Adequacy of treatment for child and adolescent mental disorders in Australia. A national study.

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**ABSTRACT**

**Objective**: Worldwide, little information is available about the extent to which children with mental disorders in the general population receive treatment from health professionals that meets minimal clinical practice guidelines. This study identifies the percentage of 6-17 year-olds with mental disorders in the 2013-14 Australian national survey of mental health who had sufficient contact with health professionals during the 18 months after the survey to have received treatment meeting criteria for minimally adequate treatment (MAT). It also identifies factors associated with children having this level of contact with health professionals.

**Method**: Mental disorders were identified using the Diagnostic Interview Schedule for Children Version IV completed by parents. Health professional attendances and psychotropic medications dispensed were identified from linked national Medicare Benefits Schedule and Pharmaceutical Benefits Scheme records.

**Results**: Only 11.6% (95% CI: 9.1-14.8) of children with disorders (n=517) had sufficient contact to achieve study criteria for MAT. Further, among children with mental disorders who had severe functional impairment and whose parents perceived that their child needed help (n=146), 20.2% (95% CI: 14.3-27.9) had contact sufficient for MAT, 46.0% (95% CI: 37.8-54.4) had contact that didn't achieve MAT criteria, and 33.8% (95% CI: 26.1-42.3) had no contact with health professionals. In multivariable regression, children with moderate or severe functional impairment were more likely to have had sufficient contact to meet MAT criteria.

**Conclusions**: During the 18 months after being identified with a mental disorder, only a small percentage of children have enough contact with health professionals to allow provision of MAT. This may be contributing to the unchanging high prevalence of childhood mental disorders.

**INTRODUCTION**

Over the last twenty years, there has been little change in the high prevalence of child and adolescent mental disorders reported in many countries (Sawyer et al., 2018a). One hypothesis that may help explain this is that treatment provided to children with mental disorders in the general population often fails to meet minimal standards required by clinical practice guidelines (for brevity, the term 'children' will be used to describe children and adolescents in this manuscript; Jorm et al., 2017). To date, however, there is little information about the extent to which the timeliness and amount of contact children with disorders have with health professionals is adequate to meet minimal standards recommended by clinical practice guidelines. There is also little information about the proportion of children with mental disorders in the general population who have a level of impairment that would benefit from treatment and who receive the treatment that is appropriate to their condition (De Silva et al., 2014). Information in both these areas is essential for effective service planning (De Silva et al., 2014; Jorm et al., 2017).

The vast majority of studies investigating patterns of service use by children with mental disorders have two important limitations. First, they typically employ a dichotomous indicator of service use that solely records contact versus no contact (Costello et al., 2014; Morris et al., 2011; Wolport and Ford, 2015). When this is done it is not possible to know whether contact was comprised of a single visit or included a sufficient number of timely attendances to allow delivery of treatment meeting minimal clinical practice guidelines. This is an important issue because interventions recommended in treatment guidelines for the management of childhood mental disorders such as major depressive disorder (MDD), anxiety disorders (AD), attention-deficit/hyperactivity disorder (ADHD), and conduct disorder (CD) uniformly require multiple contacts with service providers (National Institute

for Health and Care Excellence, 2017a; National Institute for Health and Care Excellence, 2017b; National Institute for Health and Care Excellence, 2016). Reflecting this, Saloner and colleagues suggested that a minimum of four visits plus medication or eight visits without medication are required to achieve 'minimally adequate treatment' (MAT) for children with depression or attention-deficit/hyperactivity disorder (Saloner et al., 2014). These recommendations are consistent with results from an earlier study reporting that 8 or more sessions of outpatient psychiatric treatment were required to achieve "real improvement" in the psychiatric symptoms experienced by a representative community sample of 997 children with mental disorders or psychiatric symptoms in the USA (Angold et al., 2000: , p.158). They are also consistent with standards utilised for this purpose in studies of adults (Harris et al., 2015).

Second, all previous studies of service use by children with mental disorders in the general population have relied on informant reports, typically parents, of service use that took place prior to the assessment of child, parent, and family problems. This creates two problems for interpretation of results. First, the assessment of children's disorders and key predictor variables after treatment has occurred makes it possible that the level of problems identified may not reflect those that were present before services were accessed. For example, family problems which may have encouraged help seeking before treatment commenced may have resolved following treatment by a health professional. Second, it is possible that parents may not accurately recall contact with health professionals, particularly if this took place months or even years earlier (Rhodes and Fung, 2004; Sawyer et al., 2018b).

This study had three aims: (i) to assess the level of contact 6-17 year-olds in Australia had with health professionals during the 18 months after they were identified as having MDD,

AD, ADHD, and/or CD in the Australian Child and Adolescent Survey of Mental Health and Wellbeing, (Lawrence et al., 2015) (ii) to identify the percentage of children with these disorders having sufficient contact to allow delivery of MAT, and (iii) to identify factors associated with children having received sufficient contact to allow delivery of MAT.

**METHODS**

**Study design and participants**

The participants were 6-11 and 14-17 year-olds who were identified as having a mental disorder in the second Australian Child and Adolescent Survey of Mental Health and Wellbeing, and for whom consent was provided to access children's Medicare Benefit Schedule (MBS) and Pharmaceutical Benefit Scheme (PBS) health records (Lawrence et al., 2015; Australian Government Department of Health, 2018b; Australian Government Department of Health, 2018a). Australian Government regulations for access to MBS and PBS data require consent from parents if children are <14 years, and consent from parents and children aged ≥14 years. For children aged 12-13 years, consent for children's participation in the survey was obtained from parents. However, this was insufficient for permission to access MBS and PBS prospective data because children would have been aged 14 years by the end of the follow-up period. As such, we were not able to obtain these data for children with disorders who were aged 12-13 years (n=104) at the time of the survey. As problems among very young children are likely to elicit different patterns of care, 4-5 year olds (n=88) were also not included. Of the remaining 6-17 year olds, 678 children were identified as having a mental disorder in the survey, and consent to access their health records was given for 517 children (76.3%) (Table 1).

The design of the survey has been described in detail elsewhere (Hafekost et al., 2016; Lawrence et al., 2015). In brief, the survey used a multi-stage area-based sample selection procedure to ensure proportional representation of geographic areas across Australia (Hafekost et al., 2016; Lawrence et al., 2015). It identified a random probability-based sample of 6,310 parents/carers of 4-17 year-olds (response rate=55%) who completed interviews with trained field workers. Survey weights were developed accounting for the original probability of selection for each child, variations in response rates and in consent rates by age of children in the family, and to benchmark them to the age-sex distribution of the population of children aged 6-17 years in Australia as determined by the Australian Bureau of Statistics (Australian Bureau of Statistics, 2016).

Written informed consent was obtained from parents, and from 14-17 year-olds for MBS and PBS access. The study protocol was approved by the Australian Government Department of Health Ethics Committee (number 17/2012) and The University of Western Australia Human Research Ethics Committee (number RA/4/1/5538).

**Measures**

*Mental disorders:* Mental disorders were assessed using the Diagnostic Interview Schedule for Children-Version IV (DISC-IV) completed by parents/carers (Fisher et al., 1993; Shaffer et al., 2000). The DISC-IV implements the criteria for mental disorders set out in the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (American Psychiatric Association, 2000). Parents/carers completed DISC-IV modules assessing (AD; social phobia, separation anxiety disorder, generalised anxiety disorder, obsessive-compulsive disorder); MDD; ADHD; and CD. For the purpose of this study, we report service use by those who met criteria for a disorder during the previous 12 months. The parents of all

children with disorders were also asked a series of questions that identified the age when their child first began to experience symptoms of their disorder.

***Functional Impairment:*** Detailed information about the measure used to assess children's level of functional impairment is available in a technical report (Zubrick et al., 2015). In brief, the measure consists of 17 items that rate the extent to which AD, MDD, ADHD or CD adversely affect children's schooling, friendships, family, and the children themselves. For the purpose of the present study, we used tertiles of children's 'Diagnostic Impact Score' to categorize children into one of three impairment groups described as mild, moderate, and severe impairment (Zubrick et al., 2015). If a child had an impairment score for more than one diagnostic grouping, the most severe level of functional impairment was utilised in the present study.

***Parental Psychological Distress:*** The Kessler-6 (K6) scale was used to assess parental psychological distress in the past four weeks. For the purpose of this study, recommended cut-off scores were used to categorise parents into one of two distress levels described as 'high' and 'normal' (Furukawa et al., 2003).

***Family Functioning****:* The 6-item Family Assessment Device General Functioning Subscale completed by parents was used to assess family functioning. Recommended cut-off scores were used to categorise families into one of two groups described as 'unhealthy' and 'healthy' (Boterhoven de Haan et al., 2015).

Sociodemographic information included family structure (single versus two parent households), household income, and household location (metropolitan versus rural) and was

collected using Australian Bureau of Statistics standard formats (Australian Bureau of Statistics, 2014). Parent-perceived need for help was based on a report that children identified with mental disorders in the survey had used services for help with emotional and behavioural problems during the previous 12 months (and their parent considered that they needed this help) or that the parent considered that children needed help but it had not been accessed.

Information about attendances with general practitioners, paediatricians, psychologists, psychiatrists, social workers, and occupational therapists was obtained from linked administrative data in the MBS (Australian Government Department of Health, 2018a). The MBS provides fees for medical practitioners' services in Australia, including specialists, and for specific services provided by psychologists, social workers, and occupational therapists. The MBS items used in the present study to identify attendances with each of these health professionals relevant to children's mental health problems are shown in Supplementary Table 1. Linked data from the administrative records of medicines dispensed through the PBS in Australia were used to identify children who had been treated with psychotropic medication (Australian Government Department of Health, 2018b). The PBS provides government subsidised medicines for most medical conditions, including mental disorders. The linked PBS data contained details of all dispensed medications under the scheme, excluding medications supplied by hospitals and a very small number of non-approved pharmacies (Page et al., 2015). The psychotropic medications dispensed for children in the study are shown in Supplementary Table 2.

**Statistical analyses**

Using linked data from MBS and PBS records, all children were assigned to one of three groups based on their level of contact with health professionals and their treatment with psychotropic medication during the 18 months after they were identified as having a mental disorder: (i) contact that met study criteria for MAT (i.e., 4-7 visits with a health professional plus concurrent medication or $\geq$8 visits with or without medication, within a 12 month period after a child's first contact with the health professional), (ii) contact that didn't meet criteria for MAT (i.e., 1-3 visits or 4-7 visits without medication, within a 12-month period), and (iii) no contact with a health professional.

All statistical analyses were conducted using the Stata software version 15.1 'svy' procedure to account for the clustered nature of the sample design and the use of survey weights (StataCorp, 2017). For ease of presentation, the initial results tables show prevalence estimates and 95% confidence intervals (CIs). Logistic regression was used to examine the strength of the relationship between level of treatment contact during the 18 month study period, and child and family characteristics, child diagnosis, child level of functioning, parent perceptions of need for help, and children's history of previous service contact. In these analyses, two sets of logistic regression models were fitted. Initially bivariable logistic models were used to assess the strength of the relationship between level of treatment contact and each predictor variable. Subsequently a single multivariable model was produced in which all the predictor variables were included in the model to identify the strength of the relationship between level of treatment contact and each predictor variable, after adjusting for the effect of the other predictor variables.

All results report sample numbers, and weighted percentages unless otherwise indicated.

**Data sharing**

The 2013-14 National Survey dataset is available to research professionals through the Australian Data Archive (Zubrick et al., 2014). The linked MBS/PBS data will be available in the same location shortly.

**RESULTS**

**Participant characteristics**

The demographic and psychosocial characteristics of children in the present study (n=517) are shown in Table 1. There was little difference between the characteristics of children for whom consent for MBS/PBS access was provided versus those for whom it was not provided. However, as a result of a lower rate of consent by 14-17 year-olds, there was a smaller proportion of 14-17 year-olds in the group for whom MBS and PBS data were available versus those for whom these data were not available (Table 1).

**Contact with health professionals**

During the 18-month follow-up period, 47.4% (n=244/517) of children attended a health professional at least once. General practitioners had contact with 25.7% (n=140/517) of these children, paediatricians with 25.5% (n=126/517), psychologists with 19.1% (n=104/517), and psychiatrists with 4.8% (n=27/517) of the children.

Only 11.6% (n=67/517) of all children with mental disorders had a level of contact with health professionals that met study criteria for MAT (Table 2). A further 35.8% (n=177/517) had contact that didn't meet the criteria for MAT and 52.6% (n=273/517) had no contact with a health professional. When analyses were restricted to children with mental disorders who had severe functional impairment and whose parents perceived that their child needed help,

20.2% (n=30/146) had sufficient contact to meet MAT criteria, 46.0% (n=64/146) had

contact that didn't achieve MAT criteria, and 33.8% (n=52/146) had no contact with health

professionals. The level of contact for children with severe functional impairment whose

parents didn't perceive a need for help generally occupied an intermediate position between

the other two groups (Table 2). In all three groups, among children who had contact with

health professionals, a higher percentage had a level of contact that did not meet the criteria

for MAT (Table 2). There was a median of 30 days (IQR=14-82) between health professional

attendances for all children attending health professionals, and a median of 28 days (IQR=14-

75) for children with severe functional impairment and parental perceived need for help.

**Factors associated with health professional contact**

As compared to children who had no contact with health professionals, a higher percentage of

children whose contact with health professionals met MAT criteria had depressive disorders,

a more severe level of functional impairment, ≥2 comorbid disorders, parents who perceived

their child needed help, and/or ≥ 4 visits with health professionals during the two years prior

to the National Survey (Table 3). A similar pattern of differences was evident between

children who had contact that met MAT criteria versus those whose contact didn't meet these

criteria (Table 3). However, the size of the differences between these latter groups was

smaller.


In the multivariable logistic regression models (Table 4), children whose level of care met

criteria for MAT were 11 times more likely to have severe functional impairment and 10

times more likely to have moderate functional impairment than children who had no contact

with health professionals. They were also more likely to have had the onset of their

symptoms >2 years before the survey and to have attended health professionals during the

previous 2 years. A similar pattern was evident between children who had sufficient contact

to meet MAT criteria and those whose contact didn't meet these criteria (Supplementary Table 3). However, the size of the odds ratios was consistently smaller in these latter comparisons.

**Sensitivity Analyses**

We undertook two sets of sensitivity analyses. First, children in Australia who attend psychiatrists, paediatricians, or psychologists in government-funded hospitals or community child and adolescent mental health services may not have their attendances recorded in MBS. We investigated the potential impact of this on the results of the study by identifying children for whom there were parent-reported attendances in these settings but no MBS record during the year prior to the national survey (i.e., children who were receiving their care through a non-MBS based service). In total 42 children were reported by parents as having one or more such attendances. Extrapolating this to the 18-month follow-up period in the present study suggests that 63 additional children (42 x 18/12=63) may have had contact with health professionals in a non-MBS based setting during this period. Assuming that the same proportion of these 63 children had sufficient contact for them to receive MAT as the children in the MBS-identified group (i.e., 11.6%, n=67/517), there would be 7 additional children who met MAT criteria that we could not identify using MBS records. This would not substantially increase the percentage of children receiving MAT in the study (i.e., 14.3%, n=(67+7)/517 rather than 11.6%, (n=67/517)).

Second, the study follow-up period was limited to 18 months due to availability of post-survey MBS and PBS data. As such, it is possible that a longer period of follow-up would have identified additional health visits resulting in more children achieving the criteria for MAT. We investigated this in two ways. First, we investigated the percentage of children

whose treatment achieved MAT criteria from 12 months prior to the survey to 18 months post-survey (i.e. a period of 2·5 years). The general pattern of results was similar to that reported for the 18 month period (Supplementary Table 4). As well, although a somewhat larger percentage of children had contact that met the criteria for MAT during this longer period (19.1%, n=105/517 versus 11.6%, n=67/517), they were only a small minority of all children with disorders. Second it is possible that children who commenced treatment later in the 18 month follow-up period subsequently met criteria for MAT after the 18 month period ended. To test for this possibility we investigated the percentage of children who met versus did not meet MAT criteria across three month intervals during the study period (Supplementary Table 5). In the last 6 months of the follow-up a higher percentage of children had contact that did not meet versus met MAT criteria (23.8%, n=44/177 versus 4.9%, n=4/67) than occurred earlier in the period. However, assuming that approximately 11.6% of the children not meeting MAT criteria subsequently had sufficient treatment to meet criteria (i.e., 5 children), this would have had little impact on the estimated percentage of children receiving MAT in the study.

**DISCUSSION**

The results from the present study suggest that only a small minority of children with MDD, AD, ADHD, and CD in Australia have sufficient contact with health professionals to allow delivery of treatment meeting minimal clinical practice guidelines. For example, during the 18 months after they were identified as having one of these disorders, although 47.4% (n=244/517) of children had contact with a health professional only 11.6% (n=67/517) had sufficient contact to meet study criteria for MAT. Furthermore, only 20.2% (n=30/146) of children with severe functional impairment and parent-perceived need for help had sufficient contact to meet MAT criteria. The results suggest that the prevalence of 'minimally adequate'

treatment provided to children with mental disorders in the general population is much lower than that reported in studies that solely record whether children with disorders have contact with a health professional. It seems likely that these latter studies have greatly over-estimated the extent to which children with mental disorders in the general population are receiving effective treatment (Jorm et al., 2017).

The relatively small number of children who had sufficient contact with health professionals to meet study criteria for MAT is consistent with results from previous studies. For example, in Great Britain, Meltzer and colleagues reported that over a 12-month period only 25% of 5-15 year-olds with a mental disorder had attended their general practitioner more than two times (Meltzer et al., 2003). In the USA, in a one-year prospective study of 1,007 children aged 9, 11, or 13 years at baseline, less than 10% used services during multiple 3-month periods across the year of the study (Farmer et al., 1999).

Jorm et al. (2017) have suggested that a potential reason for lack of change in prevalence of mental disorders among adults in the general population is that much of the treatment provided may fail to meet minimal standards of clinical practice guidelines. Support for this hypothesis was provided in results from a recent national study of adults with affective and/or anxiety disorders in Australia, which found that only 16% of participants were receiving MAT, defined in a similar way to the present study (Harris et al., 2015; Saloner et al., 2014). Results from the present study suggest that a similar problem exists with the provision of treatment for children with mental disorders. It is plausible that failure to ensure that treatment provided to children with mental disorders in the general population meets minimal practice guidelines is contributing to the unchanging prevalence of child and adolescent disorders in Australia and other countries (Sawyer et al., 2018a).

There was little difference in the demographic characteristics of children who had contact with health professionals meeting the criteria for MAT and those who had no contact or contact not meeting these criteria. However, as compared to those who had no contact with a health professional, children with moderate or severe levels of functional impairment or children who had attended health professionals during the previous two years were more likely to have a level of contact that met criteria for MAT. Similar differences were evident between children whose contact met MAT criteria versus those who had contact that didn't meet these criteria. The results suggest that the level of children's functional impairment rather than their demographic characteristics plays a key role in parent and clinician decisions about the provision of ongoing care and support. These findings are similar to that reported in one of the few previous studies to examine this issue which found that higher symptom levels among children were associated with persisting service use over a 12 month period (Farmer et al., 1999). They are also comparable to those reported in a prospective study of 4 year-old children which found that family burden and parent-perceived need for help when children were aged 4 years predicted service use when children were aged 7 years (Wichstrøm et al., 2014).

Strengths of this study include its national scope, the quality of its sampling methods, its use of well-established diagnostic criteria and methods, and its use of service information collected contemporaneously at the time of attendances. However, the study also has some limitations. First, the response rate in the national survey was 55%. Extensive checking showed that the participants in the survey were highly representative of the national population of 4-17 year-olds (Hafekost et al., 2016; Lawrence et al., 2015). However, it is possible that inclusion of children who did not participate may have changed population

estimates. Second, diagnostic information was limited to parent-report and it is possible that additional information from other informants such as children or teachers may have altered the proportion of children who met the criteria for having a mental disorder. Finally, it was beyond the scope of this study to investigate use of school-based services but previous work has shown that these are also an important source of support for children with mental disorders (Lawrence et al., 2015).

In conclusion, previous studies have highlighted a treatment gap between the prevalence of childhood mental disorders and the prevalence of health service contact by children with disorders in the general population. However less attention has been paid to the quantity and quality of treatment received by those who do attend services. The results from the present study suggest that successfully reducing the prevalence of childhood mental disorders will require greater efforts to ensure that children's level of contact with health professionals is sufficient to allow delivery of treatment that meets minimal standards of clinical practice guidelines for the provision of evidence-based treatments.

**Declaration of Conflicting Interests:**

The authors declare that there are no conflicts of interest.

**Funding:**

Table 1. Demographic and psychosocial characteristics of children with a mental disorder by MBS data-linkage consent status

| Characteristic | All Children with mental disorders[a] (n=675)[b] | Consented to Datalinkage (n=517) | No Consent to Datalinkage (n=158) |
|---|---|---|---|
| Child sex | | | |
|   Female | 301 (44.6%) | 226 (43.7%) | 75 (47.5%) |
|   Male | 374 (55.4%) | 291 (56.3%) | 83 (52.5%) |
| Age | | | |
|   6-11 years | 356 (52.7%) | 310 (60.0%) | 46 (29.1%) |
|   14-17 years | 319 (47.3%) | 207 (40.0%) | 112 (70.9%) |
| Family structure | | | |
|   Single parent | 224 (33.2%) | 167 (32.3%) | 57 (36.1%) |
|   Two parents | 451 (66.8%) | 350 (67.7%) | 101 (63.9%) |
| Family income | | | |
|   <$52,000 | 235 (36.4%) | 186 (37.1%) | 49 (34.3%) |
|   $52,000-$129,999 | 271 (42.0%) | 215 (42.8%) | 56 (39.2%) |
|   ≥$130,000 | 139 (21.6%) | 101 (20.1%) | 38 (26.6%) |
| Location | | | |
|   Non-metropolitan | 261 (38.7%) | 209 (40.4%) | 52 (32.9%) |
|   Metropolitan | 414 (61.3%) | 308 (59.6%) | 106 (67.1%) |
| Disorder | | | |
|   Major Depressive Disorder | 181 (26.8%) | 126 (24.4%) | 55 (34.8%) |
|   Anxiety Disorder | 350 (51.9%) | 274 (53.0%) | 76 (48.1%) |
|   ADHD | 318 (47.1%) | 253 (48.9%) | 65 (41.1%) |
|   Conduct Disorder | 85 (12.6%) | 66 (12.8%) | 19 (12.0%) |
| Functional impairment | | | |
|   Mild | 224 (33.2%) | 176 (34.0%) | 48 (30.4%) |
|   Moderate | 226 (33.5%) | 170 (32.9%) | 56 (35.4%) |
|   Severe | 225 (33.3%) | 171 (33.1%) | 54 (34.2%) |
| Symptom onset | | | |
|   ≤ 2 years ago | 220 (32.6%) | 169 (32.8%) | 51 (32.3%) |
|   > 2 years ago | 454 (67.4%) | 347 (67.2%) | 107 (67.7%) |
| Comorbid disorder | | | |
|   One disorder | 464 (68.7%) | 350 (67.7%) | 114 (72.2%) |
|   ≥2 disorders | 211 (31.3%) | 167 (32.3%) | 44 (27.8%) |
| Parental Perceived need | | | |
|   No | 253 (37.6%) | 192 (37.2%) | 61 (39.1%) |
|   Yes | 419 (62.4%) | 324 (62.8%) | 95 (60.9%) |
| Family functioning[c] | | | |
|   Healthy | 617 (91.4%) | 474 (91.7%) | 143 (90.5%) |
|   Unhealthy | 58 (8.6%) | 43 (8.3%) | 15 (9.5%) |
| Parent distress[d] | | | |
|   Normal | 602 (89.5%) | 461 (89.2%) | 141 (90.4%) |
|   High | 71 (10.5%) | 56 (10.8%) | 15 (9.6%) |

n indicates sample; % indicates weighted percentage. ADHD=attention-deficit/hyperactivity disorder; MBS=Medicare Benefits Schedule.
[a] Participants with missing characteristics: n=30 missing family income; n=1 missing duration of symptoms; n=3 missing parental perceived need; n=2 missing parent distress.
[b] n=3 missing consent status.
[c] Based on 6-item Family Assessment Device General Functioning Subscale score.
[d] Based on Kessler K6 score.

Table 2. Percentage (95% CI) of children meeting criteria for minimally adequate treatment

| Nature of Contact[a] | All Children | Severe Functional Impairment | Severe Functional Impairment and Parental Perceived Need |
|---|---|---|---|
| | (n=517) | (n=171) | (n=146) |
| Met Criteria[b] | 11.6 (9.1-14.8) | 19.5 (14.0-26.5) | 20.2 (14.3-27.9) |
| 4-7 visits + medication | 5.8 (4.0-8.4) | 8.0 (4.6-13.7) | 9.0 (5.0-15.5) |
| ≥8 visits + medication | 3.2 (2.1-5.0) | 5.1 (2.6-9.6) | 4.6 (2.2-9.4) |
| ≥8 visits + no medication | 2.6 (1.5-4.5) | 6.4 (3.4-11.7) | 6.7 (3.4-12.5) |
| Did not meet criteria[c] | 35.8 (31.5-40.3) | 42.8 (35.4-50.5) | 46.0 (37.8-54.4) |
| 1-3 visits | 28.0 (24.1-32.3) | 29.5 (22.7-37.5) | 31.9 (24.2-40.8) |
| 4-7 visits + no medication | 7.8 (5.6-10.7) | 13.2 (8.5-20.0) | 14.1 (8.9-21.7) |
| No Contact | 52.6 (47.9-57.2) | 37.7 (30.4-45.6) | 33.8 (26.1-42.3) |

n indicates sample; % indicates weighted percentage. CI=confidence interval.

[a] Reports the highest level of treatment for children visiting more than one health professional; ≥8 visits + medication was deemed a higher level of treatment than ≥8 visits + no medication. Includes visits to psychologists, paediatricians, psychiatrists, general practitioners, occupational therapists, and social workers.

[b] Within a 12 month period: 4-7 visits with a health professional plus medication, or ≥8 visits with or without medication.

[c] Within a 12 month period: 1-3 visits or 4-7 visits without medication.

Table 3. Demographic and psychosocial characteristics (% [95% CI]) of children meeting minimally adequate treatment criteria in the 18 month follow-up period (n=517)

| Characteristic[a] | Met Criteria[b] (n=67) | Did Not Meet Criteria[c] (n=177) | No Contact (n=273) |
|---|---|---|---|
| Child sex | | | |
| Female | 53.0 (40.2-65.4) | 37.4 (30.0-45.4) | 45.8 (39.6-52.0) |
| Male | 47.0 (34.6-59.8) | 62.6 (54.6-70.0) | 54.2 (48.0-60.4) |
| Age | | | |
| 6-11 years | 41.6 (29.7-54.7) | 68.4 (60.4-75.5) | 62.9 (56.6-68.9) |
| 14-17 years | 58.4 (45.3-70.3) | 31.6 (24.5-39.6) | 37.1 (31.1-43.4) |
| Family structure | | | |
| Single parent | 35.9 (23.8-50.1) | 33.3 (26.4-41.2) | 32.4 (26.6-38.7) |
| Two parents | 64.1 (49.9-76.2) | 66.7 (58.8-73.6) | 67.6 (61.3-73.4) |
| Family income | | | |
| <$52,000 | 33.8 (22.2-47.8) | 42.5 (34.8-50.6) | 40.0 (33.6-46.8) |
| $52,000-$129,999 | 52.0 (38.7-65.1) | 39.5 (32.0-47.6) | 38.7 (32.5-45.3) |
| ≥$130,000 | 14.1 (7.3-25.7) | 18.0 (12.9-24.5) | 21.3 (16.6-27.0) |
| Location | | | |
| Non-metropolitan | 35.3 (23.9-48.7) | 39.1 (30.6-48.2) | 43.4 (35.7-51.4) |
| Metropolitan | 64.7 (51.3-76.1) | 60.9 (51.8-69.4) | 56.6 (48.6-64.3) |
| Disorder | | | |
| Major Depressive Disorder | 47.1 (34.5-60.0) | 20.8 (15.3-27.5) | 16.6 (12.6-21.6) |
| Anxiety Disorder | 57.6 (44.3-70.0) | 58.9 (51.4-66.0) | 46.9 (40.6-53.4) |
| ADHD | 44.2 (31.9-57.3) | 55.4 (47.4-63.2) | 49.1 (43.1-55.1) |
| Conduct Disorder | 7.7 (3.0-18.5) | 16.0 (10.7-23.3) | 13.5 (9.7-18.5) |
| Functional impairment | | | |
| Mild | 5.8 (2.4-13.4) | 29.1 (22.4-36.8) | 45.7 (39.4-52.2) |
| Moderate | 39.2 (27.5-52.3) | 31.8 (24.7-39.8) | 30.8 (25.6-36.7) |
| Severe | 55.0 (42.0-67.4) | 39.1 (31.6-47.1) | 23.5 (18.5-29.2) |
| Symptom onset | | | |
| ≤ 2 years ago | 25.6 (15.6-39.1) | 24.6 (18.4-32.1) | 38.2 (31.9-44.8) |
| > 2 years ago | 74.4 (60.9-84.4) | 75.4 (67.9-81.6) | 61.8 (55.2-68.1) |
| Comorbid disorder | | | |
| One disorder | 54.3 (41.6-66.5) | 59.8 (51.9-67.2) | 77.9 (72.4-82.6) |
| ≥2 disorders | 45.7 (33.5-58.4) | 40.2 (32.8-48.1) | 22.1 (17.4-27.6) |
| Parental perceived need | | | |
| No | 15.8 (8.8-26.8) | 26.6 (20.4-33.8) | 48.3 (42.0-54.6) |
| Yes | 84.2 (73.2-91.2) | 73.4 (66.2-79.6) | 51.7 (45.4-58.0) |
| Family functioning[d] | | | |
| Healthy | 85.7 (73.2-93.0) | 96.0 (92.3-97.9) | 89.6 (84.7-93.0) |
| Unhealthy | 14.3 (7.0-26.8) | 4.0 (2.1-7.7) | 10.4 (7.0-15.3) |
| Parent distress[e] | | | |
| Normal | 90.7 (81.1-95.7) | 90.1 (83.6-94.2) | 88.1 (82.9-91.9) |
| High | 9.3 (4.3-18.9) | 9.9 (5.8-16.4) | 11.9 (8.1-17.1) |

(continued)

Table 3 (continued)

| Characteristic[a] | Met Criteria[b] (n=67) | Did Not Meet Criteria[c] (n=177) | No Contact (n=273) |
|---|---|---|---|
| Previous mental health visits[f] | | | |
| 0 | 13.7 (7.4-23.9) | 32.9 (26.3-40.3) | 71.7 (65.5-77.2) |
| 1-3 | 23.0 (12.9-37.5) | 22.1 (16.1-29.5) | 19.4 (14.6-25.3) |
| ≥4 | 63.3 (49.5-75.1) | 45.0 (37.4-52.8) | 8.9 (6.0-13.0) |

n indicates sample; % indicates weighted percentage. ADHD=attention deficit/hyperactivity disorder; CI=confidence interval.

[a] Participants with missing characteristics: n=15 missing family income; n=1 missing duration of symptoms; n=1 missing parental perceived need.

[b] Within a 12 month period: 4-7 visits with a health professional plus medication, or ≥8 visits with or without medication.

[c] Within a 12 month period: 1-3 visits or 4-7 visits without medication.

[d] Based on 6-item Family Assessment Device General Functioning Subscale score.

[e] Based on Kessler K6 score.

[f] Number of visits to health professionals in the two years prior to the national survey.

Table 4. Odds ratios (95% CI) for receiving minimally adequate treatment[a] versus no contact (reference category) with mental health professionals in the 18 months after diagnosis (n=340)[b]

| Characteristic | Bivariable OR (95% CI) | Multivariable OR (95% CI) |
|---|---|---|
| Child sex | | |
| Female | 1.00 | 1.00 |
| Male | 0.75 (0.43-1.32) | 0.57 (0.26-1.24) |
| Age | | |
| 6-11 years | 1.00 | 1.00 |
| 14-17 years | 2.38 (1.32-4.28) | 0.61 (0.23-1.63) |
| Family structure | | |
| Single parent | 1.00 | 1.00 |
| Two parents | 0.86 (0.46-1.59) | 0.73 (0.29-1.83) |
| Family income | | |
| <$52,000 | 1.00 | 1.00 |
| $52,000-$129,999 | 1.59 (0.83-3.04) | 2.10 (0.77-5.73) |
| ≥$130,000 | 0.79 (0.32-1.92) | 1.66 (0.44-6.19) |
| Location | | |
| Non-metropolitan | 1.00 | 1.00 |
| Metropolitan | 1.41 (0.77-2.55) | 0.78 (0.37-1.64) |
| Disorder[c] | | |
| Major Depressive Disorder | 4.46 (2.39-8.33) | 1.98 (0.51-7.66) |
| Anxiety Disorder | 1.54 (0.85-2.80) | 0.68 (0.12-3.76) |
| ADHD | 0.82 (0.46-1.47) | 0.83 (0.21-3.30) |
| Conduct Disorder | 0.53 (0.19-1.53) | 0.40 (0.05-2.91) |
| Functional impairment | | |
| Mild | 1.00 | 1.00 |
| Moderate | 10.09 (3.68-27.68) | 9.58 (2.55-35.91) |
| Severe | 18.58 (6.78-50.92) | 10.56 (2.22-50.09) |
| Symptom onset | | |
| ≤ 2 years ago | 1.00 | 1.00 |
| > 2 years ago | 1.79 (0.91-3.53) | 3.23 (1.16-9.02) |
| Comorbid disorder | | |
| One disorder | 1.00 | 1.00 |
| ≥2 disorders | 2.97 (1.64-5.39) | 1.35 (0.21-8.69) |
| Parental perceived need | | |
| No | 1.00 | 1.00 |
| Yes | 4.97 (2.45-10.05) | 1.84 (0.67-5.03) |
| Family functioning[d] | | |
| Healthy | 1.00 | 1.00 |
| Unhealthy | 1.43 (0.56-3.64) | 0.58 (0.13-2.51) |
| Parent distress[e] | | |
| Normal | 1.00 | 1.00 |
| High | 0.76 (0.31-1.83) | 1.31 (0.29-5.95) |

(continued)

Table 4 (continued)

| Characteristic | Bivariable OR (95% CI) | Multivariable OR (95% CI) |
|---|---|---|
| Previous mental health visits[f] | | |
| 0 | 1.00 | 1.00 |
| 1-3 | 6.20 (2.44-15.75) | 4.13 (1.49-11.43) |
| ≥4 | 37.05 (16.46-83.40) | 19.86 (7.60-51.88) |

n indicates sample; OR indicates weighted odds ratio. CI=confidence interval; OR=odds ratio.

[a] Within a 12 month period: 4-7 visits with a health professional plus medication, or ≥8 visits with or without medication.

[b] Participants with missing characteristics: n=8 missing family income; n=1 missing duration of symptoms.

[c] Reference category is children without the disorder.

[d] Based on 6-item Family Assessment Device General Functioning Subscale score.

[e] Based on Kessler K6 score.

[f] Number of visits to health professionals in the two years prior to the national survey.

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Supplementary Table 1. Medicare Benefits Schedule (MBS) items describing attendances to health professionals for mental health problems[a]

| Health Professional | MBS Item Number/s | Description |
| --- | --- | --- |
| General Practitioner | 2700 to 2725 | Preparation or review of a general practitioner mental health treatment plan; attendance pertaining to patient mental health. |
| Psychologist | 10968; 80000 to 80020; 80100 to 80120; 82000; 82015 | Attendance to a clinical or registered psychologist for the purpose of receiving assessment or treatment of a mental disorder or pervasive developmental disorder, where the patient is referred by a medical practitioner. |
| Psychiatrist | 288 to 353; 866 | Attendance to a consultant psychiatrist. |
| Paediatrician | 110, 116, 132, 133 | Items most commonly used by paediatricians for assessment and treatment of mental disorders.(Hiscock et al., 2017) |
| Social Worker | 80155 to 80165 | Attendance to a social worker to receive focussed psychological strategies services for an assessed mental disorder, where the patient is referred by a medical practitioner. |
| Occupational Therapist | 80125 to 80145 | Attendance to an occupational therapist to receive focussed psychological strategies services for an assessed mental disorder, where the patient is referred by a medical practitioner. |

MBS=Medicare Benefits Schedule.
[a] All items in the linked MBS data were assessed for their inclusion as an attendance to a health professional for mental health problems.

Supplementary Table 2. Medications used for management of emotional and behavioural problems identified from Pharmaceutical Benefits Scheme

| Drug |
| --- |
| Amitriptyline hydrochloride |
| Atomoxetine |
| Carbamazepine |
| Citalopram |
| Clonidine |
| Desvenlafaxine |
| Dexamphetamine sulphate |
| Diazepam |
| Duloxetine |
| Escitalopram |
| Fluoxetine hydrochloride |
| Fluvoxamine |
| Imipramine |
| Lithium carbonate |
| Methylphenidate |
| Mirtazapine |
| Nortriptyline hydrochloride |
| Olanzapine |
| Paroxetine |
| Pericyazine |
| Prochlorperazine |
| Propranolol hydrochloride |
| Quetiapine |
| Risperidone |
| Sertraline |
| Sodium valproate |
| Temazepam |
| Venlafaxine |

Supplementary Table 3. Odds ratios for receiving minimally adequate treatment versus treatment not meeting these criteria (reference category) with mental health professionals in the 18 months after diagnosis (n=244)[a]

| Characteristic | Bivariable OR (95% CI) | Multivariable OR (95% CI) |
|---|---|---|
| Child sex | | |
|   Female | 1.00 | 1.00 |
|   Male | 0.53 (0.29-0.96) | 0.70 (0.35-1.43) |
| Age | | |
|   6-11 years | 1.00 | 1.00 |
|   14-17 years | 3.04 (1.62-5.68) | 1.26 (0.54-2.90) |
| Family structure | | |
|   Single parent | 1.00 | 1.00 |
|   Two parents | 0.89 (0.46-1.74) | 0.57 (0.23-1.41) |
| Family income | | |
|   <$52,000 | 1.00 | 1.00 |
|   $52,000-$129,999 | 1.66 (0.83-3.31) | 1.42 (0.62-3.22) |
|   ≥$130,000 | 0.99 (0.39-2.50) | 0.91 (0.28-2.98) |
| Location | | |
|   Non-metropolitan | 1.00 | 1.00 |
|   Metropolitan | 1.18 (0.65-2.14) | 0.67 (0.34-1.32) |
| Disorder[b] | | |
|   Major Depressive Disorder | 3.39 (1.82-6.34) | 2.28 (0.64-8.17) |
|   Anxiety Disorder | 0.95 (0.52-1.75) | 0.54 (0.14-2.12) |
|   ADHD | 0.64 (0.34-1.19) | 0.97 (0.26-3.64) |
|   Conduct Disorder | 0.44 (0.14-1.33) | 0.26 (0.05-1.54) |
| Functional impairment | | |
|   Mild | 1.00 | 1.00 |
|   Moderate | 6.23 (2.20-17.67) | 7.08 (2.05-24.41) |
|   Severe | 7.10 (2.58-19.53) | 5.33 (1.39-20.53) |
| Symptom onset | | |
|   ≤ 2 years ago | 1.00 | 1.00 |
|   > 2 years ago | 0.95 (0.47-1.90) | 1.36 (0.55-3.37) |
| Comorbid disorder | | |
|   One disorder | 1.00 | 1.00 |
|   ≥2 disorders | 1.25 (0.69-2.25) | 1.03 (0.23-4.56) |
| Parental perceived need | | |
|   No | 1.00 | 1.00 |
|   Yes | 1.93 (0.90-4.11) | 0.83 (0.32-2.12) |
| Family functioning[c] | | |
|   Healthy | 1.00 | 1.00 |
|   Unhealthy | 3.96 (1.38-11.38) | 4.11 (0.86-19.72) |
| Parent distress[d] | | |
|   Normal | 1.00 | 1.00 |
|   High | 0.92 (0.33-2.55) | 1.27 (0.38-4.19) |
| Previous mental health visits[e] | | |
|   0 | 1.00 | 1.00 |

| | | |
|---|---|---|
| 1-3 | 2.50 (0.93-6.73) | 2.38 (0.78-7.24) |
| ≥ 4 | 3.37 (1.54-7.37) | 2.75 (1.12-6.75) |

n indicates sample; OR indicates weighted odds ratio. CI=confidence interval; OR=odds ratio.

[a] Participants with missing characteristics: n=11 missing family income; n=1 missing duration of symptoms; n=1 missing parental perceived need.

[b] Reference category is children without the disorder.

[c] Based on 6-item Family Assessment Device General Functioning Subscale score.

[d] Based on Kessler K6 score.

[e] Number of visits to health professionals in the two years prior to the national survey.

Supplementary Table 4. Percentage (95% CI) of children meeting criteria for minimally adequate treatment between 12 months prior to the national survey and 18 months after the survey

| Nature of Contact[a] | All Children | Severe Functional Impairment | Severe Functional Impairment and Parental Perceived Need |
|---|---|---|---|
| | (n=517) | (n=171) | (n=146) |
| Met Criteria[b] | 19.1 (15.7-23.0) | 31.5 (24.4-39.6) | 33.0 (25.2-42.0) |
| 4-7 visits + medication | 7.6 (5.4-10.6) | 11.7 (7.2-18.2) | 12.7 (7.6-20.4) |
| $\geq$8 visits + medication | 5.5 (3.9-7.9) | 8.1 (4.6-13.7) | 8.1 (4.4-14.5) |
| $\geq$8 visits + no medication | 6.0 (4.2-8.5) | 11.7 (7.5-17.7) | 12.2 (7.7-18.9) |
| Did not meet criteria[c] | 37.0 (32.7-41.6) | 42.4 (34.3-50.8) | 44.9 (36.1-53.9) |
| 1-3 visits | 28.4 (24.3-32.8) | 30.0 (22.9-38.1) | 32.7 (24.8-41.8) |
| 4-7 visits + no medication | 8.7 (6.4-11.7) | 12.4 (8.1-18.6) | 12.1 (7.5-19.1) |
| No Contact | 43.8 (39.2-48.6) | 26.2 (19.5-34.2) | 22.1 (15.4-30.6) |

n indicates sample; % indicates weighted percentage. CI=confidence interval.
[a] Reports the highest level of treatment for children visiting more than one health professional; $\geq$8 visits + medication was deemed a higher level of treatment than $\geq$8 visits + no medication. Includes visits to psychologists, paediatricians, psychiatrists, general practitioners, occupational therapists, and social workers. [b] Within a 12 month period: 4-7 visits with a health professional plus medication, or $\geq$8 visits with or without medication.
[c] Within a 12 month period: 1-3 visits or 4-7 visits without medication.

Supplementary Table 5. Timeframe during which children began treatment in the 18 month follow-up period (n [%])

| Months Until First Treatment Visit | Met Criteria (n=67) | Did Not Meet Criteria (n=177) |
|---|---|---|
| 0-3 | 34 (54.0%) | 64 (36.0%) |
| 3-6 | 12 (14.2%) | 32 (17.9%) |
| 6-9 | 4 (5.9%) | 23 (13.7%) |
| 9-12 | 13 (20.9%) | 14 (8.5%) |
| 12-15 | 4 (4.9%) | 27 (13.6%) |
| 15-18 | 0 (0.0%) | 17 (10.2%) |

n indicates sample; % indicates weighted percentage.