COVID-19 Immunisation, Willingness to Be Vaccinated and Vaccination Strategies to Improve Vaccine Uptake in Australia

Bing Wang 1,2, Rebecca Nolan 3 and Helen Marshall 1,2,*

Abstract: The COVID-19 vaccine rollout is crucial to lifting community and economic restrictions. This cross-sectional study aimed to assess: (a) COVID-19 vaccine uptake and associated factors; (b) COVID-19 vaccine intentions and associated factors; (c) community support for COVID-19 vaccination strategies and associated factors. The survey was conducted between May and July 2021 in Australia. Of 3003 participants, 30% reported they were already vaccinated and 39% indicated they would get vaccinated. Low socioeconomic and education levels, non-English speaking backgrounds and being parents were associated with decreased vaccine willingness and/or vaccination rates. High levels of support for vaccination strategies were demonstrated with mandatory vaccination being less preferable. Respondents from non-English speaking backgrounds were more likely to support a mandatory vaccination policy. Respondents with the highest socioeconomic level were more likely to support vaccination requirements for international travel, visiting nursing homes and working in healthcare settings. Respondents who were aged ≥70 years were more likely to support all proposed vaccination strategies. Targeted campaigns should be implemented for parents and those who live in socioeconomic disadvantaged areas and have lower educational attainment. Concise and clear vaccine information should be provided in lay and multiple languages to improve vaccine confidence. Vaccine enforcement policies should be considered and implemented with caution.

Keywords: COVID-19 vaccines; vaccine uptake; vaccine intention; vaccine policies

1. Introduction

COVID-19 vaccines have been approved and rolled out in many countries. In Australia, it has been estimated that 85% of the Australian population including 5–16 year-olds will have to be vaccinated to achieve herd immunity [1]. Initial shortage of vaccine supply, delays in local production and public concerns over the safety of COVID-19 vaccines with intensive media coverage have impacted Australia’s rollout. Although 47.5% of the world population has received at least one dose of a COVID-19 vaccine [2], concerns about vaccination hesitancy had been raised even prior to the start of rollouts and has been reported worldwide [3,4]. High vaccination coverage is critical to lifting COVID-19 restrictions and achieving potential herd immunity. There is an urgent need to examine vaccine uptake and public opinion towards vaccination policies in order to develop evidence-based communication strategies to build trust and continue to improve COVID-19 vaccine uptake in target groups.

It is likely that population attitudes towards the COVID-19 vaccine will fluctuate with further waves of the pandemic, necessitating regular tracking of vaccine confidence among different population groups to ensure public health campaigns remain responsive to community vaccine sentiments. In a longitudinal survey conducted in Australia between...
January and August 2021, there were several sub-populations identified that remained hesitant about COVID-19 vaccination and had lower vaccination rates [5,6]. Various vaccine campaign strategies have been considered or implemented by the Government or private corporations. For example, COVID-19 vaccines have become mandatory for aged care workers and most people working on the quarantine front line in Australia. Shepparton food processor SPC became the first company in Australia to mandate COVID-19 vaccination of all staff [7]. However, very few studies have been conducted to explore community acceptance of those vaccination enforcement policies and campaign strategies. More children and young people have been infected with the Delta variant due to high transmissibility and as they remain an unvaccinated group. The COVID-19 vaccine rollout has been extended to children aged between 12 and 15 years in many countries including the US, Australia and other European countries. However, parental support for their children to be vaccinated has not been well captured [6,8,9].

Our study aimed to assess: (1) COVID-19 vaccine uptake; (2) sociodemographic and health factors associated with vaccine uptake; (2) vaccine willingness/hesitancy to immunise themselves/their child; (4) sociodemographic and health factors associated with vaccine intentions; (5) community support for Government strategies to improve COVID-19 uptake; (6) sociodemographic and health factors associated with support for COVID-19 vaccination strategies.

2. Materials and Methods

2.1. Study Design and Data Sources

A cross-sectional survey design was implemented through the Population Health Survey Module System (PHSMS). The PHSMS is an ‘omnibus-type’ service available to government and non-government organisations to obtain data on a range of population health and wellbeing issues within South Australia, Australia.

2.2. Data Collection

Data were collected from South Australian adults aged 18 years and over using a computer-assisted telephone interviewing system. The cooperation rate was 77.3% [10]. The survey questions (Table S1) were approved by the Department for Health and Wellbeing Human Research Ethics Committee (HREC/18/SAH/78).

2.3. Statistical Analysis

Data are presented by various population sub-groups of sociodemographic and health characteristics. The categorisation criteria are described in the Supplementary Materials. Sociodemographic variables such as gender, age, Aboriginal and Torres Strait Islander status, culturally and linguistically diverse backgrounds, marital status, socioeconomic status (SES), education attainment and employment status, were summarised with mean values and standard deviations for continuous variables and percentages and 95% confidence intervals for categorical variables. Respondents from culturally and linguistically diverse backgrounds were measured using the respondent’s country of birth (COB): English speaking countries and non-English speaking countries. Socioeconomic status was assessed by quintiles of postcode-based Australian Socio-Economic Index For Areas (SEIFA) according to the definition from the Australian Bureau of Statistics (ABS) [11].

The predictor variables comprised of age, gender, Aboriginality, SEIFA, marital status, educational attainment, employment status, country of birth, metropolitan/country areas and presence of chronic medical conditions. Parental status was an additional predictor variable in the regression model to investigate factors associated with COVID-19 vaccination rates. Respondents’ vaccination status and willingness to vaccinate themselves was an additional predictor variable in the model assessing parental willingness to vaccinate their children. The outcome measures included vaccine willingness to get vaccinated for themselves or their children, self-reported vaccination status, and support for mandatory vaccination, vaccination reminders and vaccine requirements for international and do-
mestic travel, visiting nursing homes and working in healthcare settings. When ordered logistic regression models did not demonstrate adequate fit, logistic regression models were used. The outcome was defined as 1 if a respondent answered “very likely/strongly agree” and 0 for any other responses in the logistic regression models. Logistic regression analyses were performed for vaccination status and travel requirements.

Univariate and multivariate logistic regression analyses were performed to test association between predictor variables and outcome measures. All multivariate logistic regression models only included covariates that achieved bivariate regression threshold of statistical significance ($p \leq 0.20$) in the univariate logistic regress analyses. All results presented in the regression analyses were weighted. Raking was used to weight respondents incorporating various population characteristics to more closely reflect the South Australian population using benchmarks derived from the June 2016 ABS Census data. With raking, we chose a set of variables (gender, age, area of residence, country of birth, dwelling status, marital status, education level, employment status, household size) where the South Australian population distribution is known, and the raking procedure iteratively adjusts the weight for each survey participant until the sample distribution aligns with the South Australian population [12]. The weighting process ensured our results were representative of the South Australian population as a whole.

3. Results
3.1. Study Population

This survey was conducted with 3003 South Australians between May and July 2021 including 718 parents or caregivers. Weighted data show approximately equal number of males and females and 2.4% of those interviewed being Aboriginal or Torres Strait Islander (Table 1). In comparison with the Australian adult population, our survey respondents are generally representative with the exception of South Australians being older, less culturally diverse and more likely to be single.

Table 1. Weighted and unweighted sociodemographic characteristics of all respondents.

|                          | Weighted ($n = 3003$) | Unweighted ($n = 3003$) | Australia [13] |
|--------------------------|-----------------------|-------------------------|----------------|
|                          | $n$       | % (95%CI)          | $n$       | % (95%CI)          | %      |
| Gender                   |           |                      |           |                      |        |
| Male                     | 1460     | 48.7 (46.7–50.7)   | 1528     | 51.0 (49.2–52.8)   | 48.8   |
| Female                   | 1537     | 51.3 (49.3–53.3)   | 1469     | 49.0 (47.2–50.8)   | 51.2   |
| Age (median)             | 49       |                      | 55       |                      | 46     |
| 18–29 years              | 584      | 19.5 (17.8–21.2)   | 480      | 16.0 (14.7–17.3)   | 20.9   |
| 30–49 years              | 949      | 31.6 (29.7–33.6)   | 798      | 26.6 (25.0–28.2)   | 35.3   |
| 50–69 years              | 927      | 30.9 (29.0–32.8)   | 1021     | 34.0 (32.3–35.7)   | 30.0   |
| ≥70 years                | 543      | 18.1 (16.7–19.5)   | 704      | 23.4 (22.0–25.0)   | 13.7   |
| Aboriginal status        |           |                      |           |                      |        |
| No                       | 2913     | 97.6 (96.8–98.2)   | 2932     | 98.2 (97.7–98.6)   | 97.7   |
| Yes                      | 71       | 2.4 (1.8–3.2)      | 53       | 1.8 (1.4–2.3)      | 2.3    |
| SEIFA                    |           |                      |           |                      |        |
| lowest quintile          | 555      | 18.5 (16.9–20.2)   | 494      | 16.5 (15.2–17.8)   |        |
| low quintile             | 663      | 22.1 (20.4–23.8)   | 617      | 20.6 (19.1–22.0)   |        |
| middle quintile          | 632      | 21.0 (19.4–22.7)   | 643      | 21.4 (20.0–22.9)   |        |
| high quintile            | 547      | 18.2 (16.7–19.9)   | 558      | 18.6 (17.2–20.0)   |        |
| highest quintile         | 606      | 20.2 (18.6–21.8)   | 690      | 23.0 (21.5–24.5)   |        |
Table 1. Cont.

| Weighted (n = 3003) | Unweighted (n = 3003) | Australia [13] |
|---------------------|-----------------------|----------------|
|                     | n                    | % (95%CI)      | n               | % (95%CI)     | %     |
| **Marital status**  |                      |                |                  |                |       |
| Single              | 1493                 | 50.2 (48.2–52.3)| 1733             | 58.2 (56.4–59.9)| 49.7  |
| Married/de facto    | 1480                 | 49.8 (47.7–51.8)| 1246             | 41.8 (40.1–43.6)| 50.3  |
| **Education level** |                      |                |                  |                |       |
| Lower than Year 12  | 714                  | 23.9 (22.2–25.7)| 637              | 21.3 (19.9–22.8)| 28.3  |
| ≥Y12/TAFE/certificate/diploma | 1685 | 56.5 (54.5–58.5) | 1311             | 43.8 (42.1–45.6)| 48.7  |
| Degree or higher    | 583                  | 19.6 (18.3–20.9)| 1042             | 34.8 (33.2–36.6)| 23.0  |
| **Employment**      |                      |                |                  |                |       |
| Unemployed          | 127                  | 4.2 (3.6–5.0)  | 163              | 5.5 (4.7–6.3)  | 4.3   |
| Employed *          | 1654                 | 55.4 (53.4–57.4)| 1568             | 52.4 (50.6–54.2)| 61.6  |
| Others **           | 1205                 | 40.4 (38.4–42.4)| 1259             | 42.1 (40.3–43.9)| 34.1  |
| **Household income**|                      |                |                  |                |       |
| <AUD 60,000         | 830                  | 27.6 (25.8–29.5)| 829              | 27.6 (26.0–29.2)|       |
| AUD 60,000–AUD 150,000 | 789     | 26.3 (24.5–28.1)| 803              | 26.7 (25.2–28.4)|       |
| >AUD 150,000        | 303                  | 10.1 (9.0–11.3) | 345              | 11.5 (10.4–12.7)|       |
| UNK                 | 1081                 | 36.0 (34.1–38.0)| 1026             | 34.2 (32.5–35.9)|       |
| **COB (Country of Birth)** |        |                |                  |                |       |
| COB English main language | 2551 | 85.2 (83.8–86.6) | 2480             | 82.9 (81.5–84.2)| 77.0  |
| COB Non-English speaking | 443 | 14.8 (13.4–16.2) | 512              | 17.1 (15.8–18.5)| 23.0  |
| **Area of residence**|                      |                |                  |                |       |
| Metro. Adelaide     | 2175                 | 72.4 (70.6–74.2)| 2199             | 73.2 (71.6–74.8)|       |
| SA Country          | 828                  | 27.6 (25.8–29.4)| 804              | 26.8 (25.2–28.4)|       |
| **Chronic medical conditions** |        |                |                  |                |       |
| No                  | 1554                 | 51.9 (49.8–53.9)| 1502             | 50.2 (48.4–51.9)|       |
| Yes                 | 1442                 | 48.1 (46.1–50.2)| 1493             | 49.9 (48.1–51.6)|       |
| **Number of children living in household** | | | | | |
| 0                   | 2238                 | 74.5 (72.7–76.2)| 2250             | 75.3 (73.7–76.8)|       |
| 1                   | 348                  | 11.6 (10.3–13.0)| 334              | 11.2 (10.1–12.4)|       |
| ≥2                  | 395                  | 13.3 (12.0–14.7)| 404              | 13.5 (12.3–14.8)|       |

Note: The weighting of the data can result in rounding discrepancies or totals not adding. CI: confidence interval. Missing data were excluded from descriptive analyses. * Employed included full-time employed, part-time employed and casual employment. ** Other category includes respondents engaged in home duties, unable to work, carers, volunteers, students, retired and any other response.

3.2. Factors Associated with COVID-19 Vaccination

Of 3003 respondents, 30.0% reported that they were already vaccinated (Table 2). In the weighted and adjusted logistic regression, vaccination rates were lower in younger adults, those without a chronic condition, those from non-English speaking backgrounds, those from lower socioeconomic areas and those with an education level of <Year 12 (Table 3). Parents or caregivers of a child/children aged <16 years were less likely to have been vaccinated than their counterparts (aOR = 0.65, 95%CI: 0.50–0.86).
Table 2. Descriptive statistics of self-reported vaccination status and vaccine willingness to get vaccinated for themselves or their children.

| Vaccine Willingness or Vaccination Status | n/N (Weighted) | % (95%CI) (Weighted) | n/N (Unweighted) | % (95%CI) (Unweighted) |
|------------------------------------------|----------------|----------------------|------------------|-------------------------|
| I have been vaccinated (one or two doses) | 901/3003       | 30.0 (28.3–31.8)     | 1107/3003        | 36.9 (35.2–38.6)       |
| I will be getting vaccinated when it becomes available to me | 1181/3003 | 39.3 (37.3–41.4) | 1136/3003 | 37.8 (36.1–39.6) |
| I will not be getting vaccinated when it becomes available to me | 243/3003 | 8.1 (7.0–9.4) | 196/3003 | 6.5 (5.7–7.5) |
| I am undecided whether or not I will be getting vaccinated when it becomes available to me | 660/3003 | 22.0 (20.3–23.8) | 552/3003 | 18.4 (17.0–19.8) |
| Prefer not to say | 18/3003 | 0.6 (0.3–1.2) | 12/3003 | 0.4 (0.2–0.7) |

If you are a parent or caregiver of a child/children aged less than 16 years, please answer this question. If the COVID-19 vaccine is safe, effective and approved to use in children by the Government, how likely would you be to get your child/children vaccinated?

| Likelihood | n/N (weighted) | % (95%CI) (weighted) | aOdds Ratio (95%CI) |
|------------|----------------|----------------------|---------------------|
| Very likely | 362/717 | 50.5 (46.4–54.7) | Ref * |
| Somewhat likely | 145/717 | 20.3 (17.2–23.7) | 1.75 (1.16–2.65) |
| Not very likely | 57/717 | 8.0 (5.9–10.6) | 2.01 (1.73–23.2) |
| Not at all likely | 96/717 | 13.5 (10.6–16.9) | 7.8 (6.0–10.0) |
| Don’t know | 43/717 | 6.1 (4.4–8.3) | 6.4 (4.8–8.5) |
| Prefer not to say | 13/717 | 1.7 (0.8–4.0) | 1.0 (0.5–2.0) |

Table 3. Adjusted odds ratios of receiving at least one dose of the COVID vaccine.

| Respondents Who Were Vaccinated with at Least One Dose of the COVID Vaccine | Multivariate Logistic Regression |
|----------------------------------------------------------------------------|---------------------------------|
| n/N (weighted) | % (95%CI) (weighted) | aOdds Ratio (95%CI) |
|----------------|----------------------|---------------------|
| Age
| 18–29 years | 60/582 | 10.3 (7.8–13.5) | Ref * |
| 30–49 years | 167/939 | 17.8 (15.1–21.0) | 1.75 | 1.16–2.65 |
| 50–69 years | 329/922 | 35.7 (32.5–39.1) | 3.89 | 2.68–5.65 |
| ≥70 years | 344/542 | 63.6 (59.6–67.4) | 13.55 | 8.85–20.75 |
| Gender
| Male | 401/1445 | 27.8 (25.4–30.3) | Ref * |
| Female | 500/1534 | 32.6 (30.1–35.2) | 1.09 | 0.89–1.33 |
| Aboriginal status
| No | 883/2898 | 30.5 (28.7–32.3) | Ref * |
| Yes | 13/71 | 18.7 (9.5–33.4) | 1.01 | 0.39–2.60 |
| SEIFA
| lowest quintile | 127/549 | 23.2 (19.5–27.3) | Ref * |
| low quintile | 202/658 | 30.8 (27.0–34.7) | 1.31 | 0.95–1.80 |
| middle quintile | 201/630 | 31.8 (28.0–35.9) | 1.60 | 1.16–2.21 |
| high quintile | 150/544 | 27.5 (23.7–31.7) | 1.19 | 0.85–1.66 |
| highest quintile | 221/603 | 36.7 (32.7–40.8) | 1.76 | 1.27–2.44 |
Table 3. Cont.

| Respondents Who Were Vaccinated with at Least One Dose of the COVID Vaccine | Multivariate Logistic Regression |
|---|---|
| Married/de facto | 499/1489 | 33.5 (31.2–36.0) | Ref * |
| Single | 397/1465 | 27.1 (24.5–29.8) | 0.82 | 0.67–1.01 |

| Education level | Marital status |
|---|---|
| Lower than Year 12 education | 246/706 | 34.8 (31.0–38.9) | Ref * |
| ≥Year 12/TAFE/certificate/diploma | 439/1679 | 26.1 (23.8–28.7) | 1.09 | 0.85–1.39 |
| Degree or higher | 215/582 | 37.0 (33.9–40.2) | 2.24 | 1.69–2.97 |

| Employment | Marital status |
|---|---|
| Unemployed | 20/124 | 16.1 (11.1–22.8) | Ref * |
| Employed * | 378/1648 | 23.0 (20.8–25.3) | 1.36 | 0.83–2.23 |
| Others ** | 498/1196 | 41.6 (38.6–44.7) | 1.25 | 0.75–2.10 |

| COB (Country of Birth) | Marital status |
|---|---|
| COB English main language | 798/2533 | 31.5 (29.6–33.5) | Ref * |
| COB Non-English speaking | 101/441 | 22.9 (19.1–27.2) | 0.72 | 0.54–0.95 |

| Area of residence * | Marital status |
|---|---|
| Metro. Adelaide | 617/2158 | 28.6 (26.6–30.7) | Ref * |
| SA Country | 284/827 | 34.3 (30.9–38.0) | 1.25 | 0.99–1.57 |

| Chronic medical conditions | Marital status |
|---|---|
| No | 342/1544 | 22.1 (20.0–24.4) | Ref * |
| Yes | 556/1434 | 38.8 (36.1–41.5) | 1.27 | 1.03–1.57 |

| Parents or caregivers of a child/children aged <16 years | Marital status |
|---|---|
| No | 770/2277 | 33.8 (31.7–36.0) | Ref * |
| Yes | 131/708 | 18.5 (15.7–21.6) | 0.65 | 0.50–0.86 |

* Employed included full-time employed, part-time employed and casual employment. ** Other category includes respondents engaged in home duties, unable to work, carers, volunteers, students, retired and any other response. * Reference group

3.3. Factors Associated with Willingness to Receive COVID-19 Vaccine

Of 3003 respondents, 39.3% indicated they would agree to be vaccinated (Table 2). Exactly half of parents or caregivers of a child/children aged less than 16 years indicated that they were very likely to get their children vaccinated (50.5%, 95%CI: 46.4%–54.7%). However, 8.1% (95%CI: 7.0%–9.4%) of respondents stated that they would not be vaccinated and 13.5% (95%CI: 10.6%–16.9%) of parents indicated that they were not at all likely to get their child vaccinated.

After excluding vaccinated respondents and those who preferred not to say from the weighted and adjusted ordered logistic regression analysis, respondents who had the lowest SES, were not married and had <Year 12 education, were less willing to be vaccinated with the COVID-19 vaccine compared with those who had the highest SES, were married and had ≥Year 12 education (Table 4). A higher proportion of Aboriginal and Torres Strait Islander people were undecided about COVID-19 vaccination (49.6%, 95%CI: 34.0%–65.3%) than non-Indigenous people (31.2%, 95%CI: 28.8%–33.7%) and less stated they would be vaccinated (37.5% (95%CI: 23.5%–53.8%) vs. 57.1% (95%CI: 54.5%–59.7%)).
Table 4. Weighted and adjusted odds ratios of likelihood of taking the COVID vaccine themselves.

| Age          | Respondents Who Stated “I Will Not Be Getting Vaccinated” | Respondents Who Stated “I Am Undecided” | Respondents Who Stated “I Will Be Getting Vaccinated” | Multivariate Ordered Logistic Regression |
|--------------|----------------------------------------------------------|----------------------------------------|--------------------------------------------------------|------------------------------------------|
|              | n/N (weighted) | % (95%CI) (weighted) | n/N (weighted) | % (95%CI) (weighted) | n/N (weighted) | % (95%CI) (weighted) | aOdds Ratio | 95%CI |
| 18–29 years  | 45/522         | 8.6 (6.1–12.0)    | 173/522       | 33.1 (28.4–38.2)      | 304/522       | 58.3 (53.0–63.3)   |             |      |
| 30–49 years  | 89/771         | 11.5 (8.9–14.8)   | 246/771       | 31.9 (27.9–36.1)      | 437/771       | 56.6 (52.2–60.9)   |             |      |
| 50–69 years  | 83/593         | 14.0 (11.0–17.8)  | 189/593       | 31.8 (27.6–36.4)      | 321/593       | 54.1 (49.4–58.8)   |             |      |
| ≥70 years    | 26/197         | 13.0 (8.7–19.0)   | 52/197        | 26.6 (20.9–33.2)      | 119/197       | 60.4 (53.4–67.0)   |             |      |
| Gender       |               |                  |              |                          |              |                          |             |      |
| Male         | 117/1044       | 11.2 (9.1–13.7)   | 327/1044      | 31.3 (28.1–34.7)      | 600/1044      | 57.5 (53.9–60.9)   |             |      |
| Female       | 124/1034       | 12.0 (9.7–14.7)   | 333/1034      | 32.2 (28.8–35.8)      | 577/1034      | 55.8 (52.1–59.5)   |             |      |
| Aboriginal status |               |                  |              |                          |              |                          |             |      |
| No           | 235/2015       | 11.7 (10.0–13.5)  | 628/2015      | 31.2 (28.8–33.7)      | 1151/2015     | 57.1 (54.5–59.7)   | Ref *       |      |
| Yes          | 7/58           | 12.9 (5.5–27.6)   | 29/58         | 49.6 (34.0–65.3)      | 22/58         | 37.5 (23.5–53.8)   | 0.85        | 0.45–1.59 |
| SEIFA        |               |                  |              |                          |              |                          |             |      |
| lowest quintile | 65/422         | 15.4 (11.6–20.2)  | 146/422       | 34.6 (29.3–40.4)      | 211/422       | 49.9 (44.2–55.7)   | Ref *       |      |
| low quintile | 63/455         | 13.8 (10.4–18.1)  | 153/455       | 33.7 (28.5–39.2)      | 239/455       | 52.6 (47.0–58.1)   | 1.02        | 0.74–1.40 |
| middle quintile | 42/430         | 9.9 (6.9–13.8)    | 132/430       | 30.8 (25.8–36.2)      | 255/430       | 59.4 (53.8–64.7)   | 1.24        | 0.90–1.72 |
| high quintile | 41/395         | 10.5 (7.1–15.3)   | 123/395       | 31.3 (26.1–37.0)      | 230/395       | 58.2 (52.3–64.0)   | 1.16        | 0.82–1.63 |
| highest quintile | 31/382         | 8.2 (5.4–12.1)    | 105/382       | 27.5 (22.6–33.0)      | 245/382       | 64.3 (58.6–69.7)   | 1.45        | 1.04–2.03 |
| Marital status |               |                  |              |                          |              |                          |             |      |
| Married/de facto | 87/989         | 8.8 (7.0–11.1)    | 297/989       | 30.0 (27.0–33.3)      | 605/989       | 61.1 (57.7–64.4)   | Ref *       |      |
| Single       | 151/1069       | 14.2 (11.7–17.1)  | 354/1069      | 33.1 (29.6–36.8)      | 564/1069      | 52.7 (48.9–56.5)   | 0.74        | 0.60–0.91 |
| Education level |               |                  |              |                          |              |                          |             |      |
| Lower than Year 12 education | 77/460         | 16.7 (12.9–21.3)  | 183/460       | 39.7 (34.4–45.3)      | 201/460       | 43.6 (38.3–49.1)   | Ref *       |      |
| ≥Year 12/TAFE/certificate/diploma | 141/1240     | 11.4 (9.3–13.9)   | 396/1240      | 32.0 (28.8–35.3)      | 703/1240      | 56.7 (53.1–60.1)   | 1.59        | 1.24–2.05 |
Table 4. Cont.

| Respondents Who Stated “I Will Not Be Getting Vaccinated” | Respondents Who Stated “I Am Undecided” | Respondents Who Stated “I Will Be Getting Vaccinated” | Multivariate Ordered Logistic Regression |
|----------------------------------------------------------|----------------------------------------|--------------------------------------------------------|----------------------------------------|
| Degree or higher                                          | 18/104                                 | 41/104                                                 | 46/104                                 | 73.2 (69.2–76.8) | 2.91 | 2.14–3.96 |
| Employment                                                | 120/1269                               | 386/1269                                               | 749/1269                               | 43.9 (34.9–53.3) | Ref* |
| Unemployed                                                | 172/1269                               | 39.0 (30.3–48.4)                                      | 749/1269                               | 43.9 (34.9–53.3) | Ref* |
| Employed *                                                | 208/1736                               | 550/1736                                               | 978/1736                               | 59.0 (55.7–62.3) | 1.42 | 0.95–2.11 |
| Others **                                                 | 34/340                                 | 108/340                                                | 198/340                                | 54.2 (49.7–58.6) | 1.48 | 0.98–2.24 |
| COB (Country of Birth)                                    | 208/1736                               | 550/1736                                               | 978/1736                               | 56.3 (53.5–59.1) | Ref* |
| COB English main language                                 | 120/1269                               | 31.7 (29.1–34.4)                                      | 978/1736                               | 56.3 (53.5–59.1) | Ref* |
| COB Non-English speaking                                  | 34/340                                 | 108/340                                                | 198/340                                | 58.2 (52.2–64.0) | Ref* |
| Area of residence *                                       | 176/1541                               | 476/1541                                               | 889/1541                               | 57.7 (54.7–60.6) | Ref* |
| Metro. Adelaide                                           | 120/1202                               | 373/1202                                               | 707/1202                               | 58.8 (55.5–62.1) | Ref* |
| SA Country                                                | 120/878                                | 287/878                                                | 471/878                                | 53.6 (49.7–57.5) | 0.92 | 0.74–1.14 |

* Employed included full-time employed, part-time employed and casual employment. ** Other category includes respondents engaged in home duties, unable to work, carers, volunteers, students, retired and any other response. * Reference group
After controlling for parents’ vaccination status and willingness and other sociodemographic factors in the ordered logistic regression (Table S2), those who indicated that they have been vaccinated or will be vaccinated significantly increased the likelihood of having their children vaccinated (aOR: 14.10, 95%CI: 9.15–21.71).

3.4. Public Support of Potential Vaccination Policies and Strategies

Most respondents (84.8%, 95%CI: 83.2%–86.2%) supported the vaccination requirements for international travel and 60.7% (95%CI: 58.7%–62.7%) for domestic travel. Proof of vaccination was strongly supported by 67.9% (95%CI: 66.0%–69.9%) for visiting Residential Aged Care Homes and working in healthcare settings. Only 30.1% (95%CI: 28.2%–31.9%) strongly agreed that the Government should make COVID-19 vaccination mandatory. Vaccination reminders were strongly supported by 46.7% (95%CI: 44.7%–48.8%) of respondents (Table 5). Those aged ≥70 years were more likely to support all those proposed vaccination policies and strategies (Tables S3–S7). Respondents from non-English backgrounds were more likely to support mandatory vaccination policy (Supplementary Table S5). Respondents with the highest SES were more likely to support the vaccination requirements for international travel, visiting Residential Aged Care Homes and working in healthcare settings (Tables S3 and S7). Chronic illness was associated with a higher level of vaccination support for domestic travel (Table S4). Women were less willing to support the mandatory vaccination policy (Table S5).

Table 5. Descriptive statistics of respondents who supported potential vaccination policies and strategies.

| Potential Vaccination Policies and Strategies | n/N (Weighted) | % (95%CI) (Weighted) | n/N (Unweighted) | % (95%CI) (Unweighted) |
|---------------------------------------------|---------------|----------------------|-----------------|------------------------|
| Do you think COVID-19 vaccination or proof of vaccination should be required for: (Select all that apply) |
| International travelling | 2546/3003 | 84.8 (83.2–86.2) | 2600/3003 | 86.6 (85.3–87.8) |
| Domestic travelling | 1824/3003 | 60.7 (58.7–62.7) | 1907/3003 | 63.5 (61.8–65.2) |
| Should not be required | 294/3003 | 9.8 (8.5–11.2) | 246/3003 | 8.2 (7.3–9.2) |
| Don’t know | 137/3003 | 4.6 (3.8–5.5) | 134/3003 | 4.5 (3.8–5.3) |
| Prefer not to say | 10/3003 | 0.3 (0.1–0.7) | 6/3003 | 0.2 (0.1–0.4) |
| COVID-19 vaccination or proof of vaccination should be required for visiting Residential Aged Care Homes and working in a hospital or healthcare clinic. |
| Strongly Agree | 2040/3003 | 67.9 (66.0–69.9) | 2120/3003 | 70.6 (68.9–72.2) |
| Somewhat agree | 509/3003 | 17.0 (15.5–18.6) | 493/3003 | 16.4 (15.1–17.8) |
| Neither agree or disagree | 107/3003 | 3.6 (2.9–4.4) | 100/3003 | 3.3 (2.7–4.0) |
| Somewhat disagree | 163/3003 | 5.4 (4.5–6.5) | 139/3003 | 4.6 (3.9–5.4) |
| Strongly disagree | 132/3003 | 4.4 (3.6–5.4) | 110/3003 | 3.7 (3.0–4.4) |
| Don’t know | 37/3003 | 1.2 (0.8–1.8) | 30/3003 | 1.0 (0.7–1.4) |
| Prefer not to say | 14/3003 | 0.5 (0.2–0.9) | 11/3003 | 0.4 (0.2–0.7) |
| COVID-19 vaccination should be made mandatory by the Government. |
| Strongly Agree | 903/3003 | 30.1 (28.2–31.9) | 962/3003 | 32.0 (30.4–33.7) |
| Somewhat agree | 725/3003 | 24.1 (22.5–25.9) | 756/3003 | 25.2 (23.7–26.8) |
| Neither agree or disagree | 261/3003 | 8.7 (7.6–9.9) | 261/3003 | 8.7 (7.7–9.8) |
| Somewhat disagree | 468/3003 | 15.6 (14.2–17.1) | 463/3003 | 15.4 (14.2–16.8) |
| Strongly disagree | 561/3003 | 18.7 (17.1–20.4) | 484/3003 | 16.1 (14.8–17.5) |
| Don’t know | 74/3003 | 2.5 (1.9–3.2) | 68/3003 | 2.3 (1.8–2.9) |
| Prefer not to say | 12/3003 | 0.4 (0.2–0.8) | 9/3003 | 0.3 (0.2–0.6) |
Table 5. Cont.

| Potential Vaccination Policies and Strategies | n/N (Weighted) | % (95%CI) (Weighted) | n/N (Unweighted) | % (95%CI) (Unweighted) |
|---------------------------------------------|----------------|----------------------|-----------------|------------------------|
| Tailored vaccine reminder message/letter should be sent to everyone. | Strongly Agree | 1403/3003 | 46.7 (44.7–48.8) | 1479/3003 | 49.3 (47.5–51.0) |
| | Somewhat agree | 858/3003 | 28.6 (26.7–30.5) | 827/3003 | 27.5 (26.0–29.2) |
| | Neither agree or disagree | 219/3003 | 7.3 (6.3–8.4) | 215/3003 | 7.2 (6.3–8.1) |
| | Somewhat disagree | 261/3003 | 8.7 (7.6–9.9) | 250/3003 | 8.3 (7.4–9.4) |
| | Strongly disagree | 202/3003 | 6.7 (5.7–7.9) | 179/3003 | 6.0 (5.2–6.9) |
| | Don’t know | 52/3003 | 1.7 (1.3–2.4) | 47/3003 | 1.6 (1.2–2.1) |
| | Prefer not to say | 8/3003 | 0.3 (0.1–0.7) | 6/3003 | 0.2 (0.1–0.4) |

4. Discussion

The majority of respondents indicated they were very likely to receive the COVID-19 vaccine, or they were already vaccinated with at least one dose of a COVID-19 vaccine. However, 8% were resistant to vaccination and 14% were not at all likely to get their child vaccinated. This will result in a vulnerable unvaccinated group when COVID-19 restrictions are eased in Australia. Vaccine willingness and resistance have been investigated worldwide using different methodologies. Intention to receive the COVID-19 vaccine has fluctuated over time and between countries [3–5,14–22]. A large decline (15%) in vaccine willingness between August 2020 and January 2021 was observed in an Australian national longitudinal survey [16]. In Australia, vaccine hesitancy and lower vaccination rates were observed in a few sub-populations [5,6]. In a parent online survey conducted in June 2020, 24% of Australian parents were unsure or unwilling to accept a COVID-19 vaccine [23]. Around one third of parents reported that they were unsure (don’t know) or not likely to get their children vaccinated in our survey, which was lower than the proportion of parental vaccine acceptance reported in other surveys conducted in the UK and Australia [6,8]. In the UK, a higher level of vaccine acceptance for adults than for their child/children was reported, which was similar to our study results [8]. Our results showed that parents were less likely to have their children vaccinated if they were not willing to get vaccinated or have not been vaccinated themselves. The comparable findings were reported in Japan that parents’ willingness to get vaccinated for themselves was a significant factor for parental willingness to get children vaccinated [9]. Moreover, after adjusting for age and other sociodemographic factors, being a parent was associated with a lower likelihood of being vaccinated.

Social, political, health and demographic factors associated with intention to receive a COVID-19 vaccine have been investigated and results vary between countries, studies and survey times. In line with a few other surveys [3,5,16,17,21,23–28], our survey showed the lower education level and socioeconomic disadvantage were associated with reduced vaccine willingness and vaccination uptake. Association between age and vaccine willingness was inconsistently reported in previous surveys [3,5,16–18,23–25,28–30]. Similar to a previous survey [17], age and chronic illness were not associated with vaccine willingness in our study. However, older respondents with chronic illness were more likely to have already received the vaccine, which may reflect that the COVID-19 vaccine rollout in Australia gradually expanded and elderly people and people with underlying medical conditions were prioritised to receive the vaccine in the earlier phase of the rollout. Factors associated with vaccination uptake were assessed in respondents who self-reported that they had received at least one dose of vaccination in surveys conducted in April (9%) and August (57%) 2021. In line with the above mentioned surveys [5,6], it was noted that educational attainment and socioeconomic status were associated with vaccination rates. Respondents from non-English speaking backgrounds were less likely to have been vaccinated although
there was no difference in vaccine willingness compared to those of English speaking background [5,6,16]. Despite our small sample size, Aboriginal and Torres Strait Islander people are more hesitant to receive COVID-19 vaccines. Further research led by Aboriginal and Torres Strait Islander people would improve our understanding of factors associated with COVID-19 vaccine hesitancy in this important group.

This study found that respondents were generally supportive of mandating vaccination in some high risk settings, for the purpose of travelling and reminder strategies. The high level of support of vaccination requirements for international travel and a lower level of support for domestic travel is consistent with concerns about risk to Australians of overseas exposure of the COVID-19 variants. Although there is majority community support for these measures, there are still exemptions, and legal, ethical and technological issues to consider [31,32]. An equally high proportion of respondents agreed that COVID-19 vaccination should be required for visiting nursing homes and working in healthcare settings to reduce the risk to vulnerable people. In the US, a case study demonstrated that a COVID-19 vaccination condition of employment should be implemented with caution, as it required efforts and involvement from staff at all levels of the workplace, adequate time for developing and disseminating information, transparent communication and sufficient funding [33]. Compared to a previous survey reporting that 73% agreed that the Government should require a COVID-19 vaccine for work, travel and study in 2020, our survey showed a lower level of support for possible Government mandates (54% strongly or somewhat agreed). Similar to the survey conducted in 2020, older respondents and higher income respondents were more likely to support mandatory vaccination [14]. Although mandatory vaccination strategies may be a practical solution to improve vaccine uptake within a short period and effectiveness has been demonstrated in the childhood immunisation program and several other contexts [34], studies have found that vaccine enforcement reduced overall vaccine acceptance which may potentially undermine the goals of COVID-19 vaccination campaigns in the US [20,35]. Simple reminder messages, letters or emails have increased uptake of seasonal flu vaccines [36], and uptake at the beginning of the COVID-19 vaccine rollout in the US [37]. However, a randomised controlled trial found short messages did not increase vaccination rates in the US [38], which may indicate text messages were more useful to turn pre-existing intentions into behaviours rather than convincing people with vaccine hesitancy. This strategy was supported by most respondents.

The survey was administered in a representative weighted sample with one third reporting that they had received at least one vaccination dose. Although respondents self-reported their vaccination status, we expect minimal recall bias due to the recent onset of the COVID-19 vaccine program. Comparisons with other surveys over time and in other countries should be interpreted with caution, as public attitudes change and evolve in response to important media announcements and major events. Our findings are limited to the cross-sectional design, being one snapshot in time but are current to the situation in Australia of outbreaks and lockdowns. The study sample is representative of the South Australian population, and may not be generalised to the whole Australian population which is slightly younger (median age: 38 years (Australian population); 40 years (South Australian population)) and more culturally diverse (percentage of people were born in Australia: 66.7% (Australian population); 71.1% (South Australian population)) [13].

5. Conclusions

The COVID-19 vaccine rollout has already expanded to children aged 12 and older in Australia and other countries. The vaccine rollout will depend on widespread community trust of COVID-19 vaccines including parents. Despite enormous efforts that have delivered the COVID-19 vaccine rollout, governments, health professionals and COVID-19 vaccination providers may still need to address vaccine hesitancy in parents and other socioeconomically disadvantaged groups by providing evidence-based information in lay language for the limited-English-proficient populations, and by developing effective vaccine campaigns in languages other than English for migrants and refugees. Equity in
protecting people with low SES and education or from non-English speaking backgrounds and Aboriginal and Torres strait Islander peoples will need extra resourcing to ensure everyone is adequately protected, and this will be of benefit to the whole community. The vaccination strategies to improve uptake in less willing sub-groups should be considered with caution. Future research is paramount to monitor vaccine willingness and uptake, and adjust communication strategies to improve vaccine uptake in people who were uncertain or less willing to be vaccinated.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/vaccines9121467/s1, Table S1: Survey questions, Table S2: Weighted and adjusted odds ratios of parental willingness to get their child/children vaccinated, Table S3: Weighted and adjusted odds ratios of agreeing that COVID vaccination should be required for international travelling, Table S4: Weighted and adjusted odds ratios of agreeing that COVID vaccination should be required for domestic travelling, Table S5: Adjusted odds ratios of strongly agreeing that COVID-19 vaccination should be made mandatory by the Government, Table S6: Adjusted odds ratios of strongly agreeing that tailored vaccine reminders should be sent to everyone, Table S7: Adjusted odds ratios of strongly agreeing that COVID-19 vaccination should be required for visiting Residential Aged Care Homes and working in healthcare settings.

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Institutional Review Board Statement: All survey questions were approved by the Department for Health and Wellbeing Human Research Ethics Committee (HREC/18/SAH/78). The PHSMS surveys a representative sample of South Australians in Australia to obtain data on a range of health issues relevant to its subscribers. Potential subscribers of the PHSMS include government agencies, non-government organisations, research institutes, universities and health professionals. The Data, Analysis and Reporting Team at Wellbeing SA supported the ethics application process and applied for the ethics approval for all subscribers.

Informed Consent Statement: Informed verbal consent was obtained from the participants prior to the survey commencing. Participants could choose to skip questions or sections throughout the interview and could withdraw their consent to participate in the survey at any time.

Data Availability Statement: The data presented in this study are available from the corresponding author (H.M.) upon reasonable request and final ethics approval.

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