


COMMENTARY **OPEN ACCESS**

Reducing Health Inequity for Children and Young People in Rural Australia: Are Digital Interventions a Panacea? A Rural Generalist's Commentary

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ABSTRACT

Aims: To explore the role of digital interventions in improving health equity for children and young people (CYP) in rural Australia from a rural generalist's perspective.

Context: Rural Australian CYP experience worse health outcomes than their urban peers and have insufficient access to early intervention and support. Rural paediatric outpatient waiting times as long as 6 years have been reported, with some regions having no services. Digital interventions have expanded since the COVID pandemic, providing new opportunities to improve quality and access to care for CYP in rural settings.

Approach: Here we provide a synthesis of the literature and health policy, from the perspective of a clinician working in rural Australian paediatric care, to describe the role and limitations of digital interventions to support CYP in rural areas.

Conclusion: Digital interventions such as telephone and video consultations, online tools, child-friendly robot ward rounds, and digital GP-paediatrician co-consulting models show great promise in helping to bridge the gap in health outcomes for rural Australian CYP. Models of care that utilise digital components can provide care closer to home for rural families; however, research to evaluate the effectiveness of these models in the Australian context is lacking. Infrastructure challenges, cultural considerations, and patient preferences limit the utility of digital interventions for some populations. A panacea? Unfortunately, not; however, these technologies herald an exciting new phase in healthcare for rural Australian CYP, and digital interventions are likely to play an increasingly important role in increasing access to care for this population.

1 | Background

Rural Australian children and young people (CYP) remain an important and under-served population [1, 2]. Data from 2022 showed that 1.34 million (28%) out of a total of 4.8 million Australian children aged 0–14 years reside outside major cities [2]. Australia's vast geographical area and low population density outside the major cities present challenges in the delivery of

health services to rural and remote communities. Despite having a higher disease burden, children living in rural areas have lower health service use, are significantly less likely to access early intervention, and receive lower government health expenditure compared to their urban counterparts [1]. The evolving role of technology in healthcare creates potential to address difficulties with access and quality of care for rural CYP [3–5]. However, robust evaluation of existing digital models is lacking.

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Summary

- What this paper adds
 - This paper captures a rural generalist's perspective on the role of digital interventions for rural children and young people (CYP).
 - The complexity of the issues impacting rural CYP's access to healthcare, and the role of digital approaches in meeting the needs of rural CYP are explored.
 - Hybrid digital and face-to-face models, an evolving area of opportunity for rural CYP's healthcare, are discussed.
- What is already known on this subject
 - Rural CYP experience worse health outcomes and face more barriers to healthcare than their urban peers.
 - The availability of digital interventions has increased since the COVID pandemic.
 - Questions remain as to the suitability of digital interventions for improving health equity for rural CYP.

This commentary explores current challenges in healthcare for rural CYP, the role and limitations of digital interventions, and hybrid digital and face-to-face models in improving equity of access and health outcomes for rural Australian CYP.

2 | Challenges in Healthcare for Rural CYP

2.1 | Access to Healthcare

Approximately 75% of GPs and 85% of paediatricians work in major cities, with less than 1% of 'non-GP specialists' including paediatricians living more remotely than large rural towns [6]. When adjusted for other confounding variables, those living in remote and very remote areas are over 8 times more likely to report not being able to access a GP when needed [3]. Similar challenges exist in access to all health providers in rural areas, including allied health providers, nurse practitioners and pharmacists [6].

Lack of access to a GP is associated with poorer health outcomes and increased potentially preventable hospitalisations [7]. Despite Australia's Primary Health Care 10 Year Plan 2022–2032, access to a GP continues to worsen with geographical remoteness [1]. Difficulty accessing primary care in rural areas results in higher use of emergency departments (EDs) for non-urgent issues [3]. Children with low access to GPs are six times more likely than other children to present to public EDs for non-urgent medical care. GP care is far more cost-effective than hospital care for conditions not requiring hospital admission, with a non-admitted patient in the emergency department costing approximately 8 times that of a 20–40-min GP consult (\$595.17 vs. \$76.95) [6]. Using EDs for primary care contributes to the higher cost of delivering hospital services in rural areas and poorer health outcomes, with this issue increasing with remoteness [3, 7].

The negative impact of Covid-19 on the mental health of CYP [8] has been noted by GPs, who report concern over the worsening mental health of young people. Significant difficulty accessing specialist support for these conditions, especially outside urban centres, is a growing issue [6].

2.2 | Access to Support for Mental Health and Neurodevelopmental Concerns

The rate of mental health concerns in Australian CYP has been increasing, and the disease burden in Australia from neurodevelopmental disorders such as Autism Spectrum Disorder and attention deficit hyperactivity disorder (ADHD) is among the highest in the world [6]. A 2023 study from pre- to post Covid-19 found that for CYP up to 18 years, mental health presentations to the GP significantly increased over this time [9].

Accessing care for CYP with mental health, behavioural or neurodevelopmental concerns is a significant issue [10] compounded by workforce issues in rural areas and restrictive legislation surrounding the prescription of stimulants for ADHD [1, 11]. More than 20% of paediatricians in both public and private sectors limit the number of patients they accept for these conditions, reflecting insufficient training for clinicians in this area, and inadequate remuneration for the additional work required for complex presentations [10]. Rural paediatric outpatient waiting times of up to 6 years have been reported, and some regions have no paediatricians accepting referrals for children experiencing 'behavioural problems' [1, 3, 10, 12]. Lack of local services can result in rural families needing to travel many hours for private care. Families that can not afford to pay for travel, accommodation, or private fees can face years-long waiting times, and children often miss out on early intervention entirely [1, 12]. This issue could be alleviated through primary care, but current legislation prevents GPs from prescribing psychostimulants for ADHD in many areas of Australia, intensifying the chronic and severe issues with access [11]. Severe shortages of child psychologists and child and adolescent psychiatrists add to this inequity for rural CYP [1]. The adverse effects of poor access to services are considerable and can include worsening of mental health, reduced educational attainment, and negative impacts on social and family functioning [1, 10]. Priority populations such as Aboriginal and/or Torres Strait Islander communities are unfairly impacted by a lack of available services, and this is compounded by the impact of geographical remoteness [1].

2.3 | Access to Care for Aboriginal and/or Torres Strait Islander CYP

It is impossible to discuss health inequities in Australia without acknowledging the resilience of Aboriginal and/or Torres Strait Islander people against the background of colonisation [13]. The ongoing effects of social and cultural determinants including colonialism, racism, and intergenerational trauma continue to adversely affect Aboriginal and/or Torres Strait Islander people [13]. The positive impact of cultural factors such as self-determination, family and kinship, country and caring for country, language, cultural knowledge and expression is acknowledged [13].

Aboriginal and/or Torres Strait Islander children represent 5.9% of Australia's total children, yet make up 47% of all children in remote and very remote areas [2]. Difficulties accessing health-care in these areas disproportionately impact this population [1], resulting in remote-living Aboriginal and/or Torres Strait Islander children experiencing worse health outcomes than their urban-living peers [1]. The quality of care provided for this population can be negatively impacted by inadequate staffing, ineffective service delivery, and culturally unsafe practices [14]; the role and limitations of digital interventions in addressing these concerns are discussed below.

2.4 | The Role and Limitations of Digital Health Interventions for Rural CYP

In preparing this commentary, the authors used an iterative search process of two health databases (Pubmed and EMBASE), targeted websites, Google Scholar, as well as snowball methods. Of the 175 documents reviewed, only 2 systematic reviews, 3 scoping reviews, 1 implementation evaluation and 1 randomised controlled trial were considered relevant for digital health interventions in the rural Australian CYP context. The paucity of available robust evidence to inform clinical practice highlights the importance of future research.

Examples of available digital healthcare models for Rural Australian CYP are demonstrated in Supplementary Table S1 (15–21), paediatric hybrid models in Supplementary Table S2 (22–28), and hybrid models for all ages in Supplementary Table S3 (29–32).

2.5 | Digital Interventions for General Practice

Although digital interventions predated COVID-19, the pandemic catalysed changes in the delivery of primary care in many areas of Australia. From 2020, in response to COVID, the use of telehealth by GPs became common, as Medicare Benefits Scheme (MBS) rebates for telephone and video consultations were introduced for the first time. In the second half of 2020, almost 30% of GP consultations were conducted via telehealth [4]. Despite this, research into the quality of care provided by telehealth GP consultations for CYP has been limited [15]. Rural CYP accessing digital models face infrastructure challenges such as unreliable internet connectivity [1]. Additionally, rural CYP face financial barriers when accessing GP care virtually, as MBS rules dictate a face-to-face review must have occurred within the preceding 12 months for patients to be able to access rebates for a telehealth GP consultation [16]. Unless this requirement is changed, this rule will continue to negatively impact rural CYP who often face geographical isolation and a lack of transport [2, 17].

The utility of digital primary care interventions for rural CYP is restricted by a worsening GP workforce crisis. A 2022 report predicted a total shortfall by 2032 of 11,392 full-time equivalent GPs, or 30% of GPs required, with this issue disproportionately affecting rural areas [18]. Half of all GPs working in remote and

very remote locations plan to retire within the next 10 years [6], and the rate of medical school graduates choosing GP training recently fell to an historic low, at only 13.8% [6]. Digital interventions have the potential to connect rural CYP with GPs in urban locations, but the chronic, severe and worsening shortage of GPs will only improve with changes in government policy and funding models.

2.6 | Digital Interventions for Non-GP Specialist Paediatric Care

For non-GP specialist paediatric care, most Australian families found telehealth paediatric consultations were acceptable and saved both cost and time attending the appointments [19]. This was especially true for rural families and those from lower socioeconomic backgrounds [19]. Virtual paediatric care has been available in Australia for over 20 years, including specialist telehealth consultations and the provision of child-friendly robot ward rounds [20]. A 2020 retrospective review of the first 15 years of the QLD Telepaediatric Service found significant positive benefits of their model, with improved access and cost savings associated with reduced travel for patients. This model utilises 'centralised coordination' with urban-based specialty teams providing telehealth care for rural patients across QLD. This retrospective audit analysed 23,054 telehealth service records from 2000 to 2016 and associated publications from the service. Of the 42 listed studies, most had small sample sizes; there were no randomised controlled trials, no studies using a control group and only one systematic review [20]. Further review of the use of this model during and after the pandemic is awaited, as emerging telehealth technologies are yet to prove their scalability and feasibility in the longer term.

Whilst virtual outpatient paediatric care has the potential to address access barriers for rural and remote communities, there are some presentations that require face-to-face assessment and physical examination. Due to this limitation, telehealth will not by nature be able to address all the needs of rural children, but it does have an important role to play as an adjunct to face-to-face consultations [21].

2.7 | Digital Interventions for Mental Health and Neurodevelopmental Concerns

Rural CYP requiring support for neurodevelopmental concerns face significant barriers to diagnostic assessment and required multidisciplinary care [1]. Despite this, robust research exploring the implementation of telehealth models of multidisciplinary allied health care is lacking, with a 2020 systematic scoping review only identifying two relevant randomised controlled trials for inclusion [22]. Only one study met the authors' quality checklist criteria, and this paper was from the USA, not Australia. A low quality of studies overall was noted by the authors [22].

Similarly, mental health service access remains difficult for rural CYP even with digital services on offer, and to date, the

uptake of digital mental health models remains poor. Between 2020 and 2022, only 2% of CYP used online mental health treatment or assessment services, and less than 5% of all Australians accessed digitally enabled mental health care [23]. Promoted as cost-effective and accessible, a recent analysis limited to federal funding only showed that each person accessing digital mental health services cost \$76, and for those seeing a GP instead, the cost was \$81 [24]. Increasing uptake of online interventions has the capacity to decrease costs and increase reach. However, concerns have been raised about the privacy, confidentiality, safety, efficacy and regulation of these services, particularly if they utilise artificial intelligence technologies [24]. A 2023 systematic review [25] exploring preferences of rural and remote youth accessing mental health services noted a paucity of relevant research. The limited available literature indicated that telehealth was not preferred as a replacement for face-to-face consultation, rather as an adjunct to these services [25]. For families seeking consultations involving mental health, developmental, or behavioural concerns, face-to-face consultations were preferred [19].

2.8 | Digital Interventions for Aboriginal and/or Torres Strait Islander CYP

Despite the potential of telehealth in rural Australia, not all populations have been able to access this model of care equitably. Priority populations, including those in remote-living communities and Aboriginal and/or Torres Strait Islander people, are more likely to struggle with accessing telehealth services, as evidenced during the COVID-19 pandemic lockdowns [26].

The efficacy of virtual models for Aboriginal and/or Torres Strait Islander people is limited by challenges in providing culturally appropriate care via telehealth [27]. There is an identified need within this population for attention to non-clinical indicators such as cultural, relational and trust components when providing healthcare [28]. Difficulty establishing trusting therapeutic relationships, concerns about privacy, lack of cultural safety and inadequate internet connectivity have been identified as barriers to the utility of telehealth for these communities [29].

Aboriginal and/or Torres Strait Islander children living in remote areas require prioritisation to enable access to high quality health care [30]. There is a need for co-designed, culturally safe care with community engagement, improved governance and strong political leadership to drive positive health system reform [30]. The 2023 report “Ngayubah Gadan (coming together) Consensus Statement”, emphasised that building healthcare capacity within Aboriginal and/or Torres Strait communities is required but must be done in consultation with those communities. Additionally, the training and support of non-medical staff, such as Aboriginal Health Workers, as part of a multidisciplinary team was reported to be essential [30]. The role of digital interventions in meeting the needs of Aboriginal and/or Torres Strait Islander rural CYP is an exciting but as-yet underserved area of research, and it may be that hybrid models, with culturally appropriate care provided

locally and supported with telehealth, may be more acceptable and effective for this population.

3 | The Role of Hybrid Models of Care for Rural CYP

3.1 | Hybrid Models of Care for Rural CYP

Opportunity exists for hybrid healthcare models, with face-to-face and digital components, that can effectively utilise and support available local resources and provide additional tiered supports when required. Established hybrid service providers include Royal Far West (RFW), whose multidisciplinary health workforce engages with rural children virtually, as well as providing regular in-person visits to support local health workers, teachers and parents [31]. Emerging hybrid models for rural CYP include Rural School Based Integrated Care and SUSTAIN [32].

3.2 | Rural School Based Integrated Care

Place-based models, such as school-based healthcare models, can integrate horizontally between health and education [33], as well as vertically, by providing specialised telehealth support in co-consultation with local staff. One such model, Rural School Based Integrated Care (RSBIC), is being developed in southern NSW (Figure 1).

RSBIC builds on the current scope of the school-based GP-led model, Djing.gii Gudjaagalali (Children Stars) School Clinic Eden, located on Thaua land within the Yuin Nation. This multidisciplinary and interdisciplinary model was developed in consultation with the local community, clinicians, educators and non-government organisations. Evaluation of this clinic is being completed; however, preliminary data have identified a need for increased allied health supports such as that provided by RFW, as local services do not have the capacity to meet community need. RSBIC proposes to increase access to multidisciplinary care by providing virtual support in collaboration with locally available health and/or educational staff (Figure 2). Unfortunately, to date, a lack of Government funding means that RFW staff have had to withdraw from the region, leaving children and families without necessary allied health support.

3.3 | SUSTAIN

Due to the lack of access to non-GP specialist paediatric care in rural areas, GPs working outside metropolitan centres require a higher level of paediatric knowledge and skills [6]. There is a need to develop and evaluate innovative models to strengthen rural paediatric primary care and to help bridge the gap in paediatric service availability for rural children. In-person paediatrician support for GPs can bolster GP confidence, increase family confidence in GP care for children and reduce referrals to EDs and outpatient clinics [34]. However, cost and logistical issues prevent the model from being feasible in remote

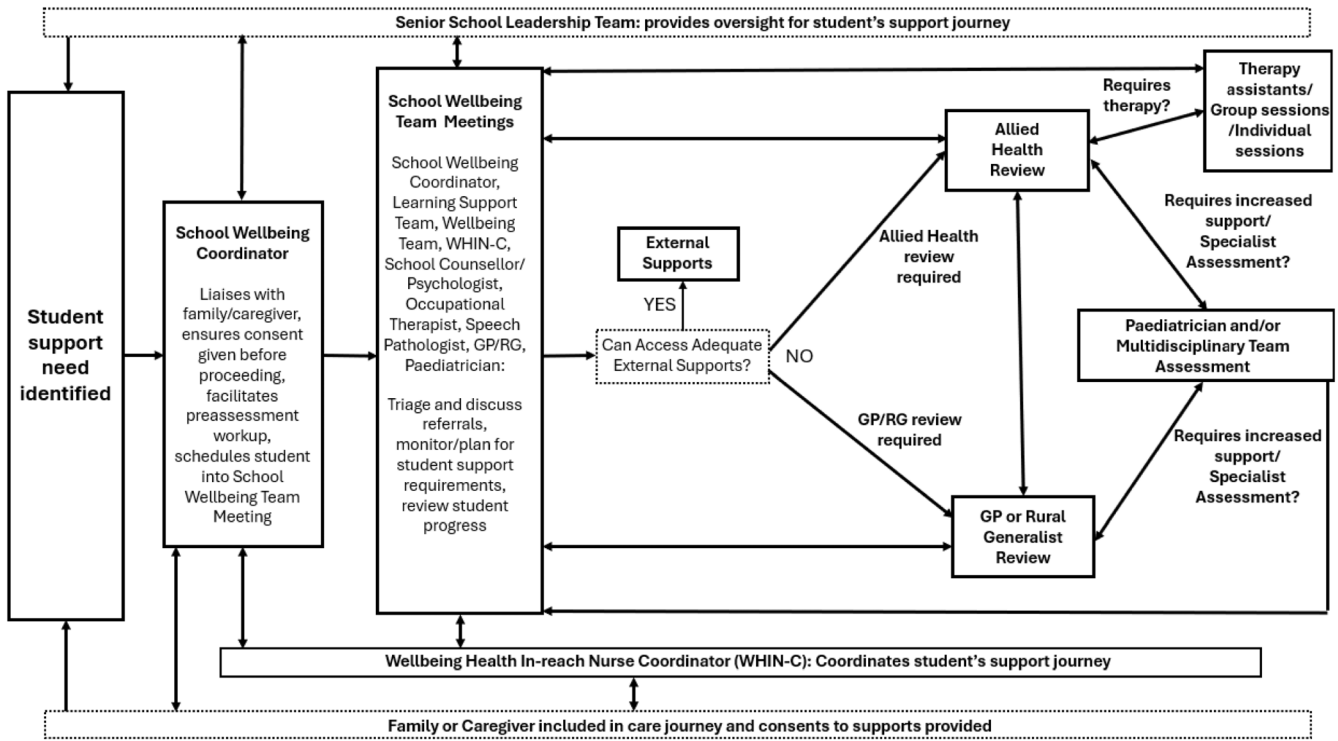


FIGURE 1 | Rural School-Based Integrated Care- Process Map.

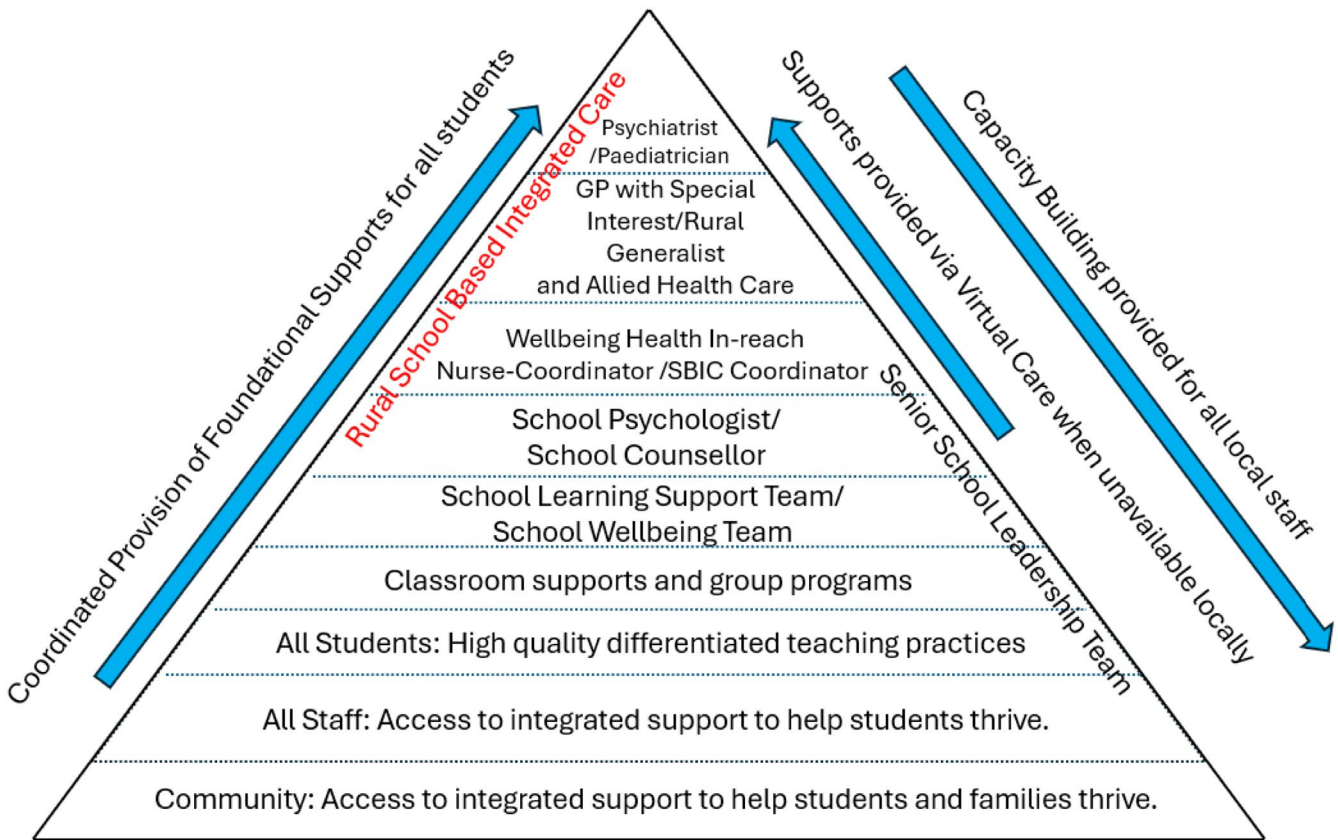


FIGURE 2 | Rural School-Based Integrated Care-Tiered Hybrid Model of Care.

areas. The SUSTAIN model of care (Figure 3), a virtual integrated GP/paediatrician model, is currently being evaluated [32]. SUSTAIN's urban-based paediatricians provide virtual

support for GPs enrolled in the study from across NSW. GPs can remotely include the paediatrician in their appointment with a child in a hybrid digital/face-to-face co-consultation.

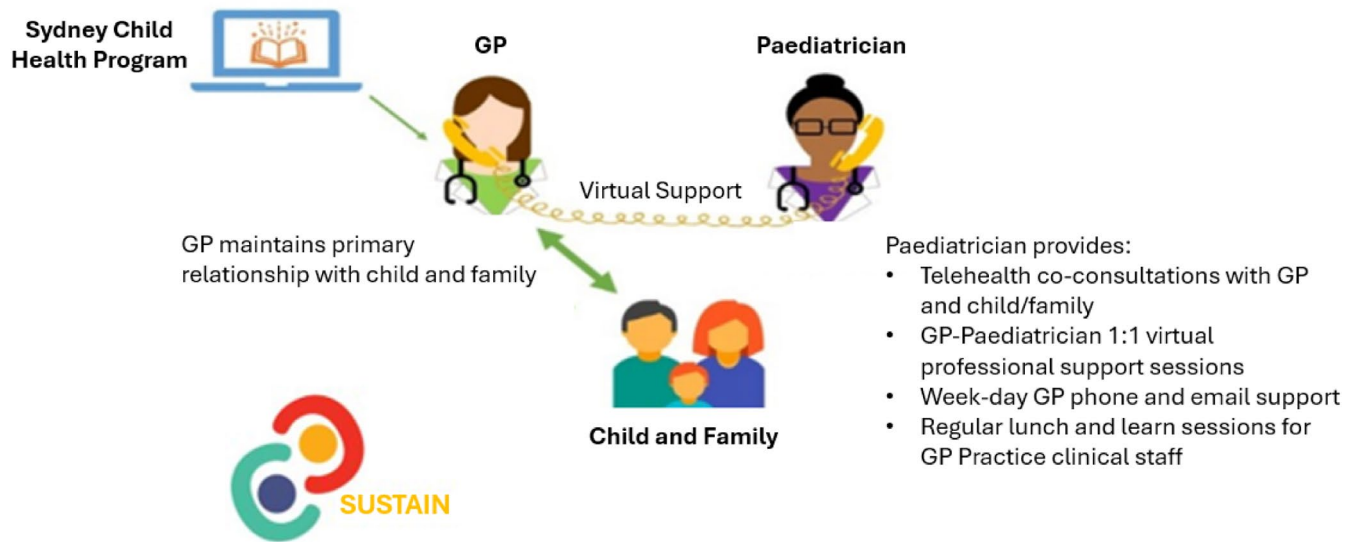


FIGURE 3 | SUSTAIN Strengthening Care for Children-Hybrid Model of Care.

Additionally, GPs can access phone and email support, regular case-based discussions and the Sydney Child Health Program.

Preliminary findings indicate SUSTAIN's hybrid model, combining face-to-face and virtual care, is well accepted by clinicians and families. We await the results of this trial with anticipation [32].

3.4 | Future Innovations in Digital Health

The role of hybrid digital interventions in supporting paediatric rural generalist medical practitioners, hereafter referred to as Rural Generalists, and rural multidisciplinary teams is an exciting and evolving area of clinical practice and health services research. Rural Generalists working with multidisciplinary teams have the potential to help solve the identified challenges of providing accessible and high quality care for rural and remote Australians [30]. The implementation of the Australian Government's Scope of Practice Review and National Disability Insurance Scheme review will impact rural CYP, as will the growing use of artificial intelligence within healthcare. Robust evaluations of existing and future digital interventions are urgently needed.

3.5 | From a Rural Generalist's Perspective

For digital interventions to improve health equity for rural CYP, the complexity and chronic under-resourcing of the Australian health system for this population need to be addressed [35]. The concerning rise in CYP experiencing mental health issues and the lack of available services for both mental health and neurodevelopmental concerns need to be urgently remedied. Adequate funding, with both top-down approaches and local codesign, especially for Aboriginal and Torres Strait Islander rural CYP, is required. Current statistics show we still have significant work to do in terms of equitable investment in rural healthcare [3] and a shamefully long way to go in order to address the injustices of

colonisation and close the gap in outcomes for Aboriginal and Torres Strait Islander Peoples [36]. Systemic issues such as inequitable funding for rural health, health worker maldistribution, and the GP workforce crisis will continue to negatively impact rural CYP unless there is significant and sustained investment and genuine collaboration from all levels of government to address the issue.

4 | Conclusion

Digital interventions show great promise in helping to bridge the gap in health outcomes for rural Australian CYP [19, 20, 34]. Models of care that utilise digital components can provide care closer to home for rural families [5], more research to evaluate and better understand the effectiveness of these models in the Australian context is needed. Future research and governmental policy addressing infrastructure deficiencies, funding challenges, cultural requirements and patient preferences should be considered in the evaluation of the appropriateness of these interventions in the Australian rural context.

Are digital interventions a panacea for rural health inequity? Unfortunately, not. However, health care models utilising innovative technologies herald an exciting new phase for rural Australian CYP and have the potential to assist in reducing inequity in access and health outcomes experienced by this population.

Author Contributions

Corin Miller: conceptualization, visualization, writing – original draft, investigation, writing – review and editing. **Hayley Smithers-Sheedy:** conceptualization, supervision, validation, visualization, writing – review and editing. **Nan Hu:** supervision, writing – review and editing. **David Schmidt:** conceptualization, supervision, validation, visualization, writing – review and editing. **Annemarie Christie:** funding acquisition, writing – review and editing. **Tammy Morris:** funding acquisition, writing – review and editing. **Lena Sanci:** conceptualization, supervision, writing – review and editing. **Raghu Lingam:**

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Ethics Statement

The authors have nothing to report.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.