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Article

Digital Humanities in Child and Adolescent Mental Health Services: A Review

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Abstract

Artificial intelligence (AI) is increasingly deployed in mental health services, including clinical decision support, risk prediction, and digital therapeutics. However, ethical, relational, and cultural frameworks to guide responsible AI integration remain conceptually contested and underdeveloped. This review examined how digital humanities–informed approaches shape the development, implementation, evaluation, and governance of AI-supported tools in youth mental health contexts. We reviewed peer-reviewed literature (2015–2025) spanning empirical, theoretical, and conceptual studies of humanities engagement in AI-enabled behavioral health systems for children and adolescents. Six interrelated themes emerged: meaning-centered engagement, participatory co-design, human-in-the-loop oversight, equity-oriented data practices, ethics-to-governance translation, and sociotechnical implementation. Digital humanities approaches, including participatory storytelling, youth co-design, arts-based platforms, and embedded ethics frameworks, were frequently integrated as core architectural features rather than peripheral enhancements. Interventions spanned schools, outpatient clinics, digital-first platforms, community programs, and crisis contexts, with developmental stage and structural adversity shaping engagement and effectiveness. Moderate-certainty evidence supports targeted symptom outcomes, while prevention, engagement, and equity findings remain lower certainty but policy-relevant. Overall, digital humanities function as structural design and governance infrastructures. Sustained, developmentally informed, and culturally grounded integration is essential for ethical and equitable AI-enabled youth behavioral health care.

Keywords: artificial intelligence; child and adolescent mental health; digital mental health interventions; ethics of care

1. Introduction

Mental health services for children and adolescents face persistent structural strain. Rising prevalence of anxiety, depression, trauma exposure, and neurodevelopmental conditions has converged with workforce shortages, geographic inequities, and prolonged waitlists, producing substantial disparities in timely access to care [1–3]. In response, digital innovation has accelerated. Artificial intelligence (AI)–enabled screening tools, telehealth platforms, mobile applications, and chatbot-based supports are increasingly deployed to mitigate systemic barriers in pediatric behavioral health [4,5]. Meta-analytic evidence suggests that certain youth-focused digital mental health interventions (DMHIs) can yield statistically significant symptom reductions, particularly for social anxiety and depressive disorders, although effect sizes are often modest and moderated by guidance intensity, developmental stage, and engagement quality [6–8].

Yet, as digital systems proliferate, critical questions emerge regarding their ethical foundations and relational consequences. Scholars and policymakers caution that AI-supported technologies introduce risks related to privacy, algorithmic bias, opaque decision-making, and inequitable access [9,10]. Sociodemographic underreporting in app-based trials further constrains equity analysis and external validity [11]. Moreover, automated agents, while offering 24/7 accessibility, lack the

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relational accountability and contextual discernment central to therapeutic care, raising concerns about depersonalization and erosion of trust [9,10]. Calls for human-centered and ethics-of-care frameworks in digital mental health underscore the need to foreground transparency, safety, and relational integrity in technology design and governance [9].

This ethical inflection point is particularly salient in child and adolescent contexts. Young people experience mental health not merely as discrete symptom clusters but as lived narratives embedded within family systems, peer networks, cultural communities, and developmental trajectories [12–14]. Developmental and ecological models emphasize that youth well-being is relationally and culturally constituted; therefore, technological interventions that abstract individuals into data points risk obscuring the social and narrative dimensions of recovery.

Concurrently, digital humanities offers a critical, yet under-integrated, framework for reorienting innovation in youth behavioral health. As an interdisciplinary field, digital humanities integrates computational methods with interpretive inquiry to examine how digital technologies shape culture, identity, ethics, and power [15–18]. Its methods, like participatory storytelling, digital art, graphic medicine, immersive media, and community-based co-design, prioritize narrative agency and cultural context [19–22].

Within youth mental health, these approaches align closely with empirical findings from the digital mental health literature. Systematic and scoping reviews consistently identify engagement, co-design, caregiver involvement, and cultural responsiveness as key determinants of the effectiveness of digital mental health interventions [23–25]. Youth-centered co-design improves usability and acceptability, while caregiver participation enhances retention and continuity of care [23,24]. Moderation analyses indicate that developmental stage and relational supports shape intervention outcomes [7]. Persistent deficits in demographic reporting and cultural tailoring further reinforce the need for equity-informed design frameworks [11]. Together, this body of evidence suggests that narrative, relational, and cultural factors are not peripheral to digital effectiveness. They are foundational.

Humanities traditions in narrative ethics, philosophy of psychiatry, and values-based practice provide normative grounding for this integration. These traditions emphasize dignity, autonomy, interpretive meaning, and the moral dimensions of care [14,26,27]. In the context of AI-supported behavioral health, such perspectives could function as guardrails against reductive algorithmic logic. For children and adolescents whose voices are frequently mediated by caregivers, institutions, and increasingly by data infrastructures, these traditions could also affirm the necessity of safeguarding youth agency. Embedding narrative infrastructures within digital platforms can humanize care, mitigate stigma, and counteract the reduction of young people to predictive risk scores [28,29].

Emerging examples illustrate this potential. Culturally co-designed digital mental health tools developed with Asian American young adults demonstrate improved alignment with community narratives and values [30]. Digital storytelling programs adapted to Indigenous healing traditions report enhanced engagement and culturally resonant outcomes [31]. These initiatives illustrate how humanities-informed approaches correct the limitations of standardized digital solutions by foregrounding diversity in lived experience and recovery pathways.

Nevertheless, despite promising case reports and theoretical support, the evidence base for digital humanities interventions in youth mental health remains fragmented. Many initiatives are qualitative, small-scale, or embedded within broader digital programs. Barriers, including digital literacy disparities, uneven broadband access, workflow integration challenges, and concerns about triggering content, require systematic synthesis [32].

Taken together, this landscape reveals both conceptual promise and empirical ambiguity. While digital mental health research increasingly acknowledges engagement and cultural context as determinants of effectiveness, no comprehensive synthesis has mapped how digital humanities methodologies are being operationalized within child and youth mental health systems. A review is therefore warranted to examine the breadth, characteristics, and implications of humanities-informed digital interventions in pediatric behavioral health.

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Accordingly, the present review aims to map the existing literature on digital humanities–informed interventions within mental health service settings for children and adolescents. Specifically, it seeks to (1) identify the types of digital humanities methods employed (e.g., digital storytelling, participatory media, arts-based technologies, AI systems incorporating narrative elements); (2) characterize the populations and service contexts in which these approaches are implemented; (3) synthesize reported outcomes, including impacts on stigma, engagement, empowerment, clinical indicators, and recovery processes; and (4) analyze how these interventions address ethical and cultural considerations and align with recovery-oriented principles.

Beyond descriptive mapping, this review critically interrogates themes with direct implications for AI governance in public-sector behavioral health systems, including cultural responsiveness, youth agency, narrative legitimacy, and the ethical dimensions of algorithmic mediation. By integrating perspectives from digital humanities, recovery research, and implementation science, the review aims to inform policy development, funding strategies, and infrastructure planning that support ethically grounded, culturally responsive, and developmentally attuned innovation. Ultimately, clarifying the intersection of humanities-informed approaches with digital and AI technologies can help ensure that technological transformation strengthens, rather than erodes, the relational and humanistic foundations of youth behavioral health care.

2. Methods

2.1. Design

Information Sources and Search Strategy. To identify relevant literature at the intersection of the humanities and AI-based digital mental health tools, this study searched PubMed for secondary research between January and February 2025. Search strings were applied to titles and abstracts, combining terms related to digital technologies, youth populations, mental health, and humanities. The following search strategy was used:

((“digital”[Title/Abstract] OR “artificial intelligence”[Title/Abstract] OR AI[Title/Abstract] OR “machine learning”[Title/Abstract] OR chatbot*[Title/Abstract] OR “large language model*”[Title/Abstract])
AND
(child*[Title/Abstract] OR youth[Title/Abstract] OR adolescent*[Title/Abstract])
AND
(“mental health”[Title/Abstract] OR depression[Title/Abstract] OR anxiety[Title/Abstract] OR wellbeing[Title/Abstract])
AND
(humanities[Title/Abstract] OR ethics[Title/Abstract] OR narrative[Title/Abstract] OR storytelling[Title/Abstract] OR philosophy[Title/Abstract] OR culture[Title/Abstract]))

This search yielded 1,648 records (Figure 1). To ensure interdisciplinary breadth, a supplementary semantic search was conducted using the Elicit engine [33], which draws from the Semantic Scholar and OpenAlex databases. The queries “Digital Humanities in Mental Health Services” and “Digital Humanities in Children Mental Health Services” were used to retrieve studies that explicitly address the integration of humanities disciplines, including ethics, philosophy, narrative studies, and cultural analysis, into AI-enabled health technologies. Records were imported into a centralized, web-based screening workspace for duplication and subsequent evaluation. Screening was conducted in two stages (title/abstract followed by full-text review) against predefined eligibility criteria. Titles, abstracts, and full-text articles were screened by a single reviewer using predefined eligibility criteria. Data extraction and thematic coding were conducted by the same reviewer and subsequently reviewed through collaborative discussion among the authors to enhance analytic rigor and ensure alignment with the study objectives. In line with the study’s objective of aggregating pre-validated, high-quality evidence across diverse clinical contexts, inclusion was restricted to scoping and systematic reviews that synthesized digital humanities applications in child

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and adolescent mental health services. This review was conducted in accordance with the PRISMA Extension for Scoping Reviews (PRISMA-ScR) guidelines [34]. Given the interdisciplinary nature of Digital Humanities and the inherent variability in clinical intervention models and theoretical orientations, a review of secondary research was selected as the most robust approach. This methodology facilitates a comprehensive mapping of the existing knowledge base, allowing for the synthesis of evidence across a diverse landscape of study designs while identifying critical gaps for future inquiry. A review protocol was developed to guide the review process; however, it was not formally registered.

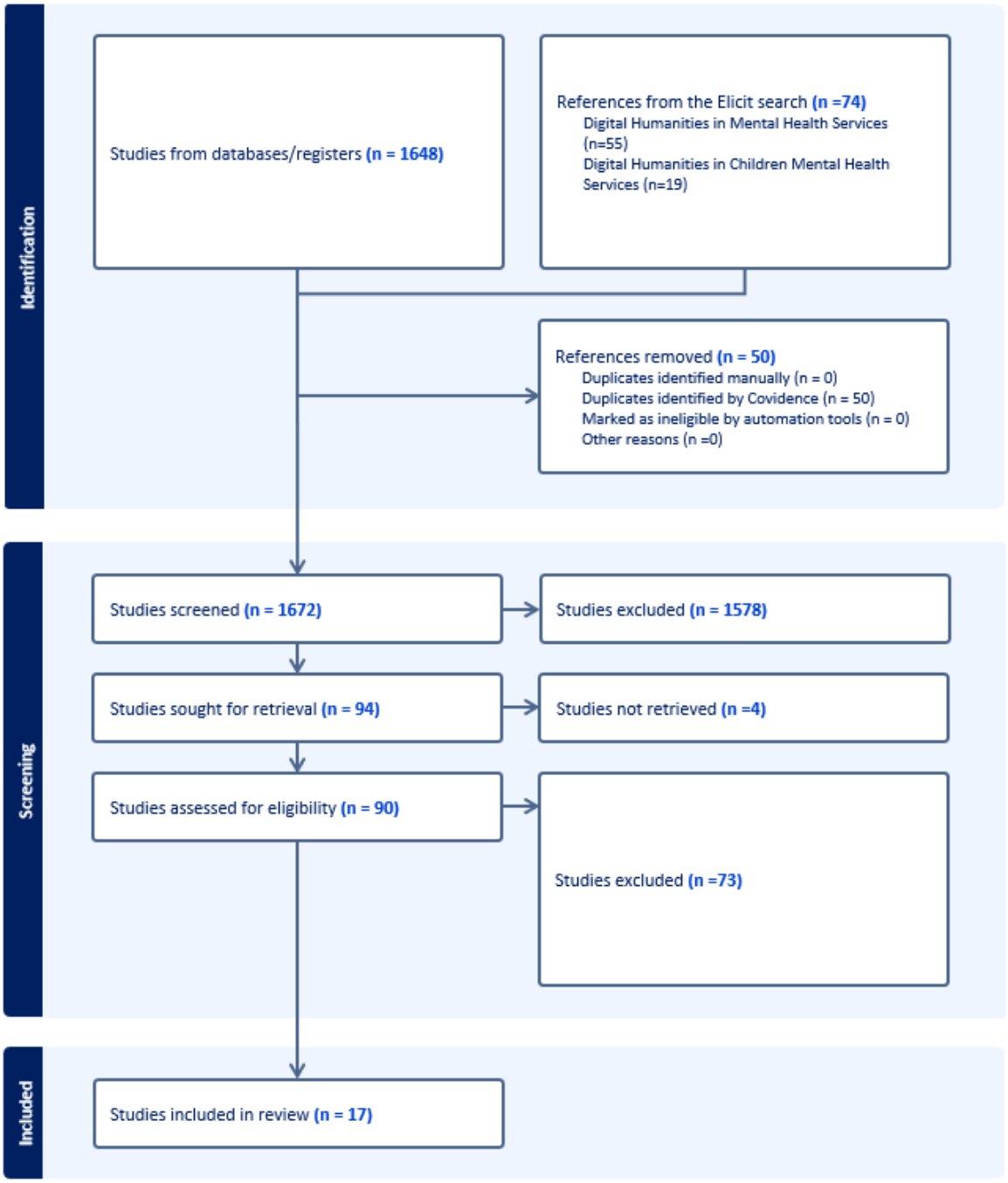

Figure 1. PRISMA flow diagram.

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Screening and Selection Process. The inclusion and exclusion criteria were systematically defined to ensure that selected studies directly addressed the intersection of humanities disciplines

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and AI-enabled digital mental health interventions. Consistent with the objective of synthesizing higher-order evidence, priority was given to systematic and scoping reviews, as these designs enable structured integration across heterogeneous studies and support the identification of recurring themes, conceptual patterns, and humanities-informed frameworks. This approach enhanced methodological rigor, analytic transparency, and the capacity to generate theoretically grounded insights. Eligible studies were required to examine digital mental health interventions targeting children and youth that explicitly incorporated AI technologies, including machine learning, predictive algorithms, large language models, or AI-based decision-support systems. Studies focusing solely on conventional or non-AI digital tools were excluded. In addition, included studies were required to engage substantively with digital humanities perspectives, as reflected in the title, abstract, or conceptual framing, and to employ such perspectives as a central analytical lens or methodological foundation.

To ensure alignment with the review's interdisciplinary focus, studies were further required to examine how humanities-informed perspectives (i.e., ethical, cultural, philosophical, social considerations) were integrated into the design, development, implementation, evaluation, or interpretation of AI-based technologies in mental health contexts. This criterion ensured that the review captured not only technological advancements but also the broader humanistic dimensions shaping the integration of AI within care systems.

Only studies demonstrating substantive methodological rigor were included. Accordingly, systematic and scoping reviews constituted the primary evidence base, while non-empirical or non-systematic publications, such as editorials, opinion pieces, letters, and abstracts lacking sufficient methodological detail, were excluded. Eligible studies were also required to focus specifically on digital mental health applications; studies addressing general AI ethics or humanities scholarship without direct relevance to mental health contexts were excluded. Research on humanities education or training in healthcare was included only when it explicitly involved AI-based technologies.

Studies were excluded if they failed to meet any of these criteria. This included articles that focused exclusively on non-AI interventions, lacked a clear humanities component, or emphasized technical optimization without substantive humanistic analysis. Additionally, purely theoretical or philosophical discussions of AI ethics that did not directly apply to digital mental health were excluded. Collectively, these criteria ensured that the final sample comprised methodologically robust, review-level evidence directly relevant to the intersection of AI, digital mental health, and humanities-informed inquiry.

For each of the 17 studies meeting the inclusion criteria, data were extracted to support a thematic synthesis focused on identifying digital humanities methods, population contexts, and clinical outcomes. Specifically, the extraction process mapped the intersection of AI health technologies and humanities disciplines by examining the mechanisms of integration, reported implementation challenges, and the perceived value of these interventions in addressing ethical considerations and recovery-oriented principles.

This structured approach enabled the identification of cross-cutting patterns across diverse study designs and settings. Through comparative thematic analysis, the synthesis elucidated how humanities disciplines contribute to the ethical, cultural, and relational governance of AI technologies within health care systems, particularly in youth mental health and SUD contexts.

Data Extraction and Synthesis. Data from each included study were systematically extracted using a structured charting framework developed a priori (see Table 1). The data extraction template captured study characteristics, primary healthcare domain, categories of AI-enabled technologies examined, humanities disciplines or theoretical frameworks engaged, and principal findings relevant to integration, outcomes, and governance. An inductive thematic analysis was conducted to synthesize findings across the included sources. Consistent with established review methodology, formal critical appraisal of included studies was not conducted. The objective of this review was to map the breadth, characteristics, and thematic patterns of the existing literature rather than to evaluate the methodological quality or risk of bias of individual studies [34–36]. Thematic analysis

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was selected as a flexible and robust method for identifying recurring patterns, key concepts, and thematic convergence within a heterogeneous body of literature, including empirical studies, theoretical papers, and conceptual frameworks [37]. This approach enabled a nuanced examination of how humanities disciplines inform the design, governance, and implementation of AI-based digital mental health tools, particularly within mental health contexts. The analysis began with descriptive coding of key variables, such as represented humanities disciplines, AI technologies, integration mechanisms, and stakeholder roles, which were then grouped into higher-order themes through iterative comparison and constant engagement with the data [38]. Coding and theme development were carried out collaboratively to enhance analytical rigor and ensure alignment with the review's objectives. The final synthesis yielded six overarching themes that illustrated the contributions, value propositions, and implementation challenges of integrating the humanities into AI-based health technologies. In this context, thematic analysis served not only to summarize the state of the literature but also to uncover conceptual gaps, unresolved tensions, and emergent opportunities at the intersection of technological innovation and humanistic inquiry.

 doi:10.20944/preprints202606.1323.v1

Table 1. Overview of the final 17 studies included in the review.

Authors (Year)	Aim	Primary Healthcare Domain	Humanities Disciplines	Key Findings
Bergin et al. [1]	To critically evaluate the design characteristics and reporting quality of preventive digital mental health interventions targeting children and adolescents.	General Child & Adolescent Mental Health	Participatory Design	Digital health interventions (DHIs) have frequently been highlighted as one way to respond to increasing levels of mental health problems in children and young people, but Bergin et al. (2020) identified substantial variability in design and reporting. Limited transparency in development and engagement strategies constrains reproducibility and scalability. Strengthening user-centered, developmentally appropriate design and standardized reporting is essential to advance preventive digital mental health interventions.
Liverpool et al. [39]	To synthesize evidence on the factors that influence engagement with digital mental health interventions among children and adolescents.	General Child & Adolescent Mental Health	Narrative Medicine / Digital Storytelling	Engagement is a central yet fragile determinant of the effectiveness of digital mental health interventions among youth, shaped by personalization, usability, human support, and developmental relevance, but hindered by usability issues, a lack of co-design, and contextual misalignment.
Murphy et al. [40]	To provide a comprehensive overview of the ethical considerations, frameworks, and debates surrounding the application of AI in health and public health contexts.	Diagnostics, precision medicine	Ethics	A scoping review of 103 studies (including 22 grey literature) revealed ethical concerns related to AI use in health care: privacy & security, trust in AI applications, accountability & responsibility for the use of AI technology, and adverse consequences of bias in algorithms and the data used to train them. Largely missing from the literature was the ethics of AI in global health, especially in low- and middle-income countries.
Möllmann et al. [41]	To provide a comprehensive overview of the ethical challenges, concerns, and frameworks associated with implementing AI technologies in digital health contexts.	General healthcare, geriatrics	Ethics	50 articles were reviewed by 5 major ethical principles. 3 principles received the most research: beneficence (48%), non-maleficence (70%), autonomy (30%), justice (48%), explicability (34%). The review highlights potential areas with little empirical evidence and calls for further research to address these gaps.
Sakellari et al. [42]	To explore and synthesize the role of digital health promotion approaches in supporting mental health and wellbeing in primary school populations.	General Child & Adolescent Mental Health	Implicit Humanities Alignment	Mental health challenges among primary school children continue to represent a significant concern. Although the current evidence base is limited, available studies suggest that web-based interventions can improve teachers' knowledge and attitudes while supporting positive behavioral outcomes in children. The scarcity of robust evidence underscores the need for further research in this area.
Sasseville et al. [43]	To provide a timely and comprehensive overview of how digital health interventions are used to support mental health management in populations with chronic physical health conditions.	Youth Mental Health	Narrative Medicine / Digital Storytelling	Digital health interventions show promise in improving mental health outcomes in chronic disease populations, particularly for depression and anxiety. However, substantial heterogeneity, limited long-term evidence, and implementation challenges, including engagement and integration into care, constrain conclusions. Further rigorous and standardized research is needed to support scalability and sustained effectiveness.
Wies et al. [44]	To provide a comprehensive scoping review of the ethical opportunities and risks related to the use of digital mental health tools in children and adolescent populations.	General Child & Adolescent Mental Health	Bioethics / Ethics	Digital mental health interventions for young people offer significant promise in improving access and early support, but raise critical ethical challenges related to privacy, safety, consent, equity, and the preservation of therapeutic relationships.
Yu et al. [45]	To develop an evidence and gap map (EGM) that provides a structured overview of the types, distribution, and strength of evidence for Mental Health and Psychosocial Support interventions targeting children and	Youth Mental Health	Implicit Humanities Alignment	The evidence base for child and adolescent mental health interventions in LMICs is uneven and concentrated in specific contexts and modalities, with substantial gaps in early childhood, long-term outcomes, equity, and system-level implementation research.

 doi:10.20944/preprints202606.1323.v1

	adolescents in lower-middle-income countries			
Fischer-Grote et al. [46]	To synthesize and quantitatively assess (via meta-analysis) the impact of digitally delivered mental health interventions on psychological outcomes in young populations during the post-pandemic period.	Youth Mental Health	Implicit Humanities Alignment	Online and remote mental health interventions for youth demonstrate small-to-moderate effectiveness, particularly when guided by human support, highlighting both their scalability and the importance of structured, supported implementation models.
Kirvin-Quamme et al. [11]	To map and critically evaluate current practices in the collection and reporting of sociodemographic characteristics within studies of digital mental health interventions.	General Child & Adolescent Mental Health	Implicit Humanities Alignment	Sociodemographic data reporting in digital mental health research is inconsistent and insufficiently standardized, limiting the ability to assess equity and raising concerns about bias and generalizability in digital and AI-enabled interventions.
Di Pierdomenico et al. [47]	To provide a comprehensive overview of universally delivered (population-level) digital mental health interventions targeting children and adolescents, focusing on their characteristics, implementation, and outcomes.	Youth Mental Health	Implicit Humanities Alignment	Universal digital mental health interventions for youth show modest preventive benefits but are constrained by engagement challenges, limited co-design, insufficient attention to equity, and a lack of long-term outcome evidence.
Kaur et al. [48]	To design, refine, and assess a community-partnered, school-based digital intervention that addresses emotion regulation difficulties among autistic children.	General Child & Adolescent Mental Health	Participatory Design	Co-developed digital mental health interventions for children on the autism spectrum are feasible and acceptable in school settings, with effectiveness contingent on stakeholder involvement, contextual adaptation, and guided implementation.
Liverpool et al. [39]	To conduct a systematic overview of reviews that consolidates and updates the evidence base on the effectiveness, design, and implementation of digital mental health interventions for youth.	Youth Mental Health	Narrative Medicine / Digital Storytelling	Digital mental health interventions for children and young people demonstrate modest effectiveness, with outcomes strengthened by human support and co-production, but are constrained by engagement challenges, variable evidence quality, and unresolved implementation and safety issues.
Takizawa et al. [25]	To conduct a meta-analysis assessing whether universally delivered digital interventions (i.e., non–risk-targeted, population-level approaches) improve mental health outcomes in children and adolescents.	Youth Mental Health	Implicit Humanities Alignment	Universal digital mental health interventions for children and adolescents produce small but significant preventive effects, with outcomes moderated by intervention design, engagement features, and the presence of human support.
Walder et al. [8]	To conduct a systematic review and meta-analysis of randomized controlled trials (RCTs) assessing whether digitally delivered interventions can reduce symptoms of social anxiety and support prevention efforts in young populations.	Youth Mental Health (Anxiety/Depression)	Implicit Humanities Alignment	Digital mental health interventions, particularly CBT-based and guided formats, are effective in reducing social anxiety symptoms among youth and young adults, with outcomes influenced by engagement, support, and intervention structure.
Babbitt et al. [49]	To synthesize existing evidence on how accurately digital mental health assessment tools identify mental health conditions	General Child & Adolescent Mental Health	Implicit Humanities Alignment	Digital mental health assessment tools are rapidly expanding in the post–COVID-19 era, but their clinical utility is constrained by limited evidence on diagnostic accuracy, necessitating rigorous validation across different age groups.

 doi:10.20944/preprints202606.1323.v1

	compared to established reference standards (e.g., clinical diagnosis or validated instruments)			
Chew et al. [50]	To provide a comprehensive synthesis of the types, functions, and effectiveness of digital mental health interventions designed for children and family systems.	Youth Mental Health	Narrative Medicine / Digital Storytelling	Digital mental health interventions for children and families improve access and show modest effectiveness, but are limited by fragmented child–parent approaches, engagement challenges, and insufficient attention to contextual and equity considerations.

Note. The table summarizes key characteristics of the included studies, including study aim or purpose, primary healthcare domain, humanities disciplines, and key findings.

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3. Results

The literature search identified 1,648 records through PubMed, supplemented by additional 74 records retrieved through Elicit semantic searches. After duplicate removal, 1.672 records underwent title and abstract screening. Of these, 90 full-text articles were assessed for eligibility. Following full-text review, 17 studies met the inclusion criteria and were included in the final thematic synthesis. The thematic synthesis of 17 studies yielded six interrelated themes that collectively characterize how digital humanities approaches are operationalized within AI-enabled youth mental health contexts. Across study designs, populations, outcomes, and ethical orientations, these themes reveal both the heterogeneity of humanities engagement and a clear convergence toward its structural importance in responsible digital mental health innovation.

First, engagement was consistently conceptualized as a process of meaning-making rather than mere usability. Evidence from systematic and meta-analytic reviews indicates that engagement is shaped by modality, developmental appropriateness, stigma, and family or social context [24,50]. Intervention characteristics such as gamification and human support further moderate outcomes [7,8]. These findings align with humanities-informed perspectives that interpret engagement as relational, identity-sensitive, and contextually embedded, rather than reducible to behavioral metrics.

Second, participatory co-design emerged as a form of ethical infrastructure. Co-design processes—such as stakeholder advisory boards, community partnerships, and iterative feedback loops—were central to feasibility, acceptability, and sustainability [1,48]. An umbrella synthesis further emphasized co-production as foundational to online safety and contextual relevance [39]. From a humanities perspective, participatory design operationalizes ethical principles, including respect, justice, and transparency, by embedding stakeholder voices within system development.

Third, the principle of human-in-the-loop functioned as both a clinical and governance imperative. Evidence indicates that human support enhances intervention effectiveness [8], while AI ethics literature underscores the necessity of maintaining meaningful human control to ensure patient safety, accountability, and professional integrity [40,51]. Thus, human oversight reflects not only technical supervision but also a humanities-grounded commitment to relational accountability and moral agency in AI-mediated care.

Fourth, equity was reframed as a data and reporting practice. Studies documented inconsistent inclusion of sociodemographic variables, limiting the assessment of disparities and generalizability [11]. Reviews of universal interventions similarly highlighted insufficient attention to structural inequities and inclusive design [47]. Ethical analyses further demonstrated that algorithmic bias reflects broader sociotechnical inequities rather than isolated technical issues [52]. This body of work positions equity as an empirical and methodological concern embedded within data practices.

Fifth, a persistent gap was identified between high-level ethical principles and their operationalization in governance structures. While reviews consistently reference principles such as beneficence, autonomy, and justice, they also emphasize the need for regulatory translation and enforceable safeguards [40,41]. The absence of harmonized global standards and fragmented regulatory environments further complicates implementation [51]. Youth-focused ethics research highlights additional requirements, including privacy, validation, and online safety [44]. Humanities scholarship contributes by translating normative commitments into actionable governance frameworks.

Finally, implementation was conceptualized as a process of sociotechnical translation. Across studies, barriers included institutional readiness, workforce training, sustainability, and contextual adaptation [39,42]. Post-pandemic evidence confirms the effectiveness of remote interventions while highlighting methodological heterogeneity and implementation variability [46]. Rapid reviews in chronic disease populations similarly demonstrate context-dependent outcomes [43]. These findings underscore that successful implementation depends on aligning technological systems with institutional, cultural, and relational infrastructures.

 doi:10.20944/preprints202606.1323.v1

Taken together, the six cross-cutting themes indicate a clear conceptual convergence: digital humanities approaches function not as peripheral enhancements but as foundational infrastructures shaping the design, governance, and implementation of AI-enabled youth mental health interventions. Across the evidence base, humanities-informed perspectives reconfigure core domains, including engagement, co-design, human oversight, equity, governance, and implementation, by embedding relational, ethical, and contextual considerations into the architecture of digital systems.

Although the strongest empirical support remains concentrated in symptom-focused outcomes derived from randomized and meta-analytic studies, the synthesis demonstrates that humanities integration is particularly influential in domains that are less readily captured by conventional efficacy metrics. These include the quality of engagement as meaning-making, the legitimacy and accountability of participatory design processes, the preservation of human agency through human-in-the-loop frameworks, the operationalization of equity through data and reporting practices, and the translation of ethical principles into actionable governance structures. Furthermore, implementation processes are shown to depend on sociotechnical alignment across institutional, cultural, and developmental contexts.

Collectively, these findings suggest that advancing responsible youth digital mental health innovation requires a dual emphasis: continued technical refinement alongside sustained, developmentally attuned, and culturally grounded integration of humanities-informed approaches.

4. Conclusion

This review reveals both the breadth and the layered complexity of humanities engagement in AI-supported youth mental health systems. When interpreted in relation to the six cross-cutting themes, spanning engagement as meaning-making, participatory co-design, human-in-the-loop governance, equity as data practice, operational ethics, and sociotechnical implementation, the literature reflects not only expansion but also conceptual consolidation in how humanities disciplines are mobilized within digital mental health innovation.

Across the corpus, humanities contributions coalesce around three interlocking domains: design, governance, and implementation. In the domain of design, humanities-informed approaches reshape engagement as a relational and identity-sensitive process and position co-design as a mechanism for embedding stakeholder perspectives into intervention architecture [39,48,50]. In the domain of governance, the literature consistently emphasizes the need for transparency, accountability, and meaningful human oversight, with the human-in-the-loop principle functioning as a core ethical and clinical safeguard [40,41,51]. In the domain of implementation, studies highlight the importance of institutional readiness, workforce capacity, and sociocultural context in shaping the uptake and sustainability of digital interventions [39,42,43,46].

A central tension within this synthesis concerns whether humanities perspectives are operationalized as instrumental enhancements or as critical frameworks that interrogate the epistemic and normative foundations of AI systems. Instrumental approaches tend to incorporate ethics to improve fairness, usability, or trust, whereas more critical perspectives emphasize how AI systems embed sociotechnical assumptions that may reproduce inequities or obscure relational dimensions of care [40,52]. This distinction is particularly salient in participatory design practices. Although co-design is widely recognized as essential for acceptability and engagement, its ethical value depends on sustained integration within governance and development processes rather than isolated consultation [1,24].

Ethics remains the dominant disciplinary entry point, yet the findings indicate that traditional principle-based approaches require translation into operational governance mechanisms. Reviews consistently identify gaps in regulatory frameworks, including the absence of harmonized standards and the need for enforceable safeguards related to privacy, safety, and accountability [41,44,51]. In parallel, humanities-informed perspectives expand ethical inquiry by emphasizing relational

 doi:10.20944/preprints202606.1323.v1

accountability, interpretive understanding, and contextual sensitivity, particularly in youth populations where developmental stage and dependency shape agency and consent [39,44].

Equity emerged as a cross-cutting concern that is operationalized through data practices and reporting standards. Inconsistent inclusion of sociodemographic variables limits the ability to assess disparities and undermines generalizability [11]. At the same time, ethical analyses highlight that algorithmic bias reflects broader structural inequities embedded within data systems and institutional contexts [52]. These findings underscore the need to align methodological practices with equity-oriented frameworks in both design and evaluation.

Implementation further illustrates the importance of sociotechnical alignment. Evidence from systematic reviews and meta-analyses demonstrates that effectiveness is contingent not only on intervention content but also on contextual factors such as delivery setting, level of human support, and organizational infrastructure [7,8,46]. Barriers related to sustainability, training, and integration into existing systems highlight the need for interdisciplinary coordination and long-term institutional commitment [24,42].

Across these domains, the preservation of relational and human-centered care remains a consistent priority. The emphasis on human oversight, participatory engagement, and contextual responsiveness reflects a broader humanities-informed understanding of care as interpretive, relational, and ethically situated rather than purely technical. This is particularly critical in youth mental health contexts, where identity development, trust, and social context are integral to intervention effectiveness.

Despite these advances, significant translational gaps persist. Comprehensive integration of co-design, embedded ethics, lifecycle governance, and culturally responsive adaptation remains limited, often constrained by resource limitations and institutional silos. Furthermore, disparities in representation across populations and contexts raise concerns regarding the inclusivity and global applicability of current AI-enabled mental health systems [11,40].

Taken together, the findings support a central conclusion: humanities disciplines function as structural determinants of AI tool legitimacy, safety, and sustainability in youth mental health and substance use contexts. Advancing responsible innovation therefore requires sustained integration of humanities-informed approaches across design, governance, and implementation, alongside continued technical development.

Author Contributions: Saahoon Hong conceptualized the study, conducted the literature review, performed data extraction and analysis, and drafted the manuscript. Betty Walton and Hea-Won Kim contributed to study design, interpretation of findings, thematic review, and manuscript revision. All authors reviewed and approved the final manuscript.

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Institutional Review Board Statement: This study was not submitted to the Institutional Review Board (IRB) because it was a review of publicly available, published literature and did not involve the collection, use, or analysis of data from human participants. No identifiable private information or human subjects were involved. Therefore, the study did not meet the definition of human subjects research and did not require IRB review or approval. ; Ethical Considerations; This study synthesized data from published literature and did not involve human participants or identifiable personal data. Institutional Review Board approval was therefore not required.

Data Availability Statement: All data analyzed during this study were derived from published sources included in the review. Additional materials are available from the corresponding author upon reasonable request.

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