

The F-A-X Pathway: Integrating XR and Arts-Based Action Research in Feminist Art Therapy

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Abstract. Declining fertility rates among immigrant women, particularly first-generation Chinese immigrant women, are closely tied to intersecting structural and psychological challenges, including limited healthcare access, fragmented social support, and cultural barriers. To address these multidimensional issues, this study introduces the F-A-X Pathway, an integrated framework that aligns Feminist Art Therapy (FAT), Arts-Based Participatory Action Research (AB-PAR), and Extended Reality (XR). Adopting a critical and pragmatic paradigm, the research employed a mixed-methods approach combining digital health interventions and online co-creation workshops. Data collection included surveys, longitudinal follow-ups, interviews, and multimodal interaction analysis, enabling both quantitative and qualitative evaluation of usability, adherence, and psychosocial outcomes. Findings demonstrate that the F-A-X Pathway enhances physical rehabilitation, facilitates psychological healing, and fosters subjectivity reconstruction. Moreover, collective co-creation processes amplified peer support, promoted group empowerment, and generated alternative discourses that challenge structural oppression. The study not only advances the digital transformation of art therapy but also offers a transferable and culturally adaptive framework for marginalized maternal populations in cross-cultural contexts.

Keywords: Feminist Art Therapy, Participatory Action Research, Extended Reality, Immigrant Women, Maternal Health

1. Introduction

The fertility rates of immigrant women are declining faster than those of native-born women, particularly those among immigrant women from China, who have long remained at a low level [1]. This trend arises not only from the reduction of individual reproductive desire but also from the intersection of predicaments from physical and psychological factors embedded in the pregnancy and childbirth period under structural oppression. These include: insufficient medical resources, fractured social support systems, inadequate public health systems, language and cultural barriers, and the vulnerability exacerbated by intercultural institutional gaps [2]. These intertwined constraints undermine maternal health and reproductive aspirations, hinder the socialization of experiences, and limit collective empowerment. Therefore, it is urgency-driven by exploring the pathway that synthesizes feminist art therapy (FAT), arts-based participatory action research (AB-

PAR), and extended reality (XR) to create co-creative spaces, which can alleviate isolation and share trauma. This pathway is referred to as the F-A-X Pathway.

There are three shortcomings in existing research: First, it is overly simplistic due to the segregation of methods and disciplines, which leads to a lack of interdisciplinary integration, making it difficult to address individual healing alongside structural oppression simultaneously [3]. Second, there is a severe lack of systematic research on first-generation Chinese immigrant pregnant women currently; thus, this group is marginalized by academia and practice. Third, the art therapy-based XR is isolated, and there is a scarcity of systematic methodology and evaluation mechanisms [4]. This article aims to achieve multiple goals through the F-A-X Pathway: to create an embodied space of healing and empowerment for a generation of immigrant pregnant women at the practical level, to demonstrate its potential as a transferable research path at the paradigm level, and to respond to structural oppression at the academic level by proposing a new explanatory framework for cross-cultural maternal and childbirth experiences.

The following are the two core research questions of this article: RQ1: Can the F-A-X Pathway achieve adherence and sustainability in remote prenatal care, maternal and infant care, and breastfeeding guidance? RQ2: How can it promote trauma repair, subjectivity construction, and group empowerment through virtual postpartum care and co-creation workshops, and establish a transferable research model?

2. F-A-X pathway foundations and framework

Grounded in feminist theory, the FAT emphasizes tackling the structural oppression as well as physical and psychological trauma faced by women, primarily through artistic expression. It highlights the value of depathologization and the construction of subjectivity [5]. AB-PAR views the art as a tool and medium for knowledge production and social intervention, which focuses on participation, action, and equality. In this way, the research has been a collaborative practice and can promote social change [6]. XR, covering virtual, augmented, and mixed reality, offers immersive, embodied, and multimodal interactions. This feature endows it with the ability to transcend geographical and temporal constraints, as well as expand the expressive dimensions of art therapy and social intervention [7]. The three are independent and complementary in the field of value orientation, research methods, and media functions. FAT offers an ethical foundation for critique and healing, AB-PAR provides a research path, namely co-creation and action, and XR maximizes therapeutic and intervention efficacy based on immersion and interaction, which lays the foundation for a comprehensive framework.

Based on this, this article proposes the F-A-X Framework, a three-pronged alignment of values (F), methods (A), and media (X) to guide healing practices and research evaluation for migrant pregnant women. This framework aims to connect individual trauma recovery with collective empowerment, while also establishing a transferable methodology that can serve as a reference for other marginalized groups. The framework integrates three elements: F provides a normative basis for depathologization and structural critique; A translates values into pathways for participatory co-creation and cyclical action; and X supports and amplifies these practices, providing conditions for embodied, multimodal, and trans-temporal interaction. Those three elements are not simply superimposed, but aligned with "why intervene (F), how to intervene (A), and through what media (X)" to form a principled research framework. The F-A-X framework maps these three components onto five core dimensions, which consist of trauma rehabilitation, subject construction, bodily recovery, usability and acceptability, as well as outputs. More specifically, F is oriented toward ethics and critique, A guarantees participation and equality, and X supports diverse interaction. This

alignment provides for consistency and operability in the practical application of theory, methods, and media.

Compared to non-systematic applications, the innovation of the F-A-X Framework mainly encompasses four aspects: first, it achieves systematic isomorphism of values, methods and media, thereby ensuring the consistency of concepts and practices; second, it integrates physical rehabilitation with psychological healing, social support and emotional expression in parallel to respond to the multiple needs of pregnant women; third, it establishes a multimodal evidence chain that integrates quantitative and qualitative, interactive and longitudinal tracking to enhance the verifiability of the research; finally, it achieves cross-cultural adaptation through symbolic rewriting and contextual reconstruction in XR, providing marginalized groups with an inclusive and transferable healing path.

3. Research methodology

This study, grounded in a critical paradigm, aims to deconstruct intersectional oppression and respond to the physical and psychological trauma of immigrant pregnant women [8]. It adopts a feminist perspective, advocating the depathologization of postpartum depression and the experience of "parenting silos,". Furthermore, the study encourages pregnant women to reconstruct their subjectivity through art and storytelling, and promotes knowledge production and collective empowerment [9]. Simultaneously, it also incorporates a pragmatic approach, translating the critique and feminist perspectives into an operational pathway. Based on the XR-driven AB-PAR framework, the study articulates the link between individual healing and social action in order to ensure the interdisciplinary and cross-cultural adaptability of the findings [10].

Immigrant pregnant women often face both physical and psychological trauma: inadequate medical care, lack of postpartum rehabilitation, and inadequate breastfeeding guidance. Combined with a lack of external support, language and cultural barriers, and maternal discipline, these factors can lead to increased isolation and depression. This study employed a mixed-methods approach, combining AB-PAR with reflexive practice, to design two complementary intervention pathways: one is an XR telemedicine platform focused on physical rehabilitation and social support, and the other is an online co-creation workshop focused on psychological healing and emotional expression. The academics utilized multi-identity reflection journals and participant feedback to continuously refine and iterate the design and prototype, thereby mitigating the risk of power asymmetry while fostering embodied and critical thinking.

Participant recruitment and relationship building: Through Chinese community centers, mother-infant mutual support groups, and confinement service networks, the research team used companionship and volunteer support instead of direct recruitment, and collaborated with cultural brokers such as midwives, social workers, and community leaders to enhance trust and ethical navigation [11].

Ethical Considerations: A dynamic, tiered informed consent process was implemented, allowing participants to make flexible choices regarding the use, including the public display of their work and the knowledge co-created by the participants. The research adhered to trauma-informed principles throughout, with emotional safety protocols, withdrawal, and referral mechanisms established. Online check-ins and follow-up visits ensured ongoing communication and prevented secondary trauma [12].

Data Collection: With a view to assessing platform usability, acceptance, and stability, the intervention of physical rehabilitation combines three scales, namely the SUS, UTAUT, and CSQ, along with adherence metrics that encompass interaction data. The research design follows a tiered

support principle, denoted as "doctor first, peer backup," covering perinatal care, rehabilitation, and breastfeeding guidance. Pre- and post-tests and longitudinal follow-up were used, supplemented by qualitative data from interviews and focus groups [13]. Alternatively, a second program with regard to psychological healing, relying on online workshops, includes modules such as supportive space design, media exploration, art development, peer dialogue, co-construction of knowledge, and cross-cultural postpartum care [14]. The way of data collection was audio recordings, videos, art archives, and embodied interaction traces. The researcher will administer adapted questionnaires before, during, and after the program, as well as at three- and six-month follow-ups. These surveys cover multiple dimensions such as postpartum depression, social support, self-efficacy, and psychological well-being.

Data Analysis: A combined approach of qualitative and quantitative methods was employed. Qualitative analysis consists of thematic, narrative, and artistic approaches, accompanied by NVivo coding and word cloud presentations. Those analysis centers on the experiences of cultural adaptation, trauma repair, and subject construction [15]. In order to demonstrate the cross-media translation of embodied experience, the method of multimodal interaction analysis was utilized, which synthesized the data drawn from language, gestures, artwork, and platform comments. The descriptive statistics and longitudinal trend analysis are core methods of quantitative analysis, which demonstrate the intervention effectiveness by experience ratings and adherence indicators [16]. Qualitative and quantitative approaches complement each other, with the former revealing experiences and narratives and the latter providing evidence of usability, acceptance, and adherence. The overall approach is situated within a critical-embodied-contextual framework, emphasizing alignment with methodology and values and controlling for bias.

4. Result

The F-A-X Pathway proposed in this study holds great potential at the application level. First, the XR-based system and prototype demonstrate feasibility and potential effectiveness in the fields of physical rehabilitation and psychological healing. These offer a technical and methodological foundation for implementing interventions. Second, at the individual level, this framework can reveal recurring cultural barriers and traumatic narratives among immigrant pregnant women in postpartum care, promoting the reconstruction of subjectivity through embodied and symbolic practices. Third, the collective co-creation process can strengthen peer support and group empowerment. Finally, these experiences are further amplified through symbolic rewriting in public discourse, potentially generating alternative discourses and destabilizing maternal disciplines and structural symbols.

Beyond these deductive results, the value of the F-A-X Pathway lies in its methodological innovation. It demonstrates how multimodal XR interactions can expand the depth and diversity of embodied healing and emotional expression, allowing individual healing to naturally extend to collective empowerment, collective social critique, and the generation of alternative discourse systems. Thus, this study constructs a critical practice chain—individual healing → subject reconstruction → collective empowerment → structural response—which not only pushes the boundaries of art therapy but also provides an embodied and contextualized practice path for feminist social justice, participatory action research, and decolonial knowledge production.

The innovation of this study is proposing a transferable F-A-X Framework for responding to the psychological and physical trauma as well as structural oppression, posed by the "intersecting matrix of childbirth." This pathway holds significant promise both theoretically and practically, but also encounters immense challenges. First, the prototypes of digital therapy need researchers and art

therapists to possess interdisciplinary technology and practical experience; otherwise, they will struggle to develop their function fully. Second, this framework's reliance on XR may exacerbate the digital divide and trigger new forms of technological oppression [17]. Third, localizing and contextualizing the approach is crucial: only by being rooted in the cultural context and practical needs of immigrant pregnant women can it ensure effectiveness and sustainability. Finally, further testing and optimization are needed through empirical pilots and longitudinal evaluations.

5. Conclusion

This study takes pregnant and postpartum Chinese immigrant women as its empirical context, breaking with Euro-American norms and providing a more diverse setting for digital and feminist research [18]. It pioneered an XR-driven AB-PAR research approach, embedding a dual framework of physical recovery and psychological healing to advance the digital transformation of art therapy. The F-A-X Pathway is both critical and therapeutic, responding to intersectional oppression and promoting the healing and repair of individuals' trauma. By harnessing cross-media, multisensory, and embodied practices, it established a new trajectory for art therapy, digital healing, and participatory action research. This pathway empowers marginalized groups to voice their opinions and engage in public discourse, while also being transferable across sectors. It extends to manifold areas, involving issues related to migration, post-disaster trauma, education, community building, and policy advocacy [19].

Only with institutional and cross-sectoral support can the development of the F-A-X pathway fully realize its potential. From the policy perspective, UNESCO and national public health systems should weave digital healing and art therapy together into public services, which dismantles barriers to access and guarantees participation and responsiveness for marginalized groups [20]. At the professional level, the International Art Therapy Association and the Feminist Research Network should promote in-depth collaboration among art therapists, XR developers, sociologists and psychologists, and policymakers to achieve the integration of methodology, technology, and social practice. In the future, a cross-temporal and multi-domain tracking and feedback mechanism will need to be established to continuously evaluate therapeutic effectiveness and cultural adaptability, and through iterative optimization, ensure its sustainable application in various contexts. Although this study proposed an innovative F-A-X Pathway, it still has limitations. The development of the digital therapy prototype relies on the interdisciplinary technical capabilities and practical experience of researchers and art therapists. The current sample size and experimental conditions limit its full functionality. Future research should expand the sample coverage, include different immigrant groups and cross-regional cases, and enhance the universality and cultural adaptability of the framework.

References

- [1] S. A. Camarota, "The Fertility of Immigrants and Natives in the United States, 2023," May 2025. [Online]. Available: <https://cis.org/Report/Fertility-Immigrants-and-Natives-United-States-2023>
- [2] S. Pappas, "'We know what to do; we just have to implement it.': Pregnancy is deadlier in the US than in other wealthy...", Live Science, Aug. 22, 2025. <https://www.livescience.com/health/fertility-pregnancy-birth/more-women-die-in-childbirth-in-the-us-than-in-other-wealthy-nations-but-we-know-what-to-do-to-save-them>
- [3] A. Zubala, N. Kennell, and S. Hackett, "Art Therapy in the Digital World: An integrative review of current practice and future directions," *Frontiers in Psychology*, vol. 12, Apr. 2021, doi: 10.3389/fpsyg.2021.600070.
- [4] H. Kim and Y. Choi, "A practical development protocol for evidence-based digital integrative arts therapy content in public mental health services: digital transformation of mandala art therapy," *Frontiers in Public Health*, vol. 11, Sep. 2023, doi: 10.3389/fpubh.2023.1175093.

- [5] “Arts Therapies and Gender Issues | International Perspectives on RESEA,” Taylor & Francis, Jul. 30, 2019. <https://www.taylorfrancis.com/books/edit/10.4324/9781351121958/arts-therapies-gender-issues-susan-hogan>
- [6] P. Freire 1921-, Donaldo Macedo, and Richard Shaull, *Pedagogy of the oppressed*. The Continuum International Publishing Group Inc, 2005. [Online]. Available: [https://files.libcom.org/files/Paulo%20Freire,%20Myra%20Bergman%20Ramos,%20Donaldo%20Macedo%20-%20Pedagogy%20of%20the%20Oppressed,%2030th%20Anniversary%20Edition%20\(2000,%20Bloomsbury%20Academic\).pdf](https://files.libcom.org/files/Paulo%20Freire,%20Myra%20Bergman%20Ramos,%20Donaldo%20Macedo%20-%20Pedagogy%20of%20the%20Oppressed,%2030th%20Anniversary%20Edition%20(2000,%20Bloomsbury%20Academic).pdf)
- [7] P. A. Rauschnabel, R. Felix, C. Hinsch, H. Shahab, and F. Alt, “What is XR? Towards a Framework for Augmented and Virtual Reality,” *Computers in Human Behavior*, vol. 133, p. 107289, Mar. 2022, doi: 10.1016/j.chb.2022.107289.
- [8] C. Eastwood, A. McDonald, D. Turner, and P. V. Obe, “Intersectionality and art therapy,” *International Journal of Art Therapy*, vol. 28, no. 1–2, pp. 2–6, Apr. 2023, doi: 10.1080/17454832.2023.2221517.
- [9] T. Van Lith, N. Gerber, and M. Centracchio, “Preliminary modelling for strategic planning in art therapy research: A multi-phase sequential mixed methods study,” *The Arts in Psychotherapy*, vol. 85, p. 102055, Jul. 2023, doi: 10.1016/j.aip.2023.102055.
- [10] G. Yitka et al., “Applied Social Prescribing Practice: A focused arts based participatory action research study of military veteran transition into Civilian life,” *Journal of Participatory Research Methods*, vol. 3, no. 2, Aug. 2022, doi: 10.35844/001c.37612.
- [11] M. Zhang, D. Ji, and X. Chen, “Building trust in participatory design to promote relational network for social innovation,” in **PDC '22: Proceedings of the Participatory Design Conference 2022 - Volume 2**, Aug. 2022, pp. 94–102. doi: 10.1145/3537797.3537817
- [12] V. C. Liu, L. E. Nelson, and S. Shorey, “Experiences of Women Receiving Trauma-Informed Care: A Qualitative Systematic review,” *Trauma Violence & Abuse*, vol. 25, no. 4, pp. 3054–3065, May 2024, doi: 10.1177/15248380241234346.
- [13] P. Kåks, M. Målqvist, M. Tomlinson, and L. S. Katzen, “Empowerment strategies of the Mentor Mother peer support program among mothers who have migrated to Sweden: a photovoice study,” *BMC Public Health*, vol. 24, no. 1, Jul. 2024, doi: 10.1186/s12889-024-19442-5.
- [14] O. Claburn et al., “Co-production in practice: A qualitative study of the development of advance care planning workshops for South Asian elders,” *Palliative Medicine*, Dec. 2024, doi: 10.1177/02692163241302678.
- [15] J. T. Colonel and B. Lin, “Word Clouds as Common Voices: LLM-Assisted visualization of Participant-Weighted themes in qualitative interviews,” *arXiv.org*, Aug. 11, 2025. https://arxiv.org/abs/2508.07517?utm_source
- [16] J. D. Smith et al., “The Longitudinal Implementation Strategy Tracking System (LISTS): feasibility, usability, and pilot testing of a novel method,” *Implementation Science Communications*, vol. 4, no. 1, Nov. 2023, doi: 10.1186/s43058-023-00529-w.
- [17] C. MacArthur, E. Kukshinov, D. Harley, T. Pawar, N. Modi, and L. E. Nacke, “Experiential disparities in social VR: uncovering power dynamics and inequality,” *Frontiers in Virtual Reality*, vol. 5, Aug. 2024, doi: 10.3389/frvir.2024.1351794.
- [18] M. Carrasco et al., “Evaluating the effect of a virtual reality digital therapeutic on maternal stress among expectant and postpartum Black and Latina mothers: a protocol paper,” *Frontiers in Psychiatry*, vol. 15, Dec. 2024, doi: 10.3389/fpsy.2024.1481453.
- [19] K. Lukoff and X. Zhang, “Community Empowerment through Location-Based AR: The Th`amien Ohlone AR Tour,” *arXiv.org*, Apr. 11, 2025. https://arxiv.org/abs/2504.09010?utm_source
- [20] T. Bober et al., “Digital Health Readiness: Making digital health care more inclusive,” *JMIR Mhealth and Uhealth*, vol. 12, p. e58035, Oct. 2024, doi: 10.2196/58035.