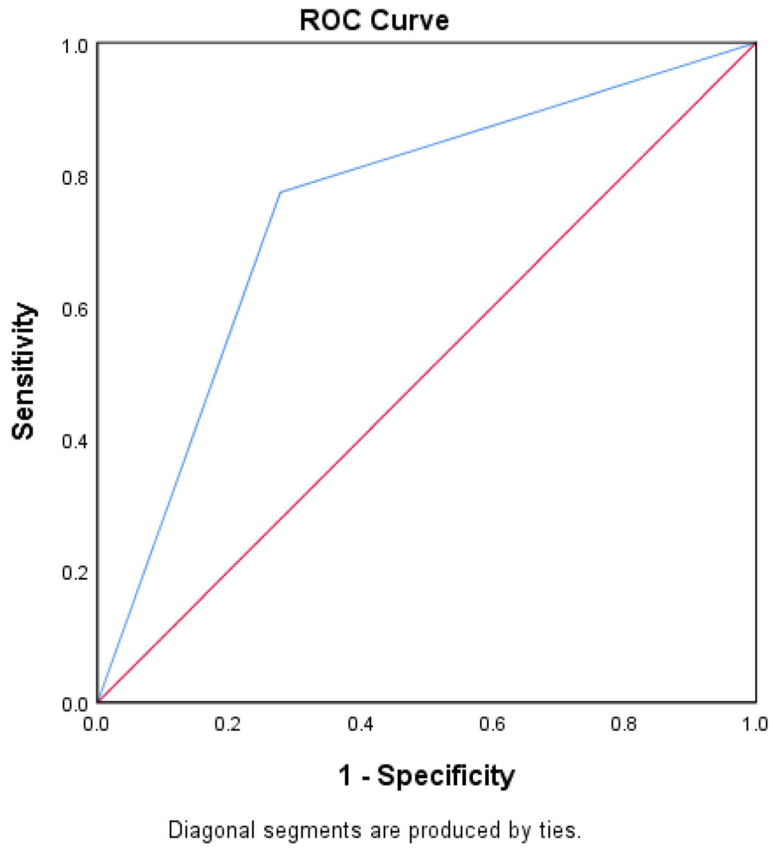

Fig. 1 ROC curve of significant predictors for predicting vaccine acceptance

campaigns may also need to consider enlisting other partners, outside of traditional medical and public health communities, to support activities that promote awareness and acceptance of the vaccine. These may include peak bodies which are not-for-profit non-government health-condition specific organisations that focus on one health condition/disease and disseminate evidence-based information related to their conditions and health [30]. Information delivered by these groups would be relevant and credible to their constituents.

Populations at risk of COVID-19 infection are diverse in social, behavioural, cultural and health practices as well as their understanding of COVID-19. Racial and ethnic disparities in the severity of COVID-19 illness have been identified [31]. In non-pandemic periods, people from culturally and linguistically diverse (CALD) backgrounds can be disadvantaged by the factors that contribute to health inequity and have been documented as resulting in lower uptake of recommended vaccines including influenza [32]. To support access to this vaccine and equity in the delivery, it is critical that engagement approaches are tailored so they meet the needs of all communities, in terms of messages and vaccine dissemination strategies [33]. For example, communicating messages about the vaccine to CALD communities is not just a question of providing translations of information that meet readability assessment scores. Previously, Mileti and Darlington (1997) found that people from CALD backgrounds generally prioritize social networks and interpersonal communication when seeking information and prefer to receive information from people with similar attributes as themselves [34]. There will be a need to involve community leaders with the promotion of a vaccine including cultural and religious leaders, and Aboriginal elders. Use of these community influencers may support the engagement of Aboriginal communities and CALD groups including newly arrived migrants who rely on informal information sources through social networks and particularly in early stages of settlement [35]. These actors may have heightened success in delivering relevant culturally appropriate messages via formats and venues which may not be reached by mainstream mass communication approaches. Beyond ensuring that messages are effectively disseminated into all parts of the community, there is also a need to think about access in terms of convenience, location of vaccine services, and time-costs associated with receive it. There may be a need to think beyond primary care to reduce access barriers for some communities [36].

When the first trials commenced in the US, rumours began to circulate that fake vaccines were being used, while in the UK, the first subjects enrolled in vaccine trials were forced to clarify that they were still alive [37]. Mis- and disinformation is going to continue to circulate during this pandemic and will surge with the availability of COVID-19 vaccines. To respond to the "infodemic", the WHO put together a framework based on a crowdsourcing exercise to support governments to manage the issue [38]. The work culminated in six key principles that governments could start to consider when planning their activities around the promotion and delivery of the COVID-19 vaccine. One key area highlighted was the need to slow down and streamline the flow of information of all kinds. Having transparent information, which is adapted to local languages, literacy levels, is regularly updated, and focuses on common/known mild reactions to new vaccines may assist with stemming the flow of misinformation about the safety of the vaccines [38]. The importance of this was identified in 2009 by Eastwood et.al who reported a critical link between willingness to accept a pandemic H1N1 vaccine and the availability of easily interpretable vaccine safety data [5].

The strengths of our study include a large, representative cross-section of the adult Australian population. However, the work is subject to several limitations including that we recruited a convenience sample of respondents. People who could not communicate in English were excluded from the sample, which may have affected representation of ethnic minorities. We also had under-representation of Aboriginal and Torres Strait Islander peoples and those residing in remote settings. Our study was also unable to examine for differences in responses between the states/territories. As participation in our study was on a voluntary basis, this study has potential for self-selection bias by community members who are particularly concerned about this pandemic. Lastly, the study was conducted via an online market research company and so required respondents to have access to the internet which may have limited the participation of some members of the community. However, given the level of internet access in Australia, this should not have been a problem.

Conclusion

Throughout this pandemic, there have been issues with communication, shifts in recommendations and fluctuations in cases, which all have the potential to undermine trust in governments. To support an effective launch of new COVID-19 vaccines, governments need to understand the community's concerns, and identify strategies that will support engagement. There is a pressing and critical need to start planning public health communication strategies that are designed to support healthcare professionals and those in civil society who may play a role, as well as engage all members of the community.

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Authors' contributions

HS conceived the study, undertook the data collection, and developed the journal paper. AEH, JL MS, DND, and KB assisted with the design of the study and study tools, as well as the development of the journal paper. RK assisted with the statistical analysis and interpretation of the results, and development of the paper. All authors have read and approved the manuscript.

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Availability of data and materials

The dataset used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

Ethics approval for the study was obtained from the University of New South Wales HREAP G: Health, Medical, Community and Social (HC200190). After reading the respondent information, consent was implied if the person completed the survey and submitted it via the QOR website.

Consent for publication

Not applicable.

Competing interests

Dr. Holly Seale has previously received funding from drug companies for investigator driven research and consulting fees to present at conferences/workshops and develop resources (Seqirus, GSK and Sanofi Pasteur). She has also participated in advisory board meeting for Sanofi Pasteur. She is a Section Editor for BMC Infectious Diseases. The other authors do not have anything to declare.

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