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Review Article

Digital Health Interventions for Postpartum Depression Following Assisted Reproduction: A Narrative Review

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Abstract:

Background: Postpartum depression (PPD) is a common and disabling perinatal mental health condition. Women who conceive through assisted reproductive technologies (ART) may be at increased risk due to prolonged infertility, treatment-related stress, and prior pregnancy loss. Although digital health interventions (DHIs) show promise for postpartum mental health care, their relevance and evidence base for ART-conceived populations remain insufficiently synthesized.

Objective: This narrative review aims to critically examine the current evidence on digital health interventions for postpartum depression in the context of assisted reproduction, with a focus on conceptual relevance, methodological strengths and limitations, and implications for clinical practice and future research.

Methods: A structured narrative synthesis was conducted using transparent search procedures across major bibliographic databases, including PubMed, PsycINFO, Scopus, and Web of Science. Peer-reviewed empirical studies, reviews, and key conceptual papers addressing digital mental health interventions for postpartum depression were included, with particular attention to the representation and reporting of ART-conceived populations.

Results: Existing digital interventions—such as mobile health applications, web-based psychotherapy, telepsychology, and emerging AI-supported tools—demonstrate feasibility and acceptability in general postpartum populations. However, ART-specific evidence remains limited, with most studies embedding women who conceive through assisted reproduction within broader perinatal samples and rarely tailoring intervention content to infertility-related psychological experiences. Methodological heterogeneity, small sample sizes, short follow-up periods, and limited subgroup analyses constrain the strength of population-specific conclusions.

Conclusions: Digital health interventions hold considerable promise for addressing postpartum depression following assisted reproduction, but current evidence is largely indirect. Conceptually, DHIs align well with the psychological needs of ART populations; empirically, however, rigorous validation is lacking. Future research should prioritize ART-specific trials, longitudinal designs, participatory co-design approaches, and integration with clinical care pathways to develop effective, personalized, and equitable digital mental health solutions for this high-risk population.

Keywords: Postpartum Depression; Assisted Reproductive Technologies; Digital Health Interventions; Perinatal Mental Health; Infertility; Mobile Health; Telepsychology; Narrative Review

Introduction

Postpartum Depression Following Assisted Reproduction

Postpartum depression (PPD) represents one of the most prevalent and disabling mental health conditions affecting women during the perinatal period, with well-documented consequences for maternal well-being, infant development, and family functioning [1,2]. While PPD has been extensively studied in the general obstetric population, growing evidence suggests that women who conceive through assisted reproductive technologies (ART) may experience a distinct and potentially heightened psychological vulnerability during the postpartum period [3].

Pregnancies achieved via ART are frequently preceded by prolonged infertility trajectories characterized by repeated treatment cycles, invasive medical procedures, uncertainty, and emotional loss [4]. Experiences of treatment failure, pregnancy loss, and chronic anticipatory anxiety may exert cumulative psychological effects that extend beyond conception and childbirth [5]. Rather than conferring psychological relief, the transition to motherhood after ART can be marked by persistent fears regarding infant health, maternal adequacy, and the sustainability of the long-awaited pregnancy outcome. Moreover, sociocultural narratives that frame ART-conceived motherhood as a "successful" or "grateful" endpoint may inhibit emotional disclosure, further complicating the recognition and treatment of postpartum depressive symptoms in this population [6].

Despite these unique psychosocial stressors, women who conceive through ART remain underrepresented in postpartum mental health research, and ART-related factors are rarely examined as independent contributors to postpartum depression. This gap underscores the need for focused scholarly attention on mental health interventions that are responsive to the specific experiences of women following assisted reproduction.

Emergence of Digital Health Interventions in Perinatal Mental Health

In parallel with increasing recognition of perinatal mental health needs, digital health interventions (DHIs) have emerged as a promising modality for the prevention and treatment of postpartum depression. These interventions encompass a broad range of technologies, including mobile health applications, web-based psychological therapies, telepsychology, and digitally mediated psychoeducation and support platforms. The rapid expansion of telehealth infrastructure, accelerated by global health system disruptions, has further normalized digitally delivered mental health care across perinatal settings [7,8].

For postpartum women, digital interventions offer several potential advantages over traditional face-to-face care, including flexibility, scalability, reduced stigma, and improved accessibility during a period often constrained by caregiving demands, physical recovery, and logistical barriers [9]. These advantages may be particularly salient for women who have undergone ART, many of whom disengage from fertility services shortly after delivery and may experience discontinuities in psychological care [10]. Digital platforms, therefore, present an opportunity to extend mental health support across the reproductive continuum, bridging fertility treatment and postpartum care.

However, while DHIs have demonstrated efficacy in general postpartum populations, their relevance, adaptability, and effectiveness for women following assisted reproduction remain insufficiently examined. Existing interventions rarely incorporate infertility-related psychological histories, ART-specific stressors, or the complex emotional transitions that characterize this group [11].

Justification for a Narrative Review

A narrative review is particularly well-suited to the present topic due to the nature and current maturity of the available literature. Research examining digital health interventions for postpartum depression is marked by substantial heterogeneity in intervention modalities, theoretical frameworks, study designs, and outcome measures. This diversity is further compounded by the inconsistent identification and reporting of ART-conceived populations, which are frequently embedded within broader perinatal samples without stratified analyses.

Moreover, many digital interventions in this domain are conceptually sophisticated yet methodologically varied, encompassing pilot studies, feasibility trials, mixed-methods research, and pragmatic evaluations that do not lend themselves to quantitative aggregation. Emerging technologies, such as artificial intelligence–supported tools and passive digital monitoring, are increasingly discussed in the literature but remain underrepresented in randomized controlled trials, despite their conceptual relevance to personalized perinatal mental health care.

Within this context, a systematic or meta-analytic approach would risk oversimplifying a complex and evolving evidence base, potentially obscuring critical theoretical insights and contextual factors. In contrast, a narrative review allows for integrative synthesis across disciplines, facilitating

critical interpretation of diverse forms of evidence while highlighting conceptual gaps, methodological limitations, and directions for future research. Accordingly, this review adopts a narrative approach to provide a comprehensive and theoretically informed examination of digital health interventions for postpartum depression following assisted reproduction.

Conceptual Framework

Psychological Vulnerability After Assisted Reproduction

Assisted reproductive technologies are not merely biomedical interventions but represent prolonged psychosocial experiences that can fundamentally shape psychological functioning across the reproductive life course. Infertility is increasingly conceptualized as a form of chronic stress exposure, often accompanied by repeated episodes of loss, uncertainty, and perceived bodily failure. For many individuals, the infertility journey involves cycles of hope and disappointment, invasive medical procedures, and sustained anticipatory anxiety, all of which may contribute to symptoms consistent with trauma-related stress. These psychological sequelae do not necessarily resolve upon successful conception and may persist into pregnancy and the postpartum period [12,13].

The transition to motherhood following assisted reproduction is frequently accompanied by complex identity shifts. Women who conceive through ART may internalize sociocultural expectations of "grateful motherhood," wherein emotional distress is perceived as incongruent with the achievement of a highly desired pregnancy. This narrative may discourage emotional disclosure and contribute to guilt, shame, or self-silencing in the face of postpartum distress. Rather than experiencing a normative adjustment period, some women report heightened vigilance regarding infant well-being, fear of loss, and doubts about maternal competence, reflecting the enduring psychological imprint of infertility and its treatment [14].

ART-related stressors may therefore interact with the normative challenges of postpartum adjustment in distinctive ways. Hormonal changes, sleep disruption, and caregiving demands occur against a backdrop of accumulated psychological burden, potentially amplifying vulnerability to depressive symptoms. Understanding postpartum depression in this population requires a framework that recognizes assisted reproduction as a longitudinal psychological process rather than a discrete reproductive outcome [15].

Postpartum Depression: Beyond Symptom Severity

Postpartum depression has traditionally been operationalized through symptom severity thresholds; however, such an approach may be insufficient to capture the lived experiences of women following assisted reproduction. In this population, psychological distress often manifests across multiple functional domains, including emotional regulation, maternal–infant bonding, perceived self-efficacy, and the consolidation of maternal identity. Difficulties in tolerating uncertainty, heightened self-criticism, and fear of emotional attachment may coexist with or precede clinically diagnosable depressive episodes [16].

Importantly, subthreshold depressive symptoms, those that fall below diagnostic cutoffs, may be particularly salient among women who conceive via ART. Given the internalized expectation to experience motherhood as unequivocally positive, even mild or moderate symptoms may be minimized or left unreported, despite their potential to impair functioning and well-being. Subclinical distress may also exert downstream effects on parenting confidence, partner relationships, and help-seeking behaviors [17].

A conceptualization of postpartum depression that extends beyond categorical diagnosis is therefore essential when considering interventions for ART populations. Digital health interventions, in particular, may be uniquely positioned to address early-stage psychological vulnerability, offering scalable tools for emotional support, self-monitoring, and cognitive restructuring before distress escalates to clinically severe depression.

Digital Health Interventions as Complex Psychosocial Tools

Digital health interventions (DHIs) are best understood as multi-component psychosocial systems rather than singular therapeutic modalities. Contemporary perinatal DHIs typically integrate psychoeducation, symptom monitoring, structured psychological strategies, and varying degrees of peer or clinician support within a single platform. This integration allows interventions to address both emotional and cognitive dimensions of distress while accommodating heterogeneity in symptom severity and engagement [18].

For women who conceive through assisted reproductive technologies, the flexibility of DHIs is conceptually relevant. Tailoring intervention content to infertility histories, prior pregnancy loss, or ART-specific anxieties may enhance perceived relevance, while timing of delivery across pregnancy and the

postpartum period may influence engagement and effectiveness. Importantly, DHIs enable variation in intervention intensity, supporting preventive, early-intervention, and adjunctive care approaches within a stepped framework.

However, DHIs should not be conceptualized as static or universally applicable solutions. Their potential impact depends on alignment with psychological context, individual needs, and broader care pathways. Accordingly, digital interventions are most appropriately viewed as adaptive supports embedded within developmental and relational processes rather than as stand-alone treatments [19].

Figure 1 presents an integrated conceptual model illustrating how ART-specific psychosocial and reproductive factors contribute to a continuum of postpartum psychological vulnerability, with digital health interventions positioned as stepped and personalized supports across this trajectory

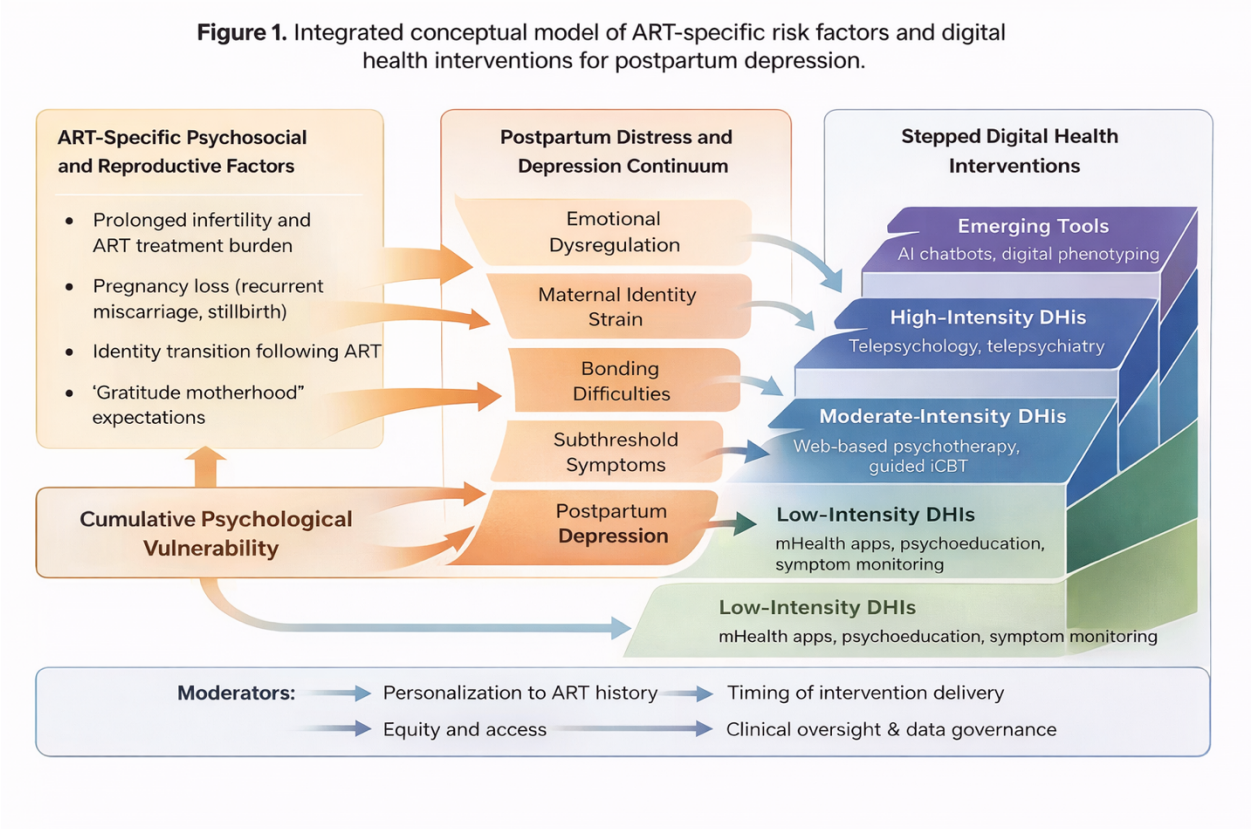

Figure 1. Integrated conceptual model of ART-specific psychological vulnerability and digital health intervention pathways.

This figure conceptualizes assisted reproductive technologies as a longitudinal psychosocial process rather than a discrete reproductive outcome. Cumulative infertility-related stressors (e.g., repeated treatment cycles, prior loss, chronic uncertainty) are shown to interact with normative postpartum challenges, contributing to a continuum of psychological vulnerability ranging from subthreshold distress to postpartum depression. Digital health interventions are positioned as stepped and adaptive supports across this continuum, with effectiveness shaped by timing of delivery, personalization to ART history, equity of access, and degree of clinical oversight. The model highlights the conceptual rationale for early, tailored, and flexible digital mental health strategies in ART-conceived postpartum populations.

Interpretation of the conceptual model

In Figure 1, directional arrows represent hypothesized pathways through which ART-related psychosocial stressors (e.g., prolonged infertility, treatment-related uncertainty, prior pregnancy loss) contribute to a continuum of postpartum psychological vulnerability, ranging from subthreshold distress to postpartum depression. Arrows flowing from ART-related experiences to postpartum outcomes indicate cumulative and interacting effects rather than linear causation. Moderating pathways reflect factors expected to influence the strength and expression of these relationships, including timing of intervention delivery, degree of personalization to ART history, equity of access to digital platforms, and level of clinical oversight. Digital health interventions are positioned as adaptive, stepped supports capable of intervening at multiple points along this vulnerability trajectory rather than as single, fixed treatment modalities.

This conceptual model is hypothesis-generating, informed by a synthesis of empirical

findings from general postpartum and infertility-related literature rather than derived from direct causal testing in ART-conceived postpartum populations

Methods

Review Design

This study was conducted as a structured narrative synthesis integrating empirical and conceptual literature on digital health interventions for postpartum depression in the context of assisted reproductive technologies (ART). Although not designed as a systematic review or meta-analysis, the review followed transparent and reproducible procedures to enhance methodological rigor and interpretive clarity.

The methodological process comprised: (i) a systematic search of multiple bibliographic databases; (ii) predefined inclusion and exclusion criteria; (iii) structured screening at title/abstract and full-text levels; and (iv) qualitative appraisal of methodological characteristics and conceptual relevance. This approach enabled synthesis of heterogeneous evidence while explicitly acknowledging when conclusions were extrapolated from general postpartum populations rather than derived from ART-specific samples.

Literature Search Strategy

A comprehensive literature search was conducted across four electronic databases: PubMed, PsycINFO, Scopus, and Web of Science, selected to capture interdisciplinary research spanning psychiatry, psychology, digital health, and reproductive medicine.

Search strategies were developed around three core conceptual domains:

(1) assisted reproductive technologies and infertility treatment;

(2) postpartum or perinatal depression; and

(3) digital or technology-based mental health interventions.

Controlled vocabulary and free-text terms were combined using Boolean operators. An example search string used in PubMed was:

("assisted reproductive technology*" OR ART OR infertility treatment OR in vitro fertilization)

AND

("postpartum depression" OR postnatal depression OR perinatal depression)

AND

("digital health" OR "mobile health" OR mHealth OR telepsychology OR telepsychiatry OR "internet-based therapy" OR "web-based intervention")

Equivalent search structures were adapted for PsycINFO, Scopus, and Web of Science.

The search covered publications from January 2010 through December 2025, reflecting the period of rapid growth in digital mental health research within perinatal care. Searches were limited to English-language publications due to feasibility considerations. Reference lists of key articles were also reviewed to identify additional relevant publications not captured through database searching.

Study Selection and Screening Process

The database search identified 1,590 records. After removal of duplicates, 300 unique records remained and were screened at the title and abstract level for relevance. Of these, 37 articles were retrieved and assessed in full text.

Full-text inclusion was based on relevance to postpartum depression, digital health interventions, and applicability to ART-conceived populations. Articles were excluded at the full-text stage primarily due to: absence of postpartum mental health outcomes; exclusive focus on antenatal populations; evaluation of non-digital interventions; or lack of relevance to depressive symptoms or psychological well-being.

Where ART status was embedded within broader perinatal samples without stratified analysis, this was explicitly documented during synthesis and interpretation.

Inclusion and Exclusion Criteria

Studies were eligible for inclusion if they examined postpartum mental health outcomes and evaluated or discussed digitally delivered mental health interventions. Eligible intervention formats included mobile health applications, internet-delivered psychotherapy (including cognitive behavioral therapy), telepsychology, telepsychiatry, and hybrid digital care models.

Outcomes of interest included depressive symptoms, psychological well-being, emotional functioning, engagement, and intervention acceptability. Particular attention was given to studies that explicitly included women who conceived through ART or provided findings relevant to this subgroup within broader perinatal samples.

Studies were excluded if they focused solely on antenatal mental health without postpartum outcomes, evaluated non-digital interventions, or were non–peer-reviewed sources lacking substantive conceptual contribution.

Qualitative Appraisal of Included Studies

Given the narrative design of this review and the heterogeneity of included evidence, no formal risk-of-bias or quality scoring tool was applied. Instead, studies were appraised qualitatively based on study design, clarity of intervention description, transparency of reporting, relevance to postpartum depression, and explicit reporting of ART-conceived samples or subgroup analyses.

This qualitative appraisal informed interpretation of findings, identification of evidence gaps, and critical discussion of the limitations associated with extrapolating findings from general postpartum populations to ART-conceived groups. The qualitative appraisal framework also informed the evidence-level classifications presented in Table 2.

Rationale for Narrative Synthesis

A systematic review with meta-analysis was not undertaken due to substantial variability in intervention modalities, theoretical frameworks, study designs, outcome measures, and reporting of ART-specific data. In many studies, ART status was not disaggregated from broader perinatal samples, limiting population-specific quantitative aggregation.

Additionally, the literature includes numerous pilot and feasibility studies prioritizing intervention development and acceptability over standardized efficacy outcomes. Under these conditions, quantitative synthesis could risk overstating precision and obscuring conceptual and contextual nuances.

A structured narrative synthesis was therefore selected to enable critical integration of diverse evidence, transparent acknowledgment of indirect findings, and identification of priorities for ART-specific digital mental health research.

Digital Health Interventions for Postpartum Depression

Before synthesizing intervention categories, it is important to distinguish between evidence derived directly from ART-conceived postpartum populations and evidence extrapolated from general postpartum samples. Across most intervention types discussed below, ART status is either not reported or included only as a secondary characteristic within broader perinatal cohorts. Accordingly, references to intervention effectiveness primarily reflect general postpartum populations unless explicitly stated otherwise.

Digital health interventions for postpartum depression encompass a broad and evolving range of technologies that differ in therapeutic intensity, level of clinical oversight, and degree of personalization. In the context of assisted reproduction, these interventions must be understood not only in terms of their general efficacy but also in relation to their capacity to address infertility-related psychological histories and postpartum adjustment challenges. The following sections synthesize key categories of digital interventions and critically examine their relevance for women following ART [18].

Mobile Health (mHealth) Applications

Mobile health applications represent one of the most widely disseminated forms of digital mental health intervention in perinatal care. These applications typically combine symptom tracking, psychoeducational content, mood monitoring, and brief self-guided exercises aimed at enhancing emotional awareness and coping. For postpartum women, mHealth platforms offer notable advantages, including on-demand access, low cost, and integration into daily routines during a period marked by time constraints and caregiving demands [19].

Evidence supporting mHealth applications for postpartum depression is derived almost entirely from general postpartum populations, with no studies identified that evaluated ART-conceived women as a primary analytic group.

From a scalability perspective, mHealth interventions hold considerable promise, particularly in settings with limited access to specialized perinatal mental health services. However, evidence consistently indicates challenges related to sustained engagement, with many users demonstrating declining adherence over time. Moreover, most commercially available and research-based applications are designed for general postpartum populations and rarely incorporate content tailored to the specific psychological experiences associated with assisted reproduction. As a result, infertility-related fears, prior treatment-related trauma, and ART-specific identity concerns are often insufficiently addressed, potentially limiting the perceived relevance and therapeutic impact of these tools for this subgroup [20].

Web-Based Psychotherapy and Internet-Delivered Cognitive Behavioral Therapy

Web-based psychotherapy, including internet-delivered cognitive behavioral therapy (iCBT), constitutes one of the most empirically supported digital approaches for postpartum depression. These interventions typically employ structured, modular programs targeting maladaptive cognitions, emotional regulation, and behavioral activation, often supplemented by therapist guidance or automated

feedback. In general postpartum populations, iCBT has demonstrated effectiveness in reducing depressive symptoms and improving psychological well-being, with outcomes comparable to face-to-face therapy in some contexts [21]. Notably, the evidence base for web-based psychotherapy and iCBT in postpartum depression is drawn predominantly from general postpartum samples, with ART-conceived populations rarely identified or analyzed separately.

Despite this evidence base, the applicability of web-based psychotherapy to women following assisted reproduction remains underexplored. ART-related psychological themes—such as fear of loss, hypervigilance regarding infant health, and ambivalence surrounding maternal identity—are seldom integrated into intervention content. Consequently, while the therapeutic mechanisms of iCBT may be broadly relevant, the absence of ART-specific adaptation may constrain engagement and limit responsiveness among women whose postpartum distress is shaped by infertility-related experiences [13].

Telepsychology and Telepsychiatry

Telepsychology and telepsychiatry involve the remote delivery of mental health care through synchronous (e.g., video or telephone sessions) or asynchronous (e.g., messaging-based) modalities. These approaches offer a higher level of clinical involvement than self-guided digital interventions and are particularly suited to individuals with moderate to severe depressive symptoms. For postpartum women, telehealth modalities reduce logistical barriers associated with in-person care, including transportation, childcare, and scheduling constraints [22]. To date, empirical evaluations of telepsychology for postpartum depression have not specifically examined ART-conceived populations, and available evidence is extrapolated from broader perinatal cohorts.

In the context of assisted reproduction, telepsychology may play a critical role in addressing discontinuities in psychological care that often arise following discharge from fertility clinics. While ART services frequently provide psychosocial support during treatment, mental health follow-up in the postpartum period is less consistently integrated. Telehealth platforms offer an opportunity to extend continuity of care, facilitating ongoing psychological support during a vulnerable transitional phase. However, empirical research explicitly examining telepsychology outcomes among ART-conceived postpartum populations remains limited, highlighting an important area for future investigation.

Emerging Technologies

Emerging digital technologies, including artificial intelligence–driven chatbots, digital phenotyping, and passive behavioral monitoring, represent a rapidly expanding frontier in perinatal mental health care. AI-supported chatbots aim to deliver real-time psychoeducation, emotional support, and cognitive restructuring through conversational interfaces, while digital phenotyping leverages data from smartphones and wearable devices to infer mood states and behavioral patterns.

Although these technologies hold promise for early detection and personalized intervention, their application in postpartum mental health and particularly among women following assisted reproduction raises significant ethical and clinical considerations. Issues related to data privacy, algorithmic bias, clinical accountability, and the potential substitution of human care warrant scrutiny. Furthermore, the clinical validity and acceptability of passive monitoring approaches in postpartum populations remain insufficiently established. At present, these technologies should be viewed as complementary tools with conceptual potential rather than evidence-based replacements for established therapeutic interventions [23,24]. As summarized in Table 1, very few studies explicitly include or analyze ART-conceived postpartum populations, and none evaluate digital mental health interventions designed specifically for this group. Importantly, emerging digital technologies in postpartum mental health have not been systematically evaluated in ART-conceived populations, and current discussions of their applicability remain largely conceptual rather than empirically grounded.

Table 1. Studies Explicitly Including ART-Conceived Populations Relevant to Postpartum Mental Health and Digital Interventions

Study	Study Design	Digital Intervention Focus	ART Sample Handling	Key Limitation
Egsgaard et al., 2025[3]	Register-based cohort study	Not intervention-specific	ART is identified as an exposure variable	No digital intervention evaluated
Jackson et al., 2025[11]	Systematic review and meta-analysis	Psychological interventions (general)	ART discussed as a subgroup	No postpartum digital intervention focus
Schmid & Ehlert, 2025[13]	Systematic review and meta-analysis	Mixed interventions	The ART subgroup reported indirectly	No stratified postpartum outcomes
Maehara et al., 2022[14]	Qualitative systematic review	Psychosocial support	ART-specific experiential focus	No digital intervention evaluation

Table 2. Summary of studies explicitly including or discussing ART-conceived populations in relation to postpartum mental health and intervention research. The table highlights the limited number of studies that directly address assisted reproductive technologies in postpartum mental health research and underscores the absence of digital mental health intervention trials designed specifically for ART-conceived postpartum populations.

Relevance and Limitations of Digital Interventions for ART Populations

While digital health interventions offer promising avenues for addressing postpartum depression, their relevance for women who conceive through assisted reproductive technologies depends on the extent to which they engage with the distinctive psychological contours of the ART experience. This section critically examines both the potential alignment of existing digital interventions with ART-specific needs and the limitations that currently constrain their effectiveness and equity.

Alignment With ART-Specific Psychological Needs

Digital interventions have conceptual strengths that align with several psychological challenges commonly observed among women following assisted reproduction. Infertility-related fears—such as persistent anxiety about infant health, fear of loss, and difficulty tolerating uncertainty—may be amenable to cognitive and emotional regulation strategies frequently embedded within digital mental health platforms. Interventions that incorporate cognitive restructuring, mindfulness-based techniques, and psychoeducation have the potential to address maladaptive threat appraisals and hypervigilance that persist into the postpartum period.

Similarly, perfectionism and fear of failure, which are often intensified by prolonged infertility and repeated treatment efforts, represent important therapeutic targets. Many women who conceive via ART report heightened self-expectations regarding motherhood, accompanied by distress when their emotional experiences do not align with idealized maternal narratives. Digital interventions that normalize emotional ambivalence, promote self-compassion, and encourage flexible standards of maternal adequacy may therefore offer particular benefit to this population. However, the degree to which existing interventions explicitly address these ART-related themes remains limited and inconsistently reported [11,25].

Gaps in Personalization

Despite their theoretical flexibility, most digital interventions for postpartum depression demonstrate limited personalization with respect to reproductive history. ART experiences are rarely assessed or integrated into intervention content, resulting in generic programming that may insufficiently resonate with women whose postpartum distress is shaped by infertility-related trauma or loss. The absence of ART-specific tailoring may contribute to reduced engagement, diminished perceived relevance, and suboptimal therapeutic outcomes.

Additionally, digital interventions predominantly adopt an individual-focused framework, with minimal attention to partners or couple dynamics. This omission is particularly salient in the context of assisted reproduction, where infertility and treatment-related stress often affect both partners

and shape relational functioning. The underrepresentation of male partners and the lack of couple-based digital interventions reflect a broader gap in perinatal mental health research and limit the capacity of current digital tools to address relational and family-level determinants of postpartum well-being [8].

Equity, Access, and Cultural Considerations

Equity considerations remain central to the evaluation of digital mental health interventions. While digital platforms are frequently promoted as accessible and scalable solutions, disparities in digital literacy, internet access, and technological resources persist across socioeconomic and geographic contexts. These disparities may be particularly pronounced among marginalized populations, potentially exacerbating existing inequities in perinatal mental health care.

Cultural and linguistic adaptation represents an additional challenge. Many digital interventions are developed within high-income, Western contexts and may insufficiently account for cultural variations in reproductive experiences, mental health conceptualizations, and help-seeking behaviors. For women who conceive through ART in diverse cultural settings, the absence of culturally sensitive content may limit engagement and effectiveness. Addressing these issues requires deliberate efforts to incorporate inclusive design principles, multilingual content, and culturally informed therapeutic frameworks into the development and evaluation of digital interventions [26].

To synthesize the relevance of existing digital health interventions for women who conceive through assisted reproductive technologies, Table 2 maps ART-specific psychological needs to postpartum manifestations and corresponding digital intervention components. This integrative framework highlights areas of conceptual alignment, as well as persistent gaps in personalization and evidence, and provides a structured overview to inform intervention design, clinical implementation, and future research.

Table 2. Mapping ART-Specific Psychological Needs to Postpartum Manifestations and Digital Health Intervention Components.

ART-Specific Psychological Need	Postpartum Psychological Manifestation	Relevant Digital Health Intervention Components	Current Evidence Base	Key Gaps and Research Needs
Infertility-related trauma and cumulative loss	Hypervigilance, fear of infant loss, persistent anxiety	Psychoeducation, CBT-based cognitive restructuring, mindfulness	**Moderate (general postpartum evidence [7,20,21]; infertility-related CBT evidence [27])**	Limited ART-specific tailoring; trauma-informed approaches are rarely integrated
Chronic uncertainty during ART treatment	Difficulty tolerating ambiguity, anticipatory anxiety	Emotion regulation tools, uncertainty-focused CBT modules	**Emerging (general anxiety treatment literature [28]; limited ART-specific data)**	Few interventions explicitly target intolerance of uncertainty
"Gratitude motherhood" expectations	Emotional suppression, guilt, and reduced help-seeking	Normalization content, peer support forums	**Limited (conceptual and psychosocial studies [14,29])**	Sociocultural narratives surrounding ART are rarely addressed in intervention trials
Perfectionism and fear of failure	Low maternal self-efficacy, self-criticism	Self-compassion modules, cognitive reframing	**Moderate (general psychological distress literature [30]; indirect postpartum data)**	Perfectionism is seldom operationalized in ART digital interventions
Identity transition after ART	Ambivalence toward motherhood, identity diffusion	Reflective journaling, identity-focused psychoeducation	**Sparse to Limited (identity research [31]; qualitative ART studies [14])**	Identity is rarely measured longitudinally
ART-related relational strain	Couple conflict, uneven emotional adjustment	Partner-inclusive modules	**Very limited (relational research [32]; no ART-specific digital trials)**	Male partners are largely excluded
Subthreshold depressive symptoms	Functional impairment below the diagnostic threshold	Low-intensity self-guided tools, stepped-care screening	**Moderate (subthreshold depression literature [33]; general postpartum DHI evidence [7])**	ART-specific early intervention effectiveness is unclear

This table integrates evidence from perinatal mental health, infertility research, and digital intervention studies to illustrate how distinct ART-related psychological experiences may manifest in the postpartum period and how existing digital health tools align with these needs. The final columns highlight the current strength of the evidence base and identify gaps where ART-specific tailoring, longitudinal evaluation, or relational approaches remain underdeveloped.

Evidence Level Definitions

Evidence grading was determined qualitatively based on the volume, methodological rigor, and consistency of findings within the reviewed literature.

- Moderate evidence: Multiple empirical studies or systematic reviews in general postpartum populations demonstrating consistent findings, though not specific to ART-conceived samples.
- Emerging evidence: Limited empirical data with preliminary support, often extrapolated from adjacent clinical domains (e.g., anxiety or infertility-related distress).
- Limited evidence: Sparse or predominantly conceptual literature with minimal direct empirical testing in postpartum or ART contexts.
- Very limited evidence: Isolated studies or indirect relational/psychosocial research without digital intervention evaluation.

Table Footnote

ART = assisted reproductive technologies; CBT = cognitive behavioral therapy. Evidence base reflects the extent and consistency of findings across general postpartum populations, as ART-specific data are inconsistently reported.

Critical Appraisal of the Evidence

A critical appraisal of the existing literature reveals a field characterized by increasing innovation and acceptability, alongside persistent methodological constraints that limit the strength and generalizability of current conclusions. Evaluating both strengths and limitations is essential for situating digital health interventions for postpartum depression within the broader evidence base, particularly in relation to women who conceive through assisted reproductive technologies.

Strengths of the Existing Literature

One notable strength of the current literature is the growing acceptance of digital mental health interventions within perinatal care. Across diverse postpartum populations, digital platforms have demonstrated high levels of feasibility and user satisfaction, suggesting that such interventions are both acceptable and pragmatically suited to the postpartum context. Flexible access, reduced stigma, and the ability to engage with support outside traditional clinical settings are frequently cited advantages.

Additionally, many studies emphasize user-centered design principles and iterative development processes, reflecting increasing attention to usability and engagement. Even in the absence of robust efficacy data for ART-specific populations, feasibility and acceptability findings provide an important foundation for further intervention refinement and evaluation. These strengths underscore the potential of digital health tools to complement existing postpartum mental health services and to reach individuals who might otherwise remain underserved.

Methodological Limitations

Despite these encouraging trends, the existing evidence base is constrained by several methodological limitations. Many studies are characterized by small sample sizes, limiting statistical power and increasing susceptibility to selection bias. This issue is particularly salient for ART-conceived populations, which are often underrepresented or insufficiently disaggregated within larger perinatal samples.

Short follow-up periods further restrict the interpretability of findings, as postpartum depression may follow fluctuating or delayed trajectories that extend beyond the immediate postnatal months. Few studies assess long-term outcomes, sustained engagement, or the durability of intervention effects. Moreover, ART-specific subgroup analyses are rarely reported, even when relevant demographic or reproductive history data are collected. This lack of stratified reporting constrains the ability to draw population-specific inferences and limits the translation of findings into tailored clinical practice.

Collectively, these methodological limitations highlight the need for more rigorous, adequately powered studies that explicitly incorporate assisted reproduction as a key analytical variable and prioritize longer-term follow-up.

A central limitation of the current evidence base is the reliance on indirect inference from general postpartum populations to ART-conceived groups. While conceptual models suggest that ART-related psychological experiences may modify postpartum vulnerability and intervention response, empirical

confirmation remains limited. Extrapolation assumes equivalence in symptom trajectories, help-seeking behavior, and intervention engagement assumptions that may not hold given the distinct reproductive histories and sociocultural contexts of ART-conceived motherhood. As a result, conclusions regarding effectiveness, optimal timing, and personalization of digital interventions for ART populations should be interpreted cautiously.

Implications for Clinical Practice and Policy

The findings of this narrative review have important implications for both clinical practice and health policy, particularly in relation to the integration of mental health support across the reproductive continuum for women who conceive through assisted reproductive technologies. Digital health interventions offer a potentially scalable means of addressing gaps in postpartum mental health care; however, their effective implementation requires deliberate alignment with existing clinical pathways, service models, and regulatory frameworks [34].

Integration Into Fertility and Postpartum Care Pathways

Digital health interventions may offer a potential mechanism to address discontinuities in care between fertility treatment and postpartum services. However, given the limited availability of ART-specific trials, their integration into clinical pathways should be considered exploratory and contingent upon further population-specific validation.

From a clinical perspective, such integration would require collaboration between reproductive medicine specialists, obstetric providers, and mental health professionals. Embedding digital screening tools and intervention options within routine postpartum follow-up may enhance early identification of depressive symptoms, particularly among women who are less likely to seek in-person mental health care. Importantly, integration efforts should emphasize personalization, ensuring that digital interventions acknowledge infertility histories and ART-related psychological experiences.

Stepped-Care and Hybrid Service Models

Digital interventions are well-suited to incorporation within stepped-care and hybrid service models, in which the intensity of care is matched to symptom severity and individual need. Low-intensity, self-guided digital tools may serve as preventive or early-intervention options for women experiencing subthreshold depressive symptoms, while more intensive telepsychology or telepsychiatry services can be offered to those with moderate to severe depression.

Hybrid models that combine digital tools with clinician oversight may be particularly advantageous for ART populations, allowing for flexible delivery while preserving therapeutic accountability and continuity. Such models also support efficient allocation of limited mental health resources and may reduce wait times for specialist care. However, successful implementation requires clear referral pathways, clinician training, and systematic evaluation of outcomes across care levels. At present, these implementation considerations remain conceptual, as ART-specific effectiveness data are insufficient to support routine clinical adoption.

Regulatory Oversight and Data Governance

The expansion of digital mental health interventions raises critical considerations regarding regulatory oversight, data governance, and ethical accountability. Given the sensitive nature of reproductive and mental health data, robust standards for data privacy, security, and informed consent are essential. Policymakers and regulatory bodies must ensure that digital interventions adhere to evidence-based practice standards and are subject to appropriate clinical validation.

Additionally, transparency regarding data use, algorithmic decision-making, and clinical responsibility is particularly important for emerging technologies such as AI-driven tools and passive monitoring systems. Without clear governance frameworks, there is a risk that digital interventions may exacerbate inequities or undermine trust in perinatal mental health services. Policy efforts should therefore prioritize the development of regulatory guidelines that balance innovation with patient safety, equity, and ethical integrity [35,36].

Cost-effectiveness considerations

Digital health interventions are often discussed as potentially cost-efficient alternatives or complements to traditional face-to-face psychotherapy due to scalability, reduced clinician time requirements, and flexible delivery formats. In general perinatal populations, preliminary economic evaluations suggest that internet-delivered cognitive behavioral therapy and stepped-care digital models may reduce treatment costs while maintaining clinical benefit [21,23]. However, no cost-effectiveness analyses have specifically evaluated digital mental health interventions in ART-conceived postpartum populations. Given the financial burden already associated with fertility treatment, careful economic evaluation is particularly important in this group to determine whether digital interventions reduce downstream healthcare utilization, improve maternal functioning, or offset long-term psychosocial costs. At present, cost-effectiveness assumptions remain

extrapolated and should be empirically tested before informing resource allocation decisions.

Future Research Directions

Advancing digital mental health interventions for postpartum depression following assisted reproductive technologies requires a research agenda that moves beyond conceptual alignment toward population-specific empirical validation. Although digital interventions demonstrate feasibility and effectiveness in general postpartum populations [7,21], the absence of ART-specific trials limits the strength of conclusions that can be drawn for this subgroup.

First, rigorously designed studies explicitly focusing on women who conceive through ART are needed. ART conception should be treated as a central analytical variable rather than a background demographic characteristic. Randomized controlled trials and pragmatic effectiveness studies incorporating ART-specific tailoring such as modules addressing infertility-related loss, anticipatory anxiety, and post-treatment identity shifts are essential to determine whether intervention responsiveness differs meaningfully from general postpartum samples [11,37]. Where ART-specific recruitment is not feasible, stratified analyses should be reported to improve interpretive precision.

Second, longitudinal research designs extending from pregnancy into later postpartum stages are necessary to capture symptom fluctuation, delayed onset of depression, and longer-term psychosocial adjustment [16]. Such designs would also allow evaluation of sustained engagement with digital platforms and durability of treatment effects outcomes that remain underreported in current DHI research [18].

Third, participatory and co-design methodologies involving individuals with lived experience of ART and clinicians in fertility and perinatal care are needed to enhance contextual relevance and acceptability. Qualitative evidence suggests that identity transition and relational dynamics play significant roles in ART-conceived parenthood [14,31,32], yet these dimensions are rarely operationalized within digital intervention frameworks. Incorporating relational and identity-based constructs may strengthen both theoretical grounding and intervention responsiveness.

Finally, the integration of digital mental health tools with clinical and contextual data streams warrants cautious exploration. Emerging work in digital mental health highlights opportunities for adaptive and personalized intervention models [18,23], but empirical validation in postpartum populations particularly those following ART remains limited. Ethical oversight, data governance, and equity considerations must accompany any expansion of technologically mediated care [26,35].

Collectively, these priorities underscore that current recommendations remain research-oriented rather than implementation-ready. Establishing whether digital interventions can be safely, effectively, and equitably adapted for ART-conceived postpartum populations requires deliberate, population-specific investigation.

Strengths and Limitations of This Narrative Review

Strengths

A key strength of this narrative review lies in its conceptual integration across multiple disciplines, including reproductive medicine, perinatal psychiatry, psychology, and digital health. By synthesizing evidence from these intersecting fields, the review provides a theoretically informed perspective on postpartum depression following assisted reproduction that would be difficult to achieve through more narrowly focused approaches. This integrative framework allows for a nuanced examination of digital health interventions as psychosocial tools situated within complex reproductive and mental health trajectories.

Another strength is the explicit focus on women who conceive through assisted reproductive technologies, a population that remains comparatively underrepresented in postpartum mental health research despite evidence of elevated psychological vulnerability. By foregrounding ART-related experiences and stressors, this review addresses a critical gap in the literature and highlights the need for population-specific intervention development and evaluation.

Limitations

Several limitations should be acknowledged. As with all narrative reviews, the synthesis presented here is subject to interpretive subjectivity, as study selection, emphasis, and thematic integration rely on author judgment rather than formal quantitative aggregation. Although transparent search strategies and inclusion criteria were employed, the narrative approach does not eliminate the potential for selection bias.

Additionally, the conclusions of this review are constrained by the quality and granularity of the available literature. ART-specific data are inconsistently reported, and many studies include

women who conceive through assisted reproduction only as part of broader perinatal samples. This dependence on secondary or incomplete reporting limits the ability to draw definitive population-specific conclusions and underscores the need for more targeted research.

Conclusion

Postpartum depression following assisted reproductive technologies represents a clinically important and conceptually distinct area of perinatal mental health that remains underexamined within digital intervention research. Women who conceive through ART often enter the postpartum period with cumulative psychological burdens shaped by prolonged infertility, treatment-related stress, prior loss, and complex identity transitions. While digital health interventions demonstrate feasibility and effectiveness in general postpartum populations, the current evidence base for their application in ART-conceived populations remains largely indirect.

Digital mental health tools are conceptually well aligned with the needs of this group, offering flexibility, scalability, and the capacity for personalization across a continuum of symptom severity. However, the absence of ART-specific trials, limited stratified analyses, and lack of longitudinal evaluation constrain confidence in their clinical readiness. As such, current findings should be interpreted as hypothesis-generating rather than confirmatory.

To advance the field in a focused and evidence-driven manner, three priorities warrant emphasis. First, future studies should prioritize ART-specific digital mental health trials or, where direct recruitment is not feasible, require stratified analyses that explicitly examine ART-conceived postpartum populations to enable valid assessment of differential effectiveness and engagement. Second, longitudinal and developmentally informed study designs spanning pregnancy through extended postpartum periods are needed to capture delayed symptom onset, durability of intervention effects, and evolving psychological needs following assisted reproduction. Third, participatory co-design approaches involving individuals with lived ART experience and clinicians across fertility and perinatal care settings should be embedded early in intervention development to enhance contextual relevance, acceptability, and equity.

Together, these priorities provide a realistic and methodologically sound roadmap for strengthening the evidence base while avoiding premature claims of implementation readiness. Establishing whether digital interventions can be safely, effectively, and equitably adapted for ART-conceived postpartum populations will require deliberate, population-specific investigation grounded in both empirical rigor and contextual sensitivity.

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