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Development of an infant and early childhood mental health service at a tertiary care pediatric hospital: a needs assessment, community case study and logic model creation

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Abstract

Introduction Early attachment relationships and positive childhood experiences are foundational to lifelong mental health, yet specialized services for children under six remain critically scarce. This study sought to characterize the service gap in infant and early childhood mental health (IECMH) in Eastern Ontario, Canada, as a first step in developing a logic model to inform creation of a program to support this population.

Methods We completed a regional estimation model of IECMH concerns, conducted a semi-structured focus group with community mental health agencies, and administered a survey to pediatric physicians at a regional children's hospital. Findings from the aforementioned evaluations informed the development of a logic model for a new, responsive, tertiary-level IECMH service.

Results Disruptive behaviours emerged as the most frequently encountered IECMH concern, and respondents identified multiple systemic barriers to accessing care, including insufficient specialist services, prolonged wait times, limited inter-agency collaboration, and a lack of provider awareness and resources. These findings underscored the urgent need to use the logic model to develop a dedicated IECMH clinic, tailored to the unique needs of this vulnerable population.

Discussion While developed within a Canadian regional context, this framework may serve as a flexible template for other jurisdictions seeking to establish or strengthen tertiary-level IECMH services. Adaptation to local service structures, workforce capacity, and population needs will be essential to ensure feasibility and sustainability. Future evaluation will be necessary to assess implementation outcomes, service utilization, and impact on child and family trajectories.

Keywords Mental health, Pediatrics, Early childhood, Needs assessment, Logic model, Health systems

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Background

Mental health and prevalence in early childhood

Early childhood represents a critical window in human development, during which the foundations of lifelong emotional and psychological well-being are established. Infant and Early Childhood Mental Health (IECMH) encompasses a young child's capacity to form secure attachments, regulate emotions, and engage in learning—processes that unfold within the complex interplay of family, community, and environmental influences [1]. Secure relationships with a primary caregiver, effective emotional regulation, and emerging social skills during this period are essential for healthy cognitive and psychosocial growth. Nonetheless, an estimated 17–20% of children under age seven receive a mental health (MH) diagnosis [2, 3]. In a cohort of Norwegian preschoolers, 7.1% were diagnosed with a MH disorder at age four [4], and, despite being diagnosed earlier in life, these young children as just as likely to maintain their diagnosis over time as children who are diagnosed when they are older [5]. Additionally, in a sample of adolescents with a MH condition, 40% demonstrated vulnerabilities in social competence, internalizing and externalizing symptoms at age five [6]; further highlighting the importance of early identification and intervention.

IECMH presenting concerns may include parenting challenges, attachment disruptions, emotional dysregulation, developmental delays, and behavioural problems, which can escalate into conditions such as anxiety, depression, attention-deficit/hyperactivity disorder, and oppositional defiant disorder [3]. In developmental psychopathology, IECMH problems are often organized using internalizing and externalizing dimensions to describe broad patterns of emotional and behavioral functioning. While this dimensional framework is useful for characterizing symptom profiles and developmental trajectories, it has important limitations in infancy and early childhood [7]. Internalizing and externalizing constructs are descriptive rather than diagnostic, and early presentations frequently span multiple domains. For example, DSM-defined mood and anxiety disorders are typically grouped as internalizing conditions, while externalizing symptoms may be associated with disorders such as attention-deficit/hyperactivity disorder, oppositional defiant disorder, conduct disorder, or intermittent explosive disorder [8]. However, many conditions, particularly trauma-related disorders, may manifest with both internalizing and externalizing symptoms, and symptom expression is often shaped by developmental stage, caregiving context, and relational stressors. As a result, discrete diagnostic boundaries are often difficult to apply in early childhood, underscoring the importance of developmentally informed, relationship-based formulations that integrate symptom patterns, functional impairment,

and relational context rather than relying solely on categorical diagnosis [9, 10]. For example, disruptive behaviours can include symptoms such as developmentally atypical aggression (e.g., hitting, biting), severe or frequent tantrums, oppositional behaviors, poor behavioral regulation, impulsivity, and difficulty complying with adult direction. In early childhood, these behaviors are understood as patterns of behavioral dysregulation rather than discrete diagnostic entities and may reflect a range of underlying processes, including emotional regulation difficulties, relational stress, trauma exposure, or emerging neurodevelopmental differences. To prevent the progression of these concerns, and optimize outcomes, timely identification and intervention during early childhood is imperative and proposed IECMH models should be intentionally designed to accommodate this developmental and diagnostic complexity by prioritizing longitudinal assessment, relational understanding, and functional needs over rigid diagnostic classification [10].

Importance of prevention and treatment in early childhood

Early identification and intervention for MH concerns in early childhood is essential. Experiences and relationships occurring early in life play a pivotal role in brain development and long-term health outcomes of these children [11]. Previous research has demonstrated that MH syndromes diagnosed later in life have been identifiable by preschool age or, in some cases, as early as infancy [12]. Thomson et al. (2019) reported that in a sample of adolescents diagnosed with a MH condition, 40% demonstrated vulnerabilities in social competence, as well as internalizing and externalizing symptoms, at age five [6]. Without early intervention, there is risk for severe, long-standing impacts on health. There are also social-related costs of untreated MH disorders, developmental, social and/or trauma concerns and long-term morbidity and mortality [13–15]. Moreover, providing timely access to appropriate services can support healthy social and emotional development, prevent worsening conditions, and reduce the burden on healthcare systems [16, 17]. As such, it is essential to identify and provide treatment for these symptoms as early as possible in a child's life.

Lack of early childhood MH services in Canada

In children under age five, prevalence of MH disorders has been reported to be 16–18%, with approximately half being severely impacted [3]. Despite the high prevalence of MH disorders in early childhood and well-documented benefits of early identification and treatment, this specialization has continued to experience significant challenges of clinical workforce capacity for IECMH services for over 20 years [18, 19]. Recently, Saunders et al. (2022) reported that physician-based MH visits for

children aged 3–6 are significantly lower than for older children, raising the concern that symptoms may not be identified earlier in life and thus leading to a potential gap in IECMH services [20].

In a review of the importance of promoting IECMH in pediatric care, Buka et al. (2022) provided recommendations for addressing the unmet needs of children with psychiatric illnesses [21]. Integrated care was identified as the primary suggestion, including collaboration between primary care providers, allied health professionals, child psychologists, and psychiatrists to create linkages across family-serving systems. There are multiple models recommended for use when designing child and adolescent MH services and all have a common theme of working within a system of care model and service delivery can occur across a continuum rather than in silos [22, 23]. For IECMH specifically, Zeanah et al. (2004) proposes the use of a four-tier IECMH intervention spectrum, with dedicated focus on promotion, prevention, treatment, and maintenance [24]. At the first level, promotion activities target the general population and can be conducted without professional guidance or involvement, such as general parenting education and resources about social and emotional development intervention can occur across a spectrum of care or advocacy initiatives and awareness campaigns. Next, preventative resources aim to decrease risk factors associated with IECMH problems before they occur and/or increase related protective factors. These resources can be universal to all (e.g. education sessions through public health or daycare centres) or those who are at-risk of developing problems due to the presence of relevant at-risk factors such as adverse childhood experiences, familial history of MH disorders (e.g. primary care provider, school counsellor). In the third level (also called Tier 3), Zeanah et al. (2004) defines treatment as the highest level of intervention and are provided by specialized IECMH professionals. This section focuses on the treatment of existing concerns and provide psychotherapeutic supports to reduce symptomology and increase functioning by delivering specific IECMH assessment and treating the child, the parent(s) or the child and parent(s) together. Lastly, maintenance services focus on the compliance with long-term treatment with the primarily aim of preventing re-exacerbation of symptoms and providing follow-up services after treatment is completed. Within this spectrum, children and families can enter services at any point along the continuum and may need services from more than one point simultaneously or they move between service levels over time [24]. However, specialized, multidisciplinary assessment and intervention for infants and young children with severe, persistent, or complex MH and relational difficulties, often in the context of caregiver mental illness, developmental complexity, or child protection involvement,

typically are considered intensive treatment services (also called Tier 3 services) and occur through tertiary-level services, such as pediatric hospitals.

In Canada, integrated and specialized IECMH services are limited, leading to concerns around accessibility of appropriate and timely services for these children and their families [25]. To understand this service gap in further detail, an unpublished preliminary environmental scan was completed of IECMH services in Eastern Ontario in 2015. The study found that the community is well served by numerous prevention and early intervention services (e.g., parenting programs, playgroups, early screening, etc.) as well as promotion-based services (e.g., public health campaigns, educational resources, etc.). However, intervention-based services, which offer direct treatment for identified IECMH concerns, and collaboration among services across the stepped care framework, were critically lacking. This suggests a significant gap in service availability within the region, where children with diagnosed MH concerns are struggling to access necessary treatment from Tier 3 (specialized, intensive treatment) services. In addition, coordinated care is limited. Given the importance of early intervention in preventing long-term MH challenges, it is essential to assess the specific IECMH service needs for Eastern Ontario and identify any gaps in tertiary-level MH services for this age group. This information is crucial to inform a logic model, which would serve to guide development of a program as well as serve as an example for other sites.

Objectives

The present study sought to examine the regional IECMH service needs in Eastern Ontario, with a focus on delineating gaps in both tertiary and community MH service provision. The study was designed to generate a comprehensive logic model for a hospital-based IECMH service that could be implemented at a pediatric academic health centre. A secondary aim was to investigate the barriers that hinder timely and effective service delivery, as well as to capture the perspectives of both community agencies and pediatric hospital physicians regarding the integration of specialized MH interventions for children aged 0–6.

Context and methods

This mixed-methods study included the development of an estimation model for IECMH concerns in the Ottawa region, Canada's capital city located in Eastern Ontario. We conducted a focus group with representatives from community organizations delivering IECMH services in Eastern Ontario. An online survey was also administered to pediatricians within the Children's Hospital of Eastern Ontario (CHEO). CHEO, located in Ottawa, Ontario, is an academic pediatric hospital affiliated with the

University of Ottawa. The hospital serves patients across Eastern Ontario, Nunavut and Southeastern Quebec. The information gathered contributed to the development of a new clinic's logic model. The study was approved by the institution's Research Ethics Board (15/188X). Participation was voluntary and all study participants provided informed consent.

Part 1: Regional estimation model

Estimation modeling was used to calculate the prevalence of children from 0 to 6 years of age in our community who stand to benefit from tertiary level MH services. Previous epidemiological research was used to provide estimated proportions of children with MH concerns overall at ~ 15% pooled prevalence [19] and ~ 5% for serious disorders [26]. Waddell et al. (2002) calculated the pooled prevalence by completing a literature review of six published articles reporting MH concerns in children and met their comprehensive screening criteria. Eligible articles had a representative sample comparable to Canadian population (e.g., United States, Australia, etc.), a minimum 1000 participants, children and adolescents ages 0–18 years, and standardized assessment protocols based on the DSM [8]. Estimated prevalence ranged from 9.5 to 20.3% with an average of 14% across the six studies. Findings from the World Health Organization's World Mental Health surveys on the global burden of mental disorders completed by Kessler et al. (2008) were used to estimate the prevalence of serious MH disorders. In their study, serious disorders were defined as the presence of select disorders (e.g., non-affective psychosis, bipolar I disorder, substance dependence with physiological dependence syndrome), a suicide attempt in conjunction with any other disorder; severe role impairment due to a mental disorder in at least two areas of functioning measured by caregiver-rated Sheehan Disability Scale [27] or having overall functional impairment from any disorder consistent with a Global Assessment of Functioning score of 50 or less [28]. This approach aligns with Canadian population-based MH research, which emphasizes that clinically meaningful need is defined by the co-occurrence of symptoms and impairment.

These prevalence rates were then applied to regional population census for children within this age group using the Government of Canada's 2016 Census Profile [29]. This calculation generated an estimation model of children under 6 in the region who would benefit from MH intervention. This estimation model was subsequently compared with the number of referrals received by our MH intake services to assess whether the needs of the IECMH population were being adequately met and to identify potential gaps in care related to both referral practices and service availability.

Part 2: Community: Focus group

The first component of the needs assessment involved a semi-structured focus group, which included community MH services and stakeholders who were members of the Ottawa Infant MH Steering Committee in 2016. Those represented on the Steering Committee either provided MH services for the 0–6 age group (and their families) or had an interest in developing these services. Stakeholders spanned many sectors; Ministry of Education school board MH representatives, supportive housing programs for parents who have experienced interpersonal violence, child welfare representatives, and early childhood education, to name a few. Focus group questions explored the participants' roles within their agency, professional backgrounds, perspectives, and experiences in providing services to this population. Specifically, there were questions designed to explore common MH concerns, service needs, challenges in accessing/delivering care, and opportunities to enhance collaboration among organizations within the community (See Supplementary Material 1 for interview guide). The focus group discussion was transcribed in full.

Part 3: Tertiary health care: Children's Hospital of Eastern Ontario (CHEO) physician survey

The second component of the needs assessment included a 5-question survey for physicians at a pediatric hospital in Eastern Ontario. Eligible participants were invited to participate in the study and complete the survey in April 2016 via the Department of Pediatrics email list. The survey was administered using REDCap (Research Electronic Data Capture), a secure web-based platform for data collection [30]. Participation was anonymous and voluntary. All survey questions focused on children from ages 0–6, and their caregivers, and asked about the context in which participants see these clients (e.g., Emergency Department, Outpatient Clinic, etc.), most common needs and presenting problems encountered (e.g., toileting concerns, emotional regulation concerns, sensory issues, etc.), barriers and challenges when referring children to MH services (e.g., waitlists, lack of information, etc.), level of confidence when selecting appropriate resource(s)/intervention(s), and their perspective on the most important factors to consider when developing a hospital-based IECMH service (see Supplementary Material 1 for full survey).

Part 4: Creation of logic model

Logic models are an integral aspect of developing a new program and are helpful for communicating program expectations to all stakeholders, including staff and external collaborators [31]. The visual model typically summarizes important components of a program, including resources and other inputs, activities, outputs and

short- and long-term outcomes. The models are designed to explain the linkage between projected activities and how they will lead to specific outcomes [31]. The logic model was developed in collaboration with stakeholders based on the data collected from the estimation model, survey, and focus group.

Analysis

Thematic Analysis with a Grounded Theory approach (where observations give rise to new ideas) was conducted for the focus group and the open-ended survey questions using NVivo [32]. Data was analyzed by two separate team members. After preliminary analysis, the two researchers compared categories, and a third coder resolved any differences after discussion with the preliminary coders through discussion. Descriptive statistics were used to present the frequencies and percentages of responses for the first four survey questions and completed using Microsoft Excel [33].

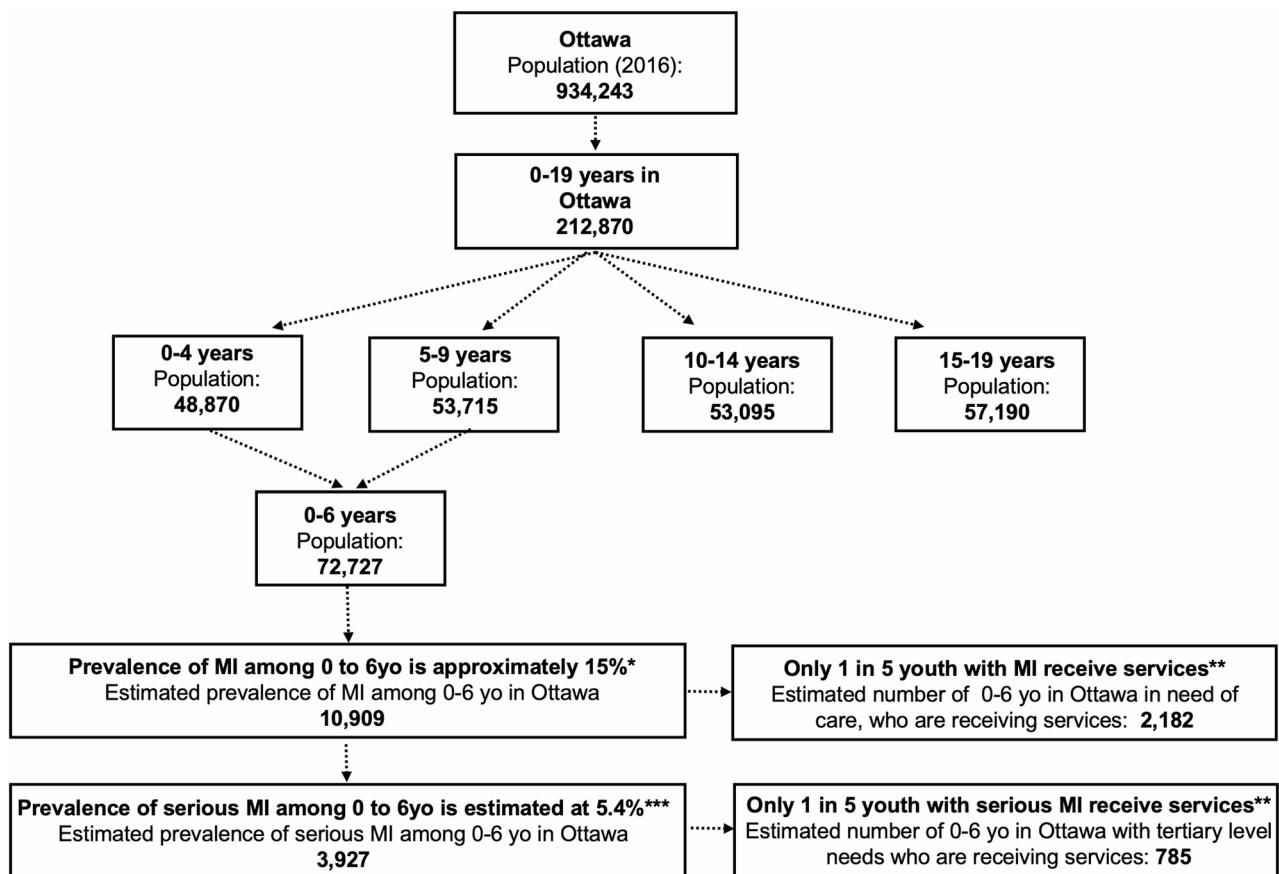
Results

Estimation model

Based on the population of the Ottawa region reported by the Government of Canada for 2016 ($N = 932,243$; [29]), it was estimated that children under age 6 account for 72,727 people (Fig. 1). After factoring in the estimated prevalence of serious mental impairment of 5.4% ($n = 3,927$), and an estimation of 1/5 youth with serious mental impairment receiving services, we estimated 785 children under age 6 with tertiary level needs should be receiving services. Based on our institution’s administrative data, only 20 families were accessing hospital-based community-delivered MH services each year - a stark contrast to the outputs of the estimation model.

Focus group

The focus group consisted of eight members of the Ottawa Infant MH Steering Committee. Each of the participants were either a director or administrator from an Ottawa-based community MH agency that either provides or has interest in developing MH services for this age group. Six major themes were identified: (1) Gaps in



Note. Figure created using data from Waddell and Offord (2002)*, Mental Health Commission of Canada (2013)**, and Kessler et al. (2009)***.

Fig. 1 IECMH Estimation Model for Ottawa, Ontario as of 2016

service, (2) Barriers in accessing care, (3) System of care approach, (4) Collaborations between tertiary and community care agencies, (5) Common referral questions, and (6) Common approaches to IECMH service delivery. See Table 1 for an overview of the themes and exemplar quotes.

Major themes

Gaps in service

Participants highlighted critical service gaps in the support available for children, particularly those navigating complex medical and social needs. Four subthemes emerged, including (1) availability for specialty/tertiary care service and expertise consultation, (2) hospital liaison partnerships, (3) services for youth who have children under age six with special needs, and (4) psychoeducation/prevention opportunities. Participants also identified a perceived gap in accessing specialized consultation for less prevalent MH conditions, such as Selective Mutism and Pica. Additionally, in cases where pediatricians require acute support they reported frequently encountered delays in psychiatric consultation. Moreover, focus group participants expressed unique difficulties assisting young parents with children (0–6) who had medical needs. These parents are likely still in school and require both MH and medical support for their children, as well as for themselves. Some participants noted experiences where they had difficulty accessing support (e.g., social worker, liaison, etc.) to help when a young mother's child is hospitalized. Lastly, participants described the need for more proactive education on available services to prevent future distress (e.g., in-hospital education at the time of birth, educational toolkits, community-based drop-in services, alternatives to the Emergency Department, etc.).

Barriers to IECMH service delivery

Participants identified barriers that hinder timely and effective IECMH service delivery in the Ottawa region. Three key subthemes emerged from participant experiences: (1) waitlists, (2) the need to foster communication and collaboration with CHEO, and (3) silos/role confusion over who has the capacity to serve specialty populations. Participants described serial waitlists as a notable issue, with families experiencing delays in accessing services across multiple sectors. They noted that by the time an assessment becomes available, they may have already completed their work with the family or moved to follow-up. Participants acknowledged that the local pediatric hospital has started addressing attachment-related concerns but that dialogue between agencies remained limited. Participants also experienced uncertainty about which organization is responsible for specific populations or services available. Some reported being caught

in a referral loop, whereby they received referrals for conditions they believed to be managed by other services. In addition, they experienced confusion due to unclear inclusion/exclusion criteria and specific referral processes.

System of care approach

Participants identified a need for structured coordination between CHEO and community agencies. Two sub-themes emerged: (1) strategic guidelines for community agencies and (2) referral pathways. Participants highlighted the potential benefit of more clear, strategic guidelines, protocols and pathways to improve wait times and coordination among services. Further, the importance of delivering concurrent medical and therapeutic services rather than sequential care was highlighted. Depending on the child or family's needs, integrated and coordinate care (e.g. multiple services at the same time across different tiers within the system of care) may be more beneficial than receiving one service at a time and only moving to the other service if it does not work. For example, participants voiced their desire for further supports around medication management from specialized providers (e.g., pediatric or psychiatry hospitalists) while the child and/or family is receiving other types of supports elsewhere (e.g., psychoeducation groups, in-home visits, etc.). Participants felt as though they could only access physician supports once the child and/or family has exhausted other services.

Collaboration between tertiary and community care agencies

Participants discussed the need to enhance coordination between community services and tertiary care. Three subthemes emerged: (1) a helpline at CHEO, (2) shared resources, and (3) sharing research progress and findings. To increase accessibility of services, and potentially prevent emergency visits, participants mentioned the potential benefit of developing service options for less acute cases, such as a specialized case-consultation collaborations, walk-in clinics and helplines staffed with multidisciplinary MH teams.

Common referral questions

Concerns were raised with the referral process for some specific conditions including Selective Mutism, attachment and separation anxiety concerns, as well as behavioural and parenting concerns. Participants frequently identified Selective Mutism as a reason for referral to specialized hospital-based services. Common symptoms leading to referral to other community-based agencies included attachment (e.g. separation anxiety) and behavioural concerns (e.g. aggression and self-regulation). Parenting concerns were also common among focus group

Table 1 Focus group themes and exemplar quotes

Theme	Subthemes	Example
Gaps in Service	Specialty/Tertiary care service and expertise	"We get some things that are out of our range like Pica and things that are a bit unusual that we would love to be able to consult with"
	Hospital-based liaison partners	"I would like a hotline where we would be able to phone a professional or a go-to person at CHEO and say to them 'this is what we're coming in with, how can we... [can] you help us support this young person who has a child?' There just seems to be that gap."
	Service for youth who have children (0-6) with medical needs	"We are looking at a lot of transitional aged youth too that are 17 or 18 years old with an infant and they are not really in the adult system, but they need assistance too because then they're being triggered with their mental health issues at the same time that their child is with medical issues, and we're trying to support both. To have a liaise would be key."
	Prevention and psycho-educational resources	"I think CHEO looking at some of those preventative things [would be helpful], so that they can push right back to where the birth is actually happening, to push some of that information of what is available in the community, when they are in the hospital for those two days, when they start to run into trouble with... You know is there lactation information? All of those things, are they getting that prior to them landing at CHEO when they are distressed and the baby is a couple of weeks old" "A toolkit [including] you could drop in at XXX and get some of these very same services instead of lining back up at CHEO."
Barriers	Serial waitlists	"We go to [redacted], but the problem with that (even with... all of the great stuff that CHEO has in terms of the anxiety specialists and ADHD specialists) is one of timing. There's a big waitlist here and a waitlist there."
	Foster communication and collaboration with CHEO	"I applaud the fact that CHEO is even now talking about attachment, because it's a relatively new focus at CHEO. Certainly, [redacted] has had an infant MH team since 2006, and it has been a challenge in terms of having dialogue with CHEO because there has not been that kind of focus there."
	Silos/ Role confusion over who has capacity to serve specialty populations	"We're doing all of our work in isolation, then we may be finished with the family or in follow up with the family before we even get to the assessment."
System of care approach	Strategic guidelines for community agencies	"The point when you decide what it is what you're going to do and how you're going to do it, is there the ability to have some kind of protocol with each of us"
	Referral pathways	"It would be amazing if we had the ability to do it at the same time, both in terms of accessing for our clients... If CHEO is dealing with clients and the needs are complex, and you see a family that's in need of more intensive therapy or some of the things that we can provide, it would be great if we could do it in a timely way so that CHEO could be doing their piece and we go home with that, and assist too."
Collaborative approaches among tertiary and community care agencies	Access to Psychiatric consultation	"A call line from the family physicians and pediatricians to a psychiatrist. They're doing it on the groundwork but just to be able to consult, something like that would be awesome."
	Shared resources	"We have walk-in clinics, so is there some ability for us to combine resources there? Maybe once a month you might want to come to our walk-in or have psychiatry, psychology or OT there... Then the parents would not go to emerge if they could hang on or the other way around. I don't know if CHEO would want to do something and then some of the other resources could be there at that time."
	Sharing research progress and findings	"There is possibly transfers of skills related to that research that would be of benefit to all our agencies."
Common referral questions	Selective mutism	"One of the things we are seeing where there is certainly a gap is the issue of selective mutism. For a while we were getting referrals for selective mutism and we very confidently said, 'Well that's a specialty and really it should be CHEO and we'll help you connect with CHEO'"
	Attachment concerns (including separation anxiety)	"We also do a lot of attachment work with them too." "Separation anxiety would be one"
	Behaviour (including aggression and self-regulation)	"We have youths with children who have self-regulation issues themselves, so then, it's very difficult for them to manage their self-regulation issues."
	Parenting concerns	"Some parents are also asking questions about routines and how to implement them, how to better discipline them, especially with older siblings involved."
Common approach to Infant and Early Childhood MH	Shared language	"The fact that CHEO has now begun to really develop the language of attachment certainly is very helpful from our perspective."
	Shared philosophy	"I think it is extremely important that we have an understanding of what is the philosophy for 0-6 at CHEO"

members, including scenarios where parents struggled with their own emotion regulation, leading to difficulty managing their child's behaviour. In these cases, parents typically requested support with implementing consistent routines and structure, discipline strategies, and managing interactions between siblings.

Common approach to IECMH

The final theme focused on shared perspectives in service delivery, an essential element for collaboration and service alignment. Focus group participants expressed interest in developing a shared language to communicate about attachment related concepts. Additionally, participants stated the importance of a shared philosophy and understanding with regards to the approach to MH services for this population at a tertiary care level.

Survey results

Out of 260 medical staff, 36 pediatric physicians from the local children's hospital participated in the survey. Representation varied across different areas of the hospital, including outpatient clinics (60%), emergency department (42.9%), and inpatient units (20%), with a few practicing within specialty programs (17.1%; Table 2).

Barriers to referrals for MH supports services

When referring children aged 0–6 to MH support services, long waitlists were reported as the most frequent barrier (71.4%; Table 2), followed by uncertainty about which program to refer to (65.7%). Additionally, 54.3% of respondents cited a lack of information regarding service availability and the absence of an available service to meet the child's needs. Other challenges included the lack of available services to meet the parent's needs (42.9%) and complicated referral procedures (40%). A smaller proportion of physicians (14.3%) reported other barriers not specified in the survey, such as ineligibility of

a child due to age and school attendance. The expectation is that school-aged children are eligible for school-based services, which are often insufficient and inappropriate for the complex CHEO population.

Common needs and presenting problems in children aged 0–6

When asked about the common needs of presenting problems in children under age six, respondents frequently identified disruptive behaviours as the most encountered concern (77.1%, Fig. 2). Approximately half of survey participants also reported seeing children presenting with feeding concerns (54.3%), attention difficulties (51.4%), language or speech delays (51.4%), sleep problems (45.7%), aggression (42.9%), emotional regulation difficulties (42.9%) and motor problems (40%). Physicians reported that in about half of the children seen there were also concerns with parenting skills (48.6%).

Confidence in selecting resources for intervention

The reported level of confidence among respondents varied widely across presenting problems (Fig. 3). Almost two thirds of physicians indicated they were confident in handling developmental (57%) and abuse/neglect (60%) concerns. Conversely, almost half of respondents expressed they had little confidence or no confidence with encounters relating to anxiety/mood (46%), disruptive behaviours/attention concerns (43%), parent-child relationship and attachment concerns (63%), and parenting skills (55%).

Key considerations for developing a hospital-based MH program

Physicians identified several key factors in developing a CHEO-based program to better address the MH needs of children aged 0–6 and their families. All responses from CHEO physicians were categorized into themes outlined in Supplementary Material 2. The first theme focused on the core services that an IECMH program should provide. It was noted that these services should be well-defined, inclusive, accessible, and supported by a multi-disciplinary team, with an emphasis on psychoeducation, attachment-based therapy, trauma-informed care, and a family systems approach.

Three additional themes emerged: referrals, community liaison, and prevention. A strong referral system was highlighted as essential, requiring streamlined processes, reduced wait times, and improved coordination through a community liaison/navigator to assist families. It was emphasized that prevention efforts should prioritize early intervention and strengthen social support networks for parents. Other critical considerations included multi-faceted care, clinician education, and structural improvements. Multi-faceted care should provide direct

Table 2 Summary of survey participant responses ($N = 36$)

	<i>n</i> (%)
<i>Context for Seeing Children 0-6</i>	
Outpatient Clinic	20 (56)
Emergency Department	16 (44)
Inpatients	10 (28)
Specialty Program	6 (17)
Other	3 (8)
<i>Referral barriers/challenges for MH services</i>	
Long waitlists	26 (72)
Uncertainty about which program to refer to	24 (67)
Lack of information regarding availability of services	20 (56)
No available service to meet need of child	20 (56)
No available service to meet need of parent	15 (42)
Complicated referral procedure	15 (42)
Other	5 (14)

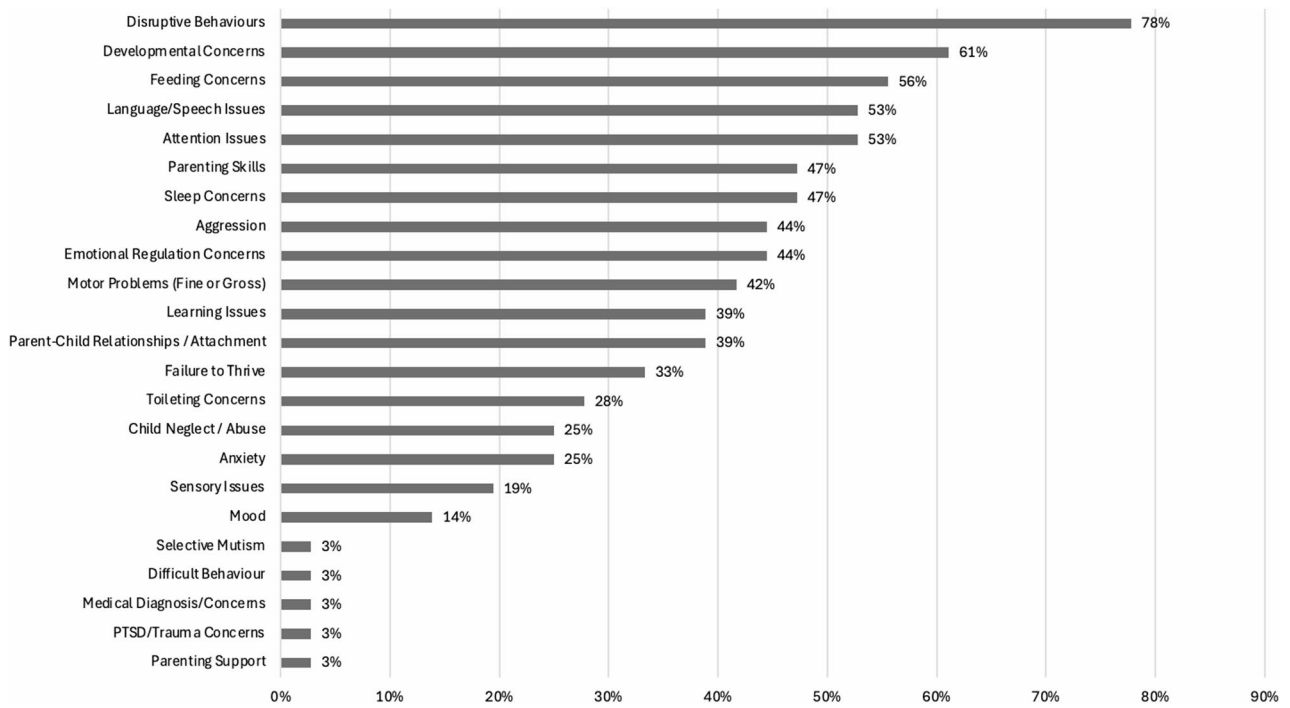


Fig. 2 Common needs and presenting problems in children aged 0–6

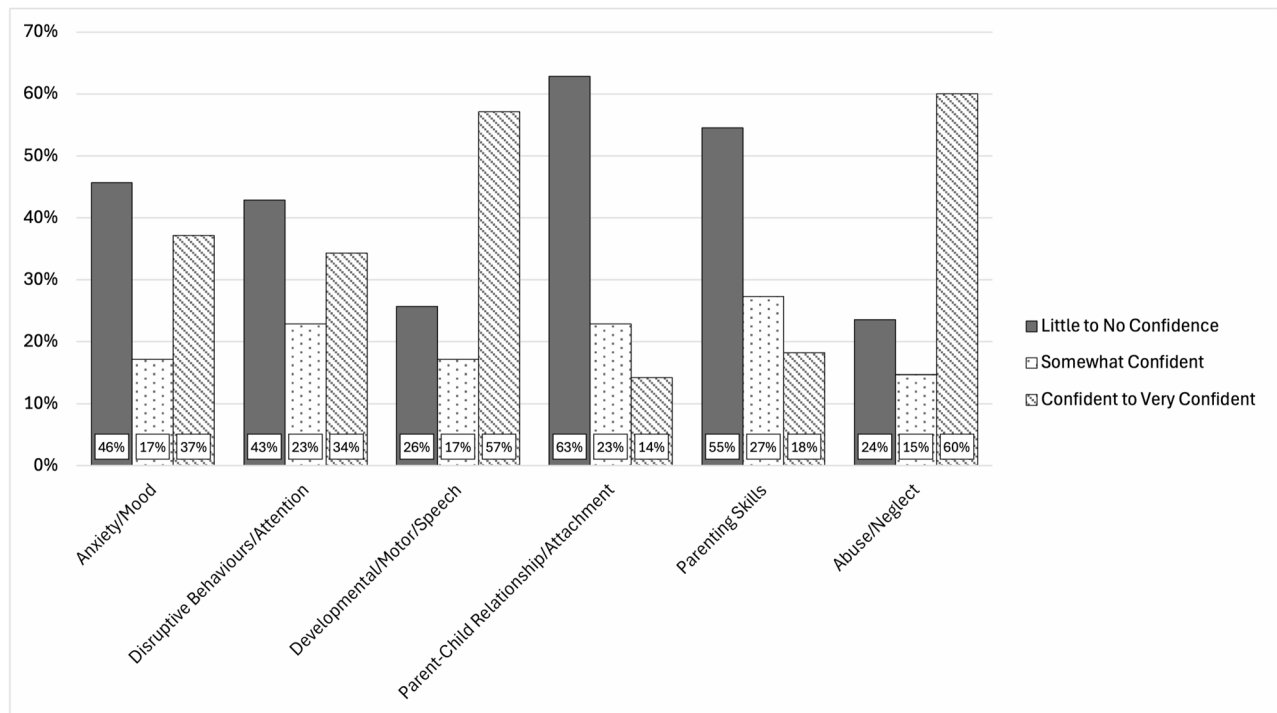


Fig. 3 Level of confidence reported by physician survey respondents by presenting problem

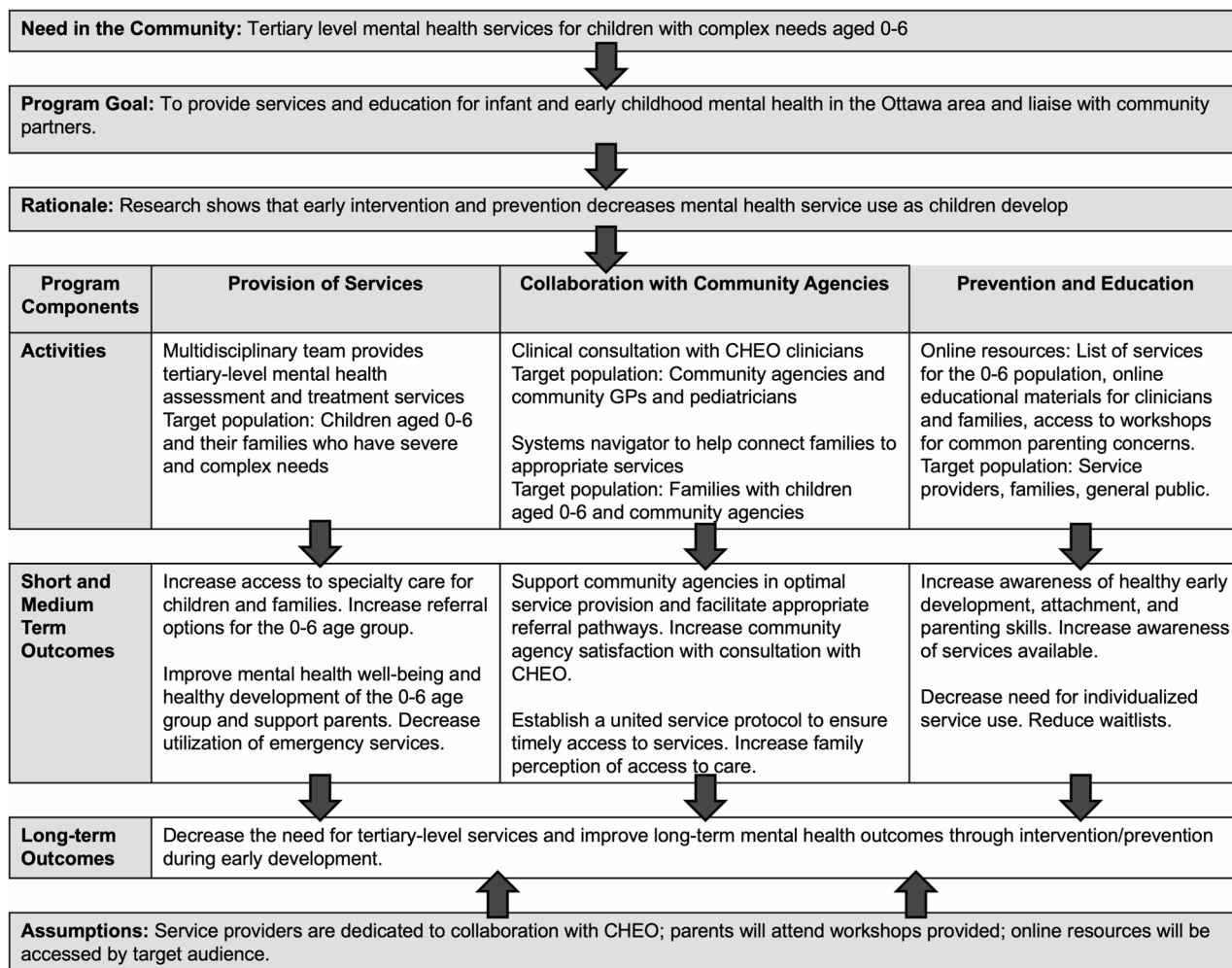


Fig. 4 Program Logic Model

support to providers, centralized online resources, and training for clinicians on early childhood MH interventions. Addressing structural issues, such as longer parental leave, expanded childcare services, food insecurity, and housing instability, were also emphasized to ensure a more comprehensive and sustainable support system.

Logic model development

Based on our needs assessment, we determined a service gap existed for tertiary-level MH services for children aged 0–6 in our region, leading to the creation of a logic model to help address this important need (Fig. 4).

The goal of the program would be to provide services and education for IECMH in the hospital’s catchment area of Eastern Ontario and to liaise with community partners. Based on the information gathered through the needs assessment, three components of an ideal program emerged.

The first component is the provision of tertiary-level MH services. This would include a multidisciplinary

team providing both assessment and treatment, with evidence-based attachment-informed therapeutic interventions. Distinguishing developmentally normative behaviors from clinically significant psychopathology is a central challenge in IECMH. Within the proposed service model, referrals are screened for high-risk features using structured clinical screening tools (e.g. the HEADS-ED Under 6; [34]) alongside clearly defined inclusion criteria, including severity, persistence, functional impairment, risk to the child or caregivers, and evidence of relational disruption. This screening process helps ensure that transient, developmentally expected behaviors (e.g., normative separation anxiety or age-typical tantrums) are managed within primary care or community settings, while higher-risk presentations are prioritized for specialized assessment and treatment. Accordingly, the proposed model does not rely on rigid diagnostic classification in early childhood. Instead, it emphasizes developmentally informed, longitudinal assessment that allows diagnostic understanding to evolve over time as

developmental trajectories become clearer. Case formulation prioritizes functional impact and relational context rather than categorical diagnosis alone. Services and interventions offered by the tertiary-level clinic are family-centered, strengths-based and reflective, and involve either a caregiver or both a caregiver and child together. The primary goal of this service is to improve the MH and developmental outcomes of children in this age group and to support their families.

The second component of the logic model focuses on collaboration between CHEO and community agencies. This includes the role of a consultant who can provide specialized consultation to community agencies when managing complex cases, collaborating to deliver the highest quality of care. In addition, a hospital-based liaison could assist families by connecting them with appropriate services in our region. These efforts would support the provision of streamlined pathways to ensure timely access to services. With caregiver consent, referrals would be directed through a system navigation process, where clinical acuity, developmental complexity, and psychosocial risk are assessed to determine the appropriate service tier. Children with mild or emerging concerns are routed to primary (Tier 1) or secondary (Tier 2) services, while infants and young children presenting with severe, persistent, or diagnostically complex MH and relational difficulties are referred to tertiary-level IECMH services (Tier 3). Tertiary services maintain bidirectional relationships with frontline and secondary providers, offering consultation, shared care, and transition planning to ensure continuity and appropriate step-down following intensive intervention.

These relationships and interfaces to support community agencies and provider clinical consultation to providers are mapped onto the ideal flow between frontline identification, centralized access, tiered service delivery, and inter-agency collaboration within the regional IECMH system of care.

The third component of this program focuses on prevention and education, primarily through online resources (e.g., lists of available services, online educational materials for clinicians and families, access to workshops for common parenting concerns, etc.). This component aims to increase awareness of healthy early development, attachment, and parenting skills, as well as to increased awareness of available services. Ultimately, these components aim to decrease downstream service use, and long-term MH concerns, using early prevention strategies. The proposed tertiary IECMH services developed based on the logic model will be embedded within a broader, regionally coordinated system of care that includes frontline, community-based, and hospital-based partners. Referral pathways may originate from multiple entry points, including early childhood educators and

childcare providers, primary care pediatricians and family physicians, public health services, community MH agencies, and child protection services to name a few, which also increases community awareness of the hospital-based service along with the education on IECMH-related topics (e.g., healthy early development, parenting skills, etc.). This further supports frontline providers' capacity to provide identify concerns related to early emotional-behavioural functioning, caregiver-child relationships, or developmental risk, and initiate prevention activities and referral discussions with families for early intervention.

Discussion

The study's findings affirmed that the pressing need for specialized IECMH services in Eastern Ontario is hampered by both systemic and operational barriers. Ultimately, this led to the creation of a logic model to guide the implementation of a specialized, tertiary-level IECMH program that can both provide needed treatment to children presenting with serious MH concerns and provide specialist support to community MH agencies.

The identification of service gaps, ranging from the lack of timely psychiatric consultation to the inefficiencies associated with existing referral networks, echoes earlier research that has demonstrated the critical importance of early identification and intervention in mitigating long-term psychopathology. The differing perspectives of community service providers and pediatric hospital physicians further underscore the multifaceted nature of the challenges involved. Community providers more frequently highlighted rare but complex presentations, such as selective mutism and attachment-related concerns, whereas hospital-based physicians more commonly encountered developmental, attentional, and language delays. Despite these differences, both groups endorsed the concept of an integrated, cohesive care model that would bridge community and tertiary services through clear protocols, shared resources, and enhanced communication.

These outcomes are consistent with the broader literature. Previous studies by Buka et al. (2022) and Saunders et al. (2022) have stressed the value of interprofessional collaboration and early intervention in reducing the adverse sequelae of untreated MH conditions [20, 21]. Additionally, the current findings lend further support to the argument that effective IECMH service provision requires, not only clinical innovation but also systemic restructuring to reduce wait times and streamline referral processes.

Internationally, IECMH service models share a strong emphasis on developmentally informed, relationship-based care, though they vary in structure and delivery across different countries and cultures. In the United

States, IECMH services are often embedded within academic medical centres or community-based programs and commonly draw on DC:0–5–informed frameworks, dyadic interventions, and consultation models integrated with pediatric and early intervention systems [7, 35]. In the United Kingdom, parent–infant MH teams are typically situated within the National Health Service and emphasize early identification, attachment-based assessment, and close collaboration with health visiting and social care systems [36, 37]. Australian IECMH models similarly prioritize early relational health and interdisciplinary care, with services often embedded within broader child and family health systems and emphasizing stepped-care approaches and cross-sector collaboration [38, 39]. The logic model proposed for Eastern Ontario aligns with these international approaches through its focus on relationally informed assessment, longitudinal formulation, and integration across pediatric, MH, and developmental services. At the same time, it reflects the Canadian health system context, including provincially funded services and regional variability in access to specialized IECMH care. By situating IECMH services within a tertiary pediatric setting while maintaining strong partnerships with community and neurodevelopmental services, the Eastern Ontario experience represents a locally adapted implementation of internationally shared IECMH principles.

Several limitations of the current study warrant mention. The generalizability of these findings is limited due to the low response rate and participation from CHEO pediatricians and absence of direct feedback from community pediatricians and family physicians. Additionally, without the data to understand the participants' medical specialty or background, the potential for selection bias is high due to the uncertainty around whether respondents' interest in the survey was due to having a special interest in this topic. While the low response rate and potential for selection bias is a concern, previous research has demonstrated that pediatric physicians have lower response rates in web-based surveys compared to neurology, internal medicine and surgical counterparts [40]. Moreover, the focus on Eastern Ontario, while offering rich insights into a specific service context, may not fully reflect the diversity of challenges present in other regions with differing resource profiles. Finally, although the study incorporated a wide range of perspectives from health and social service providers, the exclusion of direct input from parents and caregivers limits the ability to fully capture the consumer experience of IECMH service delivery. When evaluating the implementation of the logic model and its impact on the community, there would be tremendous value in taking a co-design approach by incorporating voices from caregivers with lived experience in caring for a child with IECMH

concerns in the development and conduct of any future evaluations. Lastly, it is important to recognize the significant developmental shift that occurs from birth to six years. Stratified analysis on the different developmental stages across the first six years of life (e.g. ages 0–3 vs. 4–6 years) and understanding the impact of physician participants' specific medical specialties was beyond the scope of this pilot study and should be explored further in the future.

While this article describes the service gap for IECMH treatment first identified in 2016, the concern remains a persistent challenge in 2026. The lack of coordinated, accessible services for infants and caregivers, with limited specialized providers and inconsistent provincial investment was a problem identified in this environmental scan of Eastern Ontario. A decade later, these structural barriers remain largely unchanged and spans across Canada. National organizations continue to note shortages of clinicians trained in IECMH, long wait times, and fragmented care pathways that prevent families from accessing timely support during a critical developmental period [11]. Although pilot programs and policy discussions have emerged, they have not translated into widespread, sustainable service expansion. Moreover, the impact of the COVID-19 pandemic on children and caregivers' MH cannot be ignored. The COVID-19 pandemic significantly increased stress, anxiety, and caregiving strain among parents of young children due to disrupted childcare, reduced social supports, and heightened economic pressures [41]. These conditions also shaped young children's developmental environments, with reduced peer interaction and increased household stress linked to impacts on early social-emotional development [42]. As recent as 2025, with support from Children's Healthcare Canada, Deloitte Canada published a detailed report highlighting the need for further investment in children's healthcare by describing the estimated social return on investment for early intervention [43]. Pediatric MH was a focus throughout the report, with recommendations focused on using scalable, stepped-care approaches across various population groups to reduce equity barriers and outcome improvements. Together, these factors highlight how same inequities and challenges encountered in 2016 persist in 2026 along with new concerns impacting young children's MH and development, underscoring the ongoing need for coordinated system level reform and dedicated funding for the earliest years of life.

Considering the numerous identified service gaps and systemic barriers, the next phase of this project will be to focus on evaluating the implementation the logic model for a hospital-based IECMH service. The proposed model articulates a comprehensive framework that integrates components across the system of care continuum (from community-based prevention and promotion to

tertiary-level resources), delineating clear pathways for referral, assessment, and treatment for infants and young children with severe MH needs. Since the completion of the study, Kids Come First (Eastern Ontario's regional coordinated access organization) developed an IECMH-specific Pathway model for the Eastern Ontario [44]. The pathway uses the tiered system of care approach frequently recommended when designing child and adolescent MH services [22, 23] ranging from promotion/universal supports in Tier 1 (e.g., daycares, public health clinics, school programming, etc.), prevention/early intervention in Tier 2 (e.g., school programming, psychoeducation groups, community health centres, etc.) and treatment/intensive treatment in Tier 3 (e.g., inter-agency supports, hospital-based programming, etc.). As a specialized, hospital-based program (Tier 3), the logic model proposed in this study maintains the need for components required from tertiary-level and specialized supports in a tiered, system of care approach, including bidirectional relationships with frontline and community-based providers through consultation, shared care, and coordinated transitions, supporting both escalation to specialized treatment and step-down back to lower tiers as clinical needs evolve [23]. The subsequent implementation, and rigorous evaluation, of this model will be critical in determining its effectiveness and scalability.

The findings of this mixed-methods study underscore the urgent need for a coordinated, integrated approach to IECMH in Eastern Ontario; a problem that continues to be a persistent challenge despite advocacy efforts. Both community service providers and pediatric physicians, highlight significant challenges in accessing timely and specialized care for young children and their families. By developing a unified, multidisciplinary IECMH service at CHEO, there is potential to significantly improve clinical outcomes, reduce long-term societal costs, and ultimately promote healthier developmental trajectories for children in the region. This integrated model represents not only a clinical imperative, but also a transformative opportunity to align early intervention strategies with broader system-wide reforms in MH care.

Abbreviations

IECMH Infant and early childhood mental health
MH Mental health

Supplementary Information

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Supplementary Material 1

Supplementary Material 2

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Author contributions

KM, ALH, MV, and KP were each involved in the conceptualization, methodology, investigation, supervision, project administration and resources for the project. SG and JC contributed to the methodology, investigation, validation, data curation, formal analysis, and visualization. NS and CDS assisted with writing the visualization and, with KM, contributed to writing the original draft of the manuscript. All authors (KM, CDS, NS, ALH, MV, SG, JC, LP, BD and KP) had equal contribution to reviewing and editing the final manuscript.

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Data availability

The data that support the findings of this study are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The study was approved by the institution's Research Ethics Board (15/188X).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. Zero, to Three. ZERO TO THREE [Internet]. 2025 [cited 2025 May 29]. Advancing Infant and Early Childhood Mental Health. Available from: <https://www.zerotothree.org/issue-areas/infant-and-early-childhood-mental-health/>
2. Vasileva M, Graf RK, Reinelt T, Petermann U, Petermann F. Research review: A meta-analysis of the international prevalence and comorbidity of mental disorders in children between 1 and 7 years. *J Child Psychol Psychiatry*. 2021;62(4):372–81. <https://doi.org/10.1111/jcpp.13261>. PubMed PMID: 32433792.
3. von Klitzing K, Döhnert M, Kroll M, Grube M. Mental Disorders in Early Childhood. *Dtsch Arztebl Int*. 2015;112(21–22):375–86. <https://doi.org/10.3238/arztebl.2015.0375>. PubMed PMID: 26149380; PubMed Central PMCID: PMC4496484.
4. Wichstrøm L, Berg-Nielsen TS, Angold A, Egger HL, Solheim E, Sveen TH. Prevalence of psychiatric disorders in preschoolers. *J Child Psychol Psychiatry*. 2012;53(6):695–705. <https://doi.org/10.1111/j.1469-7610.2011.02514.x>.
5. Gosling CJ, Caparos S, Pinabiaux C, Schwarzer G, Rucker G, Agha SS, et al. Association between relative age at school and persistence of ADHD in prospective studies: an individual participant data meta-analysis. *Lancet Psychiatry*. 2023;10(12):922–33. [https://doi.org/10.1016/S2215-0366\(23\)00272-9](https://doi.org/10.1016/S2215-0366(23)00272-9).
6. Thomson KC, Richardson CG, Gadermann AM, Emerson SD, Shoveller J, Guhn M. Association of Childhood Social-Emotional Functioning Profiles at School Entry With Early-Onset Mental Health Conditions. *JAMA Netw Open*.

- 2019;2(1):e186694–186694. <https://doi.org/10.1001/jamanetworkopen.2018.6694>.
7. Zero to Three. DC:0-5 (Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood V2.0). 2nd ed. Washington, DC: Zero To Three Press; 2021.
 8. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition [Internet]. 5th ed, American Psychiatric Association Publishing. 2013 [cited 2026 Feb 11]. 0 p. (DSM Library). Available from: <https://doi.org/10.1176/appi.books.9780890425596> doi:10.1176/appi.books.9780890425596.
 9. Gleason MM, Finelli J. Introduction to Infant and Early Childhood Mental Health. *Child and Adolescent Psychiatric Clinics of North America*. Infant Preschool Mental Health: Assess Treat. 2025;34(2):143–56. <https://doi.org/10.1016/j.chc.2024.07.014>.
 10. Keren M. Infancy and Early Childhood Mental Health Assessment: Overview. In: Osofsky JD, Fitzgerald HE, Keren M, Puura K, editors. *WAIMH Handbook of Infant and Early Childhood Mental Health: Cultural Context, Prevention, Intervention, and Treatment, Volume Two* [Internet]. Cham: Springer International Publishing; 2024. pp. 153–5. Available from: https://doi.org/10.1007/978-3-031-48631-9_10 doi:10.1007/978-3-031-48631-9_10.
 11. Williams RC. From ACEs to early relational health: Implications for clinical practice. *Paediatr Child Health*. 2023;28(6):377–84. <https://doi.org/10.1093/pch/pxad025>.
 12. Dougherty LR, Leppert KA, Merwin SM, Smith VC, Bufferd SJ, Kushner MR. Advances and Directions in Preschool Mental Health Research. *Child Dev Perspect*. 2015;9(1):14–9. <https://doi.org/10.1111/cdep.12099>.
 13. Bellis MA, Hughes K, Ford K, Ramos Rodriguez G, Sethi D, Passmore J. Life course health consequences and associated annual costs of adverse childhood experiences across Europe and North America: a systematic review and meta-analysis. *Lancet Public Health*. 2019;4(10):e517–28. [https://doi.org/10.1016/S2468-2667\(19\)30145-8](https://doi.org/10.1016/S2468-2667(19)30145-8) PubMed PMID: 31492648; PubMed Central PMCID: PMC7098477.
 14. Vergunst F, Commisso M, Geoffroy MC, Temcheff C, Poirier M, Park J, et al. Association of Childhood Externalizing, Internalizing, and Comorbid Symptoms With Long-term Economic and Social Outcomes. *JAMA Netw Open*. 2023;6(1):e2249568. <https://doi.org/10.1001/jamanetworkopen.2022.49568>.
 15. Wakschlag LS, Roberts MY, Flynn RM, Smith JD, Krogh-Jespersen S, Kaat AJ, et al. Future Directions for Early Childhood Prevention of Mental Disorders: A Road Map to Mental Health, Earlier. *J Clin Child Adolesc Psychol*. 2019;48(3):539–54. 1561296 PubMed PMID: 30916591.
 16. Colizzi M, Lasalvia A, Ruggeri M. Prevention and early intervention in youth mental health: is it time for a multidisciplinary and trans-diagnostic model for care? *Int J Ment Health Syst*. 2020;14(1):23. <https://doi.org/10.1186/s13033-020-00356-9>.
 17. Cohen J, Oser C, Quigley K. Making it Happen: Overcoming Barriers to Providing Infant-Early Childhood Mental Health [Internet]. Zero to Three; 2012. Available from: https://www.zerotothree.org/wp-content/uploads/2019/12/Making-it-Happen_-_Overcoming-Barriers-to-Providing-Infant-Early-Childhood-Mental-Health.pdf
 18. Zero to Three. The IECMH Clinical Workforce Solution Pathways [Internet]. 2021 Jan 5 [cited 2025 Jul 29]. Available from: <https://www.zerotothree.org/resource/the-iecmh-clinical-workforce-solution-pathways/>
 19. Waddell C, Offord DR, Shepherd CA, Hua JM, McEwan K. Child Psychiatric Epidemiology and Canadian Public Policy-Making: The State of the Science and the Art of the Possible. *Can J Psychiatry*. 2002;47(9):825–32. <https://doi.org/10.1177/070674370204700903>.
 20. Saunders NR, Kurdyak P, Stukel TA, Strauss R, Fu L, Guan J, et al. Utilization of Physician-Based Mental Health Care Services Among Children and Adolescents Before and During the COVID-19 Pandemic in Ontario, Canada. *JAMA Pediatr*. 2022;176(4):e216298–216298. <https://doi.org/10.1001/jamapediatrics.2021.6298>.
 21. Buka SL, Beers LS, Biel MG, Counts NZ, Hudziak J, Parade SH, et al. The Family is the Patient: Promoting Early Childhood Mental Health in Pediatric Care. *Pediatrics*. 2022;149(Supplement 5):e2021053509L. <https://doi.org/10.1542/peds.2021-053509L>.
 22. Horen NM, Sayles J, McDermott K, Sippel-Klug K, Drake-Croft J, Long T. Infant and Early Childhood Mental Health (IECMH) and Early Childhood Intervention: Intentional Integration. *Int J Environ Res Public Health*. 2024;21(7). <https://doi.org/10.3390/ijerph21070870>.
 23. Hannigan B, Edwards D, Evans N, Gillen E, Longo M, Prymachuk S, et al. An evidence synthesis of risk identification, assessment and management for young people using tier 4 inpatient child and adolescent mental health services. *Health Serv Deliv Res*. 2015;3(22):260. <https://doi.org/10.3310/hsdr03220>.
 24. Zeanah CH Jr, editor. *Infant Mental Health: The Clinical Science of Early Experience*. Handbook of infant mental health. 4th ed. New York, NY, US: The Guilford Press; 2018. pp. 1–20.
 25. Mental Health Commission of Canada. *Early Childhood Mental Health: What We Heard - Report Summary* [Internet]. Ottawa, Canada: Mental Health Commission of Canada; 2020 [cited 2022 Jan 5]. Available from: https://mentalhealthcommission.ca/wp-content/uploads/2021/05/ECMH_What_We_Heard_Report_eng_0.pdf
 26. Kessler RC, Aguilar-Gaxiola S, Alonso J, Chatterji S, Lee S, Ormel J, et al. The global burden of mental disorders: An update from the WHO World Mental Health (WMH) Surveys. *Epidemiol Psychiatr Soc*. 2009;18(1):23–33. <https://doi.org/10.1017/S1121189X00001421>. Located at: Cambridge Core. 2011/04/11 ed.
 27. Sheehan DV, Harnett-Sheehan K, Raj BA. The measurement of disability. *International Clinical Psychopharmacology* [Internet]. 1996;11. Available from: https://journals.lww.com/intclinpsychopharm/fulltext/1996/06003/the_measurement_of_disability.15.aspx
 28. Endicott J, Spitzer RL, Fleiss JL, Cohen J. The Global Assessment Scale: A Procedure for Measuring Overall Severity of Psychiatric Disturbance. *Arch Gen Psychiatry*. 1976;33(6):766–71. <https://doi.org/10.1001/archpsyc.1976.01770060086012>.
 29. Government of Canada. Statistics Canada [Internet]. 2017. Census Profile, 2016 Census. Available from: <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E>
 30. Harris PA, Taylor R, Minor BL, Elliott V, Fernandez M, O’Neal L, et al. The REDCap consortium: Building an international community of software platform partners. *J Biomed Inform*. 2019;95:103208–103208. <https://doi.org/10.1016/J.JBI.2019.103208>.
 31. McLaughlin JA, Jordan GB. Using Logic Models. In: *Handbook of Practical Program Evaluation* [Internet]. 2015 [cited 2025 May 29]. pp. 62–87. Available from: <https://doi.org/10.1002/9781119171386.ch3> doi:10.1002/9781119171386.ch3.
 32. QSR International. NVivo. 2018.
 33. Microsoft Corporation. Microsoft Excel [Internet]. 2020. Available from: <https://office.microsoft.com/excel>
 34. Polihronis C, Cloutier P, Robson S, Beaudin K, Blackburn J, Dawson C, et al. HEADS-ED Under 6: A clinician-administered mental health and developmental screening and triage tool. *Paediatr Child Health*. 2025;30(4):312–9. <https://doi.org/10.1093/pch/pxae103>.
 35. Lieberman AF, Van Horn P, Ippen CG. Toward Evidence-Based Treatment: Child-Parent Psychotherapy with Preschoolers Exposed to Marital Violence. *J Am Acad Child Adolesc Psychiatry*. 2005;44(12):1241–8. <https://doi.org/10.1097/01.chi.0000181047.59702.58>.
 36. Baradon T, Biseo M, Broughton C, James J, Joyce A. *The Practice of Psychoanalytic Parent-Infant Psychotherapy: Claiming the Baby*. 2nd ed. London: Routledge; 2016. <https://doi.org/10.4324/9781315751016>.
 37. England NHS, Improvement NHS, National Collaborating Centre for Mental Health. *The Perinatal Mental Health Care Pathways* [Internet]. England, UK; 2018 [cited 2026 Jan 23]. Available from: <https://www.england.nhs.uk/wp-content/uploads/2018/05/perinatal-mental-health-care-pathway.pdf>
 38. Kemp L, Harris E, McMahon C, Matthey S, Vimpani G, Anderson T, et al. Benefits of psychosocial intervention and continuity of care by child and family health nurses in the pre- and postnatal period: process evaluation. *J Adv Nurs*. 2013;69(8):1850–61. <https://doi.org/10.1111/jan.12052>.
 39. State of Victoria. *The State of Victoria’s Children Report* [Internet]. Melbourne, Australia: Department of Education and Training; 2017 [cited 2026 Feb 1]. Available from: <https://www.education.vic.gov.au/Documents/about/research/SOV-2017-research.pdf>
 40. Cunningham CT, Quan H, Hemmelgarn B, Noseworthy T, Beck CA, Dixon E, et al. Exploring physician specialist response rates to web-based surveys. *BMC Med Res Methodol*. 2015;15(1):32. <https://doi.org/10.1186/s12874-015-0016-z>.
 41. Statistics Canada. Government of Canada [Internet]. Ottawa, Canada: Government of Canada. 2021. *Impacts on Parents and Children*. Available from: <https://www150.statcan.gc.ca/n1/pub/11-631-x/2020004/s8-eng.htm>
 42. United Nations Children’s Fund. UNICEF, New York UNICEF. 2021. *The State of the World’s Children 2021: On My Mind – Promoting, protecting and caring for children’s mental health*.
 43. Deloitte, Canada, Children’s Healthcare Canada. *Thrive: The Economic Case for Investing in Children’s Health* [Internet]. Toronto, Canada: Children’s

Healthcare Canada; 2025. Available from: <https://www.childrenshealthcarecanada.ca/media/xbdp3tff/thrive-final-report-sep-25.pdf>

44. Kids Come First. Infant and Early Childhood Mental Health Pathway for the Kids Come First Region: Prenatal to 6 Years Old [Internet]. Ottawa, Canada: Kids Come First. 2024. Available from: <https://www.kidscomefirst.ca/en/resourcesGeneral/galleries/Infant--Early-Child-Mental-Health-Pathway-for-the-Kids-Come-First-Region.png>

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