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Examining the influence of community leaders and other community actors on immunisation practices in Australia: A national cross-sectional study

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ABSTRACT

Background: Variation in COVID-19 vaccination coverage and increasing vaccine hesitancy are well documented, especially amongst ethnic minority populations and current channels of vaccine and communication have been found to be inadequate. It has been suggested that more be done to utilise community-led pathways to improve vaccine readiness in ethnic minority communities in Australia. The study aimed to explore receptiveness towards the role of different actors and methods of communication about immunisation.

Methods: A cross-sectional survey of 1,227 adults in Australia was conducted to examine the roles of various actors in promoting vaccine uptake. Chi-square analyses and independent samples t-tests were used to identify significant associations between sociodemographic characteristics, vaccine practices, and vaccine information-seeking behaviours and (1) COVID-19 vaccine uptake (at least one dose) and (2) speaking a language other than English.

Results: At the time of the survey, 93% of respondents had received at least one dose of the COVID-19 vaccine. There were significant associations between COVID-19 vaccine uptake and: perceived capacity to locate accurate and timely vaccine information; receiving the COVID-19 vaccination information from a Nurse or Pharmacist; and receiving a vaccine recommendation by a GP. Additionally, respondents who spoke a language other than English reported were significantly more likely to have received information from family, friends, workplaces, local councils, religious centres, community leaders, and religious leaders than those who only spoke English.

Conclusion: Significant variations in vaccine practices and vaccine information-seeking behaviours were found, especially in those who speak a language other than English. To enhance vaccine uptake and to address vaccine hesitancy in Australia, vaccine promotion strategies and health communication efforts require significant consideration of information accessibility and communication source preferences.

1. Introduction

The COVID-19 pandemic has had disproportional impacts globally on ethnic minority populations, both clinically and socially [1,2]. Despite the increased risk of infections, severe symptoms, and mortality, the rates of vaccination against COVID-19 for ethnic minority communities have been significantly lower than those of other populations [3–6].

As an example of this Liddell et al. found in June 2021 that, amongst refugees living in Australia, 88 % were unvaccinated and 28.1 % were classed as vaccine-hesitant [4]. Similar hesitancy has also been shown in routine vaccinations in some migrant populations globally [1,7,8]. Understanding the factors that determine vaccine uptake in these communities is central to implementing a successful and effective vaccination program and addressing vaccine hesitancy in these groups. Commonly reported barriers to COVID-19 vaccination uptake globally and across multiple populations, include perceived vaccine safety and effectiveness [9,10], information gaps compounded by misinformation [5], political views [11], accessibility [12] and many others.

Furthermore, previous research has suggested that conflicting

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vaccination information and poor communication from trusted sources may contribute to vaccine hesitance in ethnic minority communities [4,13,14], yet there remains a lack of evidence on who these trusted sources are, their roles and their influence in providing vaccination information.

A multifaceted approach with strategies specific to the concerns of the hesitant population is required to address vaccine hesitancy within these groups. Community engagement is one such strategy to promote vaccination [14]. As part of this, the role of disseminating public health information must be balanced between governments and other trusted sources of the communities. These sources will differ to varying degrees in each community, and as COVID-19 highlighted, there is generally no single point of authority within multicultural communities [13–19]. In government policy and current research, a significant emphasis is placed on 'community leaders' without articulating or even understanding who they are and whether they genuinely influence the uptake of recommended practices within communities [14]. In our previous work, we used the term 'information intermediaries' to recognise the variety of people suggested as having a role in disseminating public health messages [19]. This could include staff from community organisations, community or faith-based or youth leaders, bilingual caseworkers, or 'natural' leaders (for example, a person who has completed medical training but does not practice). However, while this term attempts to be encompassing, there is still a lack of data on the roles that specific actors (i.e. information intermediaries) play in influencing vaccine uptake and on the individual information-seeking behaviours of ethnic minority communities, specifically on vaccinations.

This study aimed to address this information gap. We identify (1) information-seeking behaviours of those who speak a language other than English and (2) identify essential influencers and factors associated with COVID-19 vaccine uptake in Australian populations.

2. Methods

2.1. Study design and study population

The online cross-sectional survey was programmed using the Qualtrics platform [20], with participants recruited through the commercial survey platform, Dynata. Dynata (https://www.dynata.com/) maintains a global panel of voluntary market research participants who receive points as incentives for participation, which panel members can then redeem for cash or prizes. Dynata distributed the survey link to a random sample of their panel members residing in Australia. Panel members who were eligible to participate needed to be 18 years or over, able to read and understand English and reside in Australia. The Participant Information Statement was made available for download, and commencing the survey was taken as eligible participants providing informed consent. Of the 1,370 people who began the survey, 143 were excluded for not meeting the age, location, or quota requirements. Quota sampling was based on 20 % of total respondents being able to speak a language other than English. The survey was conducted between 1st and 5th July 2022. Duplicate responses were prevented through restricting each unique IP address to one response.

2.2. Ethics approval

Ethics approval for this study was granted by the UNSW Human Research Ethics Committee (HC220179). All respondents were provided with a link to the participant information sheet, and participating in the survey was taken as informed consent.

2.3. Pilot study

To support the development of this survey for this study, we undertook a small pilot study with a sample of international students (n = 171). Recruitment occurred via the UNSW Business Experimental Research Laboratory (BizLab) sample pool—the survey aimed to explore non-traditional actors' role in students' receptiveness to immunisation messaging. The survey mapped against the Theory of Planned Behaviour [21] and included demographic and immunisation uptake questions. In addition, respondents listened to 20 audio messages recorded by two of the authors, role-playing a range of different community actors. The messages focused on promoting vaccination and the community actors of different genders, roles (i.e. Faith leader, Government health official, student support worker, travel agent and fellow student) and conversation styles (rational and authoritative). Participants were recruited between 8 March and 20 June 2021. This research was funded by Health@Business and UNSW Medicine Collaboration Seed Fund Grant, and the project was approved by the UNSW Human Research Ethics Committee (HC200650). In summary, we found that respondents overwhelmingly preferred to receive messages about immunisation from Government Officials (73.7 %) versus their fellow students (8.2 %), student support worker (5.8 %), religious leader (2.3 %) and from a travel agent (.6%). Amongst the sources of information which participants had the highest confidence in, the least reported included churches, mosques, or other religious organisations (7.6 %) and community leaders (7.6 %). The results from this study helped inform the survey questions and focus for the later study.

2.4. Survey instruments and measures

To identify essential roles in delivering vaccine-specific health messages during the COVID-19 pandemic and beyond, we used the findings from the pilot study and a literature review to design the new questionnaire, which consisted of 18 items. Survey questions were developed based on the Theory of Planned Behaviour questionnaire, the Behavioural and Social Drivers (BeSD) of vaccination survey [22], and questions developed from the pilot study. A draft questionnaire included questions based on critical areas identified through a literature review and based, in part, on the results from the pilot study. The survey included questions focused on vaccine perceptions, the COVID-19 vaccination program in Australia, future vaccine practices and socio-demographic characteristics, including gender, age, education level, primary language, religion, and birthplace. In this study, COVID-19 vaccine uptake in participants, specifically refers to participants receiving at least 1 dose at the time of the survey. Prior to the survey rollout, the research team reviewed the questions for readability and understandability.

2.5. Data analysis

Mean and standard deviation were generated for Likert scale variables to identify respondents' level of confidence in vaccination information sources. To explore the differences in vaccination and status and those who speak a language other than English, we used the Chi-Square Test, or Fischer's Exact Test when there were fewer than five responses in a cell in the cross-tabulation, to test for associations between categorical variables. P values of < 0.05 were considered statistically significant. All analyses were conducted using the statistical analysis software SPSS v 29 [23].

3. Results

A total of 1227 respondents were enrolled in the study (completed over 70 % of questions), with an average age of 51 (18–88, SD:17.4, N = 1214) and 1 in 4 were born outside of Australia. On a scale from 1 to 10, respondents' average trust towards their GP was 7.98 (N = 1218, SD: 2.05). See Table 1 for participant characteristics.

3.1. COVID-19 vaccination information sources and beliefs

When completing the survey, 93 % (1132/1218) had received at

Table 1
Participant characteristics (N = 1218).

Variable	n(%)
What is the highest educational qualification you completed?	
Less than high school	34 (2.8)
High school or equivalent	351 (38.8)
Certificate level I to IV	261 (21.4)
Advanced Diploma and Diploma level	179 (14.7)
Bachelor's degree level and above	393 (32.3)
Do you have a chronic illness?	
Yes	330 (27.1)
No	856 (70.3)
Unsure	32 (2.6)
Which religion do you belong to or identify yourself most close to?	
Christianity	564 (46.3)
No religious affiliation	516 (42.4)
Buddhism	35 (2.9)
Islam	30 (2.5)
Hinduism	26 (2.1)
Other	25 (2.1)
Secular beliefs or other spiritual beliefs	16 (1.3)
Judaism	6 (.5)
Do you have a regular GP, you see?	
Yes	1051 (86.3)
No	144 (11.8)
Unsure	23 (1.9)
Primary language	
English	1124 (92.3)
Language other than English	94 (7.7)
Country of birth	
Australia	902 (74.1')
Outside Australia	316 (25.9)
Language other than English	
No	953 (78.2)
Yes	265 (21.8)
What is your gender?	
Female	647 (53.1)
Male	562 (46.1)
I prefer not to say	1 (.1)
Non-binary/third gender	4 (.3)
I use a different term	4 (.3)
What is your age?	N = 1214
18–29	162 (13.3)
30–39	211 (17.4)
40–49	203 (16.7)
50–59	175 (14.4)
60–69	250 (20.5)
70–79	213 (17.5)

least 1 dose of the COVID-19 vaccine (see Table 2 for a complete breakdown of COVID-19 vaccine beliefs and behaviours). Most reported getting COVID-19 vaccination information from a Nurse or Pharmacist (Fig. 1.), with the top 3 sources of information being government websites, doctors and public TV (Fig. 2.).

Respondents were asked whether any community-based activities influenced their COVID-19 vaccine intentions. Holding a COVID-19 vaccination clinic (50.6 %, 616) was the most popular choice followed by receiving a local council message on social media about COVID-19 vaccines (18.3 %, 223). While less people indicated that they responded to community leaders encouraging participants to get a COVID-19 vaccine (9.9 %, 120) or a local community organisation creating informational materials that answered community questions about COVID-19 or the vaccines (9.4 %, 115), a community forum held to discuss the COVID-19 vaccines (6.4 %, 78), a trusted community leader got the COVID-19 vaccines (6.2 %, 76), a religious leader encouraged the participant to get a COVID-19 vaccine (4.6 %, 56). The least reported influence was that a "trusted religious leader got the COVID-19 vaccine" (4.4 %, 53). (See Table 3 for more information about community influence on vaccination).

Table 2
COVID-19 vaccine beliefs and behaviours.

How important do you think vaccines are for your health?	N = 1218
Not at all important	43 (3.5)
A little important	113 (9.3)
Moderately important	217 (17.8)
Very important	845 (69.4)
Do you know where to get accurate, timely information about vaccines such as the COVID-19 vaccines?	**N = 1218**
Yes	1039 (85.3)
No	66 (5.4)
Not sure	113 (9.3)
When deciding whether to get a COVID-19 vaccine, how much did you rely on each of the following for information?	
A doctor, nurse, or healthcare provider	N = 1132
A lot	653 (57.7)
Some	278 (24.6)
A little	123 (10.9)
Not at all	78 (6.9)
Family or friends	**N = 1132**
A lot	146 (12.9)
Some	414 (36.6)
A little	320 (28.3)
Not at all	252 (22.3)
A religious leader, such as a minister, pastor, priest, imam, or rabbi	**N = 1132**
A lot	76 (6.7)
Some	130 (11.5)
A little	116 (10.2)
Not at all	810 (71.6)
A community leader	
A lot	76 (6.7)
Some	190 (16.8)
A little	182 (16.1)
Not at all	683 (60.4)
Your state/territory health department or Australian Government	**N = 1131**
A lot	526 (46.5)
Some	378 (33.4)
A little	143 (12.6)
Not at all	84 (7.4)
Did your GP recommend you get a COVID-19 vaccine?	**N = 1218**
Yes	808 (66.3)
No	337 (27.7)
Not sure	73 (6.0)
In the last 12 months, have you been given information about the COVID-19 vaccines?	**N = 1218**
Yes	959 (78.7)
No	188 (15.4)
Not sure	71 (5.8)
How satisfied were you with the information	**N = 956**
Not at all satisfied	29 (3.0)
A little satisfied	107 (11.2)

(continued on next page)

Table 2 (*continued*)

How important do you think vaccines are for your health?	N = 1218
Moderately satisfied	314 (32.8)
Very satisfied	506 (52.9)
In the last 12 months, have you actively looked for information about the COVID-19 vaccines?	**N = 1218**
Yes	721 (59.2)
No	458 (37.3)
Not sure	39 (3.2)

4. Information behaviours associated with speaking a language other than English

With exploratory analyses, we examined possible associations between vaccination information behaviours and speaking a language other than English. See Supplementary File 1 (Table 1) for a full breakdown of the results.

Regarding participant sources of information received, compared with those who only speak English. a significantly higher proportion of participants who speak another language reported getting news from complementary health providers ($p = .007$), family ($p < .001$), workplace ($p < .001$), local council ($p < .001$), religious centres ($p = .029$), community leaders ($p < .001$), and spiritual leaders ($p = .006$), Similarly, the same participants reported being less satisfied with the information provided than those who only speak English ($p < .001$).

Participants who speak a language other than English were more likely to actively look for information ($p < .001$), and regarding specific sources of information, participants who speak a language other than English, when compared to those who only speak English, more frequently used public TV ($p = .031$), public radio or podcasts($p < .001$), commercial radio or podcasts ($p < .001$), social media ($p < .001$), online newspapers/magazines ($p < .001$), email notifications ($p = .023$) and family/friends ($p = .036$). A greater proportion of those under 50 spoke a language other than English ($p < .001$). No significant differences were found in whether participants knew where to get accurate vaccine information or if the GP recommended a COVID-19 vaccine.

4.1. Information behaviours and participant characteristics associated with COVID-19 vaccination uptake

Significant associations of COVID-19 vaccine uptake included age ($p = .025$); having a regular GP ($p < .001$), having a chronic illness ($p = .015$), and having education ($p = .025$); specifically, those who were vaccinated were more likely to hold an Advanced Diploma or bachelor's degree and above. See Supplementary File 1 (Table 2) for a full breakdown of the results. Regarding vaccination behaviours, associations were found with those who received at least one dose of the COVID-19 vaccine and knowing where to get accurate and timely information about vaccines ($p < .005$), receiving a recommendation from the GP to get vaccinated ($p < .001$), receiving information about the vaccine ($p < .001$) and actively looking for information ($p = .005$). Receiving information from a nurse or pharmacist was statistically correlated with COVID-19 vaccine uptake.

Significant differences were found amongst seeking information about COVID-19 vaccination, with associations found between those who received the vaccine and participants reporting using public TV ($p = .001$), commercial TV ($p = .034$), public radio or podcasts ($p = .008$), doctors ($p < .001$), and pharmacists ($p = .032$). Conversely, associations were found between those who used social media to source information and those who did not receive the COVID-19 vaccine ($p = .012$).

Most activities within the community, including the influence of society and religious leaders, local council messaging, vaccination clinics, information materials and others, were not significantly associated with vaccine receipt. Only those who reported a local community group holding a forum to discuss the vaccine's safety influencing their

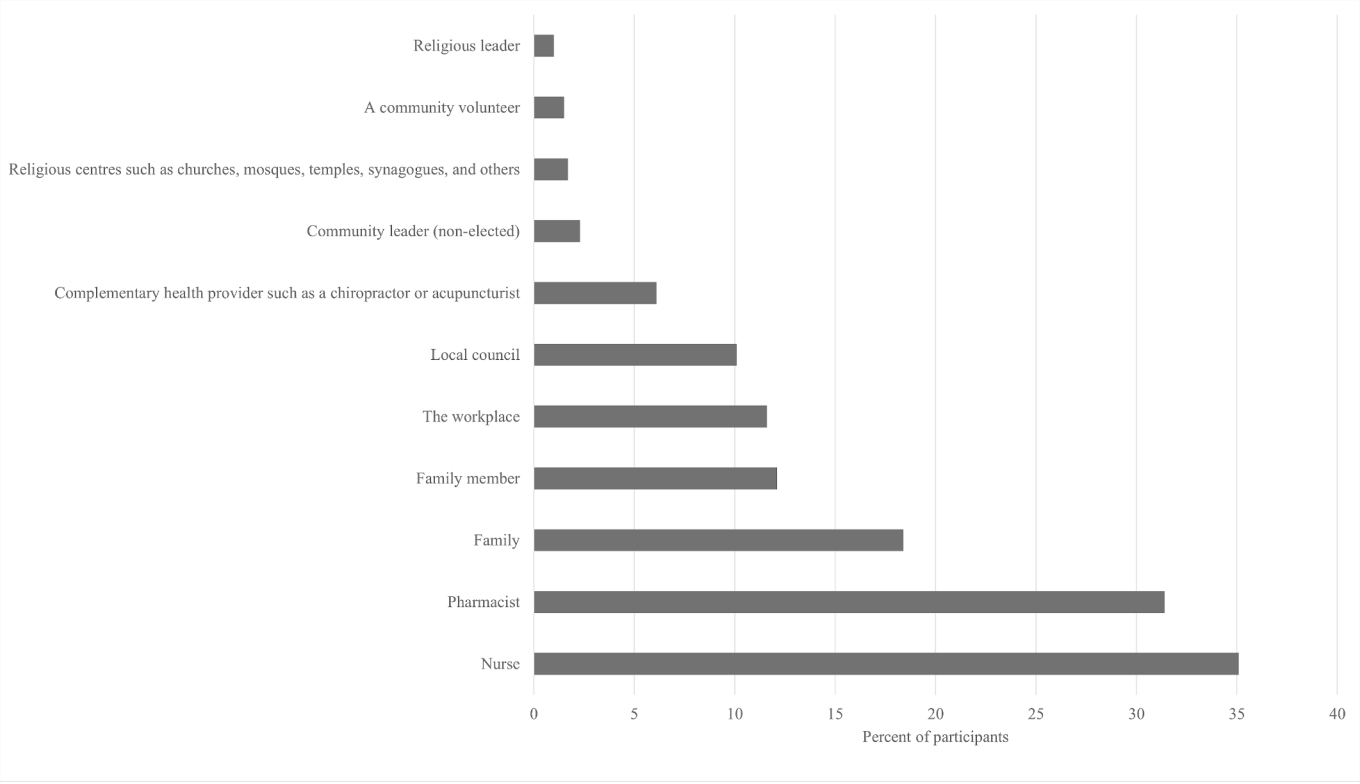

Fig. 1. Sources of information about the COVID-19 vaccination.

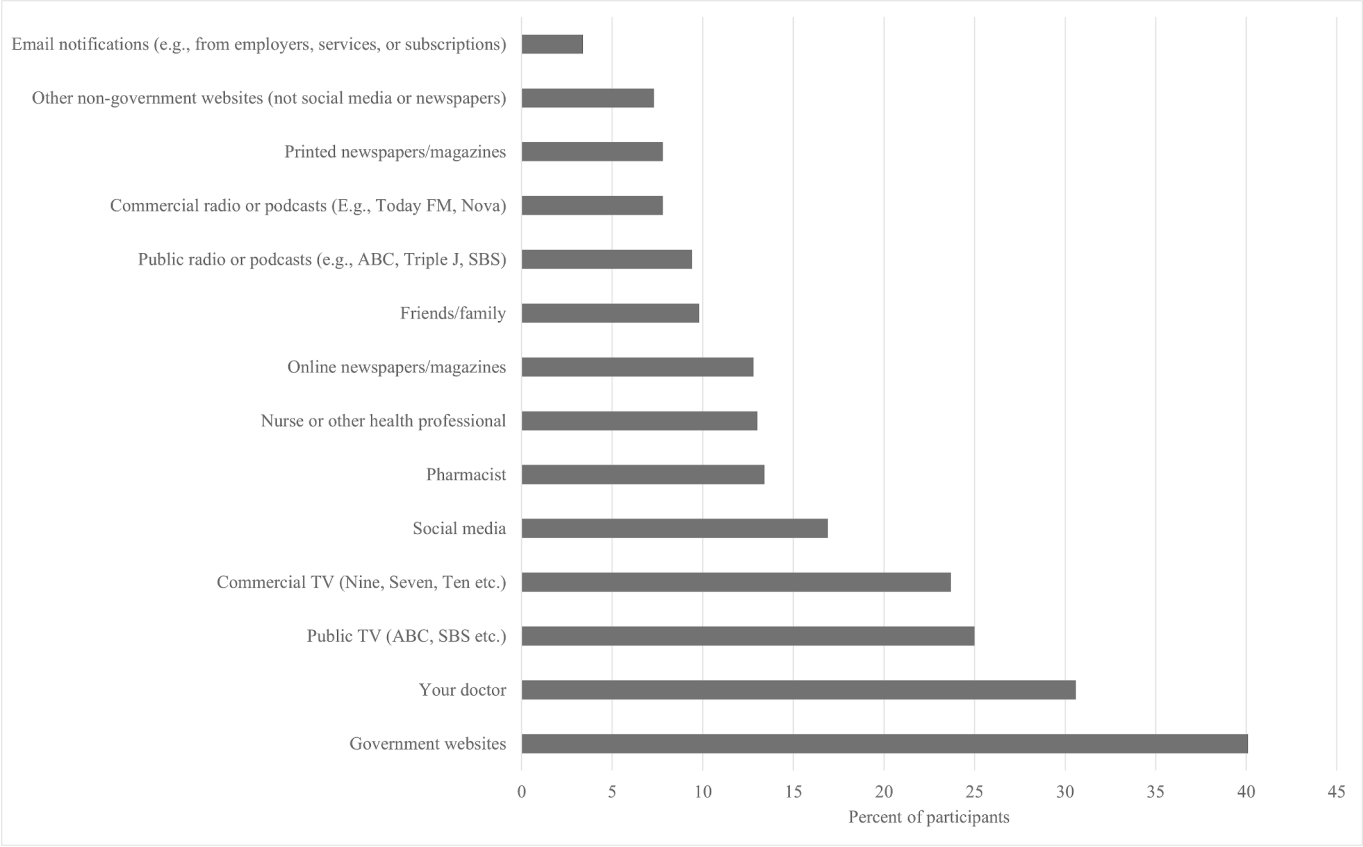

Fig. 2. Top three sources of vaccination information.

vaccine decision showed a significant association with COVID-19 vaccine uptake ($p < .001$). Other factors not correlated with COVID-19 vaccination included speaking a language other than English, country of birth, and religion.

5. Discussion

The current literature emphasises the significant impact of community leaders play in minority ethnic and multicultural communities in developing and disseminating communication materials and as critical stakeholders utilised to strengthen public health systems [5,19]. For this study, we found conflicting results, similar to the findings from the pilot study, with only 2.3 % of participants receiving information about COVID vaccination from a community leader, 1 % from a religious leader and 1.7 % from religious centres. The findings suggest only nurse or pharmacist-provided information was significantly associated with COVID-19 vaccine uptake. When analysing significant differences in vaccination information sources for those who speak a language other than English compared to participants who only spoke English, we found that all other sources outside of nurses or pharmacist which had no difference (including complementary health providers, family, workplace, local council, religious centres, community leader, religious leader, and community volunteer), were reported more frequently in participants who speak a language other than English.

Literature on vaccine hesitancy emphasises multiple significant factors contributing to COVID-19 vaccine hesitancy, many of which are especially prevalent in ethnic minority communities, including a lack of information about the COVID-19 vaccine, poor communication from trusted sources, and conflicting data [4,13]. Similarly, we found receiving information about the COVID-19 vaccine (78.7 %) and knowing where to find accurate and timely information about vaccines (85.3 %) was significantly associated with COVID-19 vaccine uptake. Furthermore, respondents' confidence in individuals and organisations in providing information about vaccination in Australia was surprisingly low, with averages ranging from only 4.09 out of a possible 10 (SD:3.00) for religious centres to the highest reported confidence average of 5.87 (SD:2.62) for a family member. Future studies should explore the reasons behind low confidence in the various organisations and individuals in providing information. With only 265 participants identifying as speaking a language other than English (21.8 %) and 316 born outside of Australia (25.9 %), our research is limited by its small sample of culturally diverse participants. More research should explore larger pieces of these populations.

Further research should be conducted with higher proportions of multicultural participants to explore in more depth the various roles of information intermediaries in communicating information to different communities, and any significant cross-cultural differences, as a large emphasis is often placed on 'community leaders' in research and government policy. We also propose that the lack of understanding of 'who' community leaders are, or even what they communicate and enact, could further explain our low reported numbers.

Other research has highlighted that people who actively seek health information have a higher rate of COVID-19 vaccination [24], which our results also confirm, as we found an association between participants who actively looked for information about the COVID-19 vaccines and being vaccinated against COVID-19. Specifically, we report a significant correlation between COVID-19 vaccine uptake and participants who primarily use public TV, commercial TV, public radio/podcasts, government websites, doctors, and pharmacists. Conversely, there was also a significant correlation was confirmed between being unvaccinated and using social media as a primary source of vaccination information.

Exploring the differences in information seeking for Australian communities is extremely important in adequately communicating and engaging with the public during public health emergencies and general

Table 3
Vaccine behaviour and community.

When deciding to get the COVID-19 vaccine, did the following influence your decision?	
Has a close friend or family member gotten vaccinated for COVID-19?	**N = 1218**
Yes	**571 (46.9)**
No	**484 (39.7)**
I did not have this experience	**163 (13.4)**
Knowing a doctor or health worker you trust got the vaccine	**N = 1218**
Yes	**570 (46.8)**
No	**437 (35.9)**
I did not have this experience	**211 (17.3)**
Knowing a local religious leader got the vaccine	**N = 1217**
Yes	**162 (13.3)**
No	**552 (45.4)**
I did not have this experience	**503 (41.3)**
Knowing a local community leader got the vaccine	**N = 1218**
Yes	**227 (18.6)**
No	**520 (42.7)**
I did not have this experience	**471 (38.7)**
A local community group you trust held a forum to discuss vaccine safety.	**N = 1218**
Yes	**188 (15.4)**
No	**530 (43.5)**
I did not have this experience	**500 (41.1)**
A local community organisation you trust created informational materials that answer common questions about the vaccine	**N = 1218**
Yes	**245 (20.1)**
No	**510 (41.9)**
I did not have this experience	**463 (37.7)**
Do you belong to a job-related association?	**N = 1218**
Yes	**176 (14.4)**
No	**1042 (85.6)**
Do you belong to a recreational group?	**N = 1218**
Yes	**338 (27.8)**
No	**880 (72.2)**
Do you belong to a community group associated with your culture or ethnicity?	**N = 1218**
Yes	**151 (12.4)**
No	**1067 (87.6)**
How much confidence do you have in the below individuals and organisations in providing information about vaccination in Australia (1-10scale)	**N, (Mean, SD)**
Your workplace	**728 (5.70, 2.74)**
Your local council	**1097 (5.64, 2.65)**
A childcare centre	**698 (5.41, 2.82)**
A school	**724 (5.49, 2.80)**
A university	**722 (5.66, 2.73)**
Religious centres, such as a church, mosques, temples, synagogues, and others	**729 (4.09, 3.00)**
Travel agent	**797 (4.69, 2.93)**
A leader in your community (non-elected)	**821 (4.60, 2.86)**
A family member	**1120 (5.87, 2.62)**
A friend	**1110 (5.61, 2.60)**
A community volunteer organisation or neighbourhood centre	**846 (5.04, 2.82)**

health communication [14]. Multiple studies in Australia [25] and the UK [26] provide evidence suggesting that there is an overreliance on social media, sources overseas and friends and family for COVID-19 information in ethnic minority groups. This behaviour is also not limited to COVID-19 either, with one study finding social media significantly more trusted and frequently used by ethnic minority parents when seeking information about their child's health [27].

Our results are consistent with the current literature on sources of information for ethnic minority groups, with participants who spoke a language other than English primarily using family/friends (13.2 %) and social media (28.7 %) when seeking COVID-29 vaccination information significantly more ($p < .001$) than those who only speak English. However, it is essential to note that the most frequently used source of information for participants who speak a language other than English was government websites (41.5 %), followed by public TV (30.2 %).

Knowledge and health information-seeking behaviours were positively associated with health protective behaviours in this study and globally [24,28,29]. Our results show associations between social media and not being vaccinated against COVID-19, which suggests there may be problems of poor reliability and legitimacy of sources. Due to the rise of online communication mediums, like social media and podcasts, most often disseminated without verification of their accuracy, misinformation and disinformation became prevalent during the COVID-19 pandemic and vaccine rollout [30].

This study further highlights the influential impact that healthcare providers have on COVID-19 vaccine uptake and found a significant correlation between participants having a regular GP, receiving a recommendation to get the COVID-19 vaccine from a GP and COVID-19 vaccine uptake. A lack of regular healthcare providers is already reported, especially amongst migrant and refugee populations, to be a significant vaccination obstacle [31,32], and receiving a recommendation from a GP is a well-recognised motivator for vaccine uptake [33]. One study by Poon et al. reports 64.4 % of doctors recommended all patients suitable for the COVID-19 vaccine, and 52.9 % of doctors proactively discuss the vaccine with patients [34]. Our results are very similar, with only 66 % of participants in the current study receiving a recommendation from a doctor. As discussed previously, the most important source of information correlated with COVID-19 vaccine uptake was nurses and pharmacists; and this result, alongside the importance of receiving recommendations, emphasises meaningful lost opportunities to increase vaccine uptake and addresses vaccine hesitancy, especially for at-risk populations. Policymakers should consider healthcare provider education as an essential aspect of vaccine policy.

The role of community for those from ethnic minority backgrounds is vital, especially highlighted during the COVID-19 pandemic and is at the core of communicating and engaging effectively with those from multicultural communities [14]. Other research emphasises the critical role that community leaders, community organisations, health professionals, multicultural service providers, and young people all play in supporting community members as trusted gateways to health information and resources [35–38].

Our research findings confirm some of the additional support that communities provided to participants, including a local COVID-19 vaccination clinic being available for 50.6 % of participants, local councils posting observed messages on social media about the COVID-19 vaccines for 18.3 % of participants, community (9.9 %) and religious leaders (4.6 %) encouraging participants to get the COVID-19 vaccine, and a local community organisation creating informational materials that answered community questions about COVID-19 or the vaccines for 9.4 % of participants.

All of these events, except for COVID-19 vaccination clinics, were reported statistically more frequent for participants who speak a language other than English. Interestingly, these events in the community were not associated with COVID-19 uptake, but participants' perceptions of the events influencing their decision to get vaccinated were associated with COVID-19 uptake. This highlights the power of value and belief systems playing an important role in vaccination decisions, and perhaps if these events were conducted with increased frequency, they may significantly influence vaccination uptake.

Overall, there are many opportunities to increase awareness and understanding of vaccination safety, as was shown to influence vaccine uptake and to increase trust in the information itself by being disseminated through a trusted and equally important utilised source.

6. Limitations

To the best of our knowledge, this study is among the first to report on the influence of community actors on vaccine uptake in Australia. However, this study has several limitations to consider. First, like many survey studies, the data are cross-sectional, so causality cannot be inferred. Second, although we sought to include participants who were from diverse, multicultural backgrounds, participants were limited to those who could read and understand English and those with computer and internet access, with most participants born in Australia, with English as a primary language, which may limit the generalisability and limit the capacity to inform tailored communication strategies for diverse populations in Australia. Future studies should include more prominent and varied participants from multicultural backgrounds to determine whether these views are consistent across different communities. Thirdly, we did not capture data on participants' reasons for preferring specific sources over others, and this information could provide insights into enhancing communication with different groups. Lastly, this study is a snapshot of behaviours, attitudes and beliefs reported in July 2022 (1 year and five months following the vaccine rollout in Australia), and we did not capture previous infection information. It is limited by the constantly changing environment and context of the COVID-19 pandemic and vaccine information/availability.

7. Conclusion

This study explored the roles that information intermediaries played in providing vaccination information to populations in Australia in 2022 and found significant variations in vaccine practices and vaccine information-seeking behaviours. This variation in information-seeking behaviour was markedly different for people who spoke a language other than English, especially the use of peer-to-peer sources. Participants identified various sources, some of which had a more substantial influence on COVID-19 vaccination uptake than others. These findings emphasise the need for tailored vaccine promotion strategies and health communication efforts, which require significant consideration of information accessibility and communication source preferences. Further research is warranted to explore the roles of information intermediaries in a larger sample of diverse populations.

Ethics approval

This study was approved by the UNSW Human Research Ethics Committee (HC220179). The Participant Information Statement was made available for download, and the survey was taken as eligible respondents provided informed consent.

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Author contributions

PM: data analysis; development (original draft, review, and editing) of the manuscript. IA, KM, BHR, and CJJ: conceptualization, review and editing of the manuscript. KB: data analysis; review and editing of the manuscript. HS: conceptualization; methodology; review, writing, and editing of the manuscript; project administration and supervision. All authors listed approved the submitted version and attest they meet the ICMJE criteria for authorship.

CRediT authorship contribution statement

Pippa McDermid: Writing – review & editing, Writing – original draft, Formal analysis, Data curation. **Ikram Abdi:** Writing – review & editing, Conceptualization. **Kinza Mustafa:** Writing – review & editing, Conceptualization. **Katrina Blazek:** Writing – review & editing, Formal analysis. **Ben Harris-Roxas:** Writing – review & editing, Data curation. **Chris J. Jackson:** Writing – review & editing. **Holly Seale:** Writing – review & editing, Supervision, Project administration, Conceptualization.

Declaration of competing interest

HS has received funding for investigator-driven research from Moderna. She has also received consultation fees/travel costs to attend meetings hosted by Moderna and Pfizer. All other authors do not have any COI to report.

Data availability

Data will be made available on request.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.vaccine.2024.04.076.

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