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“I’m scared that if I have the vaccine, it’s going to make my lung condition worse, not better.” COVID-19 vaccine acceptance in adults with underlying health conditions – a qualitative investigation

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ABSTRACT

Background: Sustained uptake of COVID-19 vaccines, including booster doses, will continue to be key to minimising morbidity and mortality caused by COVID-19. Because hesitancy can affect people’s motivation to get vaccinated, understanding and addressing factors influencing acceptance is critical to achieving high uptake. This is especially the case for adults with underlying health conditions, who are at increased risk of severe illness from COVID-19. The aim of this study was to investigate barriers and facilitators of COVID-19 vaccine acceptance in adults with underlying health conditions during the initial rollout of COVID-19 vaccines in Australia.

Methods: We conducted semi-structured, qualitative interviews with 15 adults with underlying health conditions in New South Wales (NSW) in April 2021, focusing on their previous vaccination experiences and feelings about COVID-19 vaccination. We categorised participants as accepting, hesitant or refusing. We analysed interviews thematically, informed by the World Health Organization (WHO) Behavioural and Social Drivers of Vaccination framework.

Results: Most (12/15) participants were hesitant about COVID-19 vaccination. Barriers to COVID-19 vaccine acceptance included concerns about vaccine safety and effectiveness; heightened perceptions of risk regarding the vaccines; low perceptions of COVID-19 risk; and negative social influences. Facilitators included perceived benefits of vaccination and positive social influences.

Conclusions: For some adults with underlying health conditions, perceptions of heightened vulnerability to COVID-19 vaccine side effects contributed to vaccine hesitancy during the
initial rollout of COVID-19 vaccines. We recommend supporting GPs and specialists to proactively reach out and recommend COVID-19 vaccination to this population; encouraging chronic disease organisations to act as trusted advocates of COVID-19 vaccination; and actively communicating evolving knowledge about vaccine safety.

**Keywords:** COVID-19, vaccination, acceptance, hesitancy, underlying health condition

**Author contributions**

**Maryke Steffens:** Conceptualization, Methodology, Investigation, Formal analysis, Writing - Original Draft, Writing - Review & Editing, Visualization, Funding Acquisition. **Bianca Bullivant:** Conceptualization, Methodology, Investigation, Formal analysis, Writing - Review & Editing, Project administration. **Catherine King:** Conceptualization, Methodology, Formal analysis, Writing - Review & Editing. **Kasia Bolsewicz:** Conceptualization, Methodology, Investigation, Formal analysis, Writing - Review & Editing, Funding Acquisition.

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INTRODUCTION

People’s continued uptake of COVID-19 vaccines, including booster doses, in conjunction with a suite of other public health measures, will continue to be key to minimising morbidity and mortality caused by COVID-19. As per the Behavioral and Social Drivers (BeSD) Framework,\(^1\) based on the Increasing Vaccination Model,\(^2\) the uptake of vaccines is influenced by motivational factors such as vaccine acceptance. Understanding acceptance of COVID-19 vaccination in priority groups, such as adults with underlying health conditions, to encourage uptake is especially critical due to their increased risk of severe illness from COVID-19.\(^3,4\) Previous research in adults with conditions such as multiple sclerosis and cardiovascular heart disease has found evidence of suboptimal acceptance and uptake of vaccines for illnesses such as influenza and pneumococcal disease.\(^5\)\(^-\)\(^7\) In relation to COVID-19 vaccination, the evidence to date is mixed. Some studies have reported that people with underlying health conditions may be more willing to vaccinate as compared to the rest of the population,\(^8\)\(^-\)\(^11\) while some others reported vaccination hesitancy.\(^8\)\(^,\)\(^12\)\(^-\)\(^15\) The extent and reasons for vaccination hesitancy in this population is poorly understood. Research exploring vaccination hesitancy in this population will help address this gap in knowledge and can be used to inform strategies to support continued uptake of primary and booster doses of COVID-19 vaccines during the current COVID-19 pandemic, as well as vaccination uptake during future pandemics. With this rationale, the aim of this study was to investigate barriers to and facilitators of acceptance of COVID-19 vaccines in adults with underlying health conditions. It is part of a larger study aiming to identify factors influencing COVID-19 vaccine acceptance in higher risk groups\(^16\) to inform targeted communication about COVID-19 vaccines.
We conducted this study in New South Wales (NSW), Australia’s most populous state, against a complex backdrop of multiple COVID-19 vaccines being rolled out in Australia, changing eligibility criteria, and intense media focus on the vaccines and their side effects.

The rollout of COVID-19 vaccines in Australia commenced in February 2021. Populations considered to be at higher risk of exposure to COVID-19 (such as health and aged care workers) or higher risk of severe disease (such as older adults and adults with underlying health conditions) were prioritised to receive the vaccines before the general population.17

When we started data collection for this study (7 April 2021), adults with underlying health conditions of any age were eligible to receive the Oxford-AstraZeneca COVID-19 viral vector vaccine (hereafter AZ vaccine). At this time, news of a blood clotting condition associated with this vaccine (subsequently defined as thrombosis with thrombocytopenia syndrome or TTS)18 had been reported for at least four weeks,19 and several European countries had suspended use of the vaccine.20 Just after data collection for this study commenced, adults with underlying health conditions under 50 years became eligible to receive the Pfizer-BioNTech COVID-19 mRNA vaccine (hereafter Pfizer vaccine) in Australia. This change in eligibility was triggered by advice from the Australian Technical Advisory Group on Immunisation (ATAGI) in response to a potentially increased risk of TTS following AZ vaccination in younger adults.18 Also of potential significance was the fact that, at the time, case numbers of COVID-19 in Australia (including in NSW, where this study was conducted) were low.21,22

METHODS

We worked with a professional agency that specialises in recruiting participants for research projects. We developed a clear brief and predefined criteria that the agency used
to find respondents through their database of potential respondents. Participants were eligible if they resided in NSW, were 18 years or older, spoke English, and had one or more health condition (see Table 1). These criteria were based on eligibility requirements for priority vaccination in Australia\textsuperscript{23} and designed in consultation with experts from the Australian National Centre for Immunisation Research and Surveillance. We sampled participants to ensure diversity of health conditions, location (metropolitan or regional), age, and gender. Participants provided written or verbal consent after reading an information sheet detailing the purpose of the study. Three experienced interviewers (MS, BB, KB) conducted semi-structured, qualitative interviews between 7-27 April 2021 with consenting participants over the phone or via videoconferencing. We audio-recorded the interviews, which lasted up to 30 minutes, and used a professional transcribing service. We asked participants about their perspectives on the COVID-19 pandemic, experiences with previous vaccinations, and feelings about and intentions towards COVID-19 vaccination. The full interview guide is available in Supplementary materials. We reimbursed participants A$50 for their time.

We analysed the interviews thematically, guided by the research question, to capture a breadth of views on COVID-19 vaccination. We categorised participants based on their position on COVID-19 vaccination (accepting, hesitant or refusing).\textsuperscript{24} The need to focus on pragmatic findings to inform policy and practice guided our analysis. We conducted analysis and sampling concurrently, stopping sampling when our analysis of new transcripts no longer produced new codes, and we felt we had gained a thorough understanding of the barriers to and facilitators of COVID-19 vaccine acceptance in adults with underlying health conditions.\textsuperscript{25}
We ensured analytic rigour by analysing data systematically.\textsuperscript{26-28} Pairs of researchers read each transcript separately, generated analysis notes, then together created a combined analysis file. The group (MS, KB, BB, CK) met weekly to discuss emerging categories, derived from inductive and deductive analysis, and resolve differences in interpretation. We also used group discussions to be reflexive about perspectives arising from personal and professional stakes in COVID-19 vaccination promotion. After group analysis of seven transcripts, MS created an initial framework based on emerging categories, which we used to structure our analysis of the remaining eight transcripts. MS and BB expanded and refined the framework after each weekly team analysis session.

We used the final framework to identify themes and sub-themes,\textsuperscript{29} using the BeSD framework\textsuperscript{1} (see Figure 1) to inform this process. The BeSD framework suggests vaccination uptake is influenced by motivational factors. These include what people think and feel about vaccines and the disease they protect against (e.g. safety concerns or high perceived risk of disease) and social processes (e.g. whether vaccination is an accepted social norm or whether a health provider recommends vaccination). Vaccine hesitancy (and its counterpart, acceptance) is a construct that lies within the BeSD motivational domain. The framework also suggests practical issues (e.g. access to services and information) influence vaccination behaviour, although this factor is not relevant to this study about acceptance.

This study was approved by the University of Sydney Human Research Ethics Committee (2020/277). We informed participants that the interview would be anonymous. When presenting data, we have assigned participants pseudonyms.

\textbf{RESULTS}
In total, we interviewed 15 adults (7 women, 8 men) with underlying health conditions, ranging in age from 25 to 77 years (median age 57 years), and relatively evenly distributed between metropolitan (8/15) and regional (7/15) locations in NSW. Participants had a wide range of health conditions (see Table 1). Some had multiple health conditions but are listed against their primary condition as indicated by the participant. In terms of their position on COVID-19 vaccination, most participants (12/15) were hesitant, 3/15 were accepting and none were refusing. No participant had received a COVID-19 vaccine.

We identified two themes: barriers to COVID-19 vaccine acceptance and facilitators of COVID-19 vaccine acceptance. Within each theme, we present key findings grouped into categories and sub-categories, informed by the BeSD Framework (see Figure 1) and illustrated by participant quotes.

Theme 1: Barriers to COVID-19 vaccine acceptance

Barriers to COVID-19 vaccine acceptance describes factors influencing participants’ hesitancy towards COVID-19 vaccines, mostly derived from views of hesitant participants (12/15).

1.1 What participants think and feel

Concerns about COVID-19 vaccine safety and effectiveness: Some hesitant participants had concerns about the safety of COVID-19 vaccine development. Participants questioned...
whether COVID-19 vaccines had been developed too quickly compared to other vaccines to understand the risk of long-term side-effects.

“How come in the past, it took 5-10 years to make a vaccine work and be pure and be non-lethal to people, where now they say they can do it in six to seven months? What makes it different? Why is it different? What makes – I don’t know. That’s the thing that I have a lot of trouble with.” – Vicky (hesitant, 70, has lung disease)

Participants described the risk of developing blood clots associated with the AZ vaccine as a major concern. Some interpreted this issue as a sign that the vaccine development had indeed been ‘rushed’.

“People that are getting jabbed are coming up with blood clots now and then other symptoms. And it’s like, okay, so that’s really started a red light for me to say I’m not going to get it at all.” – Henry (hesitant, 38, is immunocompromised)

Participants also expressed unease about perceived scientific uncertainty surrounding COVID-19 vaccines, reinforced by frequently changing expert advice from ATAGI about the AZ vaccine. Consequently, most hesitant participants reported a preference for the Pfizer vaccine. Older hesitant participants (who were eligible only for the AZ vaccine) described being offered a 'riskier' vaccine without clear justification, which made them more reluctant to accept vaccination altogether. One 67-year-old participant expressed outrage at being made to feel 'dispensable'.

“Is my life any less valuable than a person under 50?” I wouldn’t think so. So that’s another reason why I guess I’m not going to be rushing to have the AstraZeneca vaccine.” – Glenda (hesitant, 67, has type 2 diabetes)
In addition to safety concerns, some hesitant participants reported wanting high vaccine effectiveness to counterbalance perceived risks. Some questioned the value of receiving a vaccine that does not guarantee 100%, long-lasting protection against COVID-19 infection from current and future variants.

**Perceptions of high vaccine risk versus low disease risk:** Many hesitant participants perceived themselves to be especially vulnerable to adverse events associated with the AZ vaccine due to their chronic condition. This was a major factor in their decision-making around COVID-19 vaccination. A history of ill health meant many were highly risk averse.

"I’m going to think twice before taking this vaccine [...] I have heart condition. Maybe it stop the drug flowing into my heart and stop my heart from working." – Sophia (hesitant, 55, has a heart condition)

Some characterised not vaccinating as a way of taking care of their health. Participants contrasted this with vaccinating, which some described as potentially endangering their health and representing a loss of control.

“With the vaccines, I have no control over it at all. Once they’ve stuck that needle in me, what happens, happens, and I don’t like things, unfortunately, that I don’t have much control of.” – Vicky (hesitant, 70, has lung disease)

In contrast with a high perceived vaccine risk, most hesitant participants did not report feeling susceptible to severe COVID-19 disease. Participants described precautionary measures, such as going out less, washing hands, and wearing masks, as giving them a sense of control, as did the low number of COVID-19 cases in Australia.
Wanting to wait and see: A perceived low disease risk and perceived vulnerability to vaccine adverse events strengthened hesitant participants' willingness to take a 'wait and see' approach to vaccinating, i.e. waiting to see if vaccinated people had negative reactions or clear benefits before making a decision. This approach was especially evident in participants living in regional areas, who reported feeling far-removed from COVID-19.

"They’d have to show me positive proof that it is worth my while to have it. I think we’re very lucky living in Australia, that we have been isolated from the big effects of the pandemic, and I think that influences me." – Glenda (hesitant, 67, has type 2 diabetes)

Some, however, noted that an increase in the number of COVID-19 cases where they lived might encourage them to get vaccinated.

“I mean, if it became more in my face then I’d probably act very quickly on getting it done.” – Ben (hesitant, 57, has type 2 diabetes)

1.2 Social processes

COVID-19 vaccine hesitancy perceived as normal: Many hesitant participants characterised their COVID-19 vaccine hesitancy as normal within their social networks, and reported feeling validated by friends and family with similar concerns.

"A friend of mine is 70-odd. I think 74, and she’s got really bad lungs, bad health. And she said, 'No, I don’t think I’m going to get it straight away.' She goes, 'I’ll wait and see what people experience from it first.' So she’s in the same thoughts as mine. Same mindset." – Susanna (hesitant, 54, has had a stroke)
**Exposure to negative information:** Some participants described having their doubts about COVID-19 vaccines reinforced by exposure to negative information on the news, on radio and TV, and online, despite reporting that they weren’t always able to determine whether information was credible or not.

**Lack of provider recommendation to vaccinate:** Despite their eligibility, some hesitant and accepting participants reported not having received a recommendation from their general practitioner (GP) or specialist to get vaccinated. While some had sought guidance but did not receive it, others reported a lack of urgency about seeking advice. This may be explained in part by their low perceived risk of infection and developing severe disease.

**Lack of trust in health authorities and experts:** Some hesitant participants expressed a lack of trust in health authorities and other scientific experts, stemming from suspicions that profit was driving decisions about COVID-19 vaccines; that the scientific process had been corrupted and politicised; or that pharmaceutical companies were engaging in unethical practices. One hesitant participant feared ‘being a guinea pig’ in what she described as an ongoing ‘experiment’. Participants’ lack of trust was exacerbated by perceived inconsistent, confusing, and ‘mixed’ messages from medical or scientific experts, as well as government.

“I don’t know. I really am unsure what to do. Because some GPs are giving us good information and say ‘Do it, do it, do it’. Others are saying don’t bother. So it’s mixed messaging. And the federal government are doing exactly the same.” – Henry

(hesitant, 38, is immunocompromised)

**Theme 2: Facilitators of COVID-19 vaccine acceptance**
This second theme explains participants’ acceptance of COVID-19 vaccines and was apparent in accepting participants (3/15) and some hesitant participants (6/15) who expressed hesitancy towards the AZ vaccine but were more accepting of the Pfizer or other COVID-19 vaccines.

**Theme 2.1 What participants think and feel**

**A focus on benefits of COVID-19 vaccination:** Accepting and hesitant participants alike clearly identified benefits associated with COVID-19 vaccination, although for hesitant participants these benefits did not always outweigh perceived risks. Participants cited protection—for themselves, their family, friends, and the community—as one of COVID-19 vaccination’s main benefits. Accepting participants in particular characterised vaccination as a means of becoming stronger and healthier.

“I want to have something in my body which gives me strength to keep the COVID-19 away, keep me safe.” – Arjun (accepting, 70, has a heart condition)

Participants cited other benefits, including getting life back to ‘normal’, avoiding more lockdowns and boosting the economy.

“[Getting vaccinated] is responsible in a way that will help the community get back to where we were 12 or 18 months ago, which is where we all want to be.” – John, (accepting, 57, has had a stroke)

A wide range of participants cited the ability to travel freely interstate and overseas as a major benefit of vaccination. At the time of interviews, Australia’s international border had been closed for over a year, while borders between states had been closed intermittently over that time. Some hesitant participants suggested the ability to travel might eventually
prompt them to get vaccinated, although others characterised this as an unwelcome form of compulsion.

“Currently, I’m sitting on a fence. But I am aware that it will be mandatory for international travel, and I’m just thinking, as it is, it’s a fact that it will have to happen, and I’ll have to get vaccinated.” – Hanna (hesitant, 45, has a neurological condition)

In terms of perceived risks, accepting participants described considering risks of vaccination through an analytical rather than emotional lens, and hence attached less importance to reports of adverse events.

“I look at things through statistics. It sort of takes the emotion out of it for me. If 0.0001 of the population gets blood clots, that’s not going to worry me.” – John (accepting, 57, has had a stroke)

2.2 Social processes

Positive influence of others: Accepting and some hesitant participants reported feeling encouraged and reassured by others receiving COVID-19 vaccines, including family members, healthcare workers, and high-profile individuals.

“A friend said, 'If the Queen had it, I’m going to get it'. You know? And I’m like, 'Oh okay. So the Queen. Happy to give it to the Queen. Well, it’s got to be safe.'” – Susanna, (hesitant, 54, has had a stroke)

Trust in providers and other health experts: Both accepting and hesitant participants expressed trust in their GP and specialists, who they described as helping them navigate
feelings of uncertainty about COVID-19 vaccination. Some hesitant participants appeared open to shifting their position towards acceptance based on their doctor’s recommendation.

“My specialist wants me to have it. And she’s saved my life three times in 2017, so I trust her.” – Raphael (hesitant, 41, has cancer)

There were some exceptions, with one participant noting that it was very difficult to find a trusted GP who was not driven by financial concerns.

Some accepting participants also reported receiving a direct recommendation to vaccinate from a chronic disease advocacy organisation (for example Diabetes Australia). They described this, as well as advice from expert groups like ATAGI, as reinforcing their confidence in COVID-19 vaccines.

“You try and listen to the experts and the experts are saying we should get vaccinated.” – John (accepting, 57, has had a stroke)

DISCUSSION

This study provides important insights into factors influencing COVID-19 vaccine acceptance early in the 2021 pandemic vaccine rollout among Australian adults with underlying health conditions living in NSW. We found that a strong driver of hesitancy in our participants was their sense of heightened vulnerability to COVID-19 vaccine adverse events and apprehension about the potential for the vaccines to exacerbate their chronic conditions. We found that the AZ vaccine in particular triggered anxiety among many hesitant participants, due in part to fears that they were at increased risk of developing TTS.
Our findings resonate with the published literature. While a systematic review, as well as individual studies, have found evidence that those with underlying health conditions may be more willing to receive COVID-19 vaccines than the general public, there is also evidence of hesitancy. For example, in surveys of adults living with multiple sclerosis, approximately 1 in 5 (20% and 19%) were undecided about or intended to refuse COVID-19 vaccines. Studies in populations such as adults awaiting heart transplantation, and adults with cancer, found large proportions (29% and 40% respectively) were unwilling or undecided about getting COVID-19 vaccines. Similarly, adults undergoing chronic dialysis and adults with human immunodeficiency virus (HIV) indicated lower confidence in COVID-19 vaccines than the general public. In terms of factors acting as barriers to COVID-19 vaccine acceptance, a narrative review on acceptance in the lead up to vaccine approval found that, in a range of populations, safety concerns were a significant obstacle. Other surveys in adults with underlying health conditions in various countries have found similar concerns, including a perceived heightened risk of experiencing vaccine adverse events in light of their medical history, and a perceived risk of COVID-19 vaccines interfering with treatment. These findings are in keeping with research on other vaccines.

Our finding that adults with underlying health conditions are highly risk averse and prone to overestimating their personal risk of adverse events associated with COVID-19 vaccines suggests that general strategies to encourage vaccine acceptance—for example messaging that emphasizes the health benefits to themselves and others—may not adequately motivate this population to vaccinate. To encourage acceptance and uptake of COVID-19 vaccines, as well as those for future pandemics, adults with underlying health conditions may need targeted support. We propose several implications for policy and practice here.
First, we recommend that health professionals proactively approach patients to discuss vaccine eligibility, offer opportunities to answer questions and address concerns about the vaccines specific to patients' health situations, and, most importantly, make a strong recommendation to get vaccinated. Healthcare professionals have been shown to be highly trusted sources of information about vaccination, including about COVID-19.\textsuperscript{37} A strong and explicit recommendation from a health professional is associated with stronger vaccine uptake,\textsuperscript{2,38,39} and is recognised as an important factor influencing vaccine acceptance and uptake.\textsuperscript{40}

Professional networks, such as medical colleges and hospital networks, could support health professionals by facilitating access to new evidence and advice about COVID-19 vaccines and specific health conditions, as well as resources developed to improve conversations about novel pandemic vaccines with patients. Resources could include training in effective communication about vaccines with hesitant patients, such as the Sharing Knowledge About Immunisation approach,\textsuperscript{41} conversation guides, and printable, patient-friendly resources that address common patient concerns. Education and support for providers—for example training in motivational interviewing and similar techniques to improve patient-provider interactions about vaccination\textsuperscript{42}—is effective at improving vaccination uptake.\textsuperscript{43}

Governments could support health professionals by providing specific funding to allow them to have longer vaccination discussions, in addition to funding already provided to administer vaccines. This has occurred in Australia, under the banner of in-depth patient assessments and is provided at no cost to the patient.\textsuperscript{44} Governments could provide further support via the development of evidence-based patient resources that are easy to read, communicate complex concepts visually, and are available in different languages. This last point is
especially salient given over 20% of the Australian population speaks a language other than English at home. Patient resources should be tailored to different language and cultural groups to ensure they are appropriate and therefore more likely used. This requires that resources be developed in collaboration with and with input from communities, including in Australia, Aboriginal and Torres Strait Islander communities and culturally and linguistically diverse communities. Governments and health authorities should also actively communicate any evolving knowledge about vaccine safety to the public. While the impact of patient education on vaccine confidence and intention is limited, when used in combination with other interventions they may be effective in improving uptake. In keeping with risk communication principles, any communication about vaccine safety and specific health conditions should be offered in a timely manner, acknowledge any ongoing risk and uncertainty, and should be coordinated between government and other vaccination stakeholders to help ensure message consistency, thereby lessening the risk of audience confusion and mistrust.

Finally, organisations representing specific health conditions could act as powerful advocates for COVID-19 vaccines and future novel pandemic vaccines at a community level. Such organisations are likely to have pre-existing trusting relationships with their members and could share vaccination information tailored to specific health conditions. They may enhance their impact by coordinating with organisations sharing similar goals. Future research could map the landscape of trusted experts and organisations with potential to act as advocates for COVID-19 and future novel pandemic vaccines. Future research could also identify barriers experienced by health professionals when communicating about novel pandemic vaccines such as COVID-19 with patients, especially
those who are hesitant, and test the effectiveness of patient resources in terms of increasing knowledge and motivation to vaccinate. While findings and recommendations from this study may be applicable to COVID-19 vaccination into the future (boosters and potential routine vaccination), and to different language and cultural groups in Australia, further research is warranted to understand if and how COVID-19 vaccination schedule is understood and experienced by people with underlying health conditions, and by diverse populations.

**Limitations**

Our sample may have been limited by recruiting from a professional recruitment agency; the database from which they drew participants may not reflect diversity of the population. We used this method to enable us to access participants and to capture findings quickly to inform the state vaccination program. Furthermore, most participants lived in urban and regional locations, and only a small number had culturally and linguistically diverse (CALD) backgrounds. Experiences and views described in this study may not represent people with underlying health conditions living in more rural/remote areas of the country, and those with diverse social and cultural backgrounds.

Because this research aimed to explore COVID-19 vaccine acceptance, we did not explicitly explore practical issues such as access to and appropriateness of immunisation services. We note that for the optimal vaccination uptake both the motivational and practical factors need to be addressed.

Lastly, we conducted interviews at a time when COVID-19 vaccines were only recently available, and when the number of COVID-19 cases in the community had been and
continued to be very low. The perceptions of adults with underlying health conditions may have changed since then, however, our recommendations may have value in future pandemic scenarios.

CONCLUSION

At the beginning of the COVID-19 vaccine rollout, a strong driver of hesitancy in participants with underlying health conditions was their perception of heightened vulnerability to COVID-19 vaccine adverse events, and fears about the potential for the vaccines to exacerbate their health condition. Other barriers included concerns about vaccine safety and effectiveness; perceived low risk of severe COVID-19 disease; lack of a recommendation from a provider to vaccinate, and negative social influences. Facilitators of acceptance included focussing on the benefits of vaccination, trust in providers and health authorities, and positive social influences.

Given their aversion to perceived vaccine risk, adults with underlying health conditions may need targeted support to encourage vaccine acceptance. We recommend health professionals proactively discuss and recommend vaccination to their patients. Professional networks could support providers by facilitating access to new evidence, advice, and training to improve conversations with patients. We further recommend that governments develop patient resources in keeping with risk communication principles. Finally, organisations representing chronic health conditions could advocate for COVID-19 vaccines at the community level.

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Conflict of interest statement

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Figure captions and table titles

**Table 1.** Characteristics of study participants

**Figure 1:** Categories and sub-categories relating to barriers to and facilitators of COVID-19 vaccine acceptance, organised according to the BeSD Framework
Table 1. Characteristics of study participants

| Gender    |   |
|-----------|---|
| Female    | 7 |
| Male      | 8 |

| Age   |   |
|-------|---|
| 18-29 | 1 |
| 30-39 | 2 |
| 40-49 | 2 |
| 50-59 | 4 |
| 60-69 | 1 |
| 70-79 | 5 |
| 80+   | 0 |

| Location |   |
|----------|---|
| Metropolitan | 8 |
| Regional  | 7 |

| CALD* status |   |
|--------------|---|
| Yes          | 4 |
| No           | 11 |

| Health condition |   |
|------------------|---|
| Heart condition  | 3 |
| Stroke           | 2 |
| Diabetes         | 4 |
| Lung condition   | 1 |
| Cancer           | 2 |
| Immunocompromised| 1 |
| Neurological condition | 2 |

* Culturally and linguistically diverse
Declaration of interests

☐ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☒ The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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|---------------------------|------------------------------------------|
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| Bianca Bullivant          | Financial support was provided by NSW Health |
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