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REVIEW

Review of Innovative Mental Health Support for Children and Young People: Generative AI Co-design Applications and Challenges

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Abstract

Purpose of Review Digital technologies, particularly Generative AI (GenAI), offer transformative potential to better support children and young people with mental health conditions. This rapid review evaluated GenAI's application and the role of co-design in supporting mental health of children and young people.

Recent Findings Nine studies were included. Studies used a range of GenAI technologies, such as conversational agents and therapeutic simulations, to enhance engagement and personalisation in mental health care for young people. Co-design approaches, involving workshops, focus groups, and iterative feedback were variously used in the studies.

Summary This review highlights the transformative potential of GenAI in delivering engaging and tailored mental health support for children and young people. However, rigorous evaluation of long-term impact and scalability is needed. Integration of GenAI tools into human-led care, safeguards, and ethical frameworks also remain critical areas of future research to ensure privacy, clinical standards, and trust in digital mental health solutions.

Keywords Generative artificial intelligence · Mental health · Children and young people

Introduction

The prevalence of mental health challenges among children and young people has reportedly risen significantly, with conditions such as anxiety, depression, and behavioural disorders estimated to be affecting nearly one in five children annually [1]. The COVID-19 pandemic and associated lockdowns and social distancing has further exacerbated these issues, with prolonged isolation, disrupted routines, and heightened stress leading to a subsequent surge in mental health problems [2, 3, 4, 5]. Missed or untreated mental health conditions can have severe and lasting consequences, including impaired academic performance, strained relationships, and increased risks of substance abuse and social isolation [6]. These challenges often persist into adulthood, underscoring the urgent need for mental health solutions for children and young people that are innovative and accessible and that harness the potential of new technologies [7].

Traditional models of mental health care are often inadequate for meeting mental health needs of children and young people due to (a) barriers such as stigma, resource limitations, and geographical inaccessibility; and (b) current demand exceeding available support and contributing to high rates of staff burn-out and shortages [8, 9, 10]. Digital mental health interventions offer a promising adjunct to mental health services, leveraging technology to deliver scalable, personalised, and potentially 'bespoke' user-centred care [7]. Among these innovations, generative artificial intelligence (GenAI) tools, such as chatbots and conversational agents, have emerged as transformative technologies [10]. GenAI enables real-time, human-like interactions that simulate therapeutic conversations, provide personalised feedback, and adapt dynamically to user needs [10]. Additionally, advanced applications showcase the potential of GenAI to deliver immersive therapy and integrate multimodal insights for comprehensive mental health support [10, 11].

Involving children and young people in the co-design of digital tools is equally critical. Co-design methodologies actively engage end users—including children, parents or

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caregivers, and professionals—to ensure that interventions are safe, relevant, and aligned with user experiences and needs [12]. By integrating young people's input to GenAI design, developers can create inclusive and supportive digital environments that enhance engagement, usability, meaningful and identity-specific support, and mental well-being [13, 14]. Co-designed tools should emphasise safety and content appropriateness particularly for marginalised communities, while fostering a sense of ownership and empowerment among young users [14, 15].

While some research to date demonstrates the feasibility and initial effectiveness of GenAI technologies, a comprehensive synthesis of their applications, strengths, and limitations is needed to guide further research and development of GenAI applications for managing mental health in children and young people. This rapid review aimed to synthesise research on: (1) the application, effectiveness, and impact of generative AI for mental health support in children and young people; and (2) co-design methodologies engaging children and young people and their support networks in the development, implementation and evaluation of these technologies for mental health support. By focusing on these two areas, we aimed to provide a comprehensive overview of the current research landscape of GenAI and mental health in children and highlight gaps in knowledge to inform (a) further dialogue in this important area, and (b) future inclusive user-centred co-design research and GenAI-integrated mental health practice that is safe and effective.

Table 1 Search strategy

#	Searches
1	(mental* or mental health or psych*) and (condition* or disorder* or *health* or ill*)
2	Artificial intelligence or a.i.
3	"Generative artificial intelligen*" or "generative AI" or Genai or GAI
4	Bot or chatbot or chatgpt
5	(virtual or digital*) and (agent* or assist* or convers*)
6	"large language model" or LLM or "machine learning"
7	2 or 3 or 4 or 5 or 6
8	Child* or adolescen* or teen* or "young people" or youth* or kid*
9	Co-plan* or coplan* or "co plan*"
10	Co-creat* or cocreat* or "co create*"
11	Co-develop* or codevelop* or "co develop*"
12	Co-design* or codesign* or "co design*"
13	"Participatory action research" or PAR or "collaborative design" or "participant involved design"
14	9 or 10 or 11 or 12 or 13
15	1 and 7 and 8 and 14

Methods

This review employed a rapid review methodology, adhering to the Cochrane Rapid Reviews interim guidelines [16].

Search Strategy

The systematic search was conducted on November 4, 2024, applied across five databases: Cochrane Central, CINAHL, Embase, Medline (via Ovid), and PsycINFO. The search strategy was composed of keywords and where applicable relevant MESH terms relating to mental health, applications of artificial intelligence, children and young people and codesign (see Table 1).

Eligibility Criteria

For inclusion in the rapid review, publications were required to describe (a) co-design with children and young people, family members, teachers or health professionals; of (b) applications of GenAI for mental health prevention, promotion, or support for children and young people aged 4–18 years old (or mean age of the study population within this range).

Applications of GenAI for child and youth mental health support can be broad. Therefore, eligible applications of this technology described across publications included: (a) the use of GenAI for early detection and screening of mental health conditions in children and young people by analysing speech patterns, writing samples, and/or online behaviour; (b) GenAI-supported personalised therapy, tailoring interventions to individual needs and responses; or (c) provision of virtual support systems, such as '24/7' or 'on demand' chatbots offering emotional support, coping strategies, and crisis intervention. Additionally, GenAI could be applied to create educational tools to teach resilience, self-care, and mental health awareness; or provide parental and teacher support to help caregivers recognise and respond to mental health concerns. Finally, also eligible for inclusion were studies applying GenAI to analyse large datasets to (a) generate data-driven insights, identify trends and inform policies or practice; or (b) facilitate the digital delivery of mental health services including to underserved populations, such as those in rural or low-income areas, addressing barriers like cost, travel, and wait times. Eligible applications could aim to improve individual outcomes but also to foster a supportive environment involving family, educators, and healthcare providers, ensuring a holistic approach to mental health. There was no limitation on year of publication.

Exclusion Criteria

Publications were excluded if not written in English, not peer-reviewed (e.g. dissertations, online media, reports, book chapters), or not a full text publication (e.g. conference abstracts, or full text unattainable).

Study Selection

All documents identified during the database search were exported to EndNote (v21.2.0.17387), with potentially relevant titles imported into the Covidence systematic review software for further screening [17]. Both authors engaged in discussions of a small number of these titles to ensure a shared understanding of the inclusion and exclusion criteria prior to formal screening in Covidence. The two reviewers then independently screened all titles and abstracts, with discrepancies resolved through consensus discussions. The overall inter-rater reliability on screening of titles and abstracts as measured by Cohen's Kappa, was 0.205, indicating a moderate level of agreement among the reviewers. Studies that advanced to full-text review were initially screened by the second author, with decisions on inclusion or exclusion being checked by the first author to confirm respective decisions on inclusion and exclusions. At this stage, a single study was discussed between authors to reach consensus on the screening outcome, with authors agreeing on the decision for all other studies.

Data Extraction

Data were extracted from the included studies using ChatGPT4o [18] and was checked for accuracy by the first author. Data extracted included: (a) bibliometric details (e.g., author, publication year, country of publication): (b) study design (e.g., randomised controlled trial, pilot study, co-design protocol), (c) participant demographics (e.g., age range or mean age), (d) mental health outcomes measured (e.g., depression, anxiety, self-harm), (e) codesign processes (e.g., involvement of children and young people, iterative feedback loops, collaboration with educators and mental health professionals), (f) types of GenAI applications used (e.g., early detection, personalised therapy, virtual support systems, educational tools). These characteristics of the included studies are presented in Table 2. Tabulation was completed by ChatGPT4o [18] and reviewed for accuracy by the first author with minor corrections to extracted information required.

Critical Appraisal

The studies included in the review were categorised by study design, and relevant tools from the JBI suite of critical appraisal tools were applied [19]. Appraisals were conducted by ChatGPT4o, and checked by the first author for accuracy, revealing one discrepancy which was corrected.

Data Analysis

Included studies were analysed using narrative synthesis. This involved systematic collation, organisation, presentation, and interpretation of the data from the included studies without the use of statistical pooling. Firstly, we identified and explored key characteristics of the included studies, as well as categories, themes, and relationships within the data, to provide a coherent and comprehensive understanding of the research topic. The two authors discussed the categories and themes to reach consensus on the categories, themes and relationships identified. This collaborative process ensured the integration of diverse study designs, populations, approaches and outcomes across the studies; and for key insights and meaningful conclusions to be drawn.

Results

Characteristics of Included Studies

Flow of studies through the review is detailed in the PRISMA diagram, (See Fig. 1).

Following full text screening, nine studies were included with various designs: one quasi-experimental study [21], two feasibility and pilot studies [22], one feasibility study with case series [11, 23], three protocol studies [24, 25, 20], one implementation study [26], and one qualitative study [27]. The studies span a publication range from 2018 to 2024, reflecting increasing interest in digital mental health and co-designed interventions in recent years and reflecting the more recent advancements in GenAI.

Mental Health Outcomes across the Studies

The studies address a wide range of mental health outcomes, including emotion regulation [25], depression [26], anxiety [23], self-harm ideation [25], body image [20], social communication skills [21], coping strategies [22], resilience [22, 27], wellbeing [20, 22, 23, 26], and early identification and tracking of mood disorders [26]. In focusing on these areas, the studies employed a variety of tools to measure mental health outcomes, reflecting the diverse methodologies and target populations. Standardised self-report scales

Table 2 Characteristics of included studies table

Author, year	Study design	Country of publication	Age of participants (range and/or mean age)	Mental health outcome(s)	Codesign methodology	How GenAI was included in the study
Gabrielli, 2020	Feasibility and implementation pilot study	Italy	12–17 years (mean age 14.52)	Enhanced life skills, coping skills, mental well-being.	Formative evaluation. The co-design phase involved a participatory design workshop with 20 adolescents, where they used and commented on a prototyped session of the chatbot intervention to collect their needs and preferences for interactive content and timing of sessions, collected over 4 weeks.	Chatbot-based intervention that delivers life skills coaching through conversational agents, simulating human dialogue patterns. The coaching sessions are tailored to adolescents, enhancing engagement through relatable dialogue and media content.
Grové, 2021	Qualitative study	Australia	15–17 years (mean age 16.8 for questionnaire, 16.2 for interviews)	Promotion of well-being, resilience, and mental health literacy.	Iterative participatory co-design process including youth and expert reference groups providing feedback on the chatbot's creation and improvements, ensuring it was engaging for the target population. Youth input shaped chatbot personality, tone, and adaptive coping strategies, with iterative feedback rounds to refine features. Interviews, surveys and workshops.	The chatbot, named Ash, an AI powered chatbot, specifically using natural language processing, to simulate conversations and personalised responses and mental health support (including resources). The chatbot adapts based on user interactions.
Li, 2021	Mixed-methods study	Australia	12–17 years (mean age 14.94)	Reduction in depression and anxiety.	Focus groups, ideation workshops, user consultations, and prototype testing with young people, parents, and mental health professionals.	CBT smartphone app for depression and anxiety, developed for stand alone and adjunct use.
Livermore, 2024	Protocol study	United Kingdom	Intended for children aged 8 years and above	Mental health support for parents and caregivers.	Experience-based co-design (EBCD) methodology, involving focus groups and workshops with children, young people, parents, caregivers, and health professionals to shape the chatbot intervention.	The study aims to develop a chatbot intervention to support parents and caregivers, leveraging GenAI for providing information and support between appointments.
Matheson, 2021	RCT	Brazil	13–18 years	Improvement in body image and overall mental well-being.	Workshops with adolescents to understand their body image concerns and preferences, followed by iterative development feedback and usability testing of the chatbot.	The study includes a chatbot intervention using conversational agents to deliver therapeutic techniques via short term engagement.
Porayska-Pomsta, 2018	Quasi-experimental study	United Kingdom	4–14 years (mean: 8.54)	Enhanced social communication skills for autistic children.	Participatory design workshops with children, practitioners, and researchers to develop the ECHOES environment.	An AI virtual agent in combination with human practitioners.
Viduani, 2023	Feasibility and implementation study	Brazil	16–18 years	Mood assessment/tracking, and early identification of depressive symptoms.	Feasibility pilot with adolescents who tested the chatbot and provided feedback, leading to iterative improvements through collaborative feedback during testing phases.	WhatsApp-based chatbot to collect real-time data on adolescents' mood and behaviour, leveraging conversational AI for mental health monitoring.
Williams, 2024	RCT Protocol	United Kingdom	Intended for young people 16–25 years	Improved emotion regulation, reduced anxiety, and lower self-harm ideation.	LGBTQ+youth involved in the development of the Purrble robot to support in situ emotion regulation and address self-harm ideation.	A socially assistive robot, Purrble, leveraging AI to provide in-the-moment support.
Wrightson-Hester, 2023	Feasibility study with case series	Australia	16–24 years (9 of 13 participants within study eligibility range for inclusion)	Reduced depression and anxiety, and improved problem-related distress and goal conflict resolution.	Youth advisory committee of young people with lived experience of mental health problems provided iterative feedback.	AI-based chatbot, MYLO, to emulate method of levels therapy, supporting young people in exploring and resolving their mental health issues.

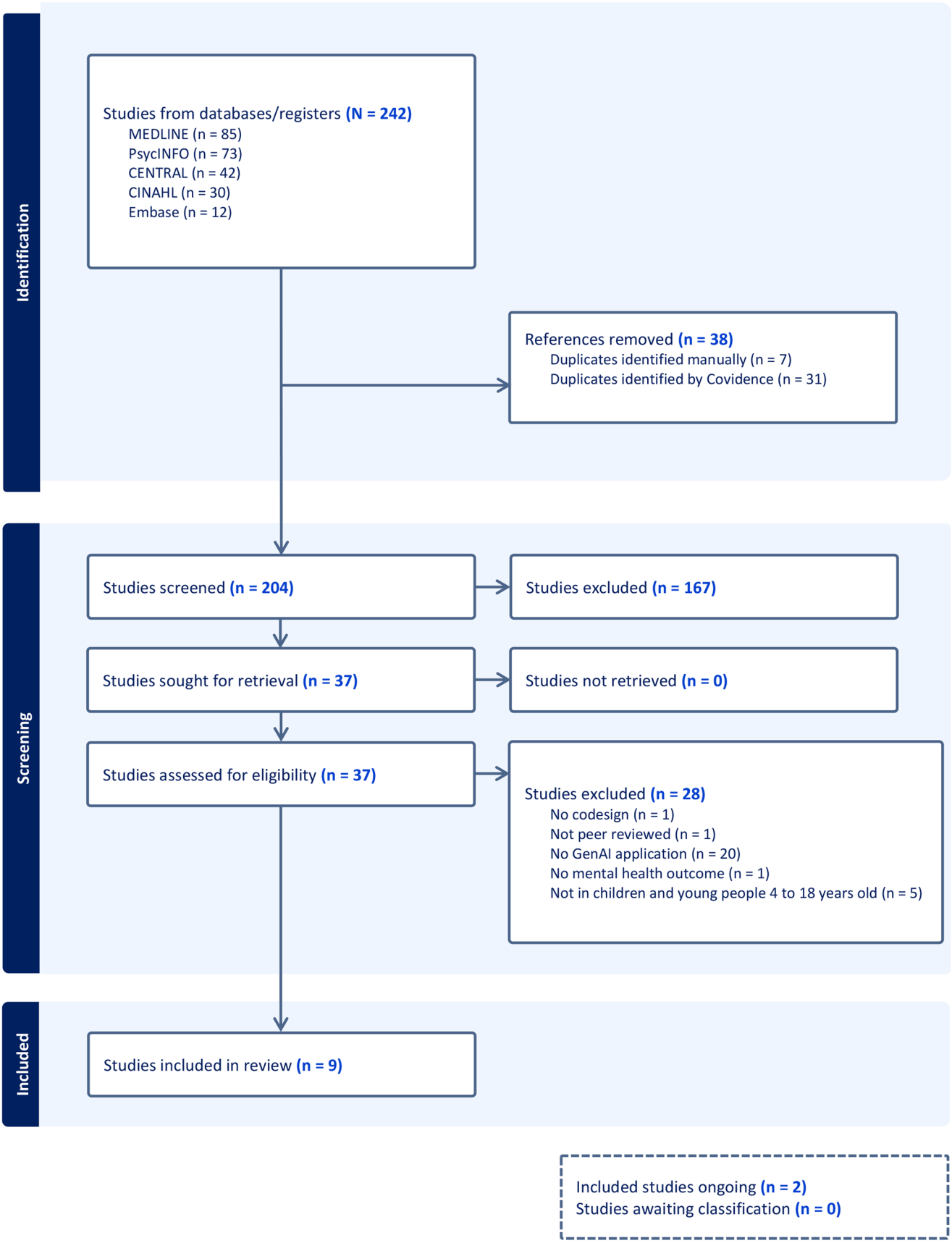

Fig. 1 PRISMA diagram. Generated by Covidence Veritas Health Innovation. Covidence systematic review software: www.covidence.org. Melbourne, Australia. 2024

were used in three studies, including the Short Mood and Feelings Questionnaire (SMFQ) for depression [26], the Generalized Anxiety Disorder-7 (GAD-7) scale for anxiety [23], the General Health Questionaaire-12 (GHQ-12) for psychiatric impairment [23], Patient Health Questionnaire (PHQ-9) for symptoms of depression [23], and the Difficulties in Emotion Regulation Scale-8 (DERS-8) for emotion regulation [25]. The Self-Harm Questionnaire (SHQ) for self-harm, the DERS-8 for emotion regulation, the GAD-7 scale for anxiety, and PHQ-9 for symptoms of depression were also noted as planned assessment tools in a protocol study [25], and state- and trait-based body image scales for body image in another protocol study [20].

Across five of the studies, qualitative methods were also prominent, including observational assessments of social communication in autistic children [21] and focus groups exploring resilience and well-being [27]. Usability evaluations and participant feedback surveys provided insights into coping strategies, mood tracking, and the overall acceptability of approaches [22, 23, 26]. Together, usability evaluations and surveys captured a broad range of mental health outcomes, combining standardized scales with qualitative and user-centered approaches to provide a comprehensive assessment.

Codesign Methodology across Included Studies

All the studies reviewed employed co-design methods, variously engaging key end users such as children and young people, parents, caregivers, educators, and health professionals. The co-design approaches used emphasised meaningful end user engagement as a cornerstone of development. The body of research also reflected researcher engagement with diverse groups of people —including children and young people, parents, health professionals, and educators—who actively contributed to the design process. Young people were frequently positioned as both end-users and co-creators; shaping app content, visual design, and functional features to better align with their preferences and needs. Studies targeting family-centered interventions incorporated parents as key informants, offering practical insights to improve usability and the functionality of support tools for their specific contexts. Additionally, health professionals played a pivotal role in ensuring that approaches were, in their view, clinically sound and aligned with therapeutic goals.

To facilitate this engagement, researchers used a variety of participatory methods. Approaches included focus groups [24], workshops [11, 27], and iterative feedback from users [21, 23, 26]. Workshops were employed to refine chatbot interaction styles and therapeutic content [11, 22]. Focus groups were used in studies where parents shared their experiences to identify gaps in current support systems [24]. Surveys and interviews further enriched the design process by capturing detailed user feedback on prototypes and acceptability of applied approaches [22, 23, 27] and were integral to providing ongoing insights. Grove [27], described these methods as being helpful in shaping a chatbot's personality, features and content. Authors of other studies described these methods as helpful in gathering detailed feedback on the user experience [22, 23], perceived usefulness, value and innovativeness of the intervention [22], engagement [23], gathering detailed feedback on prototypes, usability and ease of use [22, 27], user satisfaction [23], effectiveness [22, 27], feasibility [22, 23], and obtaining suggestions for improvements from participants [22, 23]. These methods helped to ensure that interventions met the needs of young people and expert stakeholders, and shaped development and refinement. For example, iterative design phases were used to adapt chatbot features; ensuring that they were engaging, accessible, and aligned with user expectations [23, 26]. Studies often tailored these processes to specific user groups. Adolescents, for instance, guided decisions on content relevance, aesthetics, and conversational flow [20, 22, 24, 27]; while parents helped shape practical aspects like ease of use and navigation [11, 24].

Unique approaches to co-design were reported in three of the studies. Two studies exemplified creative, multi-stakeholder collaborations through partnering with organisations like UNICEF and technology developers [20, 22]. These partnerships not only enhanced scalability but also ensured cultural relevance for interventions. In another study, artificial intelligence (AI) learning was incorporated into co-design, enabling the chatbot to adapt in real-time based on user input; a novel feature that bridged user experience and therapeutic interaction [23]. The outcomes of co-design efforts were positive. Most studies reported high levels of user satisfaction, with participants appreciating how their input shaped the final products [21, 22, 23, 26, 27]. This participatory process also resulted in AI-enhanced tools that were perceived as more usable, engaging, and clinically effective. By integrating user feedback throughout development, researchers demonstrated the value of co-design in creating tailored, impactful digital mental health support for children and young people.

Application of GenAI across Included Studies

GenAI played a pivotal role across all nine studies, with researchers considering ways to offer innovative approaches to mental health support [11, 20, 21, 22, 23, 24, 25, 26, 27]. A prominent application across the studies was the creation of conversational agents, enabling chatbots to simulate natural, human-like interactions and conversational learning [22, 23,

26]. These chatbots provided scalable and accessible ways to deliver mental health support to diverse populations through applications of GenAI [22, 23, 26, 27]. For example, in one study a chatbot was developed to teach life skills to adolescents, incorporating engaging dialogues and multimedia features [22]; while in another a WhatsApp-based chatbot was codesigned to collect real-time longitudinal data on adolescent mood fluctuations [26]. Wrightson-Hester et al., 2023 integrated a natural language processing platform and conversational agent to employ 'curious questioning' techniques inspired by therapeutic approaches to foster user engagement [23].

Beyond basic conversational capabilities, some researchers applied GenAI to simulate therapeutic interactions. For instance, Wrightson-Hester, et al., [23] developed and tested a chatbot to emulate a therapy method focused on open-ended questioning to help users reflect on their challenges and achieve emotional resolution. Williams, et al., [25] employed another approach, using a socially assistive robot equipped with AI-driven responses to enhance emotion regulation for young people experiencing self-harm ideation, creating a personalised and interactive therapeutic tool [25].

Adaptability in response to user input was another key feature enabled by GenAI in several of the studies. One chatbot demonstrated real-time conversational learning by adjusting its responses based on user input [23], while another highlighted co-designed features that allowed dynamic customisation of conversations to meet the specific needs of young users [27]. GenAI was also valuable for real-time mental health assessment. A chatbot designed to monitor adolescent mood fluctuations used natural language processing and scripted prompts to capture meaningful data [26], while a separate app integrated cognitive behavioural therapy principles with AI features to enhance user engagement and autonomous interaction [11].

In three studies, GenAI also supported interventions tailored to specific populations. For instance, one chatbot aiming to promote positive body image among adolescents was developed through scripted AI-driven dialogues and tested during a short intervention period [20]. A protocol paper included details on the parameters of a chatbot to support parents of children with chronic health conditions, integrating AI to address knowledge gaps and provide tailored information [24]. In a school-based intervention, a combination of human and AI-driven interactions was used to enhance social communication skills among autistic children, leveraging AI to support and amplify practitioner-led sessions [21].

Across the studies, integration of GenAI-supported approaches with human-led care was limited but demonstrated promising potential [20, 21, 22, 23]. Porayska-Pomsta, et al., [21] explicitly combined AI-driven interactions with practitioner-led sessions, using a hybrid model to enhance social communication skills among autistic children [21]. This approach highlighted the complementary role AI can play in augmenting clinician expertise and tailoring interventions in real time. While other studies primarily focused on standalone GenAI tools, such as chatbots and apps designed for autonomous use [20, 22, 23], the findings suggest opportunities for future beneficial integration.

Critical Appraisal

Critical appraisal was adapted from JBI checklists [19], completed for all included studies and highlighted a diverse range of methodologies and rigor in implementation (see Table 3). All of the original research studies ($n=9$) demonstrated strengths in outcome measurement and relevance to target populations. However, only two of these studies adequately addressed randomisation [20, 25]; and blinding was evident in only one study [20]. Only one study addressed baseline similarity [11] and the two protocol studies planning to address this criterion [20, 25]. The randomised controlled trials described across the two protocol papers [20, 25], scored the highest and employed rigorous methodologies, including: randomisation, baseline similarity assessment processes, thorough statistical analysis, and robust outcome measurement. This provided high confidence towards future findings regarding chatbot interventions for mental health support for Brazilian adolescents with body image concerns [20] and in situ emotion regulation among LGBTQ+youth in the United Kingdom [25].

Qualitative and feasibility studies (such as [23, 27]) captured co-design elements and participant engagement but did not include randomisation or baseline comparability, as expected for exploratory research. These studies provided valuable contextual insights but are by design limited in their ability to infer causality or assess long-term effectiveness. Studies utilising implementation methods (such as [11, 21, 22]) performed well in demonstrating feasibility and participant acceptability but lacked rigorous randomisation and statistical frameworks. Overall, while varying greatly in methodological rigour, the included studies consistently demonstrated the feasibility and relevance of GenAI advancements to mental health care for children and young people, and particularly for adolescents and underserved populations.

Table 3 Critical appraisal results

Study	Study design	JBI tool advised	Randomisation	Blinding	Baseline similarity	Outcome measures	Follow-up completeness	Statistical analysis	Feasibility	Relevance
Gabrielli, 2020	Feasibility and implementation pilot study	Checklist for Analytical Cross-Sectional Studies	Unclear	No	No	Yes	Yes	Unclear	Yes	Yes
Grove, 2021	Qualitative study	Checklist for Qualitative Studies	N/A	N/A	N/A	Yes	N/A	N/A	Yes	Yes
Li, 2021	Mixed-methods design for app development	Checklist for Mixed Methods Research	Unclear	No	Yes	Yes	Yes	Yes	Yes	Yes
Livermore, 2024	Protocol for co-designed intervention	Checklist for Qualitative Studies	N/A	N/A	N/A	Yes	N/A	N/A	Yes	Yes
Matheson, 2021	Protocol for RCT	Checklist for RCTs	Yes	Yes	N/A	Yes	N/A	Yes	Yes	Yes
Porayska-Pomsta, 2018	Quasi-experimental study	Checklist for Quasi-Experimental Studies	N/A	N/A	N/A	Yes	N/A	Yes	Yes	Yes
Viduani, 2023	Feasibility and implementation study	Checklist for Analytical Cross-Sectional Studies	No	No	Unclear	Yes	Yes	Yes	Yes	Yes
Williams, 2023	Protocol for RCT	Checklist for RCTs	Yes	No	N/A	Yes	N/A	Yes	Yes	Yes
Wrightson-Hester, 2023	Feasibility study with case series	Checklist for Qualitative Studies	N/A	N/A	N/A	Yes	N/A	Yes	Yes	Yes

Discussion

This rapid review highlights a relatively small body of literature reflecting the transformative potential of digital mental health interventions that integrate GenAI and co-design methodologies to address critical mental health challenges in children and young people. The findings demonstrate the versatility of GenAI in creating innovative solutions, including conversational agents, adaptive therapeutic interactions, real-time mood assessments, and immersive therapy tools. These applications demonstrate the ability of GenAI-enhanced approaches to potentially enhance accessibility, scalability, and user engagement, particularly for underserved populations. However, this review also revealed that this is an emergent area for research and identified several limitations and challenges that warrant further inclusive, co-design research and attention as GenAI technologies advance.

Applications of GenAI and Co-Design

GenAI tools were central to approaches to improving mental health care for children and young people, illustrating its capacity to mimic therapeutic techniques, adapt dynamically to user input, and deliver personalised mental health support for this population [21, 23, 25]. These technologies also minimised recall biases in real-time mood assessments and offered novel opportunities for monitoring mental health outcomes [11, 26]. Additionally, co-design methodologies played a pivotal role in tailoring interventions to the specific needs of young people, families, and professionals [20, 22, 27]. Engaging diverse stakeholders ensured the safety, relevance, and inclusivity of these tools, fostering a sense of ownership and enhancing usability [21, 23, 26].

The studies demonstrated unique applications of GenAI for specific populations, for example, AI-driven dialogues to promote positive body image among Brazilian adolescents through engaging and scripted interventions [20]. Another protocol study proposed the development of a chatbot designed to address knowledge gaps and provide tailored support for parents of children with chronic health conditions [24]. In another example, a combination of AI and human interaction effectively supported autistic children's social communication skills in a school-based intervention [21]. These examples highlighted the adaptability of GenAI to various cultural and contextual needs, while also emphasising the importance of further customisation to meet the diverse requirements of different user groups.

The integration of GenAI with human-led approaches to service delivery was limited across the studies but showed some potential. While most studies focused on standalone GenAI tools and approaches, findings suggested opportunities for hybrid models that balance automation with professional oversight to provide scalable, personalised mental health support for children and young people. Bridging human-led service models with AI-driven technologies to create AI-enhanced human services could offer a scalable, personalised approach to mental health support, particularly in contexts requiring a balance of automation and professional oversight.

In addition to the findings from the reviewed studies, it is essential to consider the broader strategic directions in health and service delivery. Globally, relevant directions are touched on across academic literature (e.g. 28–33). Likewise, both in Australia (e.g. 34–39) and internationally (e.g. 40–45) various government documents and statements from peak organisations help highlight critical considerations in this space. Highlights include the importance of organisational readiness [28, 34, 36, 39–44]; use case prioritisation [34, 36, 40–44]; infrastructure capabilities [29, 30, 31]; emphasis on effective, safe, functional [35, 37, 39, 41–44], co-designed and people-centered care and research-design [32, 33, 37, 38, 40, 43]; accuracy [35]; scalability [31, 35, 37]; and upholding professional standards relating to principles such as privacy, confidentiality, duty of care, and ethical considerations [32–44]. These recommendations can inform the development and deployment of GenAI tools in mental health care, ensuring that they are used responsibly and effectively, ultimately enhancing the quality and impact of care provided to young people.

Challenges and Limitations

Several challenges emerged from the studies, particularly in relation to sample diversity, scalability, and long-term efficacy. Many interventions relied on small or convenience samples, limiting generalisability. Additionally, studies often evaluated short-term outcomes without robust follow-up, leaving questions about the sustainability of benefits. The critical appraisal highlighted considerable variability in methodological rigour across the studies. Common limitations included a lack of randomisation and blinding in many studies, reflecting the exploratory nature of much of the research. While GenAI approaches demonstrated scalability in theory, deployment at a larger scale remains underexplored, with few studies addressing implementation barriers or user experiences in diverse settings. Measurement issues were also prevalent, with many studies relying on self-reported data, which is subject to biases. Standardised tools, while useful, may not fully capture the complexity of mental health outcomes in diverse populations. Incorporating mixed methods, including observational data and qualitative insights, could strengthen future evaluations.

Co-design, while a significant strength, also posed notable challenges in balancing the diverse needs of end user groups, including young people, parents, and professionals or service providers. While iterative feedback processes proved valuable in refining approaches, they were often resource-intensive and time-consuming; potentially limiting the ability to address the needs of underrepresented groups such as culturally diverse or socioeconomically disadvantaged populations. Moreover, some AI-driven tools (e.g., [23]) faced technical limitations; such as repetitive content and challenges in interpreting nuanced user inputs, which negatively impacted user engagement and satisfaction. These limitations accentuate the importance of advancing AI capabilities to better understand and respond to the complexity of human interactions.

Engaging children and young people with mental health conditions in digital interventions presents several challenges. Stigma and trust issues can prevent young people from seeking help or engaging with digital tools, as they may fear judgment or doubt the effectiveness and confidentiality

of these interventions [22, 25]. Accessibility and digital literacy are also significant barriers, as not all young people have access to the necessary technology or stable internet connections, and varying levels of digital literacy can impact their ability to engage with and benefit from digital tools [24, 26]. Personalisation and relevance are crucial, as generic interventions may not address the unique needs and preferences of each young person, making it essential to ensure that the content is engaging and relevant [23, 25]. Privacy and ethical concerns, such as data security and informed consent, need to be carefully managed to protect user information and address potential biases [23, 26]. Additionally, effective integration of digital tools such as GenAI with human-led care requires coordination between digital and human services, ensuring that young people have access to human support when needed to avoid over-reliance on digital tools without adequate oversight [23, 24]. Addressing these challenges is essential to enhance the engagement and effectiveness of digital interventions for young people with mental health conditions.

Future Directions

The results of this review indicate an urgent need for user-centred and co-design research of GenAI and mental health applications for children and young people. Building on this body of studies reflecting exploratory research, future research should prioritise larger diverse samples in qualitative designs; and, in quantitative studies, representative samples and robust longitudinal evaluations. For example, Viduani et al. [26] note the potential for future longitudinal research projects in this space to collect data over extended periods of time that would enhance understanding of temporal changes in mental health diagnosis and symptoms and individual and group trajectories in mental health in young people. Advanced AI capabilities should also be developed to enhance adaptability and responsiveness, ensuring tools meet the needs of varied populations. Grove [27] highlighted the need for ongoing updates and improvements to the chatbot based on user feedback. They also suggested scaling the chatbot to a wider audience and potentially integrating it into school and healthcare settings to support mental health and well-being [27]. Exploring scalable implementation strategies and refining co-design methodologies will be critical for optimising the impact of digital mental health interventions. Gabrieli et al., [22] report future plans to integrate their chatbot into the Cyberbullying Effects Prevention (CREEP) platform and test it with a larger sample of secondary school students in Italy and France.

Future research should also explore ways to streamline co-design processes, such as applying remote or digital methods to improve inclusivity and efficiency while prioritising the development of adaptive AI algorithms capable of delivering more personalised and context-sensitive and culturally appropriate interactions. Viduani et al., [26] note future research could explore integrating more advanced AI and natural language processing capabilities to improve the chatbot's ability to handle a wider range of responses and reduce user frustration. By addressing these challenges, co-design and AI-driven approaches can achieve broader applicability and greater impact across diverse populations. By leveraging these advancements, future approaches can provide equitable, effective mental health support globally. Furthermore, our critical appraisal of studies reviewed highlighted variability in methodological rigour and emphasised the need for future research to adopt more robust designs; particularly to validate scalability and the long-term impact of GenAI supported approaches to mental health care for children and young people.

Finally, the strategic imperative of governing GenAI in healthcare highlights the need for robust governance structures that prioritise ethics, security, and compliance. These governance frameworks are vital for the ethical and secure implementation of GenAI in mental health interventions. While GenAI has the potential to play a valuable and novel role in supporting the mental health of children and young people, the reality is that ethical and risk considerations have not kept pace with GenAI adoption in child and youth mental healthcare [33]. Very few ethical guidelines and safety protocols have been produced [34, 36, 43, 45] and these are not yet co-designed with children and young people, family members and mental health professionals. This carries significant ethical and legal risks and implications for the privacy, confidentiality, consent and safety of children and young people receiving mental healthcare support [33]. If GenAI is to be used to augment mental health services, ethical guidelines and safety protocols must first be developed. These include clinical decision and documentation tools, standards on disclosing GenAI use, and compliance with professional, privacy, confidentiality, and consent regulations [33].

In line with these considerations, authors of the included studies highlighted several specific safety concerns regarding the use of GenAI enhanced support for youth mental health. These included ensuring the chatbot provides relevant and empathic responses [22], safeguarding user data and maintaining confidentiality [27], and providing accurate and developmentally appropriate information to avoid distress [27]. Additionally, robust data security measures are essential to protect user information, and crisis contact information should be readily available to support users in distress [23]. Ethical considerations included addressing digital poverty to ensure equitable access [24], preventing overreliance on socially assistive robots [25], and implementing

safeguarding procedures to protect participants, especially when dealing with sensitive topics like self-harm and mental health issues [25]. Viduani et al., [26] noted the importance of ongoing ethical reassessment as chatbot technology evolves, particularly concerning privacy, data security, and the management of adverse incidents.

Conclusion and Implications

Findings of this review highlight the transformative potential of GenAI tools in delivering scalable, engaging, and tailored mental health interventions for children and young people. By integrating co-design methodologies, these tools have demonstrated significant usability and acceptability, particularly among children and young people. However, challenges such as technical limitations, resource-intensive development processes, and the need to improve inclusion of underrepresented groups remain. Advancing AI capabilities and streamlining participatory design processes will be essential for achieving greater inclusivity and effectiveness in future research. As digital mental health continues to evolve, future research should focus on co-design and on rigorously evaluating these tools' long-term impact, scalability, and adaptability to ensure they meet the complex needs of children and young people in real-world settings.

From a practical perspective, integrating GenAI tools into mental health services offers opportunities to extend the reach of these services, particularly in underserved populations. Clinicians could use these tools to augment existing therapeutic approaches, providing ongoing support between appointments and real-time mental health monitoring for children and young people with mental health problems. Additionally, co-designed, GenAI supported approaches could facilitate better engagement with a wider group of children and young people, by improving alignment with their unique needs and preferences. Finally, the development of safeguards and ethical frameworks to ensure these technologies are integrated into human-led care in ways that protect user privacy, uphold clinical standards, and foster trust in digital mental health solutions remains a key priority area of need in this field.

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Author Contributions Both authors conceived the study together. JD conceived the methodological approach, initially drafted the introduction, methods, results, discussion and conclusion text, contributed to screening texts, compiled figures and tables, and checked the accuracy of all data extraction and critical appraisal of study following initial completion by ChatGPT. Both authors built and piloted the Search Strategy. DS conducted the search strategy, compiled all returns into Endnote and uploaded the full set of records into Covidence, and compiled the included search strategy table in supplementary materials. DS also contributed to screening texts. All authors reviewed and finalised all text, tables and figures together.

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Declarations

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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