

A needs-based workforce model to deliver tertiary-level community mental health care for distressed infants, children, and adolescents in South Australia: a mixed-methods study



Leonie Segal, Sophie Guy, Matthew Leach, Aaron Groves, Catherine Turnbull, Gareth Furber



Summary

Background High-quality mental health services for infants, children, adolescents, and their families can improve outcomes for children exposed to early trauma. We sought to estimate the workforce needed to deliver tertiary-level community mental health care to all infants, children, adolescents, and their families in need using a generalisable model, applied to South Australia (SA).

Methods Workforce estimates were determined using a workforce planning model. Clinical need was established using data from the Longitudinal Study of Australian Children and the Young Minds Matter survey. Care requirements were derived by workshopping clinical pathways with multiprofessional panels, testing derived estimates through an online survey of clinicians.

Findings Prevalence of tertiary-level need, defined by severity and exposure to childhood adversities, was estimated at 5–8% across infancy and childhood, and 16% in mid-adolescence. The derived care pathway entailed reception, triage, and follow-up (mean 3 h per patient), core clinical management (mean 27 h per patient per year), psychiatric oversight (mean 4 h per patient per year), specialised clinical role (mean 12 h per patient per year), and socioeconomic support (mean 12 h per patient per year). The modelled clinical full-time equivalent was 947 people and budget was AU\$126 million, more than five times the current service level.

Interpretation Our novel needs-based workforce model produced actionable estimates of the community workforce needed to address tertiary-level mental health needs in infants, children, adolescents, and their families in SA. A considerable expansion in the skilled workforce is needed to support young people facing current distress and associated family-based adversities. Because mental illness is implicated in so many burgeoning social ills, addressing this shortfall could have wide-ranging benefits.

Funding National Health and Medical Research Council (Australia), Department of Health SA.

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Introduction

The global burden of mental illness is considerable and growing. It was the leading cause of years lost to disability in 2010 (estimated cost US\$2.5 trillion)^{1,2} and is projected to increase to US\$6.0 trillion by 2030.³ This burden reflects a combination of high prevalence, high severity, extensiveness of negative effects, and failure to fund preventive services.⁴

In Australia, 45% of people aged 16–85 years are estimated to have had a mental disorder in their lifetime,⁵ and 17.5% report a current mental or behavioural condition (2014–15).⁶ The burden on children, adolescents, and youth is a particular concern.⁷ The prevalence of most mental disorders peaks at age 16–24 years,⁵ but typically with antecedents in childhood.^{8,9} One in seven Australian children and adolescents (aged 4–17 years) have a current mental disorder.¹⁰ High rates of mental and emotional problems are also seen in infants,^{11–14} and one in five women have postnatal depression before the child's second birthday,¹⁵ exposing early family life to a high burden of mental illness.

The results of psychological distress and mental illness in infants, children, and adolescents are considerable and include poor mental health into adulthood,¹⁶ low school engagement and performance, high welfare dependency and involvement with the child protection system, criminal activity, insecure housing, drug and alcohol dependency, and premature death.^{17,18} Failure to address early mental illness effectively could have implications across multiple sectors.

A mental health service able to respond effectively to the mental health needs of infants, children, and adolescents is vital, but there is reason to believe that infant, child, and adolescent mental health services are struggling to meet population needs.^{19,20} Needs-based workforce modelling can be used to establish the workforce and budget required to meet need, but as far as we are aware, there are no reported studies applying these methods to child and adolescent mental health. In the 1990s, Faulkner and Goldman reported on workforce modelling for psychiatrists²¹ but simply modelled plausible scenarios,

Lancet Public Health 2018; 3: e296–303

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Health Economics and Social Policy Group (Prof L Segal PhD) and Department of Rural Health (M Leach PhD), University of South Australia, Adelaide, SA, Australia; Emerging Minds, Adelaide, SA, Australia (S Guy PhD); Office of the Chief Psychiatrist, Tasmanian Department of Health and Human Services, Hobart, TAS, Australia (A Groves MBBS); Allied and Scientific Health Office, SA Health, Adelaide, SA, Australia (C Turnbull MPH); and Health Counselling and Disability Services, Flinders University, Adelaide, SA, Australia (G Furber PhD)

Correspondence to: Prof Leonie Segal, Health Economics and Social Policy Group, Centre for Population Health Research, University of South Australia, Adelaide, SA 5000, Australia
leonie.segal@unisa.edu.au

Research in context

Evidence before this study

We searched websites of key agencies and authors entailed in workforce planning and did generic database searches (including Scopus and Google Scholar), using pertinent keywords including “child and adolescent mental health workforce”. Searches were updated on a regular basis. We were unable to identify any published needs-based workforce studies of child and adolescent mental health that have sought to estimate the size and nature of the service gap.

Added value of this study

As far as we know, this is the first study to estimate the community clinical workforce needed to address high-level mental health needs of infants, children, adolescents, and their families. The research includes patient complexity, ensuring the diversity in patient presentations is incorporated explicitly. Moreover, it draws on high-quality survey data, extensive

clinician consultations, and document review to estimate the level of need. Finally, the research integrates required clinician time—by broad role—to meet the identified need. The model was applied to the Australian state of South Australia (SA), but is readily transferable to other jurisdictions or regions using simple population multiplicands, or inputting regional prevalence data.

Implications of all the available evidence

A considerable expansion in the health workforce and an increase in funding is needed urgently to meet the sometimes severe mental health needs of infants, children, adolescents, and their families in SA. Other jurisdictions might also need to take these steps in view of the low priority typically given to addressing the mental health of infants and children, even though psychological wellbeing and sound developmental progress during childhood is vital to current and future health and social and economic outcomes.

generating widely divergent workforce estimates. Andrews and colleagues applied a needs-based model to adult mental health²² but assumed a simple diagnostic presentation, ignoring complexity and comorbidity.

The aim of our research was to estimate the workforce needed to deliver tertiary-level community mental health care for infants, children, adolescents, and their families using a generalisable model, which we applied to the state of South Australia (SA).⁴

Methods

Study design

Our study builds on Segal’s needs-based health workforce planning model.^{23,24} The model takes a geographic region as the planning frame and combines knowledge about the health status of the population with best practice care to estimate the skill sets and competencies required to address need. Competencies are then mapped to occupations to estimate the workforce requirement, which is compared with the current workforce to inform workforce reforms. The approach has several advantages. First, it is informed by prevalence estimates, in this case the mental health of infants, children, adolescents, and their families, contrasting with historic ratios of clinicians to population that entrench imbalances. Second, results are scalable, transferable, and modifiable. The model can be used to estimate the required workforce for any region, by inputting local health status characteristics and potentially adjusting other model parameters. Moreover, the model allows for a range of evidence sources to be incorporated, on community health status, workforce studies of competencies,²⁵ practice standards,²⁶ models of care,²⁷ and benchmarking.²⁸ The stages of Segal’s needs-based workforce planning model have been organised into a set of core questions, listed in panel 1.

Tasks in applying the model to infant, child, and adolescent mental health are shown in figure 1.

The study planning region was informed by jurisdictional responsibility for the delivery of community mental health services. We chose the target age range for our study based on the traditional age range for Child and Adolescent Mental Health Services (CAMHS) in the UK and Australia of 0–17 years (<18 years), including mothers in the perinatal period. Further, this age range aligned with the importance of a family-based approach, involving multidisciplinary team care, informed by a developmental origins perspective, which provided the underpinning framing for this study.

We obtained ethics approval for the study from the University of South Australia (reference HREC/17/WCHN/35, HREC protocol 0034132). The needs analysis was drawn from two longitudinal surveys that had their own governance structures and processes for release of data, which were met. We also obtained formal written approval from SA CAMHS to access employment and budget data and conduct focus groups with staff.

Procedures

We gathered data from several sources. We obtained population data for the study region from the SA Department of Planning, Transport and Infrastructure.²⁹ We derived current (2016) workforce and budgetary data for child and adolescent community mental health services from SA CAMHS.

We reviewed relevant clinical and policy documents to inform best practice care, including the 2016 Model of Care,²⁷ infant, child, and adolescent mental health workforce competency documents for Australia, New Zealand, the UK, and the USA,^{25,26} and best practice guidelines and literature reviews covering a range of clinical diagnoses and mental health programmes for

our target population. We obtained labour costs from the most recent enterprise bargaining agreements between the SA Department of Health and allied health, nursing, and medical professionals, applicable on June 30, 2017.^{30,31}

We interviewed workers in the infant, child, and adolescent mental health sector to better understand the types of clinical presentations. We undertook three focus groups comprising 14 professionals in total, focused on the age groups infant to 12 years, 13–18 years, and 18–25 years. Participants in the focus groups covered professions of psychology, nursing, social work, counselling, and teaching and were from the government, private, and non-government sectors. We recruited participants to the focus groups by email to SA CAMHS employees and via an online forum of mental health professionals (the Psychology and Health Forum). We made an audio recording of the focus groups and summarised the content of discussion that occurred during the focus group.

We organised three further focus groups (29 participants) with SA CAMHS community teams (two metropolitan and one rural). We invited participants to share deidentified current cases and discuss how management would change if there were no budget, procedural, or competency barriers. This scenario allowed participants to explore ideas of best or ideal practice with specific cases in mind. We recorded, transcribed, and summarised each focus group to extract common themes regarding best practice. We also held meetings with clinicians working in a specialist inpatient perinatal mental health service (mother and baby unit; one psychiatrist and two nurses) and a specialist community and inpatient service for adolescents and youth (two psychiatrists, one community worker, and one data analyst).

We established two expert advisory groups to provide feedback and test findings across the project. First, the Project Advisory and Chief Investigator group comprised three senior psychiatrists (including the Chief Psychiatrist for SA), a paediatric social worker (Chief Allied and Scientific Health Officer for SA), a mental health nurse, health workforce expert, and senior SA CAMHS policy officer. Second, we consulted with an expert clinical advisory group covering the professions of psychiatry, psychology, occupational therapy, speech pathology, social work, and mental health nursing with respect to the patient's journey in terms of clinical pathways and roles.

We used the Longitudinal Study of Australian Children (LSAC) and the Young Minds Matter (YMM) survey¹⁰ to estimate population prevalence of psychological distress and childhood exposure to adversities. LSAC is an Australia-wide longitudinal study of 10640 participants enrolled from infancy (aged 3–19 months) or early childhood (aged 4–5 years) that includes questions on child development, wellbeing, and family circumstances. We drew from six waves of data to age 14–15 years, comprising the original survey (first wave) plus five further surveys conducted every 2 years (waves two to six), combining data for children at each age group. YMM is an

Panel 1: Core questions of the needs-based workforce model^{23,24}

- 1 What area or region represents the planning frame for study?
- 2 How is the target population defined?
- 3 How many of the target population live in the study region?
- 4 What broad roles, skill sets, and competencies are required by clinicians to deliver appropriate care?
- 5 How many hours by broad role are needed per patient per year on average, and how does this translate into total full-time equivalent (FTE) staff for the case study region?
- 6 What is the cost of providing the modelled care to meet all identified need?
- 7 How does the estimated workforce and budget compare with current supply and what are the service delivery implications?

For the Psychology and Health Forum see <http://phf.net.au>

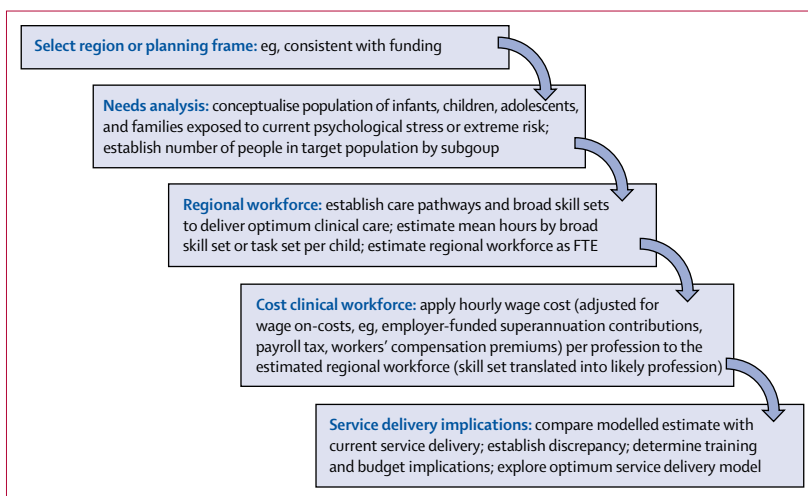


Figure 1: Application of needs-based workforce model to infant, child, and adolescent mental health FTE=full-time equivalent.

Australian child and adolescent mental health survey undertaken in 2013–14 of 6310 families with children aged from 4 years or older to younger than 18 years.¹⁰ It included a face-to-face diagnostic interview with parents or carers and a self-report survey of a subsample of 2967 adolescents aged 11–17 years covering mental health problems, service use, risky behaviours, and adversities. LSAC and YMM were designed to be representative of the Australian population. We used published population weights that convert sample prevalence to population prevalence in all our analyses.

We used data from LSAC (for children aged 0–15 years) and YMM (for youth aged 16–17 years) to estimate the number of people in our target population in SA. We based cutoffs for psychological distress or dysfunction on diagnostic interview or psycho-logical screening methods (panel 2).

We developed lists of adversities by cross-referencing known infant, childhood, and adolescent risk factors

For the Longitudinal Study of Australian Children see <http://www.growingupinaustralia.gov.au>

Panel 2: Criteria for ascertaining level of psychological distress and dysfunction in infants, children, and adolescents

Infants to age 1 year

Kessler 6 (K6) for mothers: very high distress, K6 score ≥ 19 ; high distress, K6 score of 14–18

Aged 2–3 years

Brief Infant Toddler Social Emotional Assessment (BITSEA): very high distress, BITSEA score ≥ 40 ; high distress, BITSEA score between ≥ 37 and ≤ 39

Aged 4–15 years

Strengths and Difficulties Questionnaire (SDQ): very high distress, SDQ score ≥ 20 ; high distress, SDQ score between ≥ 17 and ≤ 19

Aged 16–17 years

Diagnostic interview (mental illness diagnosis DISC-IV: social phobia, separation anxiety, general anxiety disorder, obsessive compulsive disorder, major depressive, attention-deficit hyperactivity disorder, conduct disorder), patterns of self-harm, suicide attempt: very high distress defined by severe mental illness diagnosis or suicide attempt (ever), or four or more self-harm occasions; high distress defined as moderate severity mental illness diagnosis

predictive of mental illness¹⁶ against variables from YMM and LSAC.^{10,11} They included attributes such as parental separation, parental mental illness, domestic violence, and poverty. The full list and cutoff points are reported in appendix B (sheets, Adversities by age and Adversity definitions). We defined the presence of four or more adversities for a child at a given age as high-level current adversity exposure.

Statistical analysis

Drawing on the outcomes of the consultations (ie, the focus groups and the meetings with the expert advisory groups), we proposed and tested estimates of the time needed (on average per patient) for each of the defined roles along a care pathway. We expressed workforce estimates as mean h per patient per year, recognising that some patients will need more time and others less. These estimates were critically reviewed—via a survey of clinicians—and we modified them if a discrepancy emerged.

We calculated total competency requirement (h) for our case-study region as the product of annual mean h per person by role and the estimated population in need in each age group. We converted this result to full-time equivalent (FTE) staffing, assuming 1650 h available per FTE—ie, 37.5 h per week, 44 weeks per year (52 weeks minus 4 weeks of annual leave, 5 days sick leave, 5 days professional development, and 10 days public holidays).

We did all calculations in Microsoft Excel version 15 (appendix B). Results are presented according to the questions in Segal's needs-based workforce planning model (panel 1).

Role of the funding source

The funder had no role in study design, data collection, data analysis, data interpretation, or writing of the report. Senior officers from the Department of Health SA (not from the section providing funding support) were on the project steering committee and contributed to study design, had access to data, and contributed to data interpretation. CT and AG were (at the time of this study) Department of Health SA employees. The corresponding author had full access to all data in the study and had final responsibility for the decision to submit for publication.

Results

The case study region used was the multiethnic Australian state of SA, with a population of 1730 510, of whom 368 512 are children aged 0–17 years (June 30, 2017). This regional choice reflects the state-level jurisdictional responsibility for mental health and SA-based project partners. The selected age range included mothers in the perinatal period. A seamless interface with youth and adult mental health services is important, but youth (aged 18–25 years) were not included in our target population.

Diagnosis was rejected as the primary classification system. Clinicians argued that clinical management was ascertained, primarily, by a combination of age, complicating factors (largely, family-based adversity), and clinical severity. Although clinicians will choose a therapeutic approach to match a patient's clinical presentation, it does not mean diagnosis is useful for workforce planning—eg, it is not necessary to know what medication an adolescent might be prescribed to ascertain that capability to prescribe is a required competency. Therefore, the infant, child, adolescent, and family target population was characterised by age group, severity, and presence or not of multiple adversities. Severe mental health presentations were defined by high-level psychological distress with serious effects on multiple areas of functioning (social, relational, occupational, educational, self care, developmental, or a combination of these; panel 2).

Multiple adversities were defined by the presence of environmental exposures that place infants, children, adolescents, and their families at risk of deteriorating mental health and complicate the approach to management. Pertinent adversities include relational disturbances (ie, domestic violence, insecure or disorganised attachment, poor parenting capacity, parental separation), parental mental illness, and socioeconomic disadvantage. Current exposure, or exposure within the previous 12 months, to four or more measured adversities was defined as high-level adversity exposure. The combination of high psychological distress and multiple adversity was termed complexity. The developmental origins of mental illness mean that people with severe mental illness are likely to experience multiple current adversities, such that complexity will be the norm.¹⁴

See Online for appendix

The target population can be represented by considering the intersection between severity of presentation and level of exposure to adversity (figure 2). Community infant, child, adolescent, and family mental health services could potentially cater to various combinations of subpopulations A to E. Our target population is defined by groups A, B, and C—ie, those experiencing very high or extreme mental health problems with (group A) or without (group C) multiple family-based adversities, and those with at least high levels of psychological distress and multiple current adversities (group B). These three groups will align with people warranting a tertiary-level response. Groups D and E are less complex or less severe and are probably suitable for treatment in primary or secondary care.

The prevalence of need for tertiary-level community infant, child, adolescent, and family mental health services in the SA population is reported in table 1, by age group. Prevalence varies between 5.3% and 7.6% from infancy to age 15 years, increasing to 16.3% by late adolescence, reflecting the high prevalence of deliberate self-harm and attempted suicide in the older age group and consistent with the escalation in mental health problems in mid-to-late adolescence.

From our document review and extensive consultations with the clinical community and advisory and expert panels, we ascertained that the best way to understand the desirable workforce mix was through the patient journey.

For initial assessment and follow-up post referral, an accessible, engaging, and clinically effective front-end needs to be designed to engage highly distressed infants, children, adolescents, and their families, establish appropriate treatment options, and support treatment initiation. Clinicians from the infant, child, adolescent, and family mental health services team would take an initial history, undertake clinical and risk assessments, identify core issues and treatment options, and establish an initial course of action (eg, external referral, intake into community team, inpatient) and check follow-up.

With respect to ongoing clinical care (including vital family support), a lead therapist would be allocated from the infant, child, adolescent, and family mental health services team. The discipline—eg, counselling, occupational therapy, play therapy, psychology, social work, speech pathology paediatrics, psychiatry, midwifery, or mental health nursing—would be selected dependent on core issues for that patient and team competency sets. The lead therapist would undertake a comprehensive mental health and psychosocial assessment, develop a care plan with the patient or family and relevant care professionals, deliver evidence-based therapy, coordinate the involvement of specialists, participate in infant, child, adolescent, and family mental health services team-based case conferencing and decision making, provide outreach or act as a visiting specialist to external agencies, collaborate with or co-manage cases with external agencies (eg, child protection, family support services, schools), and undertake

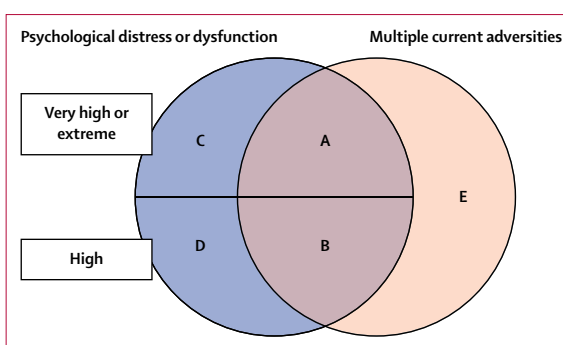


Figure 2: The intersection of psychological distress and adversity exposure. Subpopulations are represented as A–E.

	Population SA (June 30, 2017)*	Group A (%)	Group B (%)	Group C (%)	Number in groups A + B + C (%)
Age group (years)†					
0–1	41 368	1.2%	2.7%	1.6%	2275 (5.5%)
2–3	41 908	1.2%	1.2%	3.7%	2556 (6.1%)
4–5	42 327	1.6%	1.3%	2.5%	2286 (5.4%)
6–7	41 042	1.7%	1.6%	2.0%	2175 (5.3%)
8–9	41 354	3.1%	2.5%	1.1%	2771 (6.7%)
10–11	40 679	3.7%	2.7%	1.2%	3092 (7.6%)
12–13	39 592	3.0%	2.3%	1.5%	2692 (6.8%)
14–15	39 298	2.7%	2.0%	1.5%	2436 (6.2%)
16–17	40 944	8.3%	1.9%	6.1%	6674 (16.3%)
0 to <18	368 512	26 957 (7.3%)

Group A=very high levels of psychological distress plus four or more adversities. Group B=high levels of psychological distress plus four or more adversities. Group C=very high or extreme levels of psychological distress, fewer than four adversities. *Source: SA Department of Planning, Transport and Infrastructure. †For example, 0–1 is birth to age <2 years and 2–3 is age 2 years to age <4 years.

Table 1: Estimated prevalence of need for tertiary-level specialist community infant, child, and adolescent mental health services, by age group, in South Australia, 2017

contingency and discharge planning. Therapists would also be involved, in development, supervision, and training of students, new clinicians, and peers.

Psychiatric care and oversight would entail a psychiatric assessment for medication, hospitalisation, risk assessment, accountability for clinical service functions and clinical governance, supervision, and involvement in team meetings. The psychiatrist would occasionally take on the clinical lead therapist role.

Specialised skill sets would be provided as needed to supplement standard clinical skills to better meet unique patient needs—eg, speech and language difficulties, parental drug and alcohol issues, or disturbed eating behaviours (appendix A). Access to these competencies within the infant, child, adolescent, and family mental health services team would allow for more effective team-based care, simplify access for patients, and improve efficiency (less time to secure external referrals).

Intersectoral liaison, social support, active outreach, and advocacy would be used to manage the high level of adversity seen in infants, children, adolescents, and their

families presenting to the mental health services team, and help agencies to work more effectively with distressed patients. Professionals working in these roles—eg, social workers, youth workers, and family support workers—would identify and facilitate access to core social and economic support services such as housing, income support, employment, justice, and child care and address barriers to engaging in therapy (eg, child care, transport). Although in theory this role might be achieved through close relationships with family support agencies, such a model is highly vulnerable to funding vagaries. If the support service role is not incorporated into the model of care and FTE and budget, there is a considerable risk of non-provision or usurping therapeutic time of the lead clinician, assuming these activities will be covered through uncosted referrals.

The estimated mean time per patient over a 12-month period—by core role—is used to estimate total annual workforce, FTE staffing, and clinical cost. Initial assessment and follow-up was allocated a mean of 3 h per patient. For care management, the lead therapist was allocated a mean of 27 h per patient per year, reflecting fortnightly consultations of 1 h for 6 months followed by monthly consultations of 1 h for 6 months, then for every hour of direct clinical work, 30 min of indirect clinical time (eg, case notes, phone calls). The allocation for psychiatric care was a mean of 4 h for psychiatric assessment and oversight per patient per year,

corresponding to 1 h for psychiatric assessment and 1 h for communication with lead (other) therapists every 6 months. Specialist skill sets were allocated a mean of 12 h per year, comprising 1 h per month of specialist input—eg, through a parenting programme, speech or language assessment and therapy, family therapy, nutrition counselling, or assistance with school adjustment. The time allocated for socioeconomic support and active outreach was a mean of 12 h per year, consisting of 1 h per month to support patient access to social and economic services and including outreach into organisations.

Clinical hours were translated into FTE, dividing by 1650 h to account for leave and formal training. Further adjustment to FTE estimates (upwards) for non-patient administrative time or (downwards) to reflect actual service utilisation by the target population has not been attempted. Wage rates used in the cost estimates are provided in table 2. The estimated annual FTE needed to address the tertiary-level mental health needs of infants, children, and adolescents (and their families) in SA is 947 people at a clinical cost of AU\$126·8 million. This value is equivalent to a mean cost of \$4703 per child in the target population.

By comparison with these estimates, in 2016–17, clinical services delivered through community-based state-funded CAMHS teams in SA cost \$24 million, supporting a clinical FTE of 160 people. For a region with an estimated population of 365 000 people aged 0–17 years, SA CAMHS community teams saw 7603 unique patients in 2015–16, representing 2·1% of people younger than 18 years. Our needs analysis finds that our SA infant, child, adolescent, and family mental health services team should be seeing 7·3% of young people (aged 0–17 years and their families). Our modelled clinical FTE of 947 people is 5·5 times the current clinical FTE of SA CAMHS and the modelled budget of \$127 million is 5·3 times the current budget.

Private psychology and psychiatry services were excluded from our estimate of current supply. The fee-for-service practice model does not support multidisciplinary family-based care and is suited to a less complex patient population. Agencies delivering family support programmes are also excluded; although working with highly vulnerable populations, these agencies rarely offer a therapeutic mental health service.

Discussion

Using a novel needs-based workforce model, we estimated the size of the community mental health workforce needed to deliver tertiary-level care to high-needs infants, children, adolescents, and their families in the Australian state of SA. Our findings indicate that FTE staffing of approximately 947 people and a clinical budget of \$127 million is needed. These estimates are roughly five times the existing service levels of SA CAMHS, indicating high unmet need—an outcome consistent with observations of untreated or undertreated child and adolescent distress in the LSAC and other studies.^{10,19}

Age group (years)†	Initial assessment (3 h per patient)	Lead therapist (27 h per patient per year)	Psychiatric oversight (4 h per patient per year)	Specialist skill sets (12 h per patient per year)	Psychosocial support and outreach (12 h per patient per year)
0-1	6825	61425	9100	27300	27300
2-3	7668	69012	10224	30672	30672
4-5	6858	61722	9144	27432	27432
6-7	6525	58725	8700	26100	26100
8-9	8303	74807	11084	33252	33252
10-11	9276	83484	12368	37104	37104
12-13	8076	72684	10770	32304	32304
14-15	7308	65780	9750	29232	29232
16-17	20022	180172	26696	80088	80088
Total (age 0-17 years)					
Clinical time (h)	80871	727839	107828	323484	323484
FTE (n people)	49	441	65	196	196
Cost (AU\$ million)‡	5·8	60·4	17·2	26·1	17·3

FTE=full-time equivalent position (total h/1650). *Defined as groups A, B, and C in figure 2. †For example, 0-1 is birth to age <2 years and 2-3 is age 2 years to age <4 years. ‡Assuming initial assessment delivered by allied health professional (AHP) step 3 (annual salary AU\$98 896), lead therapist delivered 90% by AHP step 4 (annual salary \$102 305) and 10% by medical specialist (psychiatrist, paediatrician, neurologist) consultant step 4 (annual salary \$220 930), psychiatric oversight and care by consultant step 4, and specialist skills delivered 90% by AHP step 3 and 10% consultant step 4. All salary estimates include 20% wage on-costs (eg, employer-funded superannuation contributions, payroll tax, workers' compensation premiums).

Table 2: Estimated clinical hours, FTE, and clinical cost, by broad role, to meet tertiary-level community mental health needs of infants, children, and adolescents in our target population* in South Australia

A strength of our approach is the generation of robust workforce and budget estimates reflective of real-world case complexity. Case complexity was a dominant theme and an idea familiar to clinicians, who highlighted the special challenges of treating children experiencing psychological distress in the context of multiple family adversities. For this reason, the model moves beyond the so-called clinical problem to consider the competencies needed to manage young people and families who experience great adversity in addition to their psychological distress.

The needs estimates were drawn from high-quality datasets, using strict definitions of distress and adversity. We have drawn extensively on consultation with clinicians working in the sector in deriving and testing model parameters. Our time allocations to the care pathway were consistently (98% of the time) rated by clinicians, managers, and researchers as either about right or too low. All assumptions of our model are explicit. Uncertainty in estimates of need and translation into workforce estimates is inevitable. Our estimate of need is consistent with the YMM estimate (5·6% of children aged 4–17 years with a severe or moderate mental disorder),¹⁰ after adjusting for inclusion of attempted suicide or multiple self-harm in our estimates of mental distress in young people aged 16–17 years.

Although unmet need does not necessarily justify a service response (societal resources are scarce relative to potential needs and wants), when considered with evidence of effective and cost-effective interventions to address infant, child, and adolescent mental health concerns, a response is warranted.^{32–34} The considerable health, social, and economic costs across the life course (and intergenerationally) of untreated child and adolescent mental health problems reinforce the logic of intervening.

Our findings have important training implications. First, case complexity means that clinicians need upskilling in therapies for working with highly traumatised and chaotic families. Second, the inclusion of additional competencies and roles in infant, child, adolescent, and family mental health service teams—eg, youth workers, family outreach workers, and speech pathologists—will require access to additional mental health training in these disciplines. Third, a considerable expansion in the mental health workforce, with the necessary competencies to work with highly traumatised infants, children, adolescents and their families, will be necessary. Our new infant, child, adolescent, and family mental health service, operating as a Centre of Excellence, would also provide training (and supervision) to mental health workers and other people working with highly vulnerable families, expanding the skill base in trauma-informed service delivery and therapeutic trauma-based care. This role might be taken on by a reinvented CAMHS or a more academic-based group. A limitation of the current modelling is its static nature. A dynamic model,

incorporating changes in the prevalence of need over time, as might result from improved access to services, is a desirable next study phase. The model is concerned solely with the clinical team. We have not modelled infrastructure requirements or administrative and management FTE. Creating a suitable therapeutic environment is important but outside the scope of this study.

The best service model for our infant, child, adolescent, and family mental health service teams warrants careful exploration. The great vulnerability of the patient population identified in our needs analysis dictates a highly responsive service (hours of working, ways of working). This could mean extensive outreach and inter-agency work locating skilled staff in other programmes dealing with vulnerable families—eg, early childhood centres or intensive family support programmes. A stand-alone CAMHS team working from CAMHS offices during a standard 0900 h to 1700 h Monday to Friday working week, will not best meet patients' needs.

Infants, children, adolescents, and their families struggling with severe or complex mental health disturbances deserve access to high-quality tertiary-level community mental health services. This study represents, as far as we know, the first application of needs-based workforce modelling to estimate the workforce and budget required to meet need, providing valuable policy-relevant information.

The model we used is transparent and can be applied to other regions, using the material in appendix B. In regions with a higher prevalence of vulnerable populations or higher wage-cost structures (typical of rural and remote regions), use of regional or population-specific data sources will be important (eg, the Longitudinal Study of Indigenous Children¹⁴ would be useful in regions with more Indigenous children).

Our study provides evidence for expanding tertiary-level infant, child, adolescent, and family mental health services in SA. If this evidence is ignored and the serious service underprovision continues, the intergenerational patterns of profound disadvantage will continue, further entrenching distressing and high-cost social problems of child maltreatment, domestic violence, crime, disability, long-term unemployment, and homelessness. Although our modelling used data from SA, findings might have relevance for other jurisdictions across Australia and internationally.

Contributors

LS developed the research question and study design, was involved in consultations with clinicians, chaired the steering group, had oversight of data analysis, and contributed to data interpretation and writing of the report. ML contributed to study design, was a steering group member, and revised the report. CT and AG contributed to characterisation of the patient population and the care pathway and service model description and revised the report. SG did the data analysis to ascertain prevalence estimates and revised the report. GF contributed to study design, managed data collection from clinical teams and the expert panel, had primary responsibility for analyses and developing the Excel-based workforce model, and wrote the report.

Declaration of interests

We declare no competing interests.

Acknowledgments

This research was funded by a National Health & Medical Research Council (Australia) Partnership Grant (GNT1055351) with the Department of Health South Australia. We acknowledge formal approval of South Australia Child and Adolescent Mental Health Services (CAMHS) to access budget and staffing data and to convene focus groups with CAMHS clinical staff.

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