Original Article

Health literacy and health-promoting behaviours among Australian-Singaporean communities living in Sydney metropolitan area

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Abstract

Background: Health literacy affects how individuals navigate and make decisions within the healthcare system and has been recognized to influence health behaviours. However, less is known about its associations with health-promoting behaviours amongst Australian migrant populations. This study is an attempt to fill this gap by investigating the level of health literacy and its associations with physical activity, healthy diet, smoking and health services utilization among Australian-Singaporean communities.

Methods: A total of 157 participants were recruited from Singaporean communities living in Sydney metropolitan areas, New South Wales, Australia. Data was collected through a cross-sectional online survey from January 2016 to August 2016.

Results: Most of the respondents were female (56.1%), employed (70.7%) and had lived in Sydney for >5 years (80.3%). About 60% of the participants were inadequately health-literate (Brief Health Literacy Screening Tool score ≤ 16). The level of health literacy varied significantly based on participants' socioeconomic status. Regression analysis indicated that health literacy was a reliable predictor of health-promoting behaviours including diet, body mass index, smoking and alcohol consumption, physical activity and having a medical check-up.

Conclusions: This study's findings have significant implications for health policy makers and suggest that health literacy should be encouraged and included in any health-promoting behaviour interventions amongst migrant populations.

Keywords

Health literacy, health-promoting behaviours, health promotion, Australia, Singaporean migrant communities, health policy

Introduction

Low levels of health literacy are of great concern for Australia's healthcare system.[1] This is because approximately 60% of the Australian population aged 15–74 years did not have adequate health literacy skills in 2006.[2] A detailed breakdown of this data indicated that limited health literacy is disproportionately distributed amongst lower socioeconomic and minority groups, for instance, 46% and 26% of Australian migrants born outside of Australia in English speaking and non-English speaking countries were adequately health-literate respectively in 2006.[2]

Health literacy refers to the 'cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health'.[3] Health literacy is essential for responding to life events and management of lifestyle behavioural changes.[4,5] As such, it is increasingly becoming an essential factor for developing a 'consumer-centric healthcare system'.[6] This is because health-literate individuals are more likely to use health services more effectively, make informed decisions and maintain their health.[1]

There is strong evidence suggesting that inadequate health literacy affects health consumers' capacity to effectively navigate healthcare systems.[7,8] Lower health literacy is associated

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with poorer health status,[9] higher rates of hospitalization,[10] lower likelihood of seeking preventive measures[11] and inadequate self-management skills.[12] It is also responsible for rising healthcare costs – those with a lower health literacy are more likely to incur higher average healthcare costs.[13,14] Inadequate health literacy has been associated with suboptimal use of healthcare services as well.[15] For instance, adequately health-literate individuals are more likely to participate in screening tests and have fewer doctor visits and emergency department presentations compared with inadequately health-literate individuals.[16,17]

More importantly, health literacy is a strong determinant of health-promoting behaviours[18] such as making healthy food choices,[19] physical activity[20] and utilization of health services.[16] For instance, health literacy is linked to nutrition-specific skills including estimating portion size, understanding nutritional labels and searching for trustworthy nutritional information sources.[19,21] Likewise, a higher health literacy level is a strong predictor of more frequent physical activity.[20]

In Australia, health literacy has been mainly studied in the context of adverse health[22] but less is known about its associations with health-promoting behaviours among the general population, especially amongst migrant populations. This study is an attempt to fill this gap by investigating the level of health literacy and its associations with health-promoting behaviours such as physical activity, healthy diet, smoking and health services utilization within a rapidly growing community: Australian-Singaporean communities living in Sydney metropolitan areas.[23] Like Australians, Singaporeans have been found to have health literacy levels mirroring those of other developed countries;[24–27] however, to the best of our knowledge, no health literacy study has been carried out among Australian-Singaporean communities living in Australia. As such, this exploratory project provides valuable information about the level of health literacy and its associations with health promoting behaviours, which can be used as evidence for health decision makings within this the community. More specifically, this study aims to provide information highlighting the needs of Australian-Singaporean communities in future projects aiming at improving health literacy and health promoting behaviours.

Methods

Recruitment

A total of 157 participants were recruited from Australian-Singaporean communities living in Sydney metropolitan areas through an online survey hosted on UNSW KeySurvey. The survey was introduced to potential participants via social media platforms, such as Facebook and Twitter, as well as Singaporean community sites such as Temasek Club and Singapore Kongsi (Australia). The survey link was also disseminated through the Singaporean Student Associations in the University of New South Wales (UNSW), University of Sydney and Macquarie University to reach a wider population. Singaporean community leaders and local shops and restaurants were also contacted to disseminate the survey. Eligible Singaporeans who had an Australian citizenship or residency and were 18 years of age or older completed the survey online and submitted their answers anonymously. The study

was reviewed and approved by the Human Research Ethics Committee at UNSW (No. HC15803).

Measure

Demographic information. Participants' gender, age, height, weight, religion, education level, current employment status, current weekly personal income and length of stay in Sydney were surveyed. Participants' body mass index was calculated using their height and weight.

Health literacy. The BRIEF (Brief Health Literacy Screening Tool) test developed by Haun et al.[28] was adapted and used in this study. The BRIEF test has been shown to have a 0.79 sensitivity (95% confidence interval 0.70–0.87%) for detecting inadequate health literacy.[28,29] BRIEF scores range from 4 to 20 and are categorized into: inadequate (scores of less than 16) and adequate (scores of 17 to 20).

The four-item BRIEF test indicating health literacy levels of participants included the following questions: 'How frequently do you get someone help you read hospital materials?', 'How frequently do you have problems learning about your medical condition due to difficulties understanding written materials and information?', 'How frequently do you have problems understanding what is said to you about your medical conditions?' and 'How confident are you at filling out medical forms by yourself?'. For the first, second and third questions, response options were offered in the following five-point Likert scale: 1 = always, 2 = often, 3 = sometimes, 4 = occasionally, and 5 = never. For the fourth question, the following five-point Likert scale was offered: 1 = not at all, 2 = a little bit, 3 = somewhat, 4 = quite a bit and 5 = extremely. Mean health literacy scores were derived from summation of each the BRIEF items.

Health-promoting behaviours. Physical activity, healthy diet, smoking, alcohol consumption, doctor check-ups and self-health rating were examined as health-promoting behaviours.

Physical activity comprised two questions: 'Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate (e.g. brisk walking, cycling, swimming, etc.) for at least 10 minutes continuously?' and 'If yes, how many days per week?'. For the first question, 'yes' and 'no' options were offered and for the second question, the options of '1–2 days' and '3 or more days' were offered.

Healthy diet included two questions: 'How many serves of fruit do you consume on average each day?' and ''How many serves of vegetables do you consume on average each day?' For fruit consumption, two options, of '≤1 serve' and '2 or more serves', were offered. For vegetable consumption, three options, of '≤1 serve', '2 serves' and '3 or more serves', were offered.

Smoking status: participants indicated their smoking status via three options: 'current smoker', 'former smoker' and 'never smoked'.

Alcohol consumption comprised two questions: 'Have you ever consumed alcohol?' and 'If you consume alcohol, how many glasses of alcohol do you drink on a typical day when drinking?' For the first question, 'yes' and 'no' options were offered and for the second question '1 or 2' and '3 or more' glasses per session were offered.

Medical check-ups consisted of the question 'When did you last see your doctor for a general check-up?' and response options of '≤1 year ago', '2–3 years ago' and 'more than 3 years ago' were offered.

Self-health rating consisted of the question: 'How would you rate your own health?' A five-point Likert scale rating 1 = poor, 2 = fair, 3 = good, 4 = very good and 5 = excellent was offered.

Analysis

Univariable statistics were calculated to determine respondents' demographic characteristics, health literacy levels and health-promoting behaviours. One-way ANOVA and post-hoc Dunnett tests were performed to identify any significant differences in health literacy among socio-demographic characteristics. Finally, multinomial logistic regression analysis was carried out to determine whether health literacy can predict health-promoting behaviours.

To do this analysis, health literacy and all of the socio-demographic variables were simultaneously entered into the regression model using the 'Enter' method for each of the health-promoting behaviour variables. Non-significant socio-demographic variables were not reported to simplify the description of the findings. Socio-demographic variables used were age, gender, race, religion, marital status, education level, employment status, level of weekly income, citizenship status and length of stay in Sydney.

The variance inflation factor (VIF) was used to measure and handle multicollinearity, which refers to correlation between predictors when the regression model includes multiple factors or predictors. Multicollinearity overinflates the standard errors and consequently makes a significant variable insignificant. VIF shows how much the variance of regression coefficient increases if the predictors are correlated. The VIFs for the predictors will be equal to 1 if they are not correlated. A VIF of greater than 10 indicates high correlation and multicollinearity.[30] The VIFs for the predictors of this study varied between 1 and 5, which was not an indicative of multicollinearity. Analysis was performed using IBM Statistical Package for the Social Sciences (SPSS B23, IBM, USA).

Results

Respondent characteristics

As outlined in Table 1, a total of 157 respondents participated in this study. Most of the respondents were female (56.1%), employed (70.7%) and had lived in Sydney for >5 years (80.3%). More than half of them were overweight or obese (54.1%).

Health-promoting behaviours

Table 2 indicates the distribution of health-promoting behaviours among the participants. About half of the participants were physically inactive (48.4%) and had not visited a doctor for a medical check-up in last 2–3 years (43.3%). The majority of the participants were consumers of alcohol (60.5%) and most of them consumed three or more glasses per session (55.8%). One-fifth were current smokers and just over 10% rated their health as excellent.

Table 1. Participant socio-demographics (*N*=157).

Demographic variable	Frequency (%)
Gender	
Female	88 (56.1)
Male	69 (43.9)
Age	
18–29 years	49 (31.2)
30–40 years	45 (28.7)
41–50 years	34 (21.7)
>51 years	29 (18.5)
Religion	
Catholic/Christian	71 (45.2)
Hindu	41 (26.1)
Other	45 (28.7)
Marital status	
Single	58 (36.9)
Married	65 (41.4)
De facto/widowed/divorced	34 (21.7)
Education level	
Primary/Secondary School	23 (14.6)
College/diploma	58 (36.9)
University	76 (48.4)
Employment status	
Employed	111 (70.7)
Unemployed/retired	46 (29.3)
Weekly income	
Nil income	28 (17.8)
<AUD$1000	76 (48.4)
≥AUD$1000	53 (33.8)
Length of stay in Sydney	
<5 years	31 (19.7)
6–10 years	44 (28.0)
>10 years	82 (52.2)
BMI	
Normal (BMI <25.0)	72 (45.9)
Overweight or obese (BMI >25.0)	85 (54.1)

BMI: body mass index.

Health literacy levels

As shown in Table 3, about half of the participants 'Sometimes' or 'Occasionally' had difficulties understanding medical materials/conversations. Participants had an average health literacy score of 14.67 out of 20 with a standard deviation ±4.01. To determine the adequacy of health literacy level among the participants, the health literacy scores were categorized into adequate (score 17–20) and inadequate (score 0–16) levels. Most of the participants were inadequately health-literate (57.3%).

Associations between health literacy with socio-demographics

Table 4 outlines the comparison of health literacy across socio-demographics. One-way ANOVA and post-hoc Dunnett analysis indicated that young, single and employed participants were more likely to be health-literate compared with their counterparts. Length of living in Sydney and education level were positively correlated with health literacy; as such, those who had university education or had lived in Sydney for more

than 10 years were more health-literate. Those who had no income were more health-literate compared with those who had an income of less than AUD$1000 per week.

Regression analysis: predictive power of health literacy

As shown in Table 5, logistic regression analysis indicated that health literacy was significantly associated with health-promoting behaviours after controlling for sociodemographic factors. Those with adequate health literacy were more likely to engage in health-promoting behaviours. For instance,

those with inadequate health literacy were five times more likely to be overweight, four times more likely to consume more alcohol, 11 times more likely to be a current smoker and seven times less likely to have a general medical check-up within a year.

Discussion

This study examined the level of health literacy and whether it is associated with health-promoting behaviours such as physical activity, healthy diet, smoking and health services utilization amongst Australian-Singaporean communities living in Sydney metropolitan areas.

Most of the respondents were female (56.1%), employed (70.7%) and had lived in Sydney for >5 years (80.3%). About 60% of the participants were inadequately health-literate (57.3%) and the level of health literacy within the surveyed population was significantly varied across socio-demographics. Younger, single, highly educated and employed participants were more health-literate compared with their counterparts. This is in line with existing literature;[31,32] for instance, Findley found that those of older age and lower education levels were more likely to have inadequate health literacy.[11]

The length of stay in Sydney metropolitan areas was also correlated with the level of health literacy and those who had lived in Sydney for a longer time were more likely to be more health-literate. This finding can be explained by the fact that initial unawareness of healthcare services and unfamiliarity with the healthcare system amongst migrant populations are often alleviated with the increase of the length of stay in the host country.[33] Unlike in existing literature,[11,34] those with 'no income' gained higher health literacy scores compared with those who had less than AUD$1000 per week. This finding may have different reasons; however, one possible explanation could be a high rate of unemployment amongst well-educated individuals within the study population. This is because education levels influence health literacy scores across various socio-economic status, including weekly income.[35]

In relation to health-promoting behaviours, about half of the participants were physically inactive (i.e. not participating in any moderate-intensity exercise or activity for at least 10 minutes), over 80% had not had general medical check-ups in more than two years, over 50% were consumers of more alcohol (three or more glasses per session), over 50% were overweight/obese; one-fifth were current smokers, and just over 10% rated themselves healthy. Inadequately health-literate participants were also more likely to be physically inactive,

Table 2. Health-promoting behaviours of respondents (*N*=157).

Demographic variable	% (frequency)
Exercise status	
No	48.4 (76)
Yes	51.6 (81)
Exercise frequency	
1–2 days	48.2 (39)
3 or more days	51.8 (42)
Smoking status	
Never smoked	56.7 (89)
Former smoker	22.3 (35)
Current smoker	21.0 (33)
Vegetable consumption/day	
≤1 serve	26.8 (42)
2 serves	32.5 (51)
3 or more serves	40.8 (64)
Fruit consumption/day	
≤1 serve	75 (47.8%)
Two or more serves	82 (52.2%)
Alcohol status	
No	39.5 (62)
Yes	60.5 (95)
Amount consumed (glass/session)	
1 or 2	44.2 (42)
3 or more	55.8 (53)
Last doctor check-up	
≤1 year ago	19.1 (30)
2–3 years ago	43.3 (68)
>3 years ago	37.6 (59)
Self-rated health	
Poor/fair	8.3 (13)
Good/very good	79.6 (125)
Excellent	12.1 (19)

Table 3. Health literacy levels of respondents (*N*=157).

Item	% (frequency)				
	Always	Often	Sometimes	Occasionally	Never
Requiring assistance in reading hospital materials	8.9 (14)	12.1 (19)	15.9 (25)	38.2 (60)	24.8 (39)
Difficulties in understanding written medical materials	3.8 (6)	17.8 (28)	16.6 (26)	33.1 (52)	28.7 (45)
Difficulties in understanding medical conversations	1.3 (2)	15.9 (25)	21.7 (34)	30.6 (48)	30.6 (48)
	Not at all	**A little bit**	**Somewhat**	**Quite a bit**	**Extremely**
Confident at filling out medical forms	0.6 (1)	12.1 (19)	19.7 (31)	51.0 (80)	16.6 (26)

Mean health literacy score (± SD) = 14.67 (± 4.01), max score = 20, adequate health literacy (score 17–20) = 42.7%, inadequate health literacy (score 0–16) = 57.3%.

Table 4. Multiple comparisons (post-hoc Dunnett test analysis) between socio-demographics and health literacy (*N*=157).

Socio-demographic variable	Mean difference (SD)
Age	
18–29 years (16.39 (±2.81)) *vs.* >41–50 years (13.26 (±3.99))***	4.42 (3.99)
Marital status	
Single (16.53 (±2.73)) *vs.* married (14.46 (±4.03))***	2.07 (4.03)
Length of stay in Sydney***	
<5 years (13.39 (±4.91)) *vs.* >10 years (15.91 (±3.17))***	−2.53 (3.17)
Education level	
Primary/Secondary School (9.43 (±3.03)) *vs.* college/diploma (13.91 (±4.09))***	−4.48 (4.09)
Primary/Secondary School (9.43 (±3.03)) *vs.* university (16.83 (±2.13))***	−7.39 (2.13)
Employment status	
Employed (15.22 (±3.51)) *vs.* unemployed/retired (13.35 (±4.81))***	1.87 (4.81)
Weekly income	
Nil income (16.00 (±3.64)) *vs.* <AUD$1000 (12.43 (±4.01))***	3.57 (4.01)

*$p<0.05$.
**$p<0.01$.
***$p<0.001$.

Table 5. Multiple logistic regression analysis between health literacy score (adequate *vs.* inadequate)[a] and health-promoting behaviours after controlling for sociodemographic factors (*N*=157).

Health-promoting behaviours and significant predictors	OR (95% CI)
BMI (normal *vs.* overweight/obese)	
Health literacy score (adequate *vs.* inadequate)***	4.91 (2.41–10.02)
Exercise status (no *vs.* yes)	
Health literacy score (adequate *vs.* inadequate)**	0.24 (0.10–0.62)
Employed *vs.* unemployed/retired*	0.08 (0.01–0.73)
Exercise frequency (1–2 days *vs.* 3 or more days)	
Health literacy score (adequate *vs.* inadequate)**	0.26 (0.10–0.68)
Fruit consumption/day (≤1 serve *vs.* 2 or more serves)	
Health literacy score (adequate *vs.* inadequate)***	0.10 (0.04–0.24)
Length of stay in Sydney	
<5 years *vs.* 6–10 years**	5.63 (1.66–19.13)
<5 years *vs.* >10 years*	4.49 (1.44–14.01)
Australian citizen *vs.* Australian PR/visa*	0.35 (0.16–0.80)
Vegetable consumption/day	
≤1 serve *vs.* 2 serves	
Health literacy score (adequate *vs.* inadequate)*	0.39 (0.14–1.13)
≤1 serve *vs.* 3 or more serves	
Health literacy score (adequate *vs.* inadequate)***	0.06 (0.02–0.18)
Employed *vs.* unemployed/retired**	0.20 (0.07–0.56)
Self-rated health (poor/fair *vs.* good/very good/excellent)	
Health literacy score (adequate *vs.* inadequate)*	4.53 (0.97–21.15)
Alcohol status (no *vs.* yes)	
Health literacy score (adequate *vs.* inadequate)*	1.99 (0.96–4.14)
Amount consumed (glass/session) (1 or 2 *vs.* 3 or more)	
Health literacy score (adequate *vs.* inadequate)**	3.47 (1.41–8.53)
Smoking status	
Never smoked *vs.* current smoker	
Health literacy score (adequate *vs.* inadequate)**	11.26 (2.24–56.63)
Education level	
Primary/Secondary School *vs.* college/diploma*	0.14 (0.03–0.73)
Primary/Secondary School *vs.* university***	0.02 (0.00–0.13)
Length of stay in Sydney	
<5 years *vs.* 6–10 years	1.16 (0.27–4.91)
<5 years *vs.* >10 years*	0.17 (0.04–0.73)
Never smoked *vs.* former smoker	
Health literacy score (adequate *vs.* inadequate)***	14.18 (4.40–45.67)

(Continued)

Table 5. (Continued)

Health-promoting behaviours and significant predictors	OR (95% CI)
Last doctor check-up	
≤1 year ago *vs.* 2–3 years ago	
Health literacy score (adequate *vs.* inadequate)**	6.76 (2.16–21.19)
≤1 year ago *vs.* more than 3 years ago	
Health literacy score (adequate *vs.* inadequate)**	5.58 (1.75–17.77)
Education level	
Primary/Secondary School *vs.* college/diploma	0.27 (0.03–2.60)
Primary/Secondary School *vs.* University**	0.09 (0.01–0.97)

aAdequate health literacy (score 17–20), inadequate health literacy (score 0–16).
*p<0.05.
**p<0.01.
***p<0.001.
OR: odds ratio; CI: confidence interval; BMI: body mass index.

a smoker and not in favour of visiting a medical doctor for a general doctor check-up. Such results were expected as inadequately health-literate individuals are less likely to appreciate the importance of health-promoting behaviours.[36] In line with our findings, for instance, a recent randomized controlled study amongst the Latina community in the USA reported that increasing the level of health literacy improved the chances of engaging in physical activity.[37] Furthermore, Singaporeans are often reluctant to visit doctors when they are sick with 'minor illnesses' or when faced with medical and health issues[38,39] because they generally consider information from unauthorized sources like parents reliable and sufficient. This could explain why over 80% of the participants did not have a general medical check-up for more than two years.

In line with the literature,[40] health-literate participants were more likely to have better self-rated health status. This can be justified by the fact that health-literate individuals are more likely to take part in health-promoting behaviours and therefore perceive themselves to be healthy.

Finally, logistic regression analysis indicated that health literacy is a significant and reliable predictor of health-promoting behaviours after controlling for sociodemographic factors. For instance, those with inadequate health literacy were five times more likely to be overweight, four times more likely to consume more alcohol, 11 times more likely to be a current smoker and seven times less likely to have a general medical check-up within a year. This finding suggests that health literacy has significant potential for determining health-promoting behaviours especially amongst under-served communities like migrant populations.

Limitations

Despite the value of these findings, three limitations need to be considered. First, as mentioned in the methods section, participants were recruited via non-randomized data collection techniques and therefore do not constitute a representative sample of the Australian-Singaporean community. Second, given the nature of the study and reliance on an online self-administered survey, participants' responses could be influenced by social desirability as well as selection and recall bias. Third, this study examined only English-speaking members of the Australian-Singaporean community living in Sydney metropolitan areas. As

such, the results of this study cannot be generalized to the Australian-Singaporean or other similar communities living in Australia as well as non-English speaking Singaporean members of the community. Finally, questionnaires measuring health behaviours were not validated, which may affect the quality of data. Future studies should use validated questionnaires, which facilitates robust analysis.[41]

Conclusion

This study's findings highlight the value of health literacy especially among migrant populations and showed that the health literacy of Australian-Singaporean communities needs to be improved. More importantly, health literacy was a significant determinant of health-promoting behaviours, indicating that it deserves more attention from health policy and decision makers. Our findings warrant further qualitative research to develop an in-depth understanding of the social constructs underpinning migrants' health-promoting behaviours. Such studies would improve our understanding of migrants' competencies to make informed health decisions. Both qualitative and quantitative findings would allow health practitioners and policy makers to develop more effective health interventions.

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