How are COVID-19 knowledge and concern associated with practising preventive behaviours in Australian adults?

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Abstract

Objective: This study investigated the association between COVID-19 prevention knowledge and concern and practising preventive behaviour in Australian adults.

Methods: Using an online survey, knowledge of Australian COVID-19 guidelines, concerns about pandemic impact, the practice of preventive behaviours, and sociodemographic variables (i.e. age, gender, information source) were measured. Bivariate analysis and linear regression models were used.

Results: A total of 1,491 participants (age 50.5 ±14.9 years, 32.3% males) completed the survey. Higher knowledge and concern scores were associated with a higher practice of preventive behaviour scores (βs:0.47 & 0.08 respectively, p<0.001). Older adults (>65 years) and women had higher knowledge and practice scores compared to their counterparts. Being younger (<45 years) and male were associated with a lower practice score (βs:-0.88 & -2.52, respectively, p<0.001). Referring to public and government sources as primary sources of information was associated with a higher practice score (β:1.21, p<0.001).

Conclusions: Government-run campaigns appear to be effective in promoting preventive practices and achieving a high knowledge of COVID-19 guidelines in Australian adults.

Implications for public health: Public health strategies are required to promote the practice of preventive behaviour for COVID-19 (or future pandemics), especially among men and younger adults using social media, given their wide use of these sources.

Key words: COVID, knowledge, public health, guideline adherence

Declared as a pandemic on 11 March 2020, the novel Coronavirus (COVID-19) has claimed the lives of more than 3.22 million people and infected more than 154 million worldwide (as of 5 May 2021).[1] Countries, including Australia, have implemented different measures to reduce virus transmission and the burden on the healthcare system and to lower associated mortality. Measures and guidelines including travel bans, social distancing, cancellation or limiting of the number of people at events and changes to work practices were implemented to lower transmission rates.[2] In Australia, government campaigns such as 'Stop the Spread and Stay Healthy' were launched to provide a reliable source of information and guidelines to help reduce the spread of COVID-19.[3] However, despite all of these measures, as of 26 November 2020, more than 900 deaths and 27,000 infections have resulted from COVID-19 among Australians.[4]

For imposed measures and guidelines to be effective, a high level of public adherence is required. Based on the 'Knowledge, Attitudes, and Practices (KAP)' approach, knowledge of COVID-19 preventive behaviour and attitudes (such as concerns and perceived risk) may determine the practice of preventable behaviours.[5,6] Recent reports suggest that public campaigns to increase Australians' knowledge of COVID-19 preventive behaviour have been successful.[7] However, there is a lack of literature on the links between knowledge of COVID-19 preventive guidelines, concern for the potential risk and impact of the pandemic, and whether these factors are associated with better preventive practices among Australians. It is also unknown if differences in socio-demographics and where Australians source their COVID-19 information (e.g. governmental sources, social media) influence preventive practices. Therefore, this study investigated the association between COVID-19 prevention knowledge and concern and the practice of preventive behaviour, based on different demographic characteristics in Australian adults. These findings will inform future public health strategies and campaigns to help contain this pandemic as well as future pandemics.

Methods

This study used the KAP approach to explore COVID-19 preventive behaviours.[5,6] An anonymous online survey was hosted on Qualtrics online survey platform (Qualtrics, Provo, UT) and distributed using social media (paid Facebook advertisements and Twitter)

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and institutional resources (host university staff e-mail). Data collection occurred between 9 and 19 April 2020, when Australia was in the middle of the first COVID-19 wave (with around 6,500 cases and 70 deaths) and experiencing nationwide restrictions. Australian adults (≥18 years) were eligible to participate. Ethical approval was obtained from Central Queensland University Human Research Ethics Committee (number: 22332).

Details of the survey and methods are published elsewhere.[8] Knowledge of guidelines was examined using 25 statements developed based on the routine preventive activities of the Australian guidelines for Coronavirus Diseases 2019.[9] Participants were instructed to choose statements based on their current (at the time of the survey) knowledge of recommendations to stop the spread of COVID-19 (e.g. "Maintaining a social distance of at least 1.5 metres"). Scores were based on the number of correct statements (range 0 to 25). Concerns about the potential impact of COVID-19 were examined using 18 statements (e.g. "I am concerned about contracting COVID-19 myself"). Responses were scored from 'Not at all concerned (1)' to 'Extremely concerned (5)'. Scores were summed to give an overall concern score (range 18 to 90). The practice of COVID-19 preventive guidelines was assessed using 15 questions examining the frequency of practice (e.g. "How often do you practise regular handwashing with soap and water?") Responses were scored from 'Always (4)', to 'Never (0)'. An inaccurate response against the guideline resulted in 4 points deducted from the overall score, with a final score ranging from 0 to 56. Higher scores represented higher knowledge, concern and practice.

Participants' knowledge, concern and practice scores were presented as mean (±SD), and their bivariate differences based on demographic characteristics (age, gender, education, marital status, income, chronic disease, and source of information) were explored using an independent *t*-test and analysis of variance (ANOVA), with Bonferroni post hoc tests. Multivariable linear regression models were used to examine the association between knowledge and concern scores, with model 1 including practice score, and model 2 controlling for socio-demographic variables. Coefficients and 95% confidence intervals were reported. A p-value <0.05 was considered statistically significant. Analyses were performed using SPSS (v25).

Table 1 Participant's knowledge, concern and practice scores based on their demographic characteristics

Demographic	Number (%)	Knowledge score (max. 25) Mean (± SD)	Concern Score (max. 90) Mean (± SD)	Practice Score (max. 56) Mean (± SD)
Overall	1,491	16.36 (± 3.53)	50.95 (± 11.68)	44.28 (± 7.32)
Age				
18 – 45	552 (37.0)	16.12 (± 3.48)[a]	51.34 (± 11.06)	43.53 (± 7.23)[a]
46 to 65	697 (46.7)	16.38 (± 3.32)[a]	51.22 (± 12.10)	44.50 (± 7.45)[ab]
>65	242 (16.2)	17.27 (± 3.19)[b]	49.30 (± 11.72)	45.38 (± 7.06)[bc]
F (p-value)		9.98 (<0.001)	2.93 (0.054)	5.96 (0.003)
Gender				
Male	484 (32.3)	16.08 (± 3.76)	51.38 (± 12.55)	42.33 (± 8.94)
Female	999 (66.7)	16.50 (± 3.41)[a]	50.75 (± 11.24)	45.31 (± 6.05)[a]
t (p-value)		-2.15 (0.038)	0.97 (0.332)	-7.55 (<0.001)
Education				
Year 12 or below	224 (15)	16.84 (± 4.03)[a]	53.27 (± 12.48)[a]	44.51 (± 6.89)
Technical studies, certificate, Diploma	362 (24.3)	16.86 (± 3.64)[a]	51.36 (± 12.01)[ab]	44.09 (± 8.14)
Bachelor and above	905 (60.7)	16.15 (± 3.05)[b]	50.22 (± 11.27)[bc]	44.30 (± 7.09)
F (p-value)		7.71 (<0.001)	6.47 (0.002)	0.23 (0.795)
Household Income				
<$1,000/week	335 (26.1)	16.93 (± 3.82)[a]	51.47 (± 11.90)	44.30 (± 7.78)
$1,000 - <$2,000/week	381 (29.7)	16.38 (± 3.22)[a]	50.93 (± 11.65)	44.35 (± 7.02)
≥$2,000/week	568 (44.2)	16.11 (± 3.07)[b]	50.17 (± 11.36)	43.85 (± 7.29)
F (p-value)		6.27 (0.002)	1.40 (0.516)	0.662 (0.245)
Marital Status				
Never married	300 (20.5)	16.10 (± 3.90)	53.82 (± 12.22)[a]	43.56 (± 7.89)
Divorced/Separated/Widowed	243 (16.5)	16.63 (± 3.49)	49.96 (± 11.82)[b]	44.36 (± 7.87)
Married/De facto	918 (62.8)	16.51 (± 3.10)	50.27 (± 11.29)[b]	44.57 (± 6.74)
F (p-value)		2.07 (0.127)	11.66 (<0.001)	2.25 (0.106)
Chronic disease status				
Without chronic disease	798 (53.5)	16.09 (± 3.67)	50.49 (± 11.72)	43.99 (± 7.34)
With chronic disease	693 (46.5)	16.67 (± 3.33)[a]	51.48 (± 11.61)	44.62 (± 7.31)
t (p-value)		3.19 (0.001)	1.63 (0.988)	-1.64 (0.099)
Source of information				
Personal sources (friends, colleagues, etc.)	61 (4.2)	16.05 (± 3.81)[ab]	51.18 (± 13.93)	44.98 (± 7.07)[ab]
Social media sources (Facebook, Twitter, etc.)	146 (10)	15.64 (± 4.15)[a]	52.21 (± 12.25)	42.86 (± 7.55)[a]
Television, newspaper, radio and news websites	638 (43.9)	16.60 (± 3.33)[b]	50.52 (± 11.49)	43.89 (± 7.37)[a]
Public and governmental sources	609 (41.9)	16.47 (± 3.15)[b]	51.02 (± 11.55)	45.11 (± 7.12)[b]
F (p-value)		3.48 (0.015)	0.86 (0.460)	5.471 (0.001)

Notes:

Columns with different superscript present significant bivariate differences (t-test or ANOVA with post hoc) in knowledge, concern and practice scores between demographic classifications. For example, knowledge score is significantly different comparing >65 yo group with 46 to 65 and 18 – 45 yo groups (therefore different superscript) but no differences between knowledge score of 46 to 65 and 18 – 45 yo groups (therefore same superscript). Columns with no superscript present no significant bivariate differences in scores between demographic classifications.

Results

Participants' COVID-19 prevention knowledge, concern and practice scores, including their differences based on sociodemographic characteristics, are shown in Table 1. Overall, 1,491 participants (50.5 ±14.9 years, 32.3% males) completed the survey. Older adults (>65 years) and women had significantly higher knowledge and practice scores compared to their counterparts (Table 1). Those with bachelor and higher degrees had significantly lower knowledge and concern scores. Participants with higher income (≥$2,000/week) had significantly lower knowledge scores. Concern scores were higher for those not in a relationship. Participants with a chronic disease recorded higher knowledge scores. Those using social media (such as Facebook, Twitter, etc) as their main information source had lower knowledge and practice scores, while those relying on government sources had higher practice scores (Table 1).

Practice scores were positively associated with knowledge (β:0.47, 95%CI: 0.37 to 0.58, p<0.001) and concern scores (β:0.08, 95%CI:

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0.05 to 0.12, $p<0.001$) in models 1 and 2 (βs:0.43 and 0.09, respectively, $p<0.001$). Among demographic characteristics, being <45 years of age and male were associated with a lower practice score (β:-0.88, 95%CI: -1.65 to - 0.13; and β:-2.52, 95%CI: -3.27 to -1.76, respectively, $p<0.001$) compared to their counterparts. Using public and government sources as primary sources of COVID-19 information compared to other information sources was associated with a higher practice score (β:1.21, 95%CI: 0.49 to 1.92).

Discussion

Women and older adults practised COVID-19 preventive behaviours to a greater extent than their counterparts. This is consistent with the literature suggesting that women and older adults are generally more health-conscious[10] and practise COVID-19 prevention behaviours to a greater extent than others.[5] Our findings add further support for associations between the demographic characteristics of male gender and younger ages with the lower practice of COVID-19 preventive practice scores.[11]

Since some chronic conditions (i.e. diabetes, cancer, and respiratory conditions) increase the risk of severe illness following COVID-19 infection,[12] we anticipated better knowledge and practice scores in this cohort. However, while individuals with a chronic condition in this study demonstrated more knowledge of COVID-19 preventive guidelines, this knowledge was not associated with better practice scores.

Higher knowledge and practice scores for COVID-19 guidelines were also observed in those participants who primarily accessed information from government rather than social media sources. This may be due to the intense government-run campaigns undertaken to provide Australians with reliable and evidence-based guidelines through official public websites and media channels (such as the Queensland Government's 'How to protect yourself and others' guidelines). Also, the wide presence of health misinformation on social media resulted in a COVID-19 'infodemic',[13] which may have promoted misleading information on preventive guidelines. This finding highlights the need for governments to provide timely and accurate information via a range of sources to support the uptake of practice guidelines.

An unexpected finding was that those with higher education (bachelor's degree and above) demonstrated slightly lower knowledge of COVID-19 guidelines compared to their counterparts. This contradicts literature reporting better health literacy[14] and practice of healthy behaviours[15] in those with higher education. This may be due to the effectiveness of public health initiatives to drive behaviour change, as opposed to improving health literacy regarding COVID-19 precautionary measures. Further research is required to confirm these findings.

This study has limitations. The use of self-reported measures, although appropriate, may introduce response bias. Despite a relatively large sample size, participants were more likely to be women, have a tertiary education and be in a relationship. We also used an online survey distributed through social media to recruit participants, which limits our participants to those with internet access and who are active users of social media. All of these factors may reduce the generalisability of the findings. Also, the magnitude of some between-group differences was small, and although there was a statistically significant difference, it may not be meaningful in a real-world context.

To our knowledge, this is the first Australian study to examine the association between COVID-19 prevention knowledge, concern and preventive practices. Our findings suggest the need for public health strategies to promote better preventive practices in men, younger adults, and those without chronic conditions. Government-based campaigns to promote COVID-19 prevention strategies appear to be effective at increasing the awareness of, and adherence to, the guidelines, and should be continued across a range of sources. Given the high public reliance on social media and other non-regulated information sources, especially among younger adults, future public health initiatives should also address the reliability and accuracy of information provided via these sources.

References

1. World Health Organization. *Coronavirus Disease (COVID-19) Dashboard*. Geneva (CHE): WHO; 2020.
2. Australian Department of Health. *Coronavirus (COVID-19) Health Alert*. Canberra (AUST): Government of Australia; 2021.
3. Australian Department of Health. *Launch of the Coronavirus (COVID-19) Campaign*. Canberra (AUST): Government of Australia; 2020.
4. Australian Department of Health. *Coronavirus (COVID-19) Current Situation and Case Numbers*. Canberra (AUST): Government of Australia; 2020. Available from: https://www.health.gov.au/news/health-alerts/novel-coronavirus-2019-ncov-health-alert/coronavirus-covid-19-current-situation-and-case-numbers
5. Peng Y, Pei C, Zheng Y, Wang J, Zhang K, Zheng Z, et al. A cross-sectional survey of knowledge, attitude and practice associated with COVID-19 among undergraduate students in China. *BMC Public Health*. 2020;20(1):1292.
6. Lee M, Kang BA, You M. Knowledge, attitudes, and practices (KAP) toward COVID-19: A cross-sectional study in South Korea. *BMC Public Health*. 2021;21(1):295.
7. Thomas R, Greenwood H, Michaleff ZA, Abukmail E, Hoffmann T, McCaffery K, et al. Examining Australian's beliefs, misconceptions, and sources of information for COVID-19: A national online survey. *BMJ Open*. 2021;11(2):e043421.
8. Stanton R, To QG, Khalesi S, Williams SL, Alley SJ, Thwaite TL, et al. Depression, anxiety and stress during COVID-19: Associations with changes in physical activity, sleep, tobacco and alcohol use in Australian adults. *Int J Environ Res Public Health*. 2020;17(11):4065.
9. Communicable Diseases Network Australia. *CDNA National Guidelines for the Prevention, Control and Public Health Management of COVID-19 Outbreaks in Residential Care Facilities in Australia*. Canberra (AUST): Australian Government Department of Health; 2021. Available from: https://www.health.gov.au/resources/publications/cdna-national-guidelines-for-the-prevention-control-and-public-health-management-of-covid-19-outbreaks-in-residential-care-facilities-in-australia
10. Khalesi S, Vandelanotte C, Thwaite T, Russell AMT, Dawson D, Williams SL. Awareness and attitudes of gut health, probiotics and prebiotics in Australian adults. *J Diet Suppl*. 2020:1-15. doi: 10.1080/19390211.
11. Pickles K, Cvejic E, Nickel B, Copp T, Bonner C, Leask J, et al. COVID-19: Beliefs in misinformation in the Australian community. Unrefereed Preprint medRxiv. 2020:2020.08.04.20168583. *BMJ*. Unpublished Observations.
12. Centers for Disease Control and Prevention. *Coronavirus Disease 2019 (COVID-19): People with Certain Medical Conditions*. Alanta(GA): United States Department of Health & Human Services; 2020. Available from: https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html
13. Cinelli M, Quattrociocchi W, Galeazzi A, Valensise CM, Brugnoli E, Schmidt AL, et al. The COVID-19 social media infodemic. *Sci Rep*. 2020;10(1):16598.
14. van der Heide I, Wang J, Droomers M, Spreeuwenberg P, Rademakers J, Uiters E. The relationship between health, education, and health literacy: Results from the Dutch Adult Literacy and Life Skills Survey. *J Health Commun*. 2013;18 Suppl 1(Suppl 1):172-84.
15. Margolis R. Educational differences in healthy behavior changes and adherence among middle-aged Americans. *J Health Soc Behav*. 2013;54(3):353-68.

Supporting Information

Additional supporting information may be found in the online version of this article:

Supplementary File 1: COVID-19 Knowledge Concern Practice Survey.

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