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ABSTRACT

Inequity in Child Mental Healthcare Use*

We study the extent of horizontal inequity in children’s mental healthcare use in Australia, where universal insurance aims to provide equitable access to needed treatment, regardless of ability to pay. We use linked longitudinal survey data and administrative records that measure the need for mental healthcare – via screening questionnaires and general practitioner (GP) diagnosis – and use of mental health professionals and medication. Using between- and within-child approaches, we find that conditional on need, children from lower income families are significantly less likely to receive services from clinical psychologists than children from higher income households. However, we see little evidence of income inequities in receiving mental health services from GPs or general psychologists. We show that differences in out-of-pocket fees are a likely explanation. The findings highlight that specific support to low-income families is needed to reduce inequities in accessing a complete range of mental health services.

JEL Classification: I12, I14

Keywords: child mental health, mental health treatment, unmet mental health need, horizontal inequity, income inequity

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1 Introduction

A core objective of most health systems with universal coverage is equitable access to needed medical care, regardless of ability to pay (Van Doorslaer et al., 2006). While access to general practitioners is largely based on need (Van Doorslaer et al., 2006), there is a concerning tendency for inequity in access to more specialised services; after adjusting for self-assessed health status and morbidity, people with higher incomes are more likely to see a specialist than people with lower incomes (e.g. Morris et al., 2005; Van Doorslaer et al., 2006; d’Uva et al., 2009; Cookson et al., 2016; Lopes et al., 2023). These pro-rich inequities are especially concerning when they affect children and adolescents with mental health disorders. Mental health disorders are the leading contributor to the global disease burden among young people (World Health Organization, 2022). Over half of all mental illnesses emerge before the age of 14 (Kessler et al., 2005), significantly impacting a child’s human capital development (Currie and Stabile, 2006), and leading to long-term consequences for educational attainment, earnings and wellbeing (Fletcher, 2010; Johnston et al., 2014a; Lundborg et al., 2014; Mousteri et al., 2019). Early detection and treatment of mental illness are crucial to mitigating these negative consequences. Despite effective treatments being available, more than half of children and adolescents with mental health problems do not seek professional services (Merikangas et al., 2010; Kovess-Masfety et al., 2017).

We know little about which children are systematically missing out on needed treatment. In this paper, we examine the extent of inequity in children’s mental health care. Specifically, we investigate whether household income is a key factor in determining whether an adolescent with poor emotional health receives prompt psychological therapy, which is the first-line treatment for depression and anxiety in children and adolescents (Hazell, 2022). We focus on poor emotional health because adolescence is a critical period of development when symptoms of depression and anxiety commonly emerge (Kessler et al., 2005). It is also an important period for developing behavioural strategies to cope with and reduce symptoms of depression and anxiety. We additionally produce new evidence on how differential patient fees drive variation in income inequities across different types of psychological service providers.

An empirical challenge in measuring inequities in healthcare use is the difficulty in adequately capturing both health needs and healthcare use (Cookson et al., 2016). We use two complementary measures of mental health needs of children: medical records of an initial doctor diagnosis; and, longitudinal survey responses regarding emotional health completed by the child and their parent. Our two need measures and the use of between- and within-child approaches yield consistent results.

Our setting is Australia, which, like Canada, the United Kingdom (UK) and many European countries, has universal public health insurance based on the principle of equal treatment for equal need (horizontal equity). Despite this shared principle, access to healthcare often involves considerable out-of-pocket costs. This is particularly true for mental healthcare, where the recommended fee for clinical psychologists is about AU\$300 for a 60-minute session (Australian Psychological Society, 2024), with similarly high rates in Canada and the UK. Such fees suggest that without government support, children from low-income families may struggle to access timely mental healthcare services. Given that children from more socioeconomically disadvantaged families are more likely to experience mental health problems (Reiss, 2013), inequities in accessing needed mental health services may perpetuate broader socioeconomic disparities.

Empirical evidence on inequities in accessing mental healthcare among children is scarce.¹ Two recent studies have used administrative data on children and adolescents to explore the factors influencing

¹This is largely due to challenges in obtaining longitudinal data capturing both mental health needs and mental healthcare utilisation at an individual level. There are a few studies that examine inequities in mental healthcare among adults while controlling (to varying degrees) for mental health needs, although the findings vary by context, methods (panel or cross-sectional), type of socioeconomic status used and outcomes measured (e.g. Steele et al., 2006; Jokela et al., 2013; Bartram and Stewart, 2019; Hashmi et al., 2023; Lopes et al., 2023).

mental health treatment in the United States (Cuddy and Currie, 2020) and Canada (Currie et al., 2024). Cuddy and Currie (2020) show that among children who have an initial insurance claim for a mental illness, there is large variation across local areas (zip codes) in the probability of children receiving follow-up care and appropriate medication treatments. They also show that controlling for local area fixed-effects explains up to half of this variation. This raises the question: What factors are driving within-area variation in treatment? Currie et al. (2024) focus on whether physicians prescribe psychiatric medication differently to richer and poorer patients. Conditional on a mental disorder diagnosis and medical history, they find that low-income children are less likely to receive appropriate medications compared with high-income children who see the same doctors.

We build on these studies in three important ways. First, similar to the approach used by Cuddy and Currie (2020) and Currie et al. (2024), we use administrative healthcare records to follow children with a general practitioner (GP) diagnosis of a mental health condition and estimate whether the use of psychological therapy or prescription medication differs by household income. Unlike prior studies, which focus primarily on appropriate medication, we focus mainly on therapeutic services delivered by psychologists, as it is the recommended first-line treatment. We find that, conditional on family characteristics and local area fixed-effects, children from low-income families are less likely to receive any treatment from a psychologist (extensive margin). This inequity is driven by less use of clinical psychologists, who have additional postgraduate training and are in shorter supply than general psychologists. In contrast, we find no differences by income in the number of visits, conditional on any treatment (intensive margin). We also find no income inequities in accessing medication for anxiety or depression without therapy, which suggests fewer economic barriers to accessing medication and that low-income children are not substituting medication for therapy.

Second, we use detailed longitudinal survey data linked to healthcare records. This data allows for mental health needs to be measured with a validated emotional screening questionnaire completed by the child and their parent. We are unaware of other nationally representative datasets that include a validated mental health survey measure and administrative records of healthcare utilisation over time. This dataset allows us to address the concern that children with mental disorders may not receive an initial GP assessment and are therefore overlooked when conditioning on a formal diagnosis.

We use the repeated survey measures of emotional health over time and a within-child estimator to examine whether the impact of emotional health shocks on GP mental health assessments and psychological services vary with household income. We find consistent results with our first analysis: low income is associated with reduced use of clinical psychologists, but not general psychologists. We also observe considerable inequities in accessing a psychiatrist; though psychiatrist use is rare in our sample with <1% of children using psychiatric services. Also supporting the first analysis, which conditions on children who have a GP diagnosis, we find no income inequities in obtaining an initial GP diagnosis and mental health treatment plan.

Third, we analyse the fees paid for services to understand the role of out-of-pocket costs (or cost-sharing) in the observed income inequities for psychologists. Specifically, we investigate whether different fees are charged based on household income and whether this varies by the type of psychologist. While the government subsidy for each provider type is fixed nationwide, out-of-pocket fees are set at the discretion of the psychologist. We show that among children receiving general psychological treatment, those from low-income families are significantly more likely to be charged zero out-of-pocket fees and lower average fees. In other words, there are pro-poor disparities favouring zero-fee services. In contrast, there is no income gradient in out-of-pocket fees for clinical psychological treatment. Out-of-pocket costs represent a larger budget share for low-income individuals, and the lack of price discrimination from clinical psychologists is likely a key reason for income inequities in accessing these services.

Our third analysis on fees paid contributes to a surprisingly small literature on the charging practices

of psychologists and how patients respond to prices. [Lopes et al. \(2022\)](#) showed that an increase in the deductible of about 180 euros on mental healthcare in the Netherlands at age 18 reduced the probability of mental health care use, particularly for females from lower income households.² [Duarte \(2012\)](#) explored price elasticities by income for adult psychological services in Chile, finding that visits to psychologists are highly elastic (price elasticity of -2.08), with high-income patients being more price-sensitive than low-income patients. They suggest this pattern could be driven by high-income patients with greater financial literacy selecting lower-priced providers. Our analysis also relates to the small literature on how physicians treat patients with different SES. [Angerer et al. \(2019\)](#) showed, using a field experiment, that patients with a university degree accessed specialist physician services more often than patients without a degree, implying discrimination by healthcare providers favouring higher SES patients.

2 Institutional Setting

Medicare is Australia’s universal public healthcare system and subsidises a wide range of medical services and medications, and covers the cost of public hospital services for all Australians. The typical first step in receiving Medicare-subsidised mental healthcare in Australia is to visit a GP who will conduct an assessment to determine the patient’s mental health needs and, where appropriate, develop a mental health treatment plan (MHTP). The MHTP identifies the type of treatment needed and entitles the patient to subsidised therapeutic services provided by registered psychologists (general and clinical), occupational therapists, and social workers. Individuals are entitled to up to 10 subsidised individual therapy sessions and up to 10 group therapy sessions per calendar year. The main difference between a clinical psychologist and a general psychologist is that a clinical psychologist undergoes a higher level of specialised accredited training (taking at least eight years compared to six years for a general psychologist). In recognition of this additional expertise, Medicare provides a greater subsidy for clinical psychology services than for general psychology services.³ The GP may also prescribe psychiatric medication, such as antidepressants and antipsychotics. For more complex mental health conditions (e.g. bipolar disorder, schizophrenia, severe depression) or neurodevelopmental disorders (e.g. attention deficit hyperactivity disorder or autism spectrum disorder), the GP will usually refer children to a paediatrician or psychiatrist.

Clinical guidelines indicate that the first line of treatment for anxiety and depressive disorders in children and adolescents is psychological therapy (such as cognitive behavioural therapy) ([Hazell, 2022](#)). For more severe conditions or after no response to psychological therapy, adolescents (12-17) may be treated with recommended medications as a second line of treatment (e.g. Fluoxetine, an antidepressant of the serotonin reuptake inhibitor class). Medicare subsidises these medications and they may be prescribed by a specialist (e.g. paediatrician or psychiatrist) or a GP. In Australia, GPs account for 55% of the antidepressant prescribing to 12-14 year-olds and 78% for 15-17 year-olds ([Hazell, 2022](#)).

Despite efforts to increase access to mental health treatment through subsidised mental healthcare, there remains a persistent mental health treatment gap in Australia. Results from [Lawrence et al. \(2015\)](#) suggest that only 53% of children and adolescents with mental disorders receive treatment. This treatment gap can be attributed to several factors, including stigma, limited access to services, difficulty

²This is broadly in line with the wider evidence from the RAND Health Insurance Experiment ([Manning et al., 1987](#)), the Oregon Health Insurance experiment ([Finkelstein et al., 2012](#)) and recent quasi-experimental studies (e.g. [Dafny and Gruber, 2005](#); [Finkelstein, 2007](#); [Kolstad and Kowalski, 2012](#); [Brot-Goldberg et al., 2017](#)), which suggest that out-of-pocket fees (or cost-sharing) leads people to reduce the use of health care, including potentially valuable or necessary care, particularly among families facing budget constraints.

³For example, in 2024 a 50 minute psychological therapy session attracts a AU\$137.05 Medicare payment for clinical psychologists but only AU\$93.35 for a general psychologist. Note, both clinical and general psychologists use psychological therapies to treat individuals suffering from psychological distress and other mental health issues, and are held to the same standards of care. Neither type of psychologist prescribes medication.

in navigating the health system, affordability, and a shortage of mental health professionals.

Given these factors, household income may be a significant barrier to accessing treatment. [Lawrence et al. \(2015\)](#) found 37% of parents and carers cite financial barriers as the reason for not seeking mental health services for their children. Even with a GP MHTP, a visit to a psychologist can involve a sizable out-of-pocket fee. Using Medicare-linked records from the Longitudinal Study of Australian Children (described in more detail in Section 3), we calculate that the mean out-of-pocket cost for the initial psychological service is about AU\$50 and is similar for clinical (\$50.40) and general psychologists (\$49.40). However, despite a similar average cost, there is a higher proportion of zero-cost initial treatments from general psychologists (36%) than clinical psychologists (27%) (see Appendix Figure A.1). There is also a non-trivial proportion of high out-of-pocket costs, with some children being charged more than AU\$150.

Notably, the total cost to patients for a clinical psychologist session is much higher if they were required to pay the full fee for their treatment, equal to the Medicare subsidy plus any out-of-pocket fee. This occurs when a patient does not first obtain a MHTP or has exhausted their limited number of subsidised sessions in a calendar year provided. In addition to the difference in fees, there is a larger supply of general psychologists than clinical psychologists,⁴ meaning that accessing a general psychologist usually involves lower waiting times and shorter travel times.

3 Data

3.1 Longitudinal Study of Australian Children

We use data from the Longitudinal Study of Australian Children (LSAC), a nationally representative survey conducted every two years since 2004. The study includes two age cohorts: 5,107 children who were aged 0-1 years (B cohort) and 4,983 children who were aged 4-5 years (K cohort) in 2004. The survey collects detailed information through face-to-face interviews and self-complete questionnaires on various topics, such as household demographics, mental and physical health, child development, and parental characteristics.⁵ A unique feature of the LSAC is that it is linked to children’s complete Medicare healthcare records from 1 January 2002 until 31 March 2019. All children in LSAC are enrolled in Medicare, and at wave one, 93% of parents from both cohorts consented to the linkage of LSAC to Medicare records.

We limit the sample to children aged 10-17 because these are the ages when children and parents complete the Strengths and Difficulties Questionnaire (SDQ), which allows for a more complete measure of mental health needs. We therefore use data from Waves 4 to 7 for Cohort K, comprising 4,288 children aged 10-17 years old, and Waves 6 to 8 for Cohort B, comprising 3,921 children aged 10-15 years old.

To avoid the reverse causality concern that mental health treatment is determining mental health needs ([Lopes et al., 2023](#)), we focus on children who develop new mental health issues. This involves omitting 114 children who, at age 10, had any ongoing parent-reported mental health disorders, including ADHD, autism, anxiety disorder, and depression, or who had a history of mental healthcare use.⁶ Additionally, we excluded 357 children whose primary caregiver was not their biological mother, ensuring consistency in parental reporting. After further excluding 966 children with missing data on key variables, our eligible sample includes 6,772 children (3,566 children from Cohort K and 3,206 from Cohort B).

⁴In June 2014 when LSAC children were approximately 14 years of age, there were on average four general psychologists for every one clinical psychologist registered across Australia (Psychology Board of Australia 2014 Registration statistics, available at <https://www.psychologyboard.gov.au/about/statistics.aspx>).

⁵For sampling design of the survey, see [Soloff et al. \(2005\)](#).

⁶In sensitivity analyses we find that including children with prior mental health care use or mental disorders makes little difference to our estimates and does not change any of the conclusions. Results available on request.

3.2 Household Income

Household income is calculated as the average of parental weekly income over the past three waves (corresponding to a five-year period). This measure captures a more stable measure of income than a strictly contemporaneous measure, recognising that household income of young families is often volatile. Measured income is additionally adjusted for inflation using the 2011 Consumer Price Index (CPI) and equivalised based on the number and ages of household members.⁷

3.3 Mental Health Needs

We use the term ‘mental health needs’ to refer to having mental health problems, in particular emotional distress, at a level that justifies mental healthcare use. We use two main measures of mental health needs. The first measure uses Medicare administrative records of having a GP mental health treatment plan (MHTP). The MHTP represents an initial diagnosis by a GP for a mental health condition, such as anxiety or depression. It is expected that follow-up treatment will begin promptly, either in the form of therapy alone or therapy and medication. We consider only the first MHTP the child receives, which is observed for 1,089 children or 16% of children in our sample. This measure of need has the advantage of capturing an objective diagnosis of poor mental health and the precise date when this occurred. It does, however, require parents to schedule and attend a GP visit about their child’s mental health. Therefore, it may exclude children with genuine mental health needs, and this may be especially true for families with low health literacy or restricted GP access.

The second measure of mental health needs is derived from survey responses to the emotional problems subscale of the Strengths and Difficulties Questionnaire (Goodman, 2001), which indicates probable anxiety or depressive disorder. All parents and children complete the SDQ every wave in LSAC (from age 10 onwards), which means this measure of mental health needs is longitudinal and is not reliant on a GP assessment. The emotional problem subscale includes five questions about: often having headaches or stomachaches; having many worries; often being unhappy or tearful; being nervous in new situations; and having many fears. Each item has the possible responses, not true (0), somewhat true (1) or certainly true (2), giving a maximum total score of 10. We classify children as having poor emotional health if they score “high” or “very high” on the emotional problems scale as rated by either the parent or the child.⁸ By this definition, 2,480 children (37% of the eligible sample) have experienced poor emotional health at least once between the ages of 10 and 17.

In Appendix Figure A.2, we show the proportion of children with our two measures of mental health needs, by household income group. Figure A2a shows that among children from the lowest income quartile, approximately 25% of children have had a MHTP, and that this proportion is slightly higher than, but not statistically different to, that of the high-income group. In contrast, in Figure A2b, we observe a clear income gradient for poor emotional health, with 42% of children from low-income households ever experiencing poor emotional health between the ages of 10-17, compared to 31% of children from high-income households. This is consistent with previous studies that identify disparities in survey-based child mental health measures across socioeconomic status (SES) groups (e.g. Johnston et al., 2014b; Schady et al., 2015; Fletcher and Wolfe, 2016; Borga et al., 2021).

Notably, a considerably larger proportion of children experience poor emotional health than those who ever receive a MHTP, highlighting the large treatment gap in accessing an initial GP diagnosis

⁷This process follows the approach of the Australian Bureau of Statistics (Australian Bureau of Statistics, 2016), which constructs a household equivalence factor by allocating points to each household member: one point to the first adult, 0.5 points to each additional person aged 15 years or over, and 0.3 points to each child under the age of 15.

⁸Cut-points for the high/very high categorisation from the SDQ English Australian scoring sheet for children aged 4-17 (available from <http://www.sdqinfo.org>) is 5 for the parent-completed and 6 for the child-completed SDQ. These cut-points are designed to classify approximately 10% of the population as probably having a psychiatric disorder.

across the distribution of household income. The gap could also be attributed to measurement error since the emotional symptoms are subjectively reported by the child and their parent. We address these measurement concerns in robustness specifications in Section 5.3 by using a more restrictive cut-off for poor emotional health and altering whose SDQ assessments are used. Our results are robust to these alternative measures.

3.4 Mental Healthcare Use

We observe mental healthcare use from the linked Medicare records. We focus on services provided by registered psychologists, including general and clinical psychologists. We also observe prescription medications that are obtained for treating anxiety or depression (anxiolytics or antidepressants) and examine as an outcome whether children receive medication without therapy, which might indicate an undesirable substitution of medication for therapy. The full list of included prescription medicines is provided in Appendix Table B.1.

For the approach using the SDQ measure of mental health needs, we additionally explore mental health services provided by the GP, specifically, the development of a mental health treatment plan (MHTP). We also examine psychiatric services, which address complex or severe mental health conditions. Children may be referred directly to a psychiatrist without a GP MHTP; therefore, we only explore this outcome for the sample who experience poor emotional health as measured by the SDQ.⁹

Our main analyses focus on the use of mental health services that occur within three months of observing mental health needs. This period was chosen because it is important that children with needs receive prompt treatment, and allows for comparison with other studies that use a three-month window (e.g. Cuddy and Currie, 2020). In supplementary analyses, we provide estimates for various windows extending up to 18 months.

Among children with a GP MHTP, 58.5% access services from any psychologist within three months. Services by general psychologists are the most commonly accessed (34.2%), followed by clinical psychologists (24.9%), with 0.64% receiving both. The rate of using any mental health services is markedly lower in the sample of children who experienced poor emotional health; 3.7% received a GP MHTP within three months, while 2.9% accessed a general psychologist, and similarly, 2.9% accessed a clinical psychologist.

4 Methodology

In this study, we investigate inequity in child mental healthcare use with two analytical samples of children with mental health needs, as described earlier. These approaches identify key parameters of interest through different sources of variation. The first model uses a between-child design, comparing the mental healthcare use of children with different levels of household income, conditional on having a GP MHTP. This is similar to the approach used by Cuddy and Currie (2020) and Currie et al. (2024). The second model uses a within-child design, identifying changes in healthcare use following changes in mental health within children over time. We describe these in more detail below. In both analyses, we control for the availability of mental healthcare services and other area-level characteristics by including local area fixed-effects.

⁹Children can also be referred to a paediatrician for more complex mental health conditions, however, we are unable to clearly identify paediatrician mental health services in the Medicare data because the same service code is used for other specialist physicians, and children can visit a paediatrician for both physical and mental health conditions.

4.1 Mental healthcare use conditional on having a GP diagnosis

Our first approach identifies children in need as those who have a GP diagnosis of a mental health condition, as indicated by a MHTP in the child’s Medicare records. By conditioning on a MHTP we additionally control for potential differences in knowledge in accessing psychological services across parents with different incomes. This is because the GP will explain to the parent the need for treatment (benefits) and provide a referral for a recommended medical professional. Mental healthcare use of child i is estimated using the following linear regression equation:

$$hlthcare_i = \alpha_0 + \alpha_1 INC_i + \alpha'_2 X_i + \alpha'_3 AREA_i + \varepsilon_i \quad (1)$$

where $hlthcare_i$ is a binary variable indicating use of psychologist services (or medication treatment alone) within three months following the development of the MHTP. INC_i represents household income, measured in log form or in three categories (lowest quartile, middle two quartiles, top quartile). Our main parameters of interest are the estimated income associations (α_1), and are identified by differences in household income across children. We include a range of child and maternal characteristics (X_i) that relate to both household income and the likelihood of accessing mental health services: child’s gender, age, and number of siblings; mother’s and father’s educational attainment; maternal age; single parent status; employment status; and neighbourhood socio-economic disadvantage (SEIFA index). $AREA_i$ represents geographical area fixed-effects, defined using the Australian Bureau of Statistics’ Statistical Area Level 3 (SA3).¹⁰ Area fixed-effects are included to account for the local supply of GPs and mental health providers. By doing so, we focus on the role of income, while holding constant other supply-side factors that influence access to care in the local area.

A possible limitation of the between-child analysis represented by Equation 1 is the potential for the estimated effects of household income (α_1) to reflect unobserved parental or household characteristics, such as cognitive (e.g. health-related literacy) and non-cognitive skills (including parenting styles) and economic preferences. Our second approach (described below) controls for unobserved fixed characteristics by using within-child variation in poor emotional health and mental healthcare service use over time.

4.2 Mental healthcare use conditional on poor emotional health

For this approach, we condition on a sample of children who have ever had poor emotional health between the ages 10-17 – identified by the parent or child SDQ – and estimate a child fixed-effects regression, represented by:

$$hlthcare_{it} = \delta_i + \beta_1 emotprob_{it} + \beta_2 INC_{it} + \beta_3 emotprob_{it} \times INC_{it} + \beta'_4 Z_{it} + \beta'_5 AREA_{it} + \lambda_t + v_{it} \quad (2)$$

where, $hlthcare_{it}$ is as described under Equation 1, but with an expansion of types of services considered, including psychiatrist and GP MHTP services. δ_i is the child fixed-effect, which captures all time-invariant child and family determinants of mental healthcare use. $emotprob_{it}$ is an indicator for the child having poor emotional health in that wave. The parameter of primary interest is β_3 , which measures whether or not there are differences by household income in the changes in mental healthcare use that occur when a child experiences poor emotional health.

Z_{it} includes time-varying child and maternal characteristics (i.e. child’s age fixed-effects, mother’s age fixed-effects, single parent status, number of siblings, mother’s employment status, neighbourhood SEIFA index). Given the possibility that poor emotional health is correlated with other mental health

¹⁰There are 359 SA3s covering the whole of Australia, and are designed in urban areas to represent related suburbs with the same commercial and transport hubs, and similar socioeconomic characteristics.

conditions, we also include a range of covariates to control for other behavioural and social difficulties of the child. Specifically, we include the continuous scores and binary indicators of high difficulties for the peer, hyperactivity and conduct problems subscales of the SDQ (both parent- and child-completed), and a binary indicator of the child’s overall health status being poor (parent-reported). Finally, λ_t includes both year and month-of-survey fixed-effects. We describe all covariates and present their means in Appendix Table A.1.

5 Results

5.1 Descriptive analysis

In Figure 1, we present the raw relationship between household income and the probability of receiving mental health treatment from a psychologist, among children with mental health needs. Figure 1a shows that conditional on having a MHTP, children from the lowest income quartile (<AU\$576 per week) are substantially less likely to visit a clinical psychologist within three months compared to children from the highest income quartile (\geq AU\$1245 per week). Similarly, Figure 1b shows that, conditional on having poor emotional health, children from the poorest income quartile are much less likely to consult a clinical psychologist than children from higher income households. In contrast, there is little evidence of an income gradient for mental health services provided by general psychologists, regardless of how mental health needs are measured. In the following sections, we present estimates of this relationship that control for potential confounders, using between- and within-child estimators.

5.2 Between-child analysis of children with a GP MHTP

5.2.1 Income inequities in the probability of receiving psychologist services

Table 1 shows the results from Equation 1. For brevity, only the coefficient estimates for household income are presented, in log form (Panel A) and as income group categories (Panel B). Column (1) shows the estimates for seeing any psychologist. The results indicate that a 100% increase in household income increases the probability of receiving psychological treatment within three months by 6.8 percentage points (11.6% at the mean) ($p<0.05$). The estimates in Panel B indicate that relative to high-income families (top quartile), being in the low-income category (bottom quartile) is associated with a 13.6 percentage point decrease (23% at the mean) in the probability of receiving any treatment within three months ($p<0.10$). There is no significant difference for children from middle-income families (middle two quartiles). This suggests that the poorest households face the greatest income barriers.

When we disaggregate by type of psychologist in columns (2) and (3), it’s clear the results in Column (1) are driven by clinical psychologists. For instance, children from low-income families are 15.7 percentage points (63% at the mean) less likely to see a clinical psychologist ($p<0.01$), and children from middle-income families are 7.2 percentage points (29% at the mean) less likely to see a clinical psychologist ($p<0.05$).¹¹ However, there is no significant difference in the likelihood of seeing a general psychologist by income. We explore possible explanations for the differences in income inequities by psychologist type in Section 5.4.

In Column (4) we test whether the pro-rich inequity in accessing psychological therapy is offset by a pro-poor inequity in medication use without therapy. On average only 4.8% of the sample used medication alone. The estimates of log income and the income indicators are close to zero and statistically

¹¹It is important to consider that if children from low-income households have more severe mental health issues, conditional on a MHTP, the disparities in access to clinical psychologists might be even more pronounced than what is reported. This possibility suggests an underestimation of the extent of income inequities in accessing specialised mental health services.

insignificant, suggesting no income inequity in using medication alone. It is reassuring that we see no indication that poorer children are substituting prescription medication in place of the recommended therapeutic treatment.

In Appendix Table A.2, we present the coefficient estimates for all other covariates included in the models presented in Table 1. Of particular interest is parental educational attainment, which may be simultaneously associated with inequities in accessing needed mental healthcare, for example, through greater health literacy or cognitive skills. However, the results for mother’s and father’s education offer little support for the independent role of parental education in predicting the use of any psychologist services or medication use among children with a MHTP.

While our main analysis focuses on mental healthcare within three months from the MHTP, we present in Figure 2 low-income estimates and 95% confidence intervals for various windows of time extending up to 18 months from the initial MHTP. To ensure 18 months of complete medical records after the MHTP, we exclude children who obtained their initial MHTP after September 2017. For presentation purposes, the estimates for middle-income are omitted from the figures. From these graphs, we can see that the pattern of income inequity changes little beyond the first three months – for both general and clinical psychologists, the coefficient estimates are very stable at different treatment windows. In the lower panels of Figure 2, we illustrate how the coefficient estimates translate into the proportion of children from low-income households accessing psychologist services compared with children from high-income households. We can see that the proportion accessing general psychologists is very similar by income group (the small gap between 9 and 15 months from the initial MHTP is not statistically significant). However, for clinical psychologists, children from low-income households are persistently less likely to access services.

5.2.2 Income inequities in the number of psychologist services used

Our analysis thus far has focused on the extensive margin of using mental health services. We now examine the number of services used and use at the intensive margin. To address the count nature of our data, we employ Poisson regressions. Figure A.3 shows the distribution of the number of visits to general and clinical psychologists. Most children do not visit a psychologist, but about 22% and 14% visit a general and clinical psychologist 1-4 times, respectively. In Appendix Table A.3 we show that the income inequities for the number of psychologist services used within 12 months mirrors the results found in Table 1. As income increases, children see a clinical psychologist more often, but there is no income inequity for the number of general psychologist visits. In particular, children from low-income families see a clinical psychologist 48% fewer times than children from high-income families.

In Table 2, we examine whether there are income inequities in the number of psychologist services accessed within 12 months among children who receive at least one service from a psychologist (intensive margin). Among this sample, the children make on average 4.9 visits to a general psychologist and 5.6 visits to a clinical psychologist. We find little evidence of an income gradient for general or clinical psychologists. The estimates are generally small and not statistically significant. These results indicate that the income inequity appears to be centred on the extensive margin, not the intensive margin.

5.3 Within-child analysis – children in poor emotional health

We now turn to our results using survey-based measures of need. For this analysis, we focus on children who ever experience poor emotional health between ages 10-17. The results for the probability of receiving a GP MHTP are presented in Column (1) of Table 3 and show that the interaction between poor emotional health and log income (or the low- and middle-income indicators) is close to zero and statistically insignificant. This indicates that there is not an income inequity in accessing a GP for a MHTP among

children with poor emotional health. It is reassuring that the GP, as a first point of call, is accessible to children in need, irrespective of income.

Similar to our main analysis in Section 5.2, we find that there are considerable income inequities in seeing any psychologist (column 2), and this is driven by clinical psychologists (column 4). For instance, when children experience poor emotional health they are 5.3 percentage points less likely to see a clinical psychologist within three months if they are from a low-income household compared to a high-income household ($p < 0.01$).

In supplementary analyses, we examine the robustness of these results to alternative classifications of poor emotional health. In Panel A of Appendix Table A.4, we consider a stricter cut-off for poor emotional health, which includes only children who have very high emotional problems. From Panels B to D, we define poor emotional health using only the parent-, child-, or teacher-completed SDQ, respectively. For each we find evidence of income disparities in prompt access to mental healthcare, particularly from clinical psychologists.

In column (5) of Table 3, we additionally examine whether there are income inequities in accessing psychiatrist services. While the pathway to psychiatrist services may differ from that of psychologist services, and use of psychiatrists is far less common in our sample (0.7% see a psychiatrist), we find that income disparities continue to emerge. When children experience poor emotional health, they are 2.0 percentage points less likely to see a psychiatrist within three months if they are from a low-income household compared to a high-income household ($p < 0.01$). Overall, these findings suggest that children who are experiencing poor emotional health are less likely to receive treatment from psychologists and psychiatrists if they are from a low-income household.

5.4 The role of costs in explaining the income inequities for psychologist services

A key possible explanation for the observed income inequities in accessing clinical psychologists, but not general psychologists, is a difference in out-of-pocket costs. There are some psychology practices which offer free or low-cost counselling services.¹² These are more commonly (but not exclusively) for low income individuals or other vulnerable populations (e.g. where trauma or abuse is present or refugees or other marginalised populations). In this section, we explore income differences in zero-fee services, which is known as “bulk-billing”, and out-of-pocket costs.¹³

In Table 4 we present estimates of the income inequities in the probability of accessing a zero-fee for the initial psychologist service, among children who access at least one psychologist service following a MHTP. We focus on the initial service, which attracts a higher Medicare reimbursement rate than subsequent services, to control for potential differences in the number of services a child may use and hence the fees they are charged. The probability that a child receives a zero-fee initial service is higher for general (36%) than for clinical (27%) psychologists. Column (1) shows that children from low-income households are significantly more likely to receive a zero-fee service from a general psychologist compared with their high-income counterparts, while for clinical psychologists (column 2), there is no significant advantage for low-income households in obtaining a zero-fee initial consultation.

In columns (3) and (4), we explore whether there are income inequities in the out-of-pocket costs paid for the initial service using Poisson regressions. Here we include all children, including those that paid zero costs, and find that children from low-income households pay considerably less out-of-pocket fees (about 66% less) for their first visit to a general psychologist, compared to high-income households.

¹²For example, a list of free or low cost providers in the city of Melbourne can be found here: <https://www.innermelbpsychology.com.au/low-cost-counselling-services-in-melbourne/>.

¹³If psychologists choose to bulk-bill, they receive only the Medicare reimbursement fee and the patient pays nothing.

Middle-income children also pay less (by about 33%). For clinical psychologists, we also see that children from low- and middle-income households pay less than high-income households for their first visit (about 25% and 15% less respectively), however, the estimates are smaller in magnitude and not statistically significant.

What could explain this pattern of results? One explanation is that general psychologists more often price discriminate than clinical psychologists by giving discounts to low-income families;¹⁴ possibly because of the greater competition in the general psychology healthcare market (there are four times more general than clinical psychologists). Another explanation is that there is greater heterogeneity among general psychologists (or general psychology clinics), with different ‘types’ charging different fees and offering different service quality. For example, a ‘no-frills’ type may charge lower fees and provide a lower quality service (e.g. longer waiting times, shorter appointments, and less comfortable waiting and treatment rooms), while a ‘premium’ type may charge higher fees and provide a higher quality service. Low income families may more often select the lower fee, lower quality provider than high income families. Regardless of the explanation, the significant income gradient in out-of-pocket costs among general psychologists suggest a possible explanation for the results in Tables 1-3.

5.5 Heterogeneity by gender and area of residence

In this section we explore whether the income inequities observed in the main analysis differ by gender or residential area. The out-of-pocket costs for psychological services are unlikely to vary by gender, however, gender differences may arise if parents from low-income households have a different willingness-to-pay for mental healthcare services for girls or boys. Girls are more prone to anxiety and depression than boys (e.g. McLean and Anderson, 2009), and mental health support may be more normalised or perceived as more necessary for girls compared to boys (Clement et al., 2015). When household budgets are constrained, this may mean that parents make different healthcare choices by the child’s gender.

We also examine heterogeneity by residential area because the costs of accessing mental health services vary geographically. There is a higher concentration of mental health specialists in metropolitan areas, and both travel distances and travel costs are generally lower compared with those in rural and remote areas. Therefore, we may expect to see greater income inequities in non-metropolitan areas.

In Table 5, we present the coefficient estimates for household income, in logarithmic form, using both between-child (Panel A) and within-child (Panel B) models, separately by gender and residential area. For brevity, we show results only for services provided by any psychologist, while those for general and clinical psychologists are presented in Appendix Table A.5. For the estimates by gender in columns (1) and (2), we do not find significant gender differences in the income inequity under either approach ($p=0.646$ and $p=0.369$). In columns (3) and (4), there is a larger income effect for metropolitan areas than non-metropolitan areas in Panel A ($p=0.064$), but not in Panel B. Moreover, when we examine differences by psychologist type in Appendix Table A.5, we find no significant differences in gender or residential area for either general or clinical psychologists. Overall, the results from the heterogeneity analyses provide little evidence of differential income effects by gender or remoteness.

5.6 Other sources of mental healthcare

A strength of our data is that it captures all mental health prescriptions and all mental health services that are subsidised by Medicare. However, it is possible that children receive mental health support from other sources that do not rely on parents as gatekeepers or household income, such as school teachers or phone help line services. In this section we explore the role of household income in using alternative

¹⁴Families can ‘signal’ their low income status to healthcare providers through a Low Income Health Care Card, a Government-issued concession card that provides discounted medications and other benefits.

forms of mental health support, based on self-reported information from the LSAC children. From Wave 6 onwards, the children are asked, “Have you sought help for personal or emotional problems from any of these in the last 12 months?”, and are provided with a list of sources of support. This analysis is exploratory because it relies on young adolescents being able to accurately recall their use of support services in the last year (Kjellsson et al., 2014).

In Appendix Table A.6, using pooled ordinary least squares regressions, we examine whether income is associated with the likelihood that children seek help from other sources, controlling for all covariates included in the main model (Equation 1), in addition to measures of poor overall health and the score from each of the SDQ problem scales (reported by the child and by the parent). We find that teachers are the most common source of support (7.6%), but higher income children are not any more or less likely to seek support from teachers. Indeed, we find no evidence that income is associated with the probability of seeking support for emotional problems from other sources, including a guidance counsellor, other school staff, other adults, or someone else. However, having a higher household income is positively associated with receiving support from phone helplines and the internet, which may relate to having greater access to the internet or a phone. In general, these results suggest that while there may be inequities in accessing psychologist services and treatment medication, such inequities do not appear to exist for most free or informal services outside of the medical system.

6 Conclusion

Drawing on linked data from the Longitudinal Study of Australian Children (LSAC) and administrative healthcare records, this paper examines whether income disparities exist in accessing prompt mental healthcare among children and adolescents with poor mental health. Employing two complementary approaches to measure and control for mental health needs, we consistently find that children from low-income families are significantly less likely to access a psychologist within three months compared to their counterparts from high-income families. This income-related disparity is driven solely by clinical psychologists, is centred on the initial consultation, and persists even when we extend the observation window to 18 months. We find little evidence that the income barriers to mental healthcare exhibit differential effects across gender or residential locations. We also observe that low-income children have reduced access to psychiatrists among children experiencing poor emotional health.

Importantly, we also show that less expensive mental health treatments are not impacted by income. We find no evidence of income inequities in receiving a GP mental health diagnosis and treatment plan and accessing general psychologist services, highlighting the predominant role of the GP and the general psychologists in the treatment of children with mental health needs from low-income families. We also show that there are no income inequities in accessing pharmaceutical treatments.

Out-of-pocket costs likely act as a significant barrier to clinical psychologists for low-income families. While general psychologists tend to price discriminate by income, providing more free or discounted initial consultations to low income households, clinical psychologists do not. This is despite clinical psychologists earning a greater government subsidy for each therapeutic service than general psychologists.

It is also possible that part of the reduced usage of clinical psychologists among low-income families may be due to GPs more frequently referring families from lower incomes to general psychologists (instead of clinical psychologists) because of the known difference in total treatment costs and the greater availability and thus reduced travel costs of general psychologists.

If the higher private price of clinical psychologists is a marker of quality of care, then the income inequities in access that we see are likely to exacerbate socioeconomic inequities in the mental health and human capital development of children. In theory, clinical psychologists have undergone additional

specialised training, which may increase quality on some dimensions, and they receive a higher reimbursement rate from Medicare for each service provided, which could go towards quality-enhancing investments, such as further training and improved facilities/consulting rooms. However, there is currently no evidence on the quality of services by type of psychologist in terms of improvements in outcomes, and measuring this would be a valuable contribution of future research.

It is important to note certain limitations in our study. Firstly, the data used in this research is prior to the COVID-19 pandemic. Anecdotal evidence has pointed towards an increase in out-of-pocket costs post-COVID-19 as well as an increase in psychological distress among young people, potentially exacerbating the observed income inequities in child mental healthcare utilisation. Additionally, we are unable to uncover other possible mechanisms beyond out-of-pocket costs, such as provider discrimination, income differences in parental ability to secure an appointment, or the barriers of travel costs.

Mental health is a vital aspect of a child's overall well-being, and timely access to appropriate services can have a profound impact on their development. Addressing income inequities in child mental healthcare use is important for ensuring that all children in need are able to receive prompt treatment. Our findings are likely to be relevant for many countries with universal public health systems, and suggest that disadvantaged children and adolescents with poor mental health will continue to have poorer access to more specialised psychological treatment unless specific support is provided to overcome income barriers.

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Figures

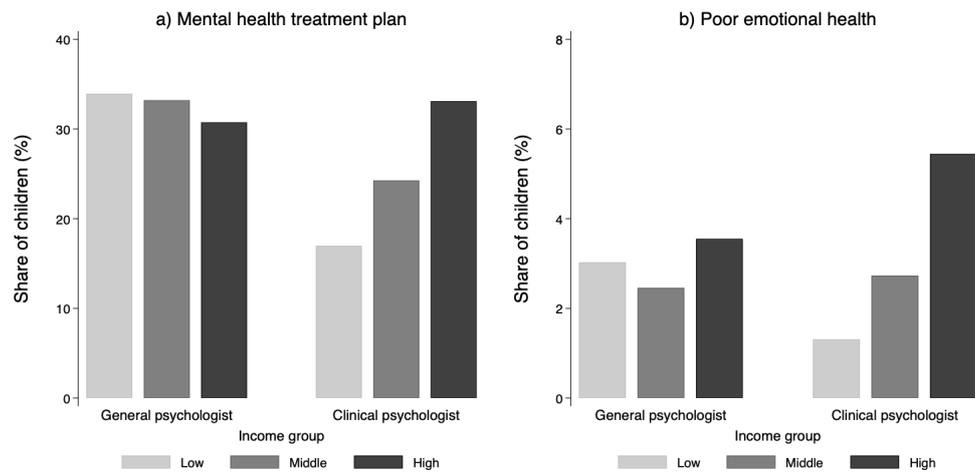


Figure 1: Psychologist use, conditional on mental health needs by household income

Notes: Data is sourced from LSAC. Figure shows the proportion of children who visited a psychologist within 3 months of a) receiving their first mental health treatment plan (MHTP), or b) the survey date when the child experienced poor emotional health (defined as a score of high or very high problems on the emotional scale of the SDQ, from either parent or child assessments). Income groups are based on equivalised household income measured as the average over the last 5 years (or 3 surveys) from when children a) received a mental health treatment plan (MHTP), or b) experienced poor emotional health.

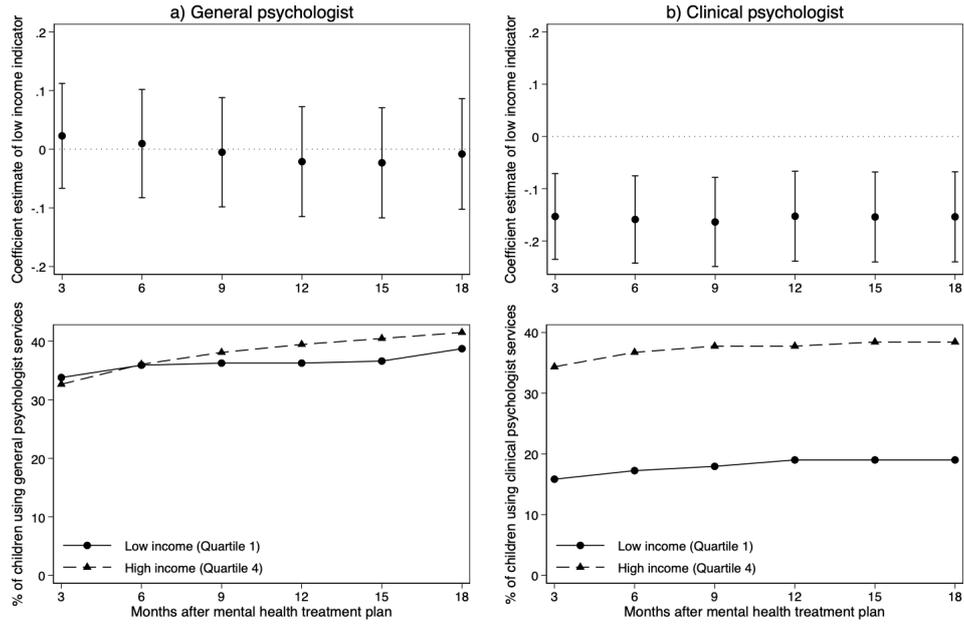


Figure 2: Psychologist services utilisation from 3-18 months following initial MHTP

Notes: Estimates from between-child analysis on sample of children who have an initial GP mental health treatment plan (MHTP). The upper panel shows the coefficient estimate (and the 95% confidence interval) for the low-income indicator (from Equation 1 regressions), for the probability of seeing a (a) general psychologist, or (b) clinical psychologist within ‘X’ months of receiving the MHTP, where ‘X’ is varied in 3-month intervals from 3 to 18 months. The lower panel figures show the calculated proportion of children seeing each type of psychologist within different treatment windows by low household income status. Models include all other control variables as indicated in Table 2 notes.

Tables

Table 1: Between-child analysis of income inequity in the probability of using psychologist services and medication

	(1)	(2)	(3)	(4)
	Any psychologist	General psychologist	Clinical psychologist	Medication alone
<i>Panel A: Log of income</i>				
Log of income	0.068** (0.028)	0.003 (0.027)	0.061** (0.025)	-0.000 (0.012)
<i>Panel B: Income group (Reference: High income)</i>				
Low income	-0.136*** (0.048)	0.025 (0.046)	-0.157*** (0.042)	0.001 (0.022)
Middle income	-0.040 (0.037)	0.030 (0.037)	-0.072** (0.036)	-0.011 (0.017)
Mean dependent var.	0.585	0.342	0.249	0.048
Observations	1,098	1,098	1,098	1,098

Notes: Robust standard errors in parentheses. Between-child analysis using the sample of children who have an initial GP mental health treatment plan (MHTP). Outcome is a binary indicator that equals one if the child saw (1) any psychologist, (2) a general psychologist, (3) a clinical psychologist, or (4) received prescription medication for anxiolytics or antidepressants without visiting a psychologist within three months of the MHTP. Other controls include parent education, single parents, non-English, SEIFA index, gender, number of siblings, mother employment status, and dummy indicators for missing covariates. All regressions include a set of dummies for child age, mother age, and SA3 local area. ***p<0.01, **p<0.05, *p<0.1.

Table 2: Between-child analysis of income inequity in the number of psychologist services used within 12 months (conditional on receiving treatment)

	(1)	(2)	(3)
	Any psychologist	General psychologist	Clinical psychologist
Panel A: Log of income			
Log of income	0.010 (0.049) [0.010]	0.005 (0.077) [0.005]	0.007 (0.060) [0.007]
Panel B: Income group (Reference: High income)			
Low income	-0.008 (0.087) [-0.008]	0.049 (0.126) [0.050]	-0.075 (0.112) [-0.072]
Middle income	-0.017 (0.062) [-0.017]	-0.016 (0.095) [-0.016]	0.006 (0.078) [0.006]
Mean dependent var.	5.226	4.887	5.580
Observations	717	432	319

Notes: Results of Poisson regressions using the sample of children who have an initial GP mental health treatment plan (MHTP) and at least one visit to the psychologist. Outcome is the number of visits within 12 months of receiving a MHTP the child used (1) any psychologist, (2) a general psychologist, or (3) a clinical psychologist. Robust standard errors in parentheses. Squared brackets show the transformed effects of income ($e^{\beta}-1$). Other controls include parent education, single parents, non-English, SEIFA index, gender, number of siblings, mother employment status, and dummy indicators for missing covariates. All regressions include a set of dummies for child age, mother age, and SA3 local area. ***p<0.01, **p<0.05, *p<0.1.

Table 3: Within-child analysis of income inequity in the probability of receiving mental health services

	(1)	(2)	(3)	(4)	(5)
	GP mental health plan	Any psychologist	General psychologist	Clinical psychologist	Psychiatrist
<i>Panel A: Log of income</i>					
Log of income	0.011 (0.013)	0.024 (0.015)	0.027** (0.011)	-0.003 (0.010)	-0.020** (0.008)
Emotional problem	0.011*** (0.004)	0.026*** (0.005)	0.009** (0.004)	0.018*** (0.004)	0.008*** (0.002)
Log of income*Emotional problem	0.010 (0.007)	0.034*** (0.009)	0.008 (0.006)	0.029*** (0.006)	0.011*** (0.004)
<i>Panel B: Income group (Reference: High income)</i>					
Low income	-0.007 (0.013)	0.043*** (0.016)	0.011 (0.013)	0.033*** (0.011)	0.021** (0.009)
Middle income	0.003 (0.008)	0.029** (0.012)	0.012 (0.009)	0.016** (0.008)	0.012** (0.006)
Emotional problem	0.016* (0.009)	0.059*** (0.013)	0.019** (0.009)	0.045*** (0.010)	0.018*** (0.006)
Low income*Emotional problem	-0.015 (0.012)	-0.062*** (0.015)	-0.013 (0.011)	-0.053*** (0.011)	-0.020*** (0.008)
Middle income*Emotional problem	-0.003 (0.011)	-0.035** (0.015)	-0.012 (0.010)	-0.027** (0.011)	-0.010 (0.008)
Mean dependent var.	0.024	0.035	0.018	0.017	0.007
Observations	7,821	7,821	7,821	7,821	7,821

Notes: Standard errors, clustered at the individual level, are in parentheses. Within-child analysis using the sample of children who have ever experienced poor emotional health (defined as a score of high or very high problems on the emotional scale of the SDQ, from either parent or child assessments). Outcome is a binary indicator that equals one if the child (1) received a GP mental health treatment plan (MHTP), (2) visited any psychologist, (3) visited a general psychologist, (4) visited a clinical psychologist, or (5) visit a psychiatrist within three months of the survey. Other controls include, single parents, SEIFA index, number of siblings, mother employment status, child overall poor health, emotional and behavioural difficulties (SDQ) reported by children and parents, and dummy indicators for missing covariates. All regressions include a set of dummies for wave, interview month, child age, mother age, and SA3 local area. ***p<0.01, **p<0.05, *p<0.1.

Table 4: Between-child analysis of income inequity in the probability of seeing a zero-fee psychologist and out-of-pocket cost (initial service)

	Zero-fee service		Out-of-pocket cost	
	General psychologist (1)	Clinical psychologist (2)	General psychologist (3)	Clinical psychologist (4)
<i>Panel A: Log of income</i>				
Log of income	-0.266*** (0.097)	-0.062 (0.090)	0.543*** (0.139) [0.721]	0.199* (0.106) [0.220]
<i>Panel B: Income group (Reference: High income)</i>				
Low income	0.422** (0.164)	0.117 (0.167)	-1.075*** (0.271) [-0.659]	-0.315 (0.270) [-0.257]
Middle income	0.131 (0.115)	0.047 (0.121)	-0.400*** (0.153) [-0.330]	-0.158 (0.161) [-0.146]
Mean dependent var.	0.359	0.269	49.389	50.375
Observations	343	264	343	264

Notes: Robust standard errors in parentheses. Between-child analysis using the sample of children who have an initial GP mental health treatment plan (MHTP). Columns (3) and (4) present results of Poisson regressions. Squared brackets show the transformed effects of income ($e^{\beta}-1$). Other controls include parent education, single parents, non-English, SEIFA index, gender, number of siblings, mother employment status, and dummy indicators for missing covariates. All regressions include a set of dummies for SA3 local area. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 5: Between-child analysis of income inequity in the probability of using psychologist services – heterogeneity by gender and residential area

	Any psychologist			
	Female (1)	Male (2)	Metro (3)	Non-metro (4)
<i>Panel A: Children with mental health treatment plan</i>				
Log of income	0.070 (0.056)	0.041 (0.065)	0.098** (0.043)	-0.015 (0.059)
Equality test (<i>p</i> -value)		0.646		0.064
Mean dependent var.	0.558	0.586	0.586	0.542
Observations	656	432	682	404
<i>Panel B: Children with poor emotional health</i>				
Log of income	0.023 (0.023)	0.022 (0.020)	0.025 (0.019)	0.008 (0.027)
Emotional problem	0.024*** (0.007)	0.027*** (0.009)	0.027*** (0.007)	0.025*** (0.008)
Log of income*Emotional problem	0.042*** (0.011)	0.025* (0.015)	0.033*** (0.011)	0.031** (0.015)
Equality test (<i>p</i> -value)		0.369		0.928
Mean dependent var.	0.036	0.032	0.039	0.028
Observations	4,859	2,962	4,711	3,096

Notes: Robust standard errors in parentheses. Between-child analysis using the sample of children who have an initial GP mental health treatment plan (MHTP), estimated separately by gender in columns (1) and (2) and by residential area in columns (3) and (4), where metropolitan is defined a living in a capital city and non-metropolitan is defined as outside of a capital city. The outcome is a binary indicator that equals one if the child saw any psychologist within three months of the MHTP. See Appendix Table A.5 for heterogeneity analyses for general and clinical psychologist. See notes for Table 2 for other control variables. ****p*<0.01, ***p*<0.05, **p*<0.1.

Appendix

A Additional figures and tables

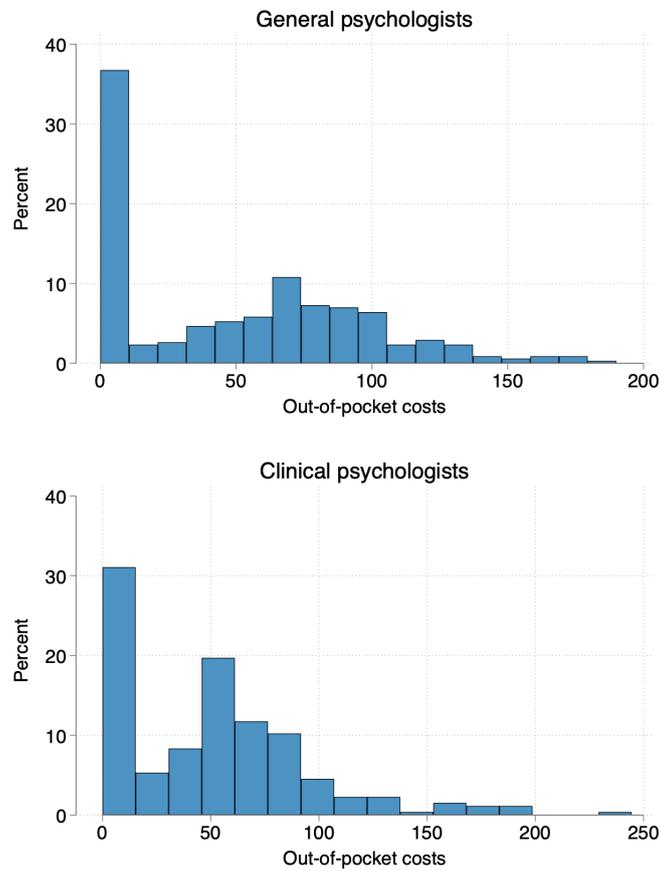


Figure A.1: Distribution of out-of-pocket costs, sample of children with mental health treatment plan (initial service)

Notes: Figure shows the distribution of out-of-pocket costs for the first psychologist service among children who received a mental health treatment plan from either (1) a general psychologist or (2) a clinical psychologist.

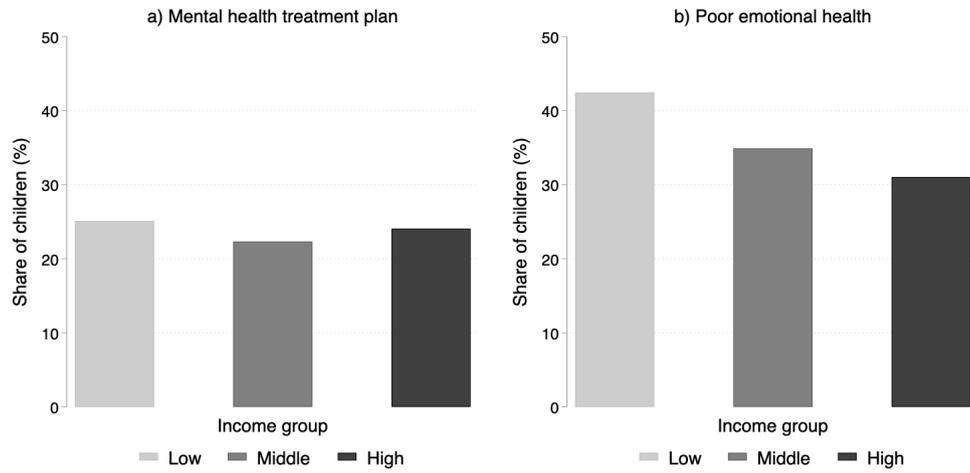


Figure A.2: Mental health needs by household income

Notes: Data is sourced from LSAC. Income groups are based on equivalised household income measured as the average over the last 5 years (3 surveys), when children were aged 10. Mental health treatment plan equals one if the child ever received a GP diagnosis and treatment plan between the ages of 10 and 17. Poor emotional health equals one if the child ever has a score of high or very high problems on the emotional scale of the SDQ, from either parent or child assessments in any wave between the ages of 10 and 17.

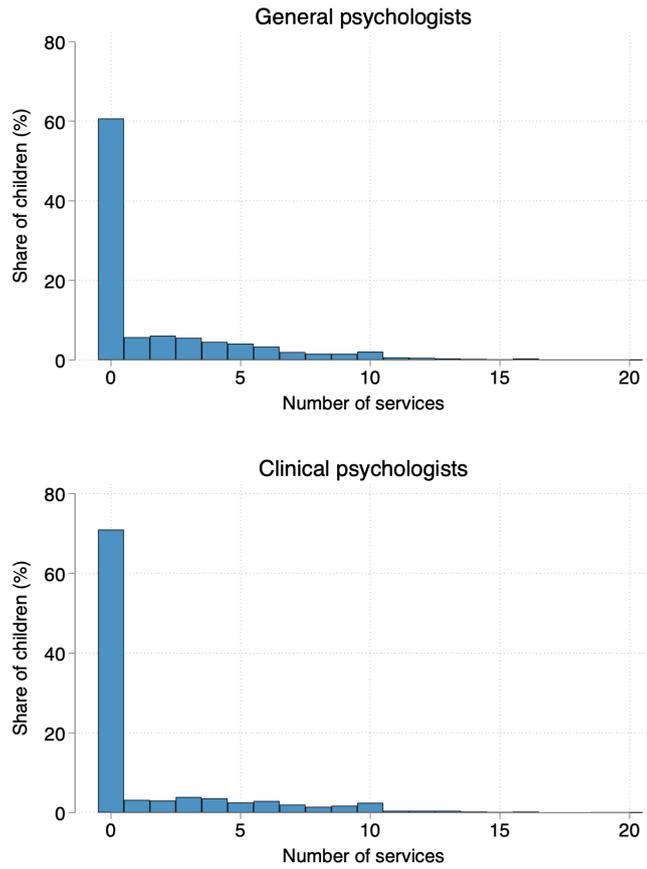


Figure A.3: Number of psychologist services used within 12 months

Notes: Figure shows the number of psychologist visits within 12 months of receiving a mental health treatment plan.

Table A.1: Descriptive statistics of all covariates

Variable	Description	Mean	
		Children with MHTP	Children with poor emotional health
Income			
Income	Average weekly household income over the past three years (equivalised, AU\$)	1,021.60	944.046
Low income	=1 if household income is in bottom income quartile	0.259	0.296
Middle income	=1 if household income is in 2 nd and 3 rd income quartiles	0.474	0.486
High income	=1 if household income is in 4 th income quartile	0.268	0.218
Mother education			
High school dropouts	=1 if mother has not finished school (in wave 1)	0.164	0.185
High school	=1 if mother has finished high school (in wave 1)	0.344	0.350
Certificate	=1 if mother has certificate degree (in wave 1)	0.347	0.310
University degree	=1 if mother has university degree (in wave 1)	0.145	0.154
Father education			
High school dropouts	=1 if father has not finished school (in wave 1)	0.145	0.161
High school	=1 if father has finished high school (in wave 1)	0.128	0.137
Certificate	=1 if father has certificate degree (in wave 1)	0.362	0.367
University degree	=1 if father has university degree (in wave 1)	0.332	0.300
Other characteristics			
Age	Age of study child	13.304	12.872
Gender	= 1 if male	0.392	0.379
Mother age	Age of mother	44.286	43.900
Non-English	= 1 if language spoken at home is not English	0.069	0.100
Single parent	= 1 if child lives with single parent	0.209	0.185
Number of siblings	Number of siblings	1.445	1.562
Mother employment	= 1 if mother is employed	0.452	0.430
SEIFA	Socio-Economic Indexes for Areas where household lives (standardised)	0.154	0.102
Child overall poor health	= 1 if reporting poor general health	0.041	0.041
SDQ - child reported			
Emotional problem (score)	Emotional problems scale (1-10)		4.213
Peer problem (score)	Peer problems scale (1-10)		2.073
Hyperactivity (score)	Hyperactivity scale (1-10)		4.109
Conduct problem (score)	Conduct problems scale (1-10)		1.900
Emotional problem (dummy)	=1 if reporting high/very high Emotional problems		0.345
Peer problem (dummy)	=1 if reporting high/very high Peer problems		0.055
Hyperactivity (dummy)	=1 if reporting high/very high Hyperactivity scale		0.174
Conduct problem (dummy)	=1 if reporting high/very high Conduct problems		0.089
SDQ - parent reported			
Emotional problem (score)	Emotional problems scale (1-10)		2.800
Peer problem (score)	Peer problems scale (1-10)		1.809
Hyperactivity (score)	Hyperactivity scale (1-10)		2.931
Conduct problem (score)	Conduct problems scale (1-10)		1.261
Emotional problem (dummy)	=1 if reporting high/very high Emotional problems		0.238
Peer problem (dummy)	=1 if reporting high/very high Peer problems		0.171
Hyperactivity (dummy)	=1 if reporting high/very high Hyperactivity scale		0.042
Conduct problem (dummy)	=1 if reporting high/very high Conduct problems		0.087
Number of children		1,098	2,477
Number of observations		1,098	7,821

Notes: Column (1) is based on the sample of children receiving a mental health treatment plan MHTP, while column (2) is based on the sample of children who have ever experienced poor emotional health (defined as a score of high or very high problems on the emotional scale of the SDQ, from either parent or child assessments).

Table A.2: Between-child analysis of income inequity in the probability of using mental health treatment – covariate estimates

	(1)	(2)	(3)	(4)
	Any psychologist	General psychologist	Clinical psychologist	Medication alone
Log of income	0.068** (0.028)	0.003 (0.027)	0.061** (0.025)	-0.000 (0.012)
<i>Mother education (Ref: High school dropouts)</i>				
High school	0.092 (0.113)	-0.035 (0.116)	0.126* (0.074)	0.003 (0.046)
Certificate	0.115 (0.139)	-0.086 (0.134)	0.200* (0.109)	0.052 (0.063)
University degree	-0.245 (0.150)	-0.321** (0.135)	0.078 (0.114)	0.141 (0.092)
<i>Father education (Ref: High school dropouts)</i>				
High school	0.222 (0.144)	0.129 (0.128)	0.097 (0.115)	-0.133 (0.083)
Certificate	-0.084 (0.099)	-0.142 (0.095)	0.061 (0.069)	0.004 (0.045)
University degree	-0.060 (0.115)	-0.105 (0.112)	0.054 (0.102)	-0.045 (0.047)
Single parent	0.010 (0.039)	-0.074* (0.039)	0.082** (0.035)	0.008 (0.018)
Mother employment	0.016 (0.032)	0.091*** (0.031)	-0.079*** (0.027)	-0.011 (0.013)
Non-English	-0.047 (0.061)	-0.085 (0.055)	0.047 (0.055)	-0.035** (0.016)
SEIFA	0.061 (0.044)	0.062 (0.042)	0.003 (0.040)	-0.040* (0.021)
Number of siblings	0.012 (0.017)	0.039** (0.016)	-0.029** (0.014)	-0.003 (0.009)
Gender (male = 1)	0.000 (0.031)	-0.012 (0.030)	0.005 (0.027)	0.008 (0.014)
Mean dependent var.	0.585	0.342	0.249	0.048
Observations	1,098	1,098	1,098	1,098

Notes: Robust standard errors in parentheses. Between-child analysis using the sample of children who have an initial GP mental health treatment plan (MHTP). Outcome is a binary indicator that equals one if the child saw (1) any psychologist, (2) a general psychologist, (3) a clinical psychologist, or (4) received prescription medication for anxiolytics or antidepressants without visiting a psychologist within three months of the MHTP. All regressions include a set of dummies for child age, mother age, and SA3 local area. ***p<0.01, **p<0.05, *p<0.1.

Table A.3: Between-child analysis of income inequity in the number of psychologist services used within 12 months

	(1)	(2)	(3)
	Any psychologist	General psychologist	Clinical psychologist
Panel A: Log of income			
Log of income	0.135** (0.062) [0.144]	0.050 (0.101) [0.051]	0.203* (0.107) [0.225]
Panel B: Income group (Reference: High income)			
Low income	-0.287** (0.112) [-0.249]	0.017 (0.167) [0.017]	-0.650*** (0.203) [-0.478]
Middle income	-0.084 (0.078) [-0.081]	0.059 (0.128) [0.061]	-0.178 (0.141) [-0.163]
Mean dependent var.	3.412	1.923	1.621
Observations	1,098	1,098	1,098

Notes: Results of Poisson regressions using the sample of children who have an initial GP mental health treatment plan (MHTP). Outcome is the number of visits within 12 months of receiving a MHTP the child used (1) any psychologist, (2) a general psychologist, or (3) a clinical psychologist. Robust standard errors in parentheses. Squared brackets show the transformed effects of income ($e^{\beta}-1$). Other controls include parent education, single parents, non-English, SEIFA index, gender, number of siblings, mother employment status, and dummy indicators for missing covariates. All regressions include a set of dummies for child age, mother age, and SA3 local area. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.4: Within-child analysis of income inequity in the probability of using psychologist services - alternative measures of poor emotional health

	(1)	(2)	(3)	(4)
	GP mental health plan	Any psychologist	General psychologist	Clinical psychologist
Panel A: Mental health needs = very high emotional problem reported by either parent or children				
Log of income	0.021 (0.020)	0.047** (0.023)	0.043** (0.017)	0.004 (0.016)
Emotional problem	0.015** (0.007)	0.037*** (0.009)	0.016** (0.007)	0.024*** (0.006)
Log of income*Emotional problem	0.002 (0.010)	0.024* (0.013)	0.000 (0.010)	0.029*** (0.009)
Observations	4,431	4,431	4,431	4,431
Panel B: Mental health needs = high/very high emotional problem reported by parent				
Log of income	0.012 (0.023)	0.033 (0.027)	0.053** (0.021)	-0.019 (0.019)
Emotional problem	0.020*** (0.007)	0.050*** (0.009)	0.017** (0.007)	0.035*** (0.007)
Log of income*Emotional problem	0.013 (0.011)	0.051*** (0.015)	0.005 (0.011)	0.051*** (0.011)
Observations	3,991	3,991	3,991	3,991
Panel C: Mental health needs = high/very high emotional problem reported by children				
Log of income	0.023 (0.015)	0.037** (0.017)	0.025* (0.014)	0.011 (0.011)
Emotional problem	0.007 (0.005)	0.023*** (0.006)	0.012** (0.005)	0.011*** (0.004)
Log of income*Emotional problem	0.013 (0.008)	0.031*** (0.010)	0.008 (0.008)	0.025*** (0.007)
Observations	5,991	5,991	5,991	5,991
Panel D Mental health needs = high/very high emotional problem reported by teachers				
Log of income	-0.018 (0.027)	-0.046 (0.032)	-0.017 (0.024)	-0.026 (0.021)
Emotional problem	0.021** (0.010)	0.022* (0.012)	0.010 (0.008)	0.012 (0.009)
Log of income*Emotional problem	0.019 (0.016)	0.031* (0.018)	0.006 (0.012)	0.025* (0.014)
Observations	1,916	1,916	1,916	1,916

Notes: Standard errors, clustered at the individual level, are in parentheses. Within-child analysis using the sample of children who have ever experienced poor emotional health (defined as a score of high problems on the emotional scale of the SDQ, from either parent or child assessments). Outcome is a binary indicator that equals one if the child (1) received a GP mental health treatment plan (MHTP), (2) visited any psychologist, (3) visited a general psychologist, or (4) visited a clinical psychologist within three months of the survey. See notes of Table 3 for other covariates. ***p<0.01, **p<0.05, *p<0.1.

Table A.5: Heterogeneity analysis – General psychologist and clinical psychologist

a) General psychologist

	General psychologist			
	Female (1)	Male (2)	Metro (3)	Non-metro (4)
Panel A: Children with mental health treatment plan				
Log of income	0.020 (0.052)	0.010 (0.066)	0.063 (0.044)	-0.094 (0.058)
Equality test (p -value)		0.880		0.010
Mean dependent var.	0.326	0.329	0.317	0.346
Observations	656	432	682	404
Panel B: Children with poor emotional health				
Log of income	0.025 (0.017)	0.028* (0.014)	0.023* (0.013)	0.017 (0.021)
Emotional problem	0.012** (0.005)	0.008 (0.007)	0.010* (0.005)	0.009 (0.006)
Log of income*Emotional problem	0.014* (0.008)	0.001 (0.011)	0.008 (0.008)	0.007 (0.011)
Equality test (p -value)		0.342		0.933
Mean dependent var.	0.019	0.016	0.020	0.016
Observations	4,854	2,962	4,716	3,097

b) Clinical psychologist

	Clinical psychologist			
	Female (1)	Male (2)	Metro (3)	Non-metro (4)
Panel A: Children with mental health treatment plan				
Log of income	0.044 (0.049)	0.034 (0.061)	0.026 (0.037)	0.075 (0.053)
Equality test (p -value)		0.861		0.358
Mean dependent var.	0.241	0.259	0.276	0.203
Observations	656	432	682	404
Panel B: Children with poor emotional health				
Log of income	-0.002 (0.016)	-0.003 (0.015)	0.003 (0.014)	-0.009 (0.016)
Emotional problem	0.013*** (0.005)	0.023*** (0.006)	0.019*** (0.005)	0.018*** (0.006)
Log of income*Emotional problem	0.029*** (0.008)	0.031*** (0.011)	0.027*** (0.008)	0.029** (0.012)
Equality test (p -value)		0.863		0.894
Mean dependent var.	0.017	0.017	0.020	0.130
Observations	4,859	2,962	4,711	3,096

Notes: Robust standard errors in parentheses. Between-child analysis using the sample of children who have an initial GP mental health treatment plan (MHTP), estimated separately by gender in columns (1) and (2) and by residential area in columns (3) and (4), where metropolitan is defined as living in a capital city and non-metropolitan is defined as outside of a capital city. The outcome is a binary indicator that equals one if the child saw any psychologist within three months of the MHTP. See notes for Table 1 for other control variables. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.6: Child-reported use of mental health support

	Sought help for personal or emotional problems from:						
	Teacher (1)	Guidance counsellor (2)	Other school staff (3)	Other adult (4)	Someone else (5)	Phone help line (6)	Internet (7)
Log of income	0.005 (0.007)	0.005 (0.007)	-0.006 (0.006)	0.000 (0.005)	0.000 (0.002)	0.006** (0.003)	0.016** (0.007)
Mean dependent var.	0.076	0.028	0.041	0.030	0.004	0.008	0.053
Observations	7,821	7,821	7,821	7,821	7,821	7,821	7,821

Notes: Standard errors are clustered at the individual level. Between-child analysis on children in LSAC waves 6 to 8. Other controls include parent education, single parents, non-English, SEIFA index, gender, number of siblings, mother employment status, child overall poor health, emotional and behavioural difficulties (SDQ) reported by children and parents, and dummy indicators for missing covariates. All regressions include a set of dummies for wave, interview month, child age, mother age, and SA3 local area. ***p<0.01, **p<0.05, *p<0.1.

B Medicines list

The anatomical therapeutic chemical (ATC) classification and name of the prescription medicines included under antidepressants or anxiolytics in the analysis in Table 1 are listed in Table B.1.

Table B.1: List of included medicines

ATC code	Drug name	Frequency
N05BA01	Diazepam	5
N05BA04	Oxazepam	1
N05BA12	Alprazolam	1
N05CD02	Nitrazepam	0
N05CD07	Temazepam	3
N06AA02	Imipramine	1
N06AA04	Clomipramine	0
N06AA09	Amitriptyline	0
N06AA12	Doxepin	0
N06AB03	Fluoxetine	15
N06AB04	Citalopram	2
N06AB05	Paroxetine	0
N06AB06	Sertraline	13
N06AB08	Fluvoxamine	3
N06AB10	Escitalopram	7
N06AG02	Moclobemide	0
N06AX03	Mianserin	0
N06AX11	Mirtazapine	2
N06AX16	Venlafaxine	1
N06AX18	Reboxetine	0
N06AX21	Duloxetine	1
N06AX23	Desvenlafaxine	2
N06AX	Other	9