

# Predictors of young people's healthcare access in the digital age

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Access to healthcare is an important social determinant of health. Barriers to healthcare for young people in Australia and internationally are well known, with confidentiality concerns consistently cited as the most important.<sup>1-3</sup> Technology has the potential to improve access to healthcare; for example, through enhancing access to information about health and health services as well as young people's ability to communicate with services.<sup>3</sup> However, relatively few studies have examined its role in these activities.<sup>4</sup>

To achieve equitable health outcomes across populations, including those who are marginalised, access must also be equitable.<sup>5</sup> Marginalised young people experience access barriers common to all young people, such as lack of suitable services, cost and lack of health literacy.<sup>3</sup> However, these are exacerbated for certain marginalised young people. For example, structural barriers have been highlighted for homeless young people<sup>6</sup> and confidentiality concerns have been identified as a significant concern by rural young people.<sup>7</sup> Further, some marginalised groups of young people also experience barriers around language and culture, discrimination and stigmatisation.<sup>3</sup>

This study aimed to quantify young people's barriers to healthcare access and their predictors to examine how these vary by

## Abstract

**Objective:** To quantify barriers to healthcare for young people (12–24 years) and identify socio-demographic correlates and predictors.

**Methods:** This cross-sectional survey targeted young people living in New South Wales, Australia, with oversampling of marginalised groups. Principles Component Analysis (PCA) identified clusters of barriers. Ordinal regression identified predictors of each barrier cluster.

**Results:** A total of 1,416 young people completed surveys. Participants with chronic conditions and increasing psychological distress reported a greater number of barriers. Of 11 potential barriers to visiting a health service, cost was most common (45.8%). The PCA identified three clusters: structural barriers (61.3%), attitudinal barriers (44.1%) and barriers relating to emerging autonomy (33.8%).

**Conclusions:** Barriers to healthcare reported by young people are multi-dimensional and have changed over time. Structural barriers, especially cost, are the most prominent among young people. Approaches to overcome structural barriers need to be addressed to better support marginalised young people's healthcare access.

**Implications for public health:** Understanding predictors of different barrier types can inform more targeted approaches to improving access. Equitable access to healthcare is a priority for early diagnosis and treatment in young people, especially reducing out of pocket costs.

**Key words:** young people, adolescents, access to healthcare, marginalised youth, technologies

socio-demographic and socio-cultural factors, including marginalisation, and the role of technology in help-seeking.

paper has been published.<sup>8</sup> Youth consultants provided advice on the survey instrument, recruitment methods, interpretation of findings, policy translation and dissemination.

## Methods

### Design

A cross-sectional survey was conducted as one component of a larger study, known as Access 3. The detailed Access 3 study protocol

### Sample

Participants were a non-probability sample of young people aged 12 to 24 years living in New South Wales (NSW), Australia, with oversampling of five marginalised groups:

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Aboriginal and/or Torres Strait Islander; living in rural/remote areas; homeless; refugee or vulnerable migrants; and sexuality and/or gender diverse.

### Recruitment

Recruitment comprised online and offline strategies. Online recruitment included targeted emails to youth-relevant networks, social media (Facebook, Twitter and Instagram) and opportunistic online promotion of the survey. Offline recruitment occurred face-to-face in youth accommodation services and youth forums. To purposively sample marginalised young people, we worked with networks and advocates from a range of community-based organisations using convenience and snowball sampling methods to achieve our sample size. Participants went into a draw to win one of 20 vouchers worth A\$50 upon survey completion.

### Data collection

The anonymous questionnaire was administered online using LimeSurvey, a survey web application,<sup>9</sup> or via hardcopy. The study period was from February 2016 to February 2017. Consent was implied by survey completion.

### Measures/instrument

Questionnaire development was guided by published evidence<sup>10,11</sup> about barriers to access and health service 'youth-friendliness' indicators. Questions about the impact of technology on whether, when and how to access healthcare were included. Demographic data were collected and the ABS socioeconomic index for areas (SEIFA) Index for Relative Socioeconomic Advantage and Disadvantage (IRSAD) and having a Health Care Card were used as proxy measures for respondent's socioeconomic status.

The identification of marginalised groups was based on self-reported survey responses. Rurality was calculated using postcode data and the Australian Bureau of Statistics (ABS) Australian Standard Geographic Classification (ASGC) Remoteness Structure and defined to include rural (inner and outer regional) and remote (remote and very remote). Homelessness was identified based on living situation (e.g. living with relatives, friends, in foster care, in a refuge/supported accommodation, boarding house, on the

street/outside), using the Australian cultural definition of homelessness.<sup>12</sup>

Health status was measured by self-assessed health status,<sup>13</sup> the Kessler 10 (K10) questionnaire that measures psychological distress<sup>14</sup> and presence of chronic physical and/or mental health conditions or disability selected from a predefined list.

Participants were asked about attitudes towards accessing healthcare and health service utilisation within the previous six months. They selected one or more responses from a list of eleven potential barriers that would prevent or stop them from accessing healthcare (see the Supplementary File for the survey questions).

Telephone numbers for youth support services were provided at the end of the survey for any young people wanting to access support. A contact number was also provided within the participant information sheet if young people wanted to get in touch about the study.

### Analysis

Data from paper surveys were entered into the same LimeSurvey database. Relationships among categorical demographic variables were explored using chi-square analyses (e.g. dichotomised age [12–17 years, 18–24 years] and number of marginalised groups: none, one, two or more). Where continuous data were skewed, they were reported as median and interquartile range (IQR). To examine the relationship with reported barriers, responses were explored using Principal Components Analysis (PCA) to reduce the number of items and determine if there were identifiable clusters of barriers. PCA with varimax rotation was first performed in a randomly selected 'training set' of 30% of the sample then repeated for independent validation in the remainder. For each, the Kaiser-Meyer-Olkin determined sample adequacy and items were retained if their eigenvalue was >1 and loading size >0.5.

To identify associations with barrier clusters or 'types', ordinal regression models were run, with the number of barriers identified within a cluster as the dependent variable. Model comparisons were based on likelihood ratio tests. Potential predictor variables in the model included age (years), gender (male, female, other), socioeconomic status (SEIFA IRSAD decile), had a Health Care Card, had private health insurance, marginalisation (belong to none, one or two or more of the

five marginalised groups), number of chronic health conditions, level of psychological distress (K10), number of health professional types other than general practitioners (GPs) seen in the previous six months (since most participants had visited a GP) and frequency of use of the internet to decide which health service to attend (not at all, sometimes, frequently). Analyses were conducted using IBM SPSS version 24,<sup>15</sup> and alpha was set at 0.05 for all analyses.

### Ethics

Ethics approval was obtained from the University of Sydney Human Research Ethics Committee and the Aboriginal Health and Medical Research Council of New South Wales Ethics Committee.

## Results

### Sample

Of the 1,416 young people (12–24 years) who completed the survey (68.4% female, 28.7% males, and 3.0% other), 1,012 completed the survey online and 404 on hard copy. One hundred and twenty-nine (9.4%) had a parent, carer or someone from school to help them complete the survey. Eight hundred and ninety-seven participants (63.3%) belonged to at least one of the pre-defined marginalised groups (Table 1). Adolescents (12–17 years) were more likely than young adults (18–24 years) to belong to multiple marginalised groups (27.9%, 196/703 vs. 17.8%, 127/713;  $p < 0.001$ ). Table 1 summarises the socio-demographic characteristics of the sample.

### Health status

Health status is described in Table 1. While the majority of respondents rated their health as good to excellent (80.8%, 1,139/1,410), almost half had high or very high psychological distress according to the K10 (52.1%, 729/1,400). Male respondents were most likely to report very good to excellent health (54.7%, 221/404; female 40.0%, 386/964; other gender 26.2%, 11/42), and other gender respondents most likely to report poor to fair health (33.3%, 14/42; female 21.1%, 203/964, male 13.4%, 54/404;  $p < 0.001$ ). There was a significant association between gender and psychological distress (high/very high K10 scores): other gender (80.9%,  $n = 34/42$ ) respondents were more likely to experience significant psychological distress than female

(55.0%, n=529/961) or male respondents (41.8%, n=166/397;  $p<0.001$ ).

Just over half the sample reported at least one chronic health condition or disability (51.9%, 736/1,416). Female and other gender participants were more likely to report having a chronic health condition or disability (female 54.8%; 530/968; other gender 83.3%, 35/42) compared with males (42.1%, 171/406,  $p<0.001$ ).

Psychological distress (high/very high K10) was significantly higher among those who belonged to at least one marginalised group (57.1%, 504/882) compared with those who did not belong to any (43.4%, 225/518,  $p<0.001$ ). Similarly, those who belonged to at least one marginalised group were more likely to report having at least one chronic health condition (55.4%, 497/897) compared to those who did not belong to any (46.1%, 239/519,  $p=0.001$ ).

### Health service utilisation

Most of the 1,416 participants had visited at least one health professional in the previous six months; this was most likely to have been a GP (81.4%, 1,149/1,411). Other types of health professionals visited by more than one-third of the sample included a dentist (45.0%, 635/1,411), pharmacist (42.1%, 594/1,411) and mental health professional (counsellor or psychologist 29.3%, 413/1,411; psychiatrist 9.9%, 140/1,411). Visits to medical/surgical specialists, nurses, allied health professionals and traditional healers in the previous six months were also reported.

### Access to technology and online activity

The great majority (96.1%, 1,326/1,410) had ongoing access to the internet while the remainder had intermittent access via school, the library or youth services (3.9%, 55/1,410), or none at all (1.1%, 16/1,410). Young adults were significantly more likely to have internet access compared to adolescents (97.9%, 696/711 vs. 94.3%, 660/700,  $p<0.001$ ).

Participants who belonged to one or more marginalised groups were significantly less likely to have internet access (94.4%, 843/893) compared to other young people (99.0%, 513/518,  $p<0.001$ ).

Most participants owned a mobile phone with internet access (87.0%, 1,227/1,411), or without internet access (8.4%, 119/1,411), while 4.6% did not own a mobile phone (65/1,411). The majority (94.0%, 1,326/1,410)

**Table 1: Sociodemographic and health characteristics of sample (n = 1,416).**

Median age	18 years (IQR 16 to 20)
<b>Gender</b>	<b>n (%)</b>
Female	968 (68.4)
Male	406 (28.7)
Other	42 (3.0)
<b>Cultural diversity</b>	
Born overseas	233 (16.6)
Born overseas and speak a language other than English	126 (9.0)
<b>Education</b>	
Current study	
High school	645 (45.8)
Intensive English Centre (IEC) in high school	21 (1.5)
Full-time tertiary studies	441 (31.3)
Part-time tertiary studies	80 (5.7)
Not studying	195 (13.9)
Other	25 (1.8)
<b>Current employment</b>	
In full time paid work	106 (7.6)
In part-time or casual work	506 (36.3)
A carer or doing home duties	22 (1.6)
Unemployed: looking for work	358 (25.7)
Unemployed, not looking for work, studying	283 (20.3)
Unemployed, not looking for work, not studying	15 (1.1)
Unable to work due to sickness or disability	37 (2.7)
Other	66 (4.7)
<b>SEIFA IRSAD decile (lower indicates greater disadvantage)</b>	
Median (IQR)	6 (4 – 9)
Range	1 – 10
<b>Healthcare card, private health insurance, youth allowance and Medicare card</b>	
Healthcare card <sup>a</sup>	391 (27.7)
Private health insurance <sup>b</sup>	634 (44.9)
Youth allowance <sup>c</sup>	312 (22.5)
Own Medicare card <sup>d</sup>	634 (45.1)
<b>Marginalised groups</b>	
Aboriginal and/or Torres Strait Islander	169 (12.0)
Rural	478 (33.9)
Homeless	118 (8.4)
Refugee	75 (5.3)
Sexuality and/or gender diverse	426 (30.1)
None of the above groups	519 (36.7)
<b>Self-reported health rating</b>	
Poor	62 (4.4)
Fair	209 (14.8)
Good	521 (37.0)
Very good	461 (32.7)
Excellent	157 (11.1)
<b>Level of psychological distress (K10 score)</b>	
Low (10–15)	354 (25.3)
Moderate (16–21)	317 (22.6)
High (22–29)	322 (23.0)
Very high (30–50)	407 (29.1)
<b>Chronic health conditions (self-reported)</b>	
None	749 (52.9)
Mental health condition only	409 (28.9)
Physical health condition only	136 (9.6)
Both	122 (8.6)

*Notes:*

*IQR, interquartile range; note, marginalised groups are not mutually exclusive.*

*a: A government-issued concession card to enable access to subsidised medicines*

*b: A voluntary scheme that allows individuals to be treated as a private patient in a public or private hospital and financial reimbursements for services not covered by Medicare.*

*c: Government financial assistance for young people aged 24 or younger who are studying, doing an apprenticeship, looking for work or who have a health condition.*

*d: A government-issued card that enables access to a range of medical services and prescriptions at a lower cost and free care as a public patient in a public hospital. Children are included on their family's card; young people are eligible to get their own card from 15 years.*

spent time online every day, and 51.6% (728/1,410) were online for 2–6 hours/day. Only 1.7% (24/1,410) did not spend time online. The times of day participants were most commonly online were evening (6–11 pm, 60.9%, 856/1,405) and mid-afternoon (3–6 pm, 21.3%, 299/1,405).

### Barriers to accessing health services

More than four-fifths (80.9%, 1,146/1,416) of the sample identified at least one barrier to accessing health services, with a median of two barriers (IQR 1–4). Frequencies of barriers are listed in Table 2. The most commonly cited barrier was 'cost' (45.8%, 649/1,416) and the least common was 'language or cultural reasons' (Table 2). When all 11 barriers were included in the PCA, a stable factor structure was not found. However, with the exclusion of 'language or cultural reasons' (barrier recognised by 5.9%, 83/1,416), three stable clusters of barriers emerged. Those who cited 'language or cultural reasons' were more likely to be older respondents (young adults 7.3%, 52/713 vs. adolescents 4.4%, 31/703,  $p<0.05$ ), and those identifying as refugees (16.0%, 12/75 vs. 5.3%, 70/1,333,  $p=0.001$ ).

The three clusters of barriers included: structural (61.3%), attitudinal (44.1%), and barriers relating to emerging autonomy (33.8%), see Table 2. Structural barriers included cost, opening hours and difficulty getting to the service. Attitudinal barriers included feeling embarrassed, feeling judged, the gender of the doctor/health professional and worry about confidentiality. Barriers relating to emerging autonomy included needing to ask parents/carers to take them, not having own Medicare card and not knowing which service/s to go to.

### Predictors of barriers to access healthcare

Predictors of barriers to access healthcare are described in Table 3. There were no substantial issues with multicollinearity between potential demographic and other predictors of barriers including psychological distress.

Predictors of structural barriers included older age (74.1%, 528/713 of young adults vs. 48.4%, 340/703 of adolescents,  $p<0.001$ ), female gender (67.3%, 651/96 vs. 46.6%, 189/40 of males,  $p<0.001$ ) and residing in a more socioeconomically advantaged area (higher SEIFA IRSAD,  $p<0.05$ ). Those with higher psychological distress (66.0%, 481/729 vs. 56.9%, 382/671),  $p<0.05$ ) and an increasing number of chronic conditions or disability ( $p<0.01$ ) were more likely to report structural barriers, as were participants who had seen more health professionals during the previous six months ( $p=0.001$ ) and those who used the internet to decide which health service to go to (71.2%, 510/716 vs. 51.1%, 356/696,  $p<0.01$ ). The model accounted for 19.2% of variance in the number of structural barriers recognised by participants (log likelihood  $X^2=268.06$ ,  $df=15$ ,  $p<0.001$ ).

Attitudinal barriers were more likely to be reported by female and other gender respondents (49.6%, 480/968 and 59.5%, 25/42 respectively), compared with males (29.3%, 119/406,  $p<0.001$  and  $p<0.01$ ), by those with private health insurance (50.3%, 319/634 vs. 39.2%, 305/779,  $p<0.05$ ), those with more chronic conditions or disability ( $p<0.01$ ) and with higher psychological distress (55.6%, 405/729 vs. 32.2%, 216/671,  $p<0.001$ ). Young adults (43.9%, 313/713 vs. adolescents 44.2%, 311/703,  $p<0.05$ ) and those with a Health Care Card were less likely

to report attitudinal barriers (40.2%, 157/391, vs. 45.7%, 467/1,022,  $p<0.01$ ). Those who used the internet to decide which health service to go to were more likely to report attitudinal barriers (48.2%, 345/716), compared to those who did not use the internet for this purpose (40.1%, 279/696,  $p<0.05$ ). The model accounted for 13.4% of variance in the number of attitudinal barriers recognised by participants (log likelihood  $X^2=179.11$ ,  $df=15$ ,  $p<0.001$ ).

Barriers relating to emerging autonomy were less likely to be reported with older age (young adults 22.3%, 159/713 vs. adolescents 45.5%, 320/703,  $p<0.001$ ), by those with a Health Care Card (23.3%, 91/391 vs. 38.0%, 388/1,022 of those without,  $p<0.001$ ) and those belonging to two or more marginalised groups (30.3%, 296/897 vs. 35.3%, 183/519 those belonging to none,  $p<0.05$ ). Those with higher psychological distress were more likely to report barriers relating to emerging autonomy (42.4%, 309/729 vs. 24.9%, 167/671,  $p<0.001$ ). The model accounted for 16.0% of variance in the number of barriers relating to emerging autonomy (log likelihood  $X^2=196.72$ ,  $df=15$ ,  $p<0.001$ ).

### Discussion

This is the first Australian study to quantify barriers to healthcare among a large sample of young people, and to identify their association with a range of socio-demographic and socio-cultural factors, health status and technology use. To our knowledge, this is also the first study internationally to include substantial numbers of young people belonging to one or more marginalised groups, which allowed for measuring the effect of increasing marginalisation on access.

We found lower self-reported good health and higher psychological distress in our sample. Just 80.8% of study participants rated their health as good to excellent compared to 91.1% in a national representative sample of Australian young people (15–24 years) in 2014–2015.<sup>13</sup> Our sample also had significantly higher levels of psychological distress compared to this population: 52.1% had high or very high K10 scores, compared to 11.7% of young Australians.<sup>13</sup> The comparatively poor health status of our sample might be due to oversampling of marginalised groups, given the proportion with high or very high mental distress and the presence of a chronic health condition

**Table 2: Final Principal Components Analysis on healthcare access barriers.**

Barrier	N=1,416 [n %]	Eigenvalue	% of variance	Component 1	Component 2	Component 3
<b>Attitudinal</b>	624 (44.1)	2.45	24.54			
I would feel embarrassed	393 (27.8)			0.77	-0.05	0.19
I would feel judged	287 (20.3)			0.78	-0.04	0.10
The gender of the doctor/health professional	267 (18.9)			0.59	0.21	-0.001
I worry about confidentiality	217 (15.3)			0.58	0.06	0.17
<b>Structural</b>	868 (61.3)	1.47	14.72			
Cost	649 (45.8)			0.01	0.64	0.21
Opening hours mean I need time off study or work	449 (31.7)			0.04	0.77	-0.16
Difficulty getting there	336 (23.7)			0.08	0.67	0.13
<b>Barriers relating to emerging autonomy</b>	479 (33.8)	1.05	10.52			
I would have to ask my parents/carers to take me	313 (22.1)			0.29	-0.04	0.52
I don't have my own Medicare card	173 (12.2)			-0.03	0.05	0.82
I don't know which service/s to go to	165 (11.7)			0.20	0.20	0.55

was significantly higher among those who belonged to at least one marginalised group compared with those who did not belong to any. Participants with more chronic health conditions and/or disability or with greater psychological distress were more likely to report all types of barriers, potentially due to increased awareness of shortcomings of the health services with increased health service use. A New Zealand study also found forgone care was greater for adolescents with higher healthcare needs.<sup>16</sup>

Use of technology to decide which health service to attend was associated with reporting attitudinal and structural access barriers. This could indicate that a reliance on online information for health system navigation may not be effective and additional resources for online tools may be needed to support technology-facilitated healthcare decision making and navigation. Alternatively, technology use may be both a way to overcome barriers and an indicator of higher health need and more help-seeking. Two Australian studies have found sexuality and gender diverse young people use technology to identify healthcare providers and services who are welcoming.<sup>17,18</sup> Participants who belonged to one or more marginalised groups were less likely to have internet access, yet access rates were still high indicating technology solutions are worth considering for this group. However, there is a need for health literacy to enable young people to identify quality health advice,<sup>19</sup> particularly as health literacy has been viewed as the greatest barrier to seeking help for mental health issues by parents and young people.<sup>20</sup>

Cost was the most frequently reported barrier, which is a concern given Australia's universal health insurance scheme. Although approximately 80% of Australian general practice consultations are bulk billed<sup>21</sup> (where a doctor accepts the Government payment as full payment, so patients do not have to pay the gap), this appears to be insufficient to meet need. Out-of-pocket costs of healthcare in Australia have increased significantly over the past decade and disproportionately affect those who have a very low income.<sup>21</sup> These include gap payments for specialist and allied health consultations, diagnostic tests and medications, while indirect costs include forgoing work and costs of travel. Cost was more commonly cited by young adults, suggesting increasing autonomy brings more financial stress. The cost barrier

was also more prevalent among those living in a higher socioeconomic area. While this seems paradoxical, it could signify healthcare in wealthier areas is more expensive and participants may have lower access to concessions and bulk-billing services. Further, young people from higher socioeconomic areas may be more likely to be in full-time education, restricting their ability to work. In our related *Access 3* study of health professionals, we found they commonly overlooked cost as a barrier.<sup>22</sup> Cost has been identified as the primary barrier by in-school New Zealand adolescents<sup>16</sup> and was a significant access barrier for marginalised young people, including sexuality diverse young people in Canada<sup>23</sup> and young people with substance use issues in the US.<sup>24</sup>

Confidentiality, previously considered the most important barrier,<sup>2</sup> was only cited by 15.3% of the sample. Possible

explanations for this apparent decrease include increased adherence over time by health professionals to clinical guidelines to explain confidentiality,<sup>25</sup> and young people understanding and expecting confidentiality. It may also reflect that social media has changed the way today's young people understand confidentiality.

Principal component analysis affirmed quantitatively three clusters of barriers that have previously been described qualitatively. Structural barriers were the most common barrier, followed by attitudinal and then barriers relating to emerging autonomy. Most studies have identified structural (e.g. service availability, opening hours, cost) and attitudinal (e.g. fear, embarrassment, shame, self-consciousness) barriers for young people<sup>26</sup> and several have found that their prevalence varies for different marginalised groups. Structural barriers

**Table 3: Predictors of barriers to accessing healthcare.**

	Attitudinal OR (95% CI)	Structural OR (95% CI)	Emerging autonomy OR (95% CI)
Age (years)	0.96 (0.92-0.99)*	1.16 (1.12-1.20)*	0.82 (0.79-0.86)*
<b>Gender</b>			
Male	Ref	Ref	Ref
Female	1.86 (1.43-2.41)*	1.58 (1.24-2.01)*	1.20 (0.91-1.59)
Other	2.36 (1.26-4.39)*	1.43 (0.77-2.64)	1.60 (0.80-3.20)
SEIFA IRSAD decile	1.02 (0.98-1.06)	1.05 (1.01-1.09)*	1.01 (0.96-1.06)
<b>Health Care Card</b>			
No, not sure	Ref	Ref	Ref
Yes, has a health care card	0.69 (0.53-0.89)*	0.81 (0.64-1.03)	0.51 (0.38-0.69)*
<b>Private Insurance</b>			
No, not sure	Ref	Ref	Ref
Yes, has private health insurance	1.31 (1.04-1.64)*	1.10 (0.88-1.36)	1.14 (0.88-1.46)
<b>Marginalisation</b>			
None	Ref	Ref	Ref
One marginalised group	1.22 (0.96-1.56)	0.93 (0.74-1.18)	0.89 (0.68-1.17)
Multiple marginalised groups (2+)	0.90 (0.65-1.25)	0.77 (0.57-1.05)	0.70 (0.49-0.995)*
<b>Number of chronic conditions</b>	1.21 (1.06-1.38)*	1.24 (1.09-1.40)*	1.16 (0.998-1.34)
<b>Psychological distress (K10)</b>			
Low	Ref	Ref	Ref
Moderate	1.13 (0.82-1.57)	1.24 (0.92-1.66)	1.57 (1.09-2.27)*
High	1.99 (1.44-2.74)*	1.41 (1.04-1.90)*	2.58 (1.81-3.70)*
Very high	2.55 (1.84-3.55)*	1.48 (1.09-2.02)*	2.72 (1.88-3.94)*
<b>Health professional types (other than GP) seen in previous six months</b>	1.03 (0.96-1.10)	1.10 (1.03-1.18)*	0.98 (0.91-1.06)
<b>Use the internet to decide which health service to go to</b>			
Not at all	Ref	Ref	Ref
Sometimes	1.30 (1.02-1.64)*	1.47 (1.17-1.84)*	1.16 (0.89-1.50)
Frequently	1.62 (1.18-2.21)*	2.31 (1.71-3.11)*	0.98 (0.68-1.41)
	179.11, df=15, p<0.001 13.4%	268.06, df=15, p<0.001 19.2%	196.72, df=15, p<0.001 16.0%

Note:

\*Statistically significant. An Odd Ratio (OR) over 1 indicates a positive association (i.e. increased odds of reporting an increasing number of barriers), while an OR under 1 indicates a negative association.

have been reported more frequently than personal barriers for homeless young people<sup>6</sup>; whereas, attitudinal barriers were more important for rural young people.<sup>7,27</sup> All three groups of barriers – structural, attitudinal and barriers relating to emerging autonomy – were described in earlier Australian research among young people.<sup>11</sup> Thus, while all clusters of barriers are important among young people, it is useful to recognise these might be influenced by psychosocial transitions that occur during adolescence.

Young people across the age spectrum experienced different types of barriers. Structural barriers were more commonly identified by young adults, while attitudinal barriers and those relating to emerging autonomy were associated with being younger. We are not aware of any studies that have quantified the effect of age on access barriers, perhaps because previous studies considered narrower age ranges.<sup>2,16,28</sup> Barriers relating to emerging autonomy and attitudinal barriers were negatively associated with increasing age, presumably because as young people mature they are less affected by attitudinal and knowledge-based barriers. In contrast, structural barriers were positively associated with age. This may be due to adolescents gaining more independence from their parents but being challenged by taking increasing responsibility for healthcare access.

Young women had higher odds of citing an attitudinal or structural barrier, consistent with a New Zealand study where barriers were reported at higher levels by females aged 13–17.<sup>16</sup> Since young women in our sample also reported more chronic illness and psychological distress, their presumed increased need to access healthcare could lead to identification of barriers. Females have also been found to be more likely to seek help and perceive help seeking as beneficial compared to males,<sup>29</sup> but in doing so they may have similarly identified a range of attitudinal or structural barriers. Stigma, particularly in relation to sexuality and pregnancy, affects young women accessing healthcare.<sup>30</sup> Other gender participants were more likely to cite attitudinal barriers and, consistent with other studies among transgender young people,<sup>18</sup> they also had higher levels of psychological distress. We found participants who had seen a greater number of health professional types (other than GPs), during the previous six months were more likely to report structural barriers.

Similarly, it may be that these young people had more chronic illness and mental health concerns, resulting in a need to access more healthcare, leading to identification of more barriers.

Surprisingly, marginalisation was not a predictor of any barrier cluster. The paradoxical effect of increasing marginalisation being inversely associated with barriers relating to emerging autonomy was unexpected. This may be due to bias in our sample given younger participants were more likely to belong to multiple marginalised groups. Our findings might also suggest existing structural supports for marginalised people (including additional financial subsidies, specialised multidisciplinary and/or integrated services) are having some impact. We found that having a Health Care Card reduced the odds for reporting attitudinal barriers and barriers relating to emerging autonomy. US studies have also found access to healthcare insurance is beneficial for healthcare access for homeless young people<sup>31</sup> and those living in low socioeconomic areas.<sup>32</sup>

There are recognised limitations to a study that it is both cross-sectional and based on self-report. The associations we found between a range of variables and barriers do not necessarily imply causation. The pilot testing of the questionnaire and use of validated items for health status, combined with the assistance of parents, carers, teachers or youth workers for some participants completing the survey, may have increased validity.

Our study has policy and practice implications relevant to all young people, but particularly those who are marginalised and experiencing poor health, higher psychological distress and/or chronic physical and mental health conditions.

Support is needed across the full 12 to 24 years age spectrum and responses may need to be tailored for developmental stage. Addressing health literacy through formal school curricula to increase knowledge of health services and the role of universal insurance remains critical for adolescents who may nevertheless rely on parents for the logistics of access (e.g. transport). Cost as a barrier to healthcare access needs greater attention by governments. A wider range of services could be covered by Medicare and bulk billing for young people could be increased. Locating health services in schools could be one way of addressing this

barrier. Although attitudinal or structural barriers were significantly greater for young women, the needs of young men's access to healthcare should not be overlooked.<sup>33</sup>

This study will be of interest to service providers, especially as previous research has demonstrated their perceptions differ from young people's descriptions of their barriers.<sup>1,7</sup> Varying groups of young people experience barriers differently and these have been explored further in our longitudinal qualitative study in the *Access 3* project. While 'language or cultural reasons' was removed to make the barrier clustering more robust, this is likely to be an important barrier for refugee young people.<sup>34</sup>

### Implications for public health

There were three findings in this study that were counter to expectations. Structural barriers affected those living in lower socioeconomic areas less than those living in higher socioeconomic areas, marginalisation was not strongly associated with any barrier cluster and use of technology to decide which health service to go to was associated with more barriers. The first two of these findings suggest a good news story – that targeted access and concession programs are working for disadvantaged and marginalised young people. The third finding implies a need to improve not only e-health literacy but also to better integrate technology with service delivery.

Addressing barriers is important to ensure equity of access and optimal health outcomes for young people. Accessible primary healthcare is essential for early diagnosis and treatment together with prevention advice in order to reduce longer-term healthcare costs resulting from delayed access to care. This means barriers need to be addressed and young people involved in the solutions at both policy and practice levels.

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## Supporting Information

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

**Supplementary File 1:** NSW Youth Health Access Survey.