



Mental health service use in Australia: The role of family structure and socio-economic status



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ABSTRACT

Objective: To investigate the patterns and the determinants of mental health service use by children and adolescents in Australia.

Method: Data from Young Minds Matter (YMM): The Second Australian Child and Adolescent Survey of Mental Health and Wellbeing is used in this study. YMM is a face-to-face household survey conducted in 2013–2014 that collected information from 6310 parents/carers of children aged 4–17 years (55% of eligible households). A self-reported survey of 2967 (89% of eligible youth) 11- to 17-year-olds from these households was also conducted. Bivariate analyses are used in this study to examine the variables and their distributions over the outcome variables. Binary logit models are used to investigate the determinants of mental health service use.

Results: Parent reported data shows that among children aged 4–17 years, 12%, 1.2% and 0.6% utilised health services, school services and telephone services, respectively. Youth reported data reveals that approximately 7.2%, 2% and 4% and 23.5% of children aged 11–17 years used health services, school services, telephone services and online services, respectively. Youth reported data further shows that online services were the most popular type of mental health service among adolescents. Those with anxiety or ADHD constituted the highest proportion of children that used any type of mental health services. Logistic analysis of parent reported data shows that children from step, blended and sole-parent households compared to original parent households were more likely to use any type of mental health service, and the same trend was seen for children living in inner regional areas compared to those living in major cities. Children of parents with lower education or unemployed parents were also more likely to utilise health services.

Conclusion: From the findings, it is concluded that age-relevant mental health services should be improved and made available for children and adolescents. Secondly, school and health services should have a particular focus on complex disorders like ADHD, anxiety and conduct disorders, as these are the services most used by children who suffer from these conditions. Finally, areas of low socio-economic status should focus on improving their school and health services as these are the services used most by children from these backgrounds.

1. Background

The mental health of children and adolescents is a key public health issue that needs to be addressed appropriately as mental illness during childhood and adolescence may adversely impact adult life (Kessler et al., 2005; Slade, Johnston, & Oakley Browne, M., Andrews, G., & Whiteford, H., 2007). Mental illness leads to lower cognitive development and educational achievements in childhood and adolescence (Currie & Stabile, 2006; Khanam & Nghiem, 2017). There is also

evidence that people with mental illness often face isolation, discrimination and stigma (AIHW, 2016), which negatively impacts their quality of life.

Mental illness may vary in severity and length and may only appear occasionally (AIHW, 2016). In the period of 2013–2014, the survey of the mental health and wellbeing of Australian children and adolescents (AIHW, 2016) revealed that 13.9% of children and adolescents aged 4–17 years faced mental illnesses, and approximately 7.4% of children and adolescents had attention deficit hyperactivity disorder (ADHD).

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The proportion of children and adolescents who experienced anxiety disorder, major depressive disorder and conduct disorder were 6.9%, 2.8%, and 2.1%, respectively. In addition, about 30.0% of all 4–17-year-old children with any mental illness experienced two or more mental illnesses at some time in the previous 12 months. AIHW (2016) also indicated that in 2011, mental illnesses accounted for approximately 12.1% of the total burden of disease in Australia. Mental illnesses were ranked as the third group of diseases after Cancer and Cardiovascular diseases, and were the main reasons for non-fatal burden, accounting for roughly 23.6% of all years lived with a disability (AIHW, 2016).

The use of mental health services¹ plays an important role in the treatment of mental illness, resulting in gains in children's educational attainment and social functioning (Davis & Michaelfooster, 2005; Geierstanger, Amaral, Mansour, & Walters, 2004; Walker, Kerns, Lyon, Bruns, & Cosgrove, 2010). Adequate management for children and adolescents with ADHD can mitigate the negative effects on their life-long functioning (Shaw et al., 2012). Children diagnosed with long-term anxiety disorders benefited from cognitive behavioural treatments (CBT) (Saavedra, Silverman, Morgan-Lopez, & Kurtines, 2010), while children and adolescents accessing inadequate treatment (such as CBT) for obsessive-compulsive disorder (OCD) may face higher long-term risk of OCD persistence and severity (Stewart et al., 2004). However in 2014, only 65.1% of Australian adolescents aged 12–17 years and 48.9% of Australian children aged 4–11 years with mental illness utilised mental health services (David et al., 2015). This warrants a thorough investigation into the factors affecting mental health service use, as it will help policy makers to formulate effective strategies to identify the most vulnerable cohorts and increase access to mental health services.

Previous studies have identified various factors that impact on whether or not children utilise mental health services. One such factor is parental income. Wang et al. (2005) and Cully et al. (2008) indicated that low income was associated with reduced use of mental health services. Steele, Dewa, and Lee (2007) in their Canadian study found that high-income earners were less likely to report acceptability barriers to mental health services (e.g. unaffordability, issues with transportation or scheduling). In contrast, other studies showed that low income was associated with increased use of mental health services (Elhai, Voorhees, Ford, Min, & Frueh, 2009; Fikretoglu, Brunet, Guay, & Pedlar, 2007; Interian, Kline, Callahan, & Losonczy, 2012). In contrast yet again, Roy-Byrne, Joesch, Wang, and Kessler (2009) and Pietrzak, Johnson, Goldstein, Malley, and Southwick (2009) found no relationship between income and mental health service use. Zimmerman (2005) also found that income tended to have only little impact on mental health service use. These mixed findings may be attributed to differing datasets and differing analytical approaches in these studies.

Parental education also affected rates of mental health service use. Wang et al. (2005) and Sayer, Clothier, Spont, and Nelson (2007) found that low education was associated with lower use of mental health services but Zimmerman (2005) found minimal association between maternal education and mental health service use. As with high income earners, Steele et al. (2007) reported those with high school diplomas were less likely to report accessibility barriers to mental health services.

Socio-economic status (SES) and demographic factors were assessed by several studies on their impact on mental health service usage. Zimmerman (2005) examined the role of socio-economic and demographic factors on children's mental health service use in the USA. The author found that girls obtained less necessary treatment for behavioural disorders and depression than boys. Middle children received less desired treatment for any mental health problem than older or

younger children. Children closely supported by their fathers tended to receive more needed treatment for their depression. Johnson et al. (2016) investigated the determinants of mental health service use of Australian children and adolescents using the second Australian Child and Adolescent Survey of Mental Health and Wellbeing. The results from their multivariate regression analysis showed that the service use was higher in single parent families, and also among those living in the least socially and economically disadvantaged areas compared to the most disadvantaged areas.

Recognition or diagnosis of mental illness in children or their parents has been found to be linked with mental health service use. Breland et al. (2014) examined the factors associated with mental health service use among 113 adolescents with depression in the USA. Their results showed that the recognition of adolescents' mental disorders and parents' depression experience were highly correlated with the use of mental health services. However, Breland et al. (2014) did not investigate care seeking separately from receipt of treatment due to limited data availability. In another study, Wichstrøm, Belsky, Jozefiak, Sourander, and Berg-Nielsen (2014) investigated the determinants of the use of mental health services by Norwegian children aged 4 years. They found that mental health services were only used if the disorders were recognised and if treatments were recommended by parents and childcare teachers.

Type of mental illness was also found to be a factor impacting mental health service use. Wichstrøm et al. (2014) reported that approximately 10% of 4-year-old children with emotional or behavioural disorders obtained professional support despite mental health services being free in the country. This was because mental health services were only utilised by these children if the disorders caused significant impairment and substantial burden for parents. However, a limitation of the study is that the combination of all professional service use may have obscured differential predictors for each type of mental health service use.

Caregiver characteristics is also associated with mental health service use. Gronholm et al. (2015) investigated the association between caregiver characteristics and use of mental services by students aged 9–18 years in Greater London, United Kingdom. The results showed that caregivers' attitudes and experience affected service use among children and adolescents, when students' clinical and sociodemographic determinants were controlled.

In summary, although several studies examined the determinants of mental health service use across countries, to the best of our knowledge, only one previous study by Johnson et al. (2016) explored the determinants of mental health service use in Australia. However, Johnson et al. (2016) examined the determinants of only two types of mental health services: health and school services. The authors did not investigate other types of services such as telephone and online services, which are recently increasing in popularity, especially among adolescents. Furthermore, Johnson et al. (2016) did not investigate the determinants of mental health service use separately for each age group (age 4–10 years and age 11–17 years). In fact in this study, the adolescent cohort (11–17 years) provided their own opinion (alongside parental opinions), which segregates them from the child cohort. Multiple studies find children's age as an important factor of mental illnesses and mental health service use. For example, McGee, Feehan, Williams and Anderson (1992) and Merikangas, Nakamura, and Kessler (2009) claimed that there is a higher probability in prevalence of major depressive episodes after age 11.

In the Australian context, the Australian government has made its investment efforts in a number of programmes to increase access to mental health services for young Australians (Johnson et al., 2016). For example, the Better Access program² has been implemented since late

¹ Mental health services refer to health services, school services, telephone counselling services, and online services for mental illness.

² The Better Access initiative aimed to increase community access to mental health professionals and team-based mental health care, with general

2006 to provide rebates through the Medicare Benefits Schedule for mental health consultations provided by general practitioners. Considerable investment has been undertaken by the Australian government in mental health promotion and preventative initiatives in schools across Australia. The community-based headspace centres have operated to support young Australians aged 12–25 years. Recently, mental health services have also been provided to children using the internet. However, the rates of mental health service use in Australia are still well below 100% (David et al., 2015). Since AIHW data revealed that a significant proportion of Australian children are affected by mental illnesses, and these mental illnesses were the third ranked group of diseases that contributed to non-fatal burden of disease in Australia, a thorough investigation to improve the services available for mental illness in Australia in particular is warranted.

Our paper extends on the Johnson et al. (2016) paper by (1) conducting multivariate analysis of two additional types of services used by children/adolescents, and (2) analyzing the determinants of service use reported by parents and self-reported by adolescents (11–17 years). In addition, we disaggregate the age group 4–17 years into two groups of children and adolescents: 4–10 years (children) and 11–17 years (adolescents). We also included additional covariates such as parental depression, and parental smoking and alcohol drinking, which were not considered by most of the previous studies including Johnson et al. (2016), who used the same data set as ours. The use of these variables is theoretically justified as parental health and health related behaviours are important inputs into child health and health service use (Case, Lubotsky, & Paxson, 2002; Khanam, Nghiem, & Connelly, 2009; Khanam, Nghiem, & Connelly, 2014). Failing to account for these factors could result in misspecification of empirical models.

2. Method

2.1. Data source

We have used data from Young Minds Matter: the Second Australian Child and Adolescent Survey of Mental Health and Wellbeing (David et al., 2015). The YMM is a national face-to-face household survey conducted in 2013–2014 involving 6310 parents/carers (55% of eligible households) of children aged 4–17 years. If a household had more than one child, a single child was randomly selected for the survey. A self-report survey from 2967 (89% of eligible youth) 11- to 17-year-olds from these households was also conducted. The survey was designed to be representative of households with children aged 4–17 years in Australia. A multi-stage, area-based sample selection procedure was used to represent a community both socially and economically with an average population of 20,000. They were stratified by state/territory and by metropolitan versus non-metropolitan (rural/regional) to ensure proportional representation of geographic areas across Australia (Hafekost et al., 2016). Exclusion criteria were: children in most remote areas, homeless children, children in institutional care and children living in households where interviews could not be conducted in English. The details of the survey and methodology used in the survey will be found in Hafekost et al. (2016).

2.2. Variables

Outcome Variables.

Services: An extensive set of questions were asked to the primary carer of the children and adolescents about services used for emotional

(footnote continued)

practitioners encouraged to work more collaboratively with psychiatrists, clinical psychologists, registered psychologists, trained social workers and occupational therapists. Since 2017, it has been expanded to include new Medicare items to allow patients to access services through video conferencing.

or behavioural problems in the past 12 months. The mental health services used by all children and adolescents included (1) health services, (2) school services, (3) telephone counselling services, (4) online services, and, (5) any type of the previous mentioned mental health services. Health services included services provided by a qualified health professional regardless of where that service was provided, including in the community, hospital inpatient, outpatient and emergency, and private rooms. Children with mental illnesses, who are eligible for health services provided by specialists and other allied health providers, may be subsidised by the government. Examples of school services included individual counselling, group counselling or support program, special class or school, and school nurse counselling (David et al., 2015), provided by the school or other educational institution that a young person was attending. Online services consisted of personalised assessment, support, counselling or structured self-help programs.

Independent Variables:

Mental disorders: Mental illnesses were assessed using the Diagnostic Interview Schedule for Children–Version IV (DISC-IV) (Fisher et al., 1993; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000). The DISC-IV uses the criteria for mental illnesses set out in the Diagnostic and Statistical Manual of Mental Disorders–Version IV (American-Psychiatric-Association, 2000) to identify if the child/adolescent had a mental illness in the previous 12 months. Seven DISC-IV modules were completed by primary carers. These included major depressive disorder, attention deficit hyperactivity disorder (ADHD), conduct disorder, and four types of anxiety disorders - social phobia, separation anxiety disorder, generalized anxiety disorder, and obsessive-compulsive disorder (David et al., 2015). In this paper we combine social phobia, separation anxiety disorder, generalized anxiety disorder and obsessive-compulsive disorder into one category - anxiety disorders. Therefore, four types of mental illnesses are used in this paper: anxiety disorders, major depressive disorder, ADHD and conduct disorder.

Family Structure and Socio-demographic Factors.

Our main variables of interest are family structure and socio-economic status (SES) of the household. Income, education and occupation of parents are used to represent SES, and family structure is measured using four variables available in YMM data. These variables are – (1) original families where all children are natural, adopted, or foster child of both parents, and there is no step child; (2) step families in which there is at least one resident step child, but no natural/adopted child of both parents; (3) blended families that have two or more children where at least one child is the natural/adopted child of both parents, and at least one child is the step child of one of the parents; (4) other families including families with children (who are not the natural, adopted, foster, step child of either parent/carer) being raised by grandparents or other relatives. Sex, age, remoteness and the index of relative socio-economic disadvantage (IRSAD) are also adjusted. We also add some important variables that may have an effect on mental health service seeking behaviour of carer (Breland et al., 2014). These variables are primary carer's mental health, primary carer's smoking status, family functioning (measures of harmony & love among parents) and the risk of alcohol related harm by the primary carer. The selection of all independent variables was based on theoretical underpinning of mental health service use and supported by previous literature.

3. Analysis

This study uses the following sample sizes (for details, see Table 1):

1. In the analysis of the use of health services and school services by children, the sample sizes for the populations aged 4–17 years, 4–10 years and 11–17 years (parent/carer reported), are 5910, 2809 and 3101, respectively;
2. In the analysis of the use of telephone services by children, the

Table 1
Distribution of mental health services over age groups.

Parents/Carer reported data				Youth self-reported			
Age 4–17		Age 4–10		Age 11–17		Age 11–17	
Service	Accessed (%)	Service	Accessed (%)	Service	Accessed (%)	Service	Accessed (%)
Health* (N = 5910)	702 (11.9%)	Health* (N = 2809)	263 (9.4%)	Health* (N = 3101)	439 (14.2%)	Health* (N = 2169)	157 (7.2%)
School (N = 5910)	72 (1.2%)	School (N = 2809)	38 (1.4%)	School (N = 3101)	34 (1.1%)	School (N = 2169)	41 (1.9%)
Telephone (N = 5708)	32 (0.6%)	Telephone (N = 2806)	5 (0.2%)	Telephone (N = 2902)	27 (0.9%)	Telephone (N = 2169)	79 (3.6%)
						Online ^a (N = 2169)	511 (23.5%)

Notes: (1) * Health services include private, hospital, CAMHS, public mental health, headspace centre, community and any health professional that the children have accessed in last 12 months; (2) ^a “There were too few cases to report separately for online services according to parent reported data, therefore, we only report from youth’s self-reported data for online services in this table” (doi.org/10.1177/0004867415622562); (3) ** The ‘Don’t know’ responses were omitted.

sample sizes for the populations aged 4–17 years, 4–10 years and 11–17 years (parent/carer reported), are 5708, 2806 and 2902, respectively;
3. The sample size for analyzing the use of health services, school services, telephone services and online services by children aged 4–17 years (youth self-reported) is 2169.

Initially, bivariate analyses (Agresti & Kateri, 2011) were conducted to examine the variables and their distributions over the outcome variables (various services used by the children). Bivariate analyses showed the frequency distribution of the sample used, which will help to reproduce the results in the future. The small sizes in particular variable groups (like telephone service access) are also displayed, which provides suggestion for future studies to work on these compromised aspects of the current study. Furthermore, the associations from the bivariate analyses ensured that the variables we selected were worthwhile, given most of them were significant, to be included in the regression models that followed. The chi-square test signified the strength of the bivariate association (Tables 2 and 3). Finally, binary logistic regressions (Harrell Jr, 2015) were estimated to investigate the determinants of mental health service use. The models were adjusted by various socio-demographic factors discussed previously (Tables 4–9). The binary logistic model was the appropriate approach in this study as the outcome variable (access to services) had only two outcome scales (yes/no). Moreover, the interpretation of logit model is more intuitive and clearly explained when it is linked with sociodemographic variables. Each age group was separately modelled for each service type (health, school, telephone, and online). Both parent reported data and youth reported data were fitted separately to assess the difference (if

Table 2
Bivariate analysis between mental health services and mental illnesses in children, as reported by parents.

Mental illnesses		Parent data								
		Age 4–17			Age 4–10			Age 11–17		
		Health services accessed (%)	School services accessed (%)	Telephone services accessed (%)	Health services accessed (%)	School services accessed (%)	Telephone services accessed (%)	Health services accessed (%)	School services accessed (%)	Telephone services accessed (%)
ADHD	No	340 (48.4%)	35 (48.6%)	14 (43.8%)	113 (43%)	15 (39.5%)	5 (100) [#]	227 (51.6%)	20 (58.8%)	9 (33.3%)
	Yes	362 (51.6%)	37 (51.4%)	18 (56.2%)	150 (57%)	23 (60.5%)	0 (0%) [#]	212 (48.4%)	14 (41.2%)	18 (66.7%)
	P-value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.334	< 0.001	0.006	< 0.001
Depression	No	466 (66.4%)	43 (59.7%)	16 (50%)	211 (80.2%)	27 (71.1%)	4 (80%) [#]	255 (58.2%)	16 (47.1%)	12 (44.4%)
	Yes	236 (33.6%)	29 (40.3%)	16 (50%)	52 (19.8%)	11 (28.9%)	1 (20%) [#]	184 (41.8%)	18 (52.9%)	15 (55.6%)
	P-value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.244	< 0.001	< 0.001	< 0.001
Anxiety disorders	No	310 (44.2%)	30 (41.7%)	14 (43.8%)	104 (39.5%)	18 (47.4%)	4 (80%) [#]	206 (46.9%)	12 (35.3%)	10 (37%)
	Yes	392 (55.8%)	42 (58.3%)	18 (56.2%)	159 (60.5%)	20 (52.6%) [#]	1 (20%) [#]	233 (53.1%)	22 (64.7%)	17 (63%)
	P-value	< 0.001	< 0.001	< 0.001	< 0.001	0.009	0.367	< 0.001	< 0.001	< 0.001
Conduct disorder	No	640 (91.2%)	61 (84.7%)	30 (93.8%)	234 (89%)	30 (78.9%)	5 (100) [#]	406 (92.5%)	31 (91.2%)	25 (92.6%)
	Yes	62 (8.8%)	11 (15.3%) [#]	2 (6.2%) [#]	29 (11%)	8 (21.1%) [#]	0 (0%) [#]	33 (7.5%)	3 (8.8%) [#]	2 (7.4%) [#]
	P-value	< 0.001	< 0.001	0.751	< 0.001	< 0.001	0.812	< 0.001	0.144	0.386

[#] The expected cell size is below 5, which compromises the chi-square assumption.

Table 3
Bivariate analysis between mental health services and mental illnesses in children (11–17 years old), as reported by children.

Mental illnesses		Youth data (Age 11–17)			
		Health services accessed (%)	School services accessed (%)	Telephone services accessed (%)	Online services accessed (%)
ADHD	No	92 (58.5%)	28 (68.3%)	50 (63.3%)	407 (79.6%)
	Yes	65 (41.4%)	13 (31.7%)	29 (36.7%)	104 (20.4%)
	P-value	< 0.001	0.078	< 0.001	0.689
Depression	No	84 (53.5%)	13 (31.7%)	55 (69.69%)	407 (79.6%)
	Yes	73 (25.5%)	28 (68.3%)	24 (30.4%)	104 (20.4%)
	P-value	< 0.001	< 0.001	< 0.001	< 0.001
Anxiety disorders	No	79 (50.3%)	36 (87.8%)	50 (63.3%)	357 (69.9%)
	Yes	78 (49.7%)	5 (12.2%) [#]	29 (36.7%)	154 (30.1%)
	P-value	< 0.001	0.128	0.009	< 0.001
Conduct disorder	No	151 (96.2%)	41 (100%)	67 (84.8%)	500 (97.8%)
	Yes	6 (3.8%) [#]	0 (0%) [#]	12 (15.2%)	11 (2.2%)
	P-value	0.449	0.579	0.067	0.589

[#] The expected cell size is below 5, which compromises the chi-square assumption.

any) between the data sets. All the models were adjusted by survey weights. R (version 3.4.1) was used to run all regressions.

4. Results

As reported by parents/carers, approximately 12%, 1.2% and 0.6%

Table 4
Bivariate analysis between mental health services and socio-demographic factors, as reported by parents.

Parent data									
Sociodemographic factors	Age 4–17			Age 4–10			Age 11–17		
	Health services accessed (%)	School services accessed (%)	Telephone services accessed (%)	Health services accessed (%)	School services accessed (%)	Telephone services accessed (%)	Health services accessed (%)	School services accessed (%)	Telephone services accessed (%)
Sex									
Female	326 (46.4%)	33 (45.8%)	23 (71.9%)	94 (35.7%)	15 (39.5%)	4 (80%) ^b	232 (52.8%)	18 (52.9%)	19 (70.4%)
Male	376 (53.6%)	39 (54.2%)	9 (28.1%)	169 (64.3%)	23 (60.5%)	1 (20%) ^b	207 (47.2%)	16 (47.1%)	8 (29.6%)
P-value	0.283	0.748	0.028	< 0.001	0.328	0.076	0.039	0.699	0.068
Age^a	11.95	10.74	14.56	7.18	7.21	9.00	14.81	14.68	15.59
Household income									
High	171 (24.4%)	13 (18.1%)	7 (21.9%)	66 (25.1%)	5 (13.2%)	1 (20%) ^b	105 (23.9%)	8 (23.5%)	6 (22.2%)
Medium	299 (42.6%)	34 (47.2%)	14 (43.8%)	109 (41.4%)	18 (47.4%)	1 (20%) ^b	190 (43.3%)	16 (47.1%)	13 (48.1%)
Low	232 (33%)	25 (34.7%)	11 (34.4%)	88 (33.5%)	15 (39.5%)	3 (60%) ^b	144 (32.8%)	10 (29.4%)	8 (29.6%)
P-value	< 0.001	0.049	0.406	0.003	0.051	0.135	< 0.001	0.629	0.640
Primary carer's highest level of education									
Bachelor	211 (30.1%)	20 (27.8%)	8 (25%)	82 (31.2%)	7 (18.4%)	1 (20%) ^b	129 (29.4%)	23 (38.2%)	7 (25.9%)
Diploma	260 (37%)	27 (37.5%)	15 (46.9%)	101 (38.4%)	13 (34.2%)	2 (40%) ^b	159 (36.2%)	14 (41.2%)	13 (48.1%)
Year 10/11	231 (32.9%)	25 (34.7%)	9 (28.1%)	80 (30.4%)	18 (47.4%)	2 (40%) ^b	151 (34.4%)	7 (20.6%)	7 (25.9%)
P-value	0.032	0.466	0.168	0.073	0.008	0.220	0.511	0.338	0.293
Primary carer's work status									
Employed	451 (64.2%)	46 (63.9%)	19 (59.4%)	158 (60.1%)	22 (57.9%)	2 (40%) ^b	293 (66.7%)	24 (70.6%)	17 (63%)
Unemployed	251 (35.8%)	26 (36.1%)	13 (40.6%)	105 (39.9%)	16 (42.1%)	3 (40%) ^b	146 (33.3%)	10 (29.4%)	10 (37%)
P-value	< 0.001	0.187	0.007	0.013	0.297	0.434	< 0.001	0.630	0.086
Family structure									
Original	358 (51%)	37 (51.4%)	17 (53.1%)	152 (57.8%)	19 (50%)	3 (60%) ^b	206 (46.9%)	18 (52.9%)	14 (51.9%)
Step	51 (7.3%)	5 (6.9%) ^b	2 (6.2%) ^b	13 (4.9%)	3 (7.9%) ^b	0 (0%) ^b	38 (8.7%)	2 (5.9%) ^b	2 (7.4%) ^b
Blended	66 (9.4%)	6 (8.3%) ^b	3 (9.4%) ^b	28 (10.6%)	3 (7.9%) ^b	0 (0%) ^b	38 (8.7%)	3 (8.8%) ^b	3 (11.1%) ^b
Sole parent/ care	216 (30.8%)	21 (29.2%)	10 (31.2%)	68 (25.9%)	12 (31.6%)	2 (40%) ^b	148 (33.7%)	9 (26.5%)	8 (29.6%)
Other	11 (1.6%)	3 (4.2%) ^b	0 (0%) ^b	2 (0.08%) ^b	1 (2.6%) ^b	0 (0%) ^b	9 (2.1%) ^b	2 (5.9%) ^b	0 (0%) ^b
P-value	< 0.001	0.002	0.009	< 0.001	0.006	0.906	< 0.001	0.096	0.236
Remoteness									
Major cities	434 (61.8%)	46 (63.9%)	21 (65.6%)	167 (63.5%)	25 (65.8%)	1 (20%) ^b	267 (60.8%)	21 (61.8%)	20 (74.1%)
Inner regional	201 (28.6%)	21 (29.2%)	7 (21.9%)	75 (27.4%)	9 (23.7%)	3 (60%) ^b	129 (29.4%)	12 (35.3%)	4 (14.8%) ^b
Outer regional	58 (8.3%)	3 (4.2%) ^b	2 (6.2%) ^b	19 (7.2%)	3 (7.9%) ^b	0 (0%) ^b	39 (8.9%)	0 (0%) ^b	2 (7.4%) ^b
Remote or very remote	9 (1.3%)	2 (2.8%) ^b	2 (6.2%) ^b	5 (1.9%) ^b	1 (2.6%) ^b	1 (20%) ^b	4 (0.9%)	1 (2.9%) ^b	1 (3.7%) ^b
P-value	0.188	0.441	0.212	0.517	0.962	0.014	0.317	0.225	0.552
The Index of Relative Socio-economic Advantage and Disadvantage (IRSAD)									
Lowest (Most disadvantaged)	142 (20.2%)	12 (16.7%)	7 (21.9%)	54 (20.5%)	7 (18.4%)	0 (0%) ^b	88 (20%)	5 (14.7%)	7 (25.9%) ^b
Second	126 (17.9%)	13 (18.1%)	3 (9.4%)	44 (16.7%)	9 (23.7%)	1 (20%) ^b	82 (18.7%)	4 (11.8%)	2 (7.4%) ^b
Third	142 (20.2%)	19 (26.4%)	8 (25%)	54 (20.5%)	11 (28.9%)	1 (20%) ^b	88 (20%)	8 (23.5%)	7 (25.9%)
Fourth	144 (20.5%)	14 (19.4%)	9 (28.1%)	57 (21.7%)	5 (13.2%)	3 (60%) ^b	87 (19.8%)	9 (26.5%)	6 (22.2%)
Highest (Most advantaged)	148 (21.1%)	14 (19.4%)	5 (15.6%)	54 (20.5%)	6 (15.8%)	0 (0%) ^b	94 (21.4%)	8 (23.5%)	5 (18.5%)
P-value	0.061	0.864	0.632	0.594	0.533	0.216	0.062	0.886	0.603
Primary carer's likelihood of serious mental illness (K6 score)									
Likely	46 (6.6%)	6 (8.3%)	2 (6.2%) ^b	22 (8.4%)	5 (13.2%) ^b	0 (0%) ^b	24 (5.5%)	1 (2.9%) ^b	2 (7.4%)
Not likely	656 (93.4%)	66 (91.7%)	30 (93.8%)	241 (91.6%)	33 (86.8%) ^b	5 (100%) ^b	415 (94.5%)	33 (97.1%) ^b	25 (92.6%)
P-value	< 0.001	0.018	0.121	< 0.001	< 0.001	0.897	0.006	1.00	0.148
Family functioning score (McMaster FAD)*	1.49	1.53	1.43	1.48	1.60	1.13	1.51	1.45	1.48
Primary carer's smoking status									
No	527 (75.1%)	52 (72.2%)	24 (75%)	199 (75.7%)	26 (68.4%)	3 (60%) ^b	328 (74.7%)	26 (76.5%)	21 (77.8%)
Yes	175 (24.9%)	20 (27.8%)	8 (25%)	64 (24.3%)	12 (31.6%)	2 (40%) ^b	111 (25.3%)	8 (23.5%)	6 (22.2%)
P-value	< 0.001	0.070	0.568	0.003	0.036	0.301	0.004	0.766	0.937
Risk of alcohol related harm by the primary carer									
Risky	195 (27.8%)	21 (29.2%)	5 (15.6%)	77 (29.3%)	13 (34.2%)	2 (40%) ^b	118 (26.9%)	8 (23.5%)	3 (11.1%)
None	507 (72.2%)	51 (70.8%)	27 (84.4%)	186 (70.7%)	25 (65.8%)	3 (60%) ^b	321 (73.1%)	26 (76.5%)	24 (88.9%)
P-value	0.864	0.947	0.181	0.695	0.504	0.467	0.549	0.678	0.079

^a Continuous variable. Their mean has been inserted in the cells

^b The expected cell size is below 5, which compromises the chi-square assumption.

of children aged 4–17 years accessed health services, school services and telephone counselling services, respectively (see Table 1). A greater proportion of children aged 11–17 years used health services and

telephone counselling services than 4–10 years. In contrast, self-reported data revealed that roughly 24% of children aged 11–17 years used online services, while only 7.2% of the same aged children

Table 5
Bivariate analysis between mental health services and socio-demographic factors of the primary carer, reported by the children.

Socio-demographic factors	Youth data			Online services accessed (%)
	Age 11–17			
	Health services accessed (%)	School services accessed (%)	Telephone services accessed (%)	
Sex				
Female	100 (63.7%)	27 (65.9%)	51 (64.6%)	325 (63.6%)
Male	57 (36.3%)	14 (34.1%)	28 (35.4%)	186 (36.4%)
P-value	< 0.001	0.036	0.005	< 0.001
Age ^a	15.68	15.17	15.43	15.64
Household income				
High	39 (24.8%)	15 (36.6%)	18 (22.8%)	156 (30.5%)
Medium	72 (45.9%)	16 (39%)	33 (41.8%)	251 (49.1%)
Low	46 (29.3%)	10 (24.4%)	28 (35.4%)	104 (20.4%)
P-value	0.048	0.549	0.011	0.532
Primary carer's highest level of education				
Bachelor	50 (31.8%)	13 (31.7%)	25 (31.6%)	176 (34.4%)
Diploma	61 (38.9%)	15 (36.6%)	28(35.4%)	195 (38.2%)
Year 10/11	46 (29.3%)	13 (31.7%)	26 (32.9%)	140 (27.4%)
P-value	0.883	0.993	0.912	0.121
Primary carer's work status				
Employed	105 (66.9%)	31 (75.6%)	52 (65.8%)	399 (78.1%)
Unemployed	52 (33.1%)	10 (24.4%)	27 (34.2%)	112 (21.9%)
P-value	< 0.001	0.866	0.012	0.966
Family structure				
Original	75 (47.8%)	20 (48.8%)	36 (45.6%)	318 (62.2%)
Step	13 (8.3%)	5 (12.2%) ^b	6 (7.6%) ^b	34 (6.7%)
Blended	15 (9.6%)	5 (12.2%) ^b	10 (12.7%)	34 (6.7%)
Sole parent/ care	53 (33.8%)	9 (22%)	26 (32.9%)	117 (22.9%)
Other	1 (0.6%) ^b	2 (4.9%) ^b	1 (1.3%) ^b	8 (1.6%)
P-value	< 0.001	0.032	0.013	0.875
Remoteness				
Major cities	108 (68.8%)	31 (75.6%)	53 (67.1%)	349 (68.3%)
Inner regional	41 (26.1%)	9 (22%)	20 (25.3%)	126 (24.7%)
Outer regional	6 (3.8%)	1 (2.4%) ^b	4 (5.1%) ^b	30 (5.9%)
Remote or very remote	2 (1.3%) ^b	0 (0%) ^b	2 (2.5%) ^b	6 (1.2%)
P-value	0.320	0.387	0.603	0.209
The Index of Relative Socio-economic Advantage and Disadvantage (IRSAD)				
Lowest (Most disadvantaged)	22 (14%)	6 (14.6%)	18 (22.8%)	70 (13.7%)
Second	23 (14.6%)	6 (14.6%)	12 (15.2%)	77 (15.1%)
Third	37 (23.6%)	11 (26.8%)	17 (21.5%)	107 (20.9%)
Fourth	32 (20.4%)	6 (14.6%)	18 (22.8%)	120 (23.5%)
Highest (Most advantaged)	43 (27.4%)	12 (29.3%)	14 (17.7%)	137 (26.8%)
P-value	0.609	0.642	0.332	0.171
Primary carer's likelihood of serious mental illness (K6 score)				
Likely	5 (3.2%) ^b	1 (2.4%) ^b	3 (3.8%) ^b	16 (3.1%)
Not likely	152 (96.8%)	40 (97.4%)	76 (96.2%)	495 (96.9%)
P-value	1.00	1.00	1.00	1.00
Family functioning score (McMaster FAD)*	1.55	1.48	1.44	1.46
Primary carer's smoking status				
No	124 (79%)	33 (80.5%)	59 (74.7%)	434 (84.9%)
Yes	33 (21%)	8 (19.5%)	20 (25.3%)	77 (15.1%)
P-value	0.488	1.00	0.159	0.022
Risk of alcohol related harm by the primary carer				
Risky	43 (27.4%)	9 (22%)	22 (27.8%)	118 (23.1%)
None	114 (72.6%)	32 (78%)	57 (72.2%)	393 (76.9%)
P-value	0.989	0.508	1.00	0.008

^a Continuous variable. Their mean has been inserted in the cells.

^b the expected cell size is below 5, which compromises the chi-square assumption.

accessed health services. While parent-reported data shows that telephone services were the least used mental health service, youth self-reported data, on the other hand, shows that school services were the least used service by children.

4.1. Relationship between types of mental disorders and mental health services

The bivariate analysis between the use of mental health services and mental disorders shows that children with anxiety or ADHD were the highest proportion of those who used mental health services (Tables 2 and 3). > 50% of the children, who accessed health, school or telephone services in the age groups of 4–17 years and 4–10 years (parent

Table 6
Determinants of mental health service use in Australia (binary regression).

Socio-demographic factors		Parent data (Age 4–17)			
		Health service	School service	Telephone service	Any service
		Odds (95% CI)	Odds (95% CI)	Odds (95% CI)	Odds (95% CI)
ADHD	Yes	3.50*** (2.86, 4.29)	1.95** (1.05, 3.61)	0.55*** (0.38, 0.79)	3.50*** (2.87, 4.28)
Depression (ref: No)	Yes	4.40*** (3.40, 5.69)	4.55*** (2.12, 9.8)	0.50*** (0.34, 0.74)	4.34*** (3.37, 5.6)
Anxiety disorders (ref: No)	Yes	2.47*** (2.01, 3.04)	1.64 (0.89, 3.03)	0.75 (0.53, 1.08)	2.38*** (1.94, 2.9)
Conduct disorder (ref: No)	Yes	1.47** (1.00, 2.15)	2.17* (0.93, 5.04)	1.19 (0.52, 2.75)	1.62** (1.11, 2.37)
Sex (ref: male)	Male	1.08 (0.89, 1.31)	0.89 (0.52, 1.53)	1.18 (0.86, 1.64)	1.01 (0.83, 1.22)
Age (continuous)		1.06*** (1.04, 1.09)	0.99 (0.94, 1.05)	0.71*** (0.67, 0.75)	1.06*** (1.04, 1.08)
Household income (ref: High)	Medium	0.89 (0.70, 1.14)	2.00* (0.94, 4.25)	1.14 (0.79, 1.65)	0.93 (0.73, 1.18)
	Low	0.93 (0.67, 1.28)	2.14* (0.91, 5.02)	1.24 (0.71, 2.15)	0.98 (0.72, 1.34)
Primary carer's highest level of education (ref: Bachelor)	Diploma	0.78** (0.61, 0.99)	0.77 (0.38, 1.55)	0.77 (0.52, 1.14)	0.79** (0.62, 1.00)
	Year 10/11	0.79* (0.61, 1.03)	0.93 (0.43, 2.01)	0.80 (0.52, 1.23)	0.82 (0.63, 1.06)
Primary carer's work status (ref: Employed)	Unemployed	1.20** (0.95, 1.50)	1.07 (0.60, 1.9)	1.19 (0.81, 1.76)	1.19 (0.95, 1.48)
Family type (ref: Original)	Step	1.96*** (1.28, 3.00)	1.67 (0.55, 5.03)	0.80 (0.40, 1.61)	1.89*** (1.24, 2.89)
	Blended	2.25*** (1.59, 3.18)	1.50 (0.60, 3.75)	0.62* (0.35, 1.08)	2.21*** (1.58, 3.1)
	Sole parent/PC	1.71*** (1.30, 2.24)	0.99 (0.51, 1.89)	1.19 (0.75, 1.88)	1.71*** (1.31, 2.23)
	Other	1.95 (0.83, 4.59)	2.83 (0.71, 11.26)	0.68 (0.21, 2.2)	1.94 (0.86, 4.38)
Remoteness (ref: Major cities)	Inner regional	1.26** (1.01, 1.57)	1.21 (0.65, 2.25)	0.84 (0.58, 1.21)	1.24* (1.00, 1.53)
	Outer regional	0.92 (0.64, 1.32)	0.56 (0.16, 1.95)	1.04 (0.61, 1.78)	0.89 (0.62, 1.26)
	Remote or very remote	1.14 (0.48, 2.71)	3.22 (0.67, 15.48)	0.92 (0.25, 3.33)	1.25 (0.53, 2.92)
Primary carer's likelihood of serious mental illness (K6 score) (ref: Likely)	Not likely	1.03 (0.64, 1.66)	0.96 (0.35, 2.59)	0.96 (0.44, 2.09)	1.01 (0.63, 1.62)
Family functioning		1.09 (0.89, 1.35)	1.52 (0.84, 2.74)	0.81 (0.58, 1.13)	1.14 (0.92, 1.42)
Primary carer's smoking status (ref: No)	Yes	1.01 (0.77, 1.31)	1.07 (0.56, 2.02)	1.16 (0.77, 1.73)	1.02 (0.79, 1.33)
Risk of alcohol related harm by the primary carer (ref: Risky)	None	1.16 (0.92, 1.46)	1.13 (0.6, 2.11)	1.01 (0.72, 1.42)	1.16 (0.93, 1.46)

Note: We have adjusted survey weights; *, ** and *** represents level of significance at 10%, 5% and 1% respectively.

Table 7
Determinants of mental health service use in Australia (binary regression).

Socio-demographic factors		Parent data (Age 4–10)		
		Health service	School service	Any service
		Odds (95% CI)	Odds (95% CI)	Odds (95% CI)
ADHD	Yes	4.08*** (2.99, 5.56)	2.76** (1.22, 6.26)	3.70*** (2.73, 5.01)
Depression (ref: No)	Yes	3.61*** (2.26, 5.79)	3.06** (1.14, 8.19)	3.62*** (2.27, 5.77)
Anxiety disorders (ref: No)	Yes	2.71*** (1.97, 3.74)	1.18 (0.52, 2.68)	2.49*** (1.83, 3.39)
Conduct disorder (ref: No)	Yes	1.16 (0.68, 1.96)	2.96** (1.05, 8.37)	1.41 (0.84, 2.38)
Sex (ref: male)	Male	1.50** (1.1, 2.05)	1.21 (0.56, 2.64)	1.33* (0.99, 1.79)
Age (continuous)		1.11** (1.02, 1.19)	1.11 (0.95, 1.28)	1.14*** (1.06, 1.23)
Household income (ref: High)	Medium	0.71* (0.49, 1.04)	2.72 (0.71, 10.37)	0.76 (0.52, 1.10)
	Low	0.77 (0.48, 1.24)	2.86 (0.7, 11.74)	0.82 (0.51, 1.31)
Primary carer's highest level of education (ref: Bachelor)	Diploma	0.89 (0.61, 1.28)	1.14 (0.37, 3.54)	0.90 (0.63, 1.29)
	Year 10/11	0.86 (0.57, 1.30)	2.14 (0.7, 6.58)	0.96 (0.64, 1.44)
Primary carer's work status (ref: Employed)	Unemployed	1.04 (0.74, 1.47)	0.93 (0.46, 1.88)	1.02 (0.73, 1.43)
Family Type (ref: Original)	Step	2.00* (0.94, 4.29)	3.96* (0.91, 17.12)	1.99 (0.96, 4.15)
	Blended	2.42*** (1.47, 3.99)	1.31 (0.36, 4.81)	2.29*** (1.40, 3.75)
	Sole parent/PC	1.56* (1.00, 2.44)	1.17 (0.47, 2.93)	1.64** (1.08, 2.50)
	Other	1.29 (0.32, 5.25)	3.14 (0.39, 25.2)	1.10 (0.28, 4.30)
Remoteness (ref: Major cities)	Inner regional	1.28 (0.9, 1.82)	1.04 (0.44, 2.50)	1.27 (0.90, 1.78)
	Outer regional	0.73 (0.41, 1.30)	1.03 (0.32, 3.30)	0.74 (0.43, 1.27)
	Remote or very remote	1.69 (0.48, 6.03)	2.94 (0.31, 27.87)	2.11 (0.66, 6.81)
Primary carer's likelihood of serious mental illness (K6 score) (ref: Likely)	Not likely	0.59 (0.31, 1.13)	0.49 (0.17, 1.43)	0.59 (0.31, 1.11)
Family functioning		1.12 (0.81, 1.54)	1.81 (0.81, 4.05)	1.18 (0.85, 1.65)
Primary carer's smoking status (ref: No)	Yes	1.02 (0.66, 1.56)	1.21 (0.46, 3.16)	1.07 (0.71, 1.61)
Risk of alcohol related harm by the primary carer (ref: Risky)	None	0.97 (0.69, 1.38)	1.00 (0.4, 2.49)	0.95 (0.68, 1.33)

Notes: We have adjusted survey weights; *, ** and *** represents level of significance at 10%, 5% and 1% respectively.

Table 8
Determinants of mental health service use in Australia (binary regression).

Socio-demographic factors		Parent data (Age 11–17)			
		Health service	School service	Telephone service	Any service
		Odds (95% CI)	Odds (95% CI)	Odds (95% CI)	Odds (95% CI)
ADHD	Yes	3.11*** (2.38, 4.07)	1.33 (0.51, 3.44)	0.53*** (0.37, 0.77)	3.34*** (2.56, 4.37)
Depression (ref: No)	Yes	5.04*** (3.72, 6.82)	7.23*** (2.61, 20.05)	0.49 *** (0.33, 0.72)	4.95*** (3.66, 6.70)
Anxiety disorders (ref: No)	Yes	2.32*** (1.77, 3.04)	2.55* (0.97, 6.75)	0.79 (0.55, 1.13)	2.32*** (1.78, 3.03)
Conduct disorder (ref: No)	Yes	1.91** (1.09, 3.34)	1.07 (0.19, 5.94)	1.20 (0.51, 2.82)	1.88** (1.08, 3.29)
Sex (ref: male)	Male	0.85 (0.66, 1.09)	0.74 (0.35, 1.54)	1.14 (0.82, 1.59)	0.82 (0.64, 1.05)
Age (continuous)		1.07** (1, 1.14)	1.03 (0.90, 1.17)	0.79*** (0.73, 0.85)	1.08** (1.02, 1.16)
Household income (ref: High)	Medium	1.01 (0.73, 1.4)	1.68 (0.62, 4.57)	1.14 (0.79, 1.66)	1.06 (0.77, 1.46)
	Low	1.06 (0.69, 1.64)	1.86 (0.53, 6.45)	1.42 (0.82, 2.45)	1.13 (0.74, 1.73)
Primary carer's highest level of education (ref: Bachelor)	Diploma	0.72** (0.53, 0.99)	0.59 (0.22, 1.53)	0.70* (0.47, 1.04)	0.73** (0.53, 0.99)
	Year 10/11	0.73** (0.52, 1.03)	0.42 (0.14, 1.25)	0.72 (0.47, 1.11)	0.71** (0.51, 1.00)
Primary carer's work status (ref: Employed)	Unemployed	1.37** (1.02, 1.84)	1.33 (0.56, 3.19)	1.17 (0.79, 1.74)	1.38 (1.03, 1.85)
Family Type (ref: Original)	Step	2.02*** (1.20, 3.39)	0.60 (0.13, 2.84)	0.79 (0.39, 1.59)	1.90** (1.13, 3.20)
	Blended	2.02*** (1.25, 3.26)	1.48 (0.40, 5.44)	0.60** (0.34, 1.06)	2.05*** (1.29, 3.27)
	Sole parent/PC	1.81*** (1.28, 2.55)	0.66 (0.26, 1.70)	1.11 (0.70, 1.75)	1.75*** (1.24, 2.45)
	Other	2.39* (0.88, 6.48)	2.87 (0.45, 18.15)	0.66 (0.21, 2.14)	2.49** (0.96, 6.45)
Remoteness (ref: Major cities)	Inner regional	1.24 (0.93, 1.64)	1.48 (0.62, 3.56)	0.85 (0.59, 1.23)	1.22 (0.92, 1.61)
	Outer regional	1.08 (0.68, 1.73)	3.3e-7*** (1.6e-7, 6.6e-7)*	1.05 (0.61, 1.82)	1.01 (0.63, 1.61)
	Remote or very remote	0.77 (0.22, 2.69)	3.87 (0.44, 33.92)	0.91 (0.25, 3.31)	0.74 (0.21, 2.60)
Primary carer's likelihood of serious mental illness (K6 score) (ref: Likely)	Not likely	1.73 (0.88, 3.4)	5.39 (0.57, 51.06)	0.98 (0.45, 2.15)	1.79* (0.91, 3.53)
Family functioning		1.06 (0.8, 1.39)	1.14 (0.45, 2.85)	0.77 (0.55, 1.08)	1.09 (0.83, 1.43)
Primary carer's smoking status (ref: No)	Yes	1.00 (0.72, 1.41)	1.01 (0.41, 2.46)	1.16 (0.77, 1.74)	1.01 (0.73, 1.41)
Risk of alcohol related harm by the primary carer (ref: Risky)	None	1.35* (1, 1.82)	1.38 (0.55, 3.43)	1.03 (0.73, 1.45)	1.39** (1.03, 1.88)

Notes: We have adjusted survey weights. ^ Sample size for number of respondents accessing the service was too low to fit the model. Please refer to Table 4; *, ** and *** represents level of significance at 10%, 5% and 1% respectively.

reported data), were suffering from ADHD. For example, approximately 60% of the children aged 4–10 years accessing school services were diagnosed to have ADHD (Table 2). Parent reported data (Table 2) shows that children (of all age groups) with anxiety disorders used more mental health services (all types) compared to children with other mental illnesses. Youth reported data (children aged 11–17 years) shows that of those who used school services, 68.3% of the children faced depression. All the bivariate relationships in Tables 2 and 3 were significant (p -value < 0.05), except online services with ADHD, and conduct disorder with health, school and online services (youth reported).

4.2. Relationship between mental health services and socio-demographic factors

Table 4 shows that socio-demographic factors such as sex of the child, household income, primary carer's education and work status, family structure, primary carer's likelihood of mental illness and smoking status had significant associations with several services accessed by the children. In particular, more female children in all age groups used telephone services than male children. More male children aged 4–10 years accessed health services, while more female children aged 11–17 years used health services. Children from low and medium income households utilised more health and school services, compared to children from high income households. Primary carer's level of education did not have any differentiated impact on children's use of

health services or school services, except for children aged 4–10 years. However, children of employed parents accessed more health and telephone services compared to children of unemployed parents. Children from original families tended to access more mental services than children from other types of family (e.g. step, blended, sole parent families). Table 4 shows that remoteness did not have a significant impact on mental health service use, excluding telephone services for children aged 4–10 years. As expected, children of parents/primary carers who do not have mental health problems themselves, do not smoke and do not drink accessed more mental health services compared to other children.

Table 5 shows that more female children accessed all types of mental health services than male children. The number of children that used telephone services was higher, as shown by youth-reported data (Table 5) than by parent-reported data (Table 4). Of notable interest is that a greater proportion of older children aged 11–17 years (both female and male) tended to access online services than other types of services, and more females used this service than males (Table 5). More children from medium or low income families or with employed parents used health and telephone services. Children with step or blended families were less likely to access health services, school services or telephone services than children from original families or sole parent care. Surprisingly, primary carer's highest level of education and remoteness had no impact on the use of mental health services. Online service accessibility, which was exclusive in youth reported data, had significant association with only sex, primary carer's smoking status or

Table 9
Determinants of mental health service use in Australia (binary regression).

Socio-demographic factors		Youth data (Age 11–17)				
		Health service	School service	Telephone service	Online service	Any service
		Odds (95% CI)	Odds (95% CI)	Odds (95% CI)	Odds (95% CI)	Odds (95% CI)
ADHD	Yes	2.14*** (1.39, 3.31)	1.42 (0.63, 3.17)	2.05*** (1.2, 3.52)	1.11 (0.83, 1.5)	1.27* (0.97, 1.68)
Depression (ref: No)	Yes	4.12*** (2.64, 6.44)	3.16*** (1.62, 6.16)	1.84* (0.93, 3.65)	1.76*** (1.26, 2.46)	2.03*** (1.48, 2.78)
Anxiety disorders (ref: No)	Yes	1.90*** (1.23, 2.93)	1.46 (0.8, 2.67)	1.14 (0.63, 2.04)	1.17 (0.89, 1.53)	1.24 (0.96, 1.60)
Conduct disorder (ref: No)	Yes	1.42 (0.54, 3.72)	3.6e-7*** (1.9e-7, 6.9e-9) [^]	0.45 (0.09, 2.16)	0.99 (0.47, 2.10)	1.03 (0.53, 2.03)
Sex (ref: male)	Male	0.50*** (0.33, 0.75)	0.46** (0.22, 0.98)	0.49*** (0.29, 0.83)	0.47*** (0.37, 0.59)	0.48*** (0.39, 0.6)
Age (continuous)		1.10 (0.96, 1.27)	0.82* (0.65, 1.03)	0.95 (0.79, 1.14)	1.15*** (1.06, 1.24)	1.12*** (1.04, 1.21)
Household income (ref: High)	Medium	1.15 (0.71, 1.85)	0.6 (0.25, 1.45)	1.22 (0.63, 2.38)	1.17 (0.9, 1.53)	1.11 (0.86, 1.43)
	Low	1.38 (0.72, 2.62)	0.73 (0.26, 2.09)	1.90 (0.83, 4.32)	1.02 (0.69, 1.52)	1.10 (0.76, 1.58)
Primary carer's highest level of education (ref: Bachelor)	Diploma	0.94 (0.6, 1.47)	0.63 (0.27, 1.43)	0.71 (0.39, 1.31)	1.05 (0.79, 1.38)	1.05 (0.80, 1.37)
	Year 10/11	0.59** (0.34, 1)	0.79 (0.31, 2.03)	0.68 (0.32, 1.43)	0.86 (0.64, 1.17)	0.86 (0.64, 1.15)
Primary carer's work status (ref: Employed)	Unemployed	1.63** (1.04, 2.54)	1.26 (0.52, 3.05)	1.51 (0.82, 2.8)	1.10 (0.82, 1.48)	1.29* (0.98, 1.69)
Family Type (ref: Original)	Step	2.03* (0.9, 4.59)	4.26*** (1.6, 11.34)	1.61 (0.65, 3.99)	1.32 (0.83, 2.11)	1.61** (1.04, 2.50)
	Blended	1.71 (0.82, 3.56)	2.53* (0.95, 6.75)	2.44* (0.99, 5.98)	0.82 (0.53, 1.29)	1.11 (0.74, 1.69)
	Sole parent/PC	1.54 (0.9, 2.63)	1.18 (0.44, 3.15)	1.76* (0.93, 3.32)	1.05 (0.76, 1.45)	1.14 (0.84, 1.55)
	Other	0.63 (0.09, 4.45)	6.67** (1.54, 28.83)	0.76 (0.09, 6.56)	1.15 (0.5, 2.66)	1.20 (0.55, 2.63)
Remoteness (ref: Major cities)	Inner regional	0.94 (0.61, 1.43)	0.87 (0.39, 1.94)	0.98 (0.54, 1.79)	0.80* (0.61, 1.04)	0.83 (0.65, 1.07)
	Outer regional	0.73 (0.28, 1.93)	0.75 (0.16, 3.46)	0.76 (0.25, 2.33)	0.8 (0.51, 1.27)	0.73 (0.47, 1.12)
	Remote or very remote	1.44 (0.21, 9.73)	4.0e-7*** (1.6e-7, 1.0e-6) [^]	2.57 (0.56, 11.87)	0.87 (0.3, 2.53)	0.80 (0.29, 2.16)
Primary carer's likelihood of serious mental illness (K6 score) (ref: Likely)	Not likely	4.57*** (1.69, 12.35)	2.62 (0.28, 24.68)	1.97 (0.56, 6.89)	1.23 (0.62, 2.45)	1.61 (0.83, 3.13)
Family functioning		1.54 (1.06, 2.25)**	1.17 (0.56, 2.46)	0.9 (0.5, 1.65)	1.01 (0.78, 1.31)	1.06 (0.83, 1.35)
Primary carer's smoking status (ref: No)	Yes	0.83 (0.49, 1.43)	0.95 (0.37, 2.43)	1.11 (0.61, 2.03)	0.8 (0.57, 1.1)	0.83 (0.61, 1.13)
Risk of alcohol related harm by the primary carer (ref: Risky)	None	1.09 (0.69, 1.75)	1.12 (0.48, 2.62)	0.99 (0.55, 1.79)	1.32** (1.01, 1.72)	1.37*** (1.07, 1.77)

Notes: We have adjusted survey weights. [^] Sample size for number of respondents accessing the service was too low to fit the model. Please refer to Table 4; *, ** and *** represents level of significance at 10%, 5% and 1% respectively.

primary carer's risk of alcohol related harm; 63.6% of the children who accessed online services were female, 15.1% of them had a primary carer who smoked and 23.1% had a primary carer who exhibited a risk of alcohol related harm.

A binary logistic model was used to investigate the factors associated with mental health service use. As expected, children with ADHD, depression, anxiety disorders and conduct disorder were more likely to utilise mental health services, school services or any service (parent data, Table 6). Children from middle and low-income households tended to utilise school services, however, the relationship between household income and school services was weak and only significant at 10%. Similarly, the relationship between household income and school services was significant at 10% when we controlled only for mental illness, age and sex. Table 6 shows that children of parents with lower education or unemployed parents were more likely to utilise health services. Only health services or any service were significantly associated with family type and remoteness (inner regional). Unexpectedly, mental health status, smoking status and risk of alcohol related harm of parents were not associated with the use of any type of mental health services.

Children aged 4–10 years tended to access health services, school services and any service instead of telephone services, as reported by parent data (see Table 7). In particular, children's use of health services, school services or any service was significantly associated with all types of mental illnesses (except conduct disorder and health services,

conduct disorder and any service, and anxiety disorders and school services). However, the children's gender and age were only significantly related to the use of health services or any service. The association between medium income family and health services was significant at only 10%. Again, parents' education level, primary carer's work status, remoteness of residential location, mental health status of parents, family functioning, parental smoking status and parental risk of alcohol related harm were not significantly associated with any type of mental health service use. Table 7 shows that children from blended families were more likely to use health and any services, whilst children from step families were more likely to utilise school services.

Table 8 highlights the mental health service use of children aged 11–17 years (parent reported). The most used services for children with mental illnesses were health services, school services and any service. In contrast to younger children aged 4–10 years (Table 7), children aged 11–17 years with ADHD and depression also utilised telephone services. As expected, children's age was significantly associated with health services, telephone services and any service use. However, children's gender and household income were not significantly related to any type of mental health service use. Primary carer's educational level, employment status and family type significantly affected children's use of health services. Remoteness (outer regional) was only significantly associated with school services use. Primary carer's likelihood of serious mental illness, family functioning, and primary carer's smoking status were not significantly associated with mental health service use.

Primary carer's risk of alcohol related harm significantly affected children's use of health services and any service.

Youth data (Table 9) shows that children aged 11–17 years with mental illnesses (except conduct disorder) were more likely to use health services, rather than school services, telephone services, online services and any service. Also, children aged 11–17 years with ADHD and depression were most likely to utilise telephone services, as reported by youth data (Table 9), than children at the same age level, as reported by parent data (Table 8). ADHD and depression were significantly associated with the use of health services, telephone services and any service, while only depression was significantly associated with school and online services. Sex significantly affected children's use of all types of mental health services and any service, whereas age only had significant impact on their use of school services, online services and any service. Similar to parent data (Table 8), youth data also shows that household income did not correlate with any type of mental health service use. Also, household income was found not to be significant even in models where only mental illness, age and sex were controlled. Factors such as parents being unemployed or parents with lower education (year 10/11) were significantly associated with children's health services use. Children from step families were more likely to use health services, school services and any service, whilst children from blended families were more likely to approach school and telephone services. Primary carer's mental illness was significantly associated with children's use of health services, and primary carer's risk of alcohol related harm had a significant impact on children's use of online services and any service.

5. Discussion and conclusions

This study investigated the socio-demographic determinants and patterns of use of different types of mental health services by Australian children based on differences in age groups, gender and diagnoses, as reported by youth versus parent data.

Children's age significantly affected their mental health service use. The results (Tables 1 and 2) show that younger children aged 4–10 years tended to use health and school services whilst older children aged 11–17 years used more telephone and online health services compared to other services (Tables 1 and 3). This may be because children aged 4–10 years do not have as easy access to telephone and online health services, as do adolescents from their own smartphones. It may also be because adolescents prefer more privacy than younger children and thus opt for the more anonymous telephone and online options than the school and health services. Despite this, the findings highlight the important role of health and school services as well as the increasing importance of telephone and online services. In particular, the tendencies revealed in these results emphasize the need to develop, improve and increase accessibility of age-specific and age-relevant mental health services for each age group of children.

The findings of the binary logistic model (parent data, Table 7) show that younger children aged 4–10 years benefitted more from health and school services. Telephone and online services are not an option for children aged 4–10 years as they are too young to use these services. More children from blended families used health services and any service, while more children from step families utilised school services. This again emphasises the importance of health and school services to those children, especially those aged 4–10 years old.

The findings of the binary logistic model [parent data (Table 8) and youth data (Table 9)] illustrate that although children aged 11–17 years with mental illness used health and school services, they tended to utilise more telephone services and online services as they got older. Again, this highlights the importance of improving telephone and online services to meet the increasing needs of older children.

The results from parent reported data (Table 2) and youth reported data (Table 3) show that children with ADHD and anxiety disorders used more mental health services (all types) compared to children with

other types of disorders. Disorders like ADHD have a greater burden of disease (ABS, 2006), compelling these children to seek help. Furthermore, the characteristic of disorders like anxiety disorders may make children hyper-vigilant about their symptoms and more likely to seek help. Therefore, more relevant resources should be allocated for children with ADHD and anxiety disorders. Perhaps also, increasing awareness, accessibility and encouragement to access mental health services may also help children with other disorders that typically do not have help-seeking behavioural characteristics like anxiety disorders.

The findings of the binary logistic model (parent data, Table 6) show that children aged 4–17 years with ADHD, depression, anxiety disorders and conduct disorder were more likely to use health services, school services or any service. This may be explained by the fact that the complexities of diseases like ADHD and conduct disorder may not be as easily resolved by online and telephone services, and need much more complex care, which school and health services can provide. Thus, school and health services also deserve significant attention towards their improvement, particularly for those with complex mental health disorders.

Greater use of school or health services was shown by children from medium or low income families and children of parents with lower education or unemployed parents. Living in a lower income household or in a household with unemployment, children may not have as easy access to online and telephone services via smartphones, tablets and personal laptops. Hence, the school and health services are the most convenient outlet for children from these socio-demographic backgrounds to seek help. This demonstrates the important role of health and school services, especially for children from more economically disadvantaged families.

The results from bivariate analyses (Tables 4 and 5) show that children from medium or low income families, having parents with diploma, employed parents, or from original families or sole parent families had higher rates of 12-month service use than children from high-income families, having parents with bachelor or year 10/11, unemployed parents or from blended or step families. It is plausible that children from these families experience a greater severity or burden of mental health illness, and as a result they are more likely to seek help than those from high income families and those with parents with higher education levels.

There are differences between the findings from parent reported and youth reported data. For example, parents cited a higher use of all types of mental health services by children aged 11–17 years (Table 2), compared to what the youth self-reported for the same age group (Table 3). Our findings are consistent with the findings by Johnson et al. (2016). The differences between parent and youth reported data may be because of different perceptions of symptoms and their severity between adolescents and their parents/carers. Furthermore, with increasing independence in adolescence, these children may not clearly communicate with their parents about their use of mental health services. Hence, the parent reported data for adolescents may be susceptible to inaccuracy. Regardless, the differences indicate the necessity and importance of providing consultations to both parents/carers and adolescents to gauge their perceptions and experiences, and to formulate improved and more relevant mental health services for them. Future studies should consider investigating whether children and adolescents access services (particularly telephone and online services) independently or with parental knowledge. This extra data will broaden the implications of the findings of this study.

Both parent reported data (Table 4) and youth reported data (Table 5) show that primary carer's level of education and remoteness had no impact on the use of mental health services by adolescents aged 11–17 years. Adolescents are increasingly independent, so their parents' education level or knowledge base most likely has less of an effect on their decision to utilise mental health services. Furthermore, remoteness is less likely to have an effect on mental health service use in

adolescents as they are more likely to use telephone and online services (Tables 4 and 5), where geographical barrier is not an issue. Additionally, telephone and online services have become more convenient for adolescents to seek help for their mental health needs. There were also discrepancies in service use between females and males in the data. The parent reported data (Table 4) and youth self-reported data (Table 5) show that female adolescents aged 11–17 years utilised all types of mental health services, especially health and online services, more than males aged 11–17 years. These differences may be explained by differences in self-perceptions of severity of mental illnesses between males and females (Doherty, & Kartalova-O'Doherty, Y., 2010). It may also be because females with mental illnesses generally display increased help-seeking behaviour than males (Doherty, & Kartalova-O'Doherty, Y., 2010; Stead, Shanahan, & Neufeld, 2010).

A limitation of this study is that this paper did not investigate whether the use of mental health services improved the children's mental health condition, school performance and social functioning. Availability of longitudinal data on mental health service use will help future researchers to explore these issues. Collinearity compromised the models associated with 'school services' as family type and remoteness showed VIF > 5, detailed in the supplementary file. Furthermore, some socio-economic variables like income, family type, remoteness could be endogenous with the health service choice. Future studies with adequate information on reasons for such choices or a different modelling approach (two-stage estimation) could provide further illustration on this issue. Moreover, the socio-economic factors or the mental illnesses could be collapsed into multiple factors and fitted to logit models to assess these domains' association with each service. Future studies with an overarching objective to assess the theoretical assumptions of association between domains could possibly explore this.

5.1. Policy recommendations

The findings of this study lead to four major policy recommendations. Firstly, mental health services should be tailored accordingly to relevant target age groups; specifically, school and health services for young children, and telephone and online services for adolescents. This can be done by: employing those skilled in pediatric psychology as school health nurses/guidance officers/counsellors, providing GPs and other health services with more training in pediatric psychology, making telephone and online services more user-friendly for adolescents (e.g. ensuring anonymity, low cost so adolescents can use without relying on parents), and, advertising about telephone and online services at adolescent-friendly outlets (e.g. social media, high schools).

Secondly, mental health services, specifically school and health services, should be improved with a focus on complex disorders like ADHD, anxiety and conduct disorders. This can be done by providing regular workshops and training sessions headed by specialist pediatric psychiatrists for school counsellors and health services, educating them on recent updates and recommendations on management of complex disorders like ADHD, anxiety and conduct disorders. It will also be beneficial to improve telephone and online services to better cater for those with complex mental health illnesses. Again, input from specialist pediatric psychiatrists will prove beneficial. Also, a round table discussion consisting of adolescents, their parents, pediatric psychiatrists and telephone/online service developers on improving telephone and online service could also prove useful.

Thirdly, in areas of low socio-demographic status (e.g. lower to middle income families, parents of low education, unemployed parents), a particular focus should be put on improving school and health services as children from low socio-demographic backgrounds rely on such services. School and health services in these areas may lack appropriate resources and personnel to adequately cater for patients. Increased funding to these areas and increased recruitment of skilled personnel (school nurses, counsellors, guidance counsellors, psychologists and psychiatrists) to areas of low socio-demographic status may

also prove useful. Incentives to work in these areas, such as increased salary by the government or low socio-demographic area work/study placement scholarships, may help recruit more skilled personnel.

Finally, there needs to be an increase in raising awareness, specifically towards male children aged 11–17 years, about the symptoms of various mental illnesses, availability of services, proper utilisation of these services and the benefits of using these services. This is because more female children aged 11–17 years accessed the mental health services than male ones (see Tables 4 and 5). This can be done by advocacy of these points by male role models within the community (e.g. school teachers, sporting coaches, school leaders). Pastoral care sessions may also be organized in schools and separated by gender. During these sessions, male school teachers, school leaders and other elder peers in the school may educate male children and adolescents about mental health. Other advertisement modalities include social media, posters in male change rooms/toilets and TV advertisements during TV programs that are commonly popular among males.

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