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Culturally adapting digital weight management interventions: Is it worth the effort?

Sabina Valentine

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At the time of writing this paper, Sabina was a third-year doctoral student in the University of Alberta's Agricultural, Food, and Nutritional Science PhD program. She is a Registered Dietitian (RD) and an educator with over 20 years' experience teaching nutrition and dietetics at the University of Alberta. Her PhD research focuses on creating culturally responsive health interventions and materials to promote equity and chronic disease prevention in culturally diverse and underserved populations.

Abstract

Culturally adapting digital weight interventions (DWIs) is often proposed as a strategy to improve engagement and health outcomes among culturally diverse populations. However, adaptation processes are inconsistently reported and poorly implemented, leading to limited effectiveness. This critical literature review examines the components and processes of cultural adaptation across 7 digital weight interventions, targeting diverse ethnic groups. While most studies implemented surface-level adaptations such as culturally relevant images and language, few demonstrated deep-level modifications reflecting users' beliefs, norms and lived experiences. Use of theoretical frameworks was limited, and only 3 studies demonstrated evidence of iterative refinement using stakeholder feedback and empirical data. Findings indicate that the observed ineffectiveness of culturally adapted DWIs may reflect gaps in adaptation methodology, rather than a failure of cultural adaptation itself to improve outcomes. Strengthening theoretical guidance, transparency in processes and stakeholder engagement is essential for improving the cultural relevance, usability and overall impact of digital interventions for diverse communities.

Introduction

Canada is a multicultural society, with immigrants comprising nearly one-quarter of residents (Ahmed et al., 2016; Statistics Canada, 2022). While many arrive in good health, this advantage often diminishes due to acculturative stress, systemic barriers, and food insecurity (Bacong & Menjívar, 2021; Dunn & Dyck, 2000). Obesity and related chronic diseases disproportionately affect culturally diverse groups (Washington et al., 2023), emphasising the need for culturally relevant weight management strategies.

Digital weight interventions, including apps, websites and text messaging, offer scalable, cost-effective tools to support weight management in diverse populations (Kim et al., 2022). Minority groups, immigrants, and refugees increasingly turn to digital platforms for health support (Huh et al., 2018; Liem et al., 2021), yet engagement remains low, often due to limited cultural relevance (Huh et al., 2018; Nouri et al., 2020). Cultural adaptation, defined as the systematic modification of an intervention to reflect a population's cultural norms, beliefs and values, has been proposed as a strategy to improve the relevance and impact of DWIs. Despite their potential, 2 systematic reviews found no consistent evidence that culturally adapted DWIs improve outcomes, prompting those researchers to question whether such adaptations are worthwhile (Balci et al., 2022; Spanhel et al., 2019).

However, the perceived failure of cultural adaptation to produce meaningful outcomes may instead reflect shortcomings in the implementation processes, resulting in digital programs that are not truly culturally relevant. Weak methods, limited theoretical grounding, high dropout rates and inconsistent outcomes point to flaws in adaptation practices, rather

Contact details:
Sabina Valentine
sparkes@ualberta.ca

than the potential impact of cultural adaptation itself (Balci et al., 2022; Nittas et al., 2024). Many so-called adaptations rely on surface-level changes and lack deep engagement with users, resulting in symbolic rather than meaningful cultural tailoring (Elliott et al., 2024; Nittas et al., 2024).

This review critically analyses how cultural adaptations are conceptualised and implemented within DWIs

This review critically analyses how cultural adaptations are conceptualised and implemented within DWIs involving nutrition and/or physical activity, highlighting key gaps that may limit their effectiveness. The findings will inform the development of more equitable, effective and culturally responsive digital health interventions for diverse populations.

Methods

This critical literature review was conducted as a sub-analysis of a broader scoping review examining the cultural adaptation of digital health interventions. This analysis focused specifically on culturally adapted DWIs targeting nutrition and/or physical activity among culturally diverse populations.

Eligible studies described culturally adapted DWIs that included tailored content or technology, addressed nutrition and/or physical activity and were delivered via internet, computer, mobile platforms or by culturally adapted text messaging. Articles were excluded if they focused solely on language translation, were published before 2009 or were not available in English. Searches were conducted across Medline, PubMed, Web of Science, Embase, and CINAHL[1] using terms related to digital health, cultural adaptation and weight management. Full inclusion criteria and search strategies are summarised in Tables 1 and 2. A professional health sciences librarian assisted with search development and execution.

Data were extracted on study design, target population, digital format, cultural adaptation process, stakeholder involvement, participant retention, and reported strengths and limitations. The review prioritised methodological dimensions of cultural adaptation, particularly the transparency, depth and iterative nature of processes used across DWIs.

Results and discussion

From the broader scoping review, 17,221 references were identified. Of these, 6,205 remained after removing duplicates. Of 339 full-text articles reviewed (following the exclusion of 5,859 after title/abstract screening), 7 studies on culturally adapted DWIs were included. A PRISMA[2] flow diagram summarises the screening process (Figure 1).

Study characteristics

All studies were on culturally adapted DWIs targeting diverse ethnic groups such as Chinese-American, Latino, Ghanaian, African-American and American Indian populations (Table 3). Study designs included 4 randomised controlled trials, a feasibility intervention, a qualitative study exploring end-users' perspectives and a mixed-methods approach, with sample sizes ranging from 16 to 241. Intervention lengths ranged from 2 to 6 months for most studies; one study focused only on the adaptation process at a single point in time. Most participants were overweight or obese adults (BMI range = 28.3–37.1 kg/m^2); the majority were women. Two studies focused on adolescents and the remaining 5 studies focused on adults. Most interventions were US based and were delivered in English, except for 2, which were conducted in Germany and Saudi Arabia and delivered in Ghanaian languages/German/English and Arabic, respectively.

Delivery formats were either fully digital (n = 3) or hybrid (digital/in-person; n = 4). All but one intervention included facilitator support. Overall, differences in study design, including intervention length, participant characteristics and delivery format (that is, fully digital versus hybrid), influenced how cultural adaptations were integrated and operationalised. Study characteristics are summarised in Tables 3 and 4.

Cultural adaptations made in extracted studies

Effective cultural adaptions are grounded in theory, guided by frameworks and shaped through meaningful engagement with stakeholders (Elliott et al., 2024; Nittas et al., 2024). Across the reviewed studies, cultural adaptations varied in depth and scope. The cultural adaptations made by each study are summarised in Table 5.

Surface-level adaptations, including modifications to language, imagery, foods or physical activity (Resnicow et al., 2000), were present in all studies. These commonly included culturally relevant foods (Chen et al., 2017; Hemmingson et al., 2016; Mattei et al., 2024; Wilson et al., 2022), visual content (Hemmingson et al.,

1 CINAHL is short for the Cumulative Index of Nursing and Allied Health Literature.

2 PRISMA is short for Preferred Reporting Items for Systematic reviews and Meta-Analyses.

2016; Napolitano et al., 2021) and simplified or bilingual language (Mattei et al., 2024). One study implemented minimal digital surface-level cultural adaptions through bilingual text-messaging reminders (Amoah et al., 2021).

Deep-level digital adaptations, which reflect users' core values, social structures and lived experiences (Resnicow et al., 2000), were identified in the digital components of 3 interventions. These included culturally specific messaging (Mattei et al., 2024), culturally resonant storytelling (Napolitano et al., 2021) and integration of traditional health beliefs (Chen et al., 2017). In contrast, 5 studies applied deep-level cultural content only to the in-person components (Amoah et al., 2021; Hemmingson et al., 2016; Napolitano et al., 2021; Wilson et al., 2022), with Amoah et al. (2021) being the only study where nearly all adaptations were in person. This pattern suggests that digital components were often viewed as functional tools for tracking, delivering reminders or information, rather than as vehicles for cultural engagement. This finding aligns with prior research demonstrating that DWIs frequently rely on superficial tailoring, with limited integration of deep cultural values (Mattei et al., 2024; Wilson et al., 2022). Without embedding intentional digital adaptation, tools risk functioning passively rather than as culturally responsive supports. These gaps emphasise the importance of aligning the depth of cultural adaptation across all components, particularly in hybrid models, to improve coherence, engagement and effectiveness.

Technical design was rarely culturally adapted. Only one study (Alnasser et al., 2015) engaged technical specialists to create a gender-sensitive layout and privacy features, though these remained surface-level cultural adaptions. No study incorporated deep cultural tailoring in digital interfaces, such as culturally meaningful goal-setting logic, navigation structures or interactive elements. This absence of technical collaboration is a missed opportunity to align platforms with user expectations and interaction norms, potentially limiting usability and cultural relevance (Naderbagi et al., 2024; Nittas et al., 2024).

Given the variation in adaptations and frequent absence of deep-level digital elements, it is important to examine the processes informing these adaptations. To assess adaptation quality, this review applies 3 interrelated dimensions drawn from existing frameworks:

1) use of cultural adaptation frameworks
2) clarity and transparency in describing adaptation processes
3) iterative refinement supported by stakeholder engagement and feedback loops (Elliott et al., 2024; Nittas et al., 2024).

Together, these elements offer a comprehensive approach to assess the depth, responsiveness and methodological rigor of cultural adaptions in DWIs.

Cultural adaptation frameworks

Cultural adaptation frameworks offer structured guidance for tailoring interventions beyond surface-level changes (Kumpfer et al., 2017). Without clear frameworks, adaptations risk becoming ad hoc or limited to visible features such as language or imagery, often overlooking deeper cultural beliefs and lived experiences (Nilsen, 2015; Skivington et al., 2024). Content models clarify what aspects should be adapted to enhance cultural relevance, while process models guide how to implement those adaptations in context-specific and systematic ways (Kumpfer et al., 2017). A theoretical foundation strengthens transparency, coherence and fidelity: defined as the degree to which an intervention is delivered as intended (An et al., 2020; Balci et al., 2022).

Among the reviewed studies, only Mattei et al. (2024) explicitly applied a process framework, FRAME-IS[3] (Miller et al., 2021), to guide and report adaptations. Although the framework supports systematic and iterative modification of interventions, it was not evident how it shaped ongoing decisions throughout the adaptation process. This gap is especially relevant because process frameworks are designed to support iterative, evidence-informed modification of non-core elements while preserving intervention fidelity (An et al., 2020; Nittas et al., 2024).

Cultural adaption frameworks offer structured guidance for tailoring interventions beyond surface-level changes

Only 3 studies (Amoah et al., 2021; Mattei et al., 2024; Wilson et al., 2022) applied Resnicow's cultural sensitivity model. As a content model, it distinguishes between surface- and deep-level adaptations and helps define the intended depth of cultural tailoring (Resnicow et al., 2000). In these studies, the model was used to inform the depth of cultural tailoring applied to intervention components, regardless of whether those adaptations were delivered digitally or in person. While Mattei et al. (2024) appeared to apply the model across both digital and in-person elements, Amoah et al. (2021) and Wilson et al. (2022) used it to guide cultural modifications

3 FRAME-IS is short for Framework for Reporting Adaptations and Modifications to Evidence-based Implementation Strategies.

that were largely surface-level in the digital components but more in depth in the in-person cultural adaptions.

The inconsistent use of frameworks across most studies reflects broader findings that the cultural adaptation of DWIs often lack theoretical grounding and structured methodology (Chatterjee et al., 2021; Elliott et al., 2024). Even when frameworks were referenced, they were not integrated into the design or execution of the adaptation process. This lack of clearly applied models remains a key barrier to developing culturally responsive DWIs and reinforces the need for theory-informed, systematically documented approaches to adaptation.

Future efforts should ensure meaningful stakeholder involvement

Iterative refinement in the cultural adaptation process

Iterative refinement drives effective cultural adaptation by transforming one-time modifications into a dynamic, feedback-driven process (Breitenstein et al., 2010; Skivington et al., 2024). This involves the systematic collection, analysis and integration of feedback to ensure cultural relevance and contextual fit over time (Breitenstein et al., 2010). This process aligns intervention content with the evolving values, needs and lived experiences of users (Elliott et al., 2024; Marsiglia & Booth, 2015). Although 5 (63%) of the reviewed studies described cultural adaption stages such as planning, development, stakeholder involvement and pilot testing (Alnasser et al., 2015; Chen et al., 2017; Mattei et al., 2024; Napolitano et al., 2021), these steps are best understood and implemented as interdependent and evolving through iterative refinement, which strengthens both cultural responsiveness and methodological rigor (Breitenstein et al., 2010).

Core elements of iterative refinement include documented changes over time (Skivington et al., 2024), sustained engagement with stakeholders (Breitenstein et al., 2010; Elliott et al., 2024; Marsiglia & Booth, 2015), structured opportunities for reflection and the use of empirical evidence such as pilot feedback (Breitenstein et al., 2010; Skivington et al., 2024). Based on these components, this review applied 5 criteria to assess refinement across studies:

1) documented adjustments
2) meaningful stakeholder involvement
3) researcher-led reflection and adjustment
4) use of emerging evidence
5) structured feedback mechanisms (Breitenstein et al., 2010; Elliott et al., 2024; Marsiglia & Booth, 2015).

Together, these features support culturally relevant, user-centred, and methodologically rigorous interventions. Evaluation of iterative processes are summarised in Table 6.

Three studies (Chen et al., 2017; Hemmingson et al., 2016; Napolitano et al., 2021) met all 5 criteria. They clearly described how feedback shaped cultural content through sustained engagement with stakeholders who contributed beyond initial planning and helped to guide ongoing refinements. The use of iterative refinement in these studies likely contributed to the development of deep-level cultural adaptations, as 2 of the 3 studies that applied this approach also implemented deep-level adaptations in their digital components, demonstrating alignment with users' values, needs and lived experiences.

The remaining 4 studies (Alnasser et al., 2015; Amoah et al., 2021; Mattei et al., 2024; Wilson et al., 2022) demonstrated only partial refinement. While all involved stakeholders and 2 studies (Alnasser et al., 2015; Mattei et al., 2024) referenced empirical input, none described how decisions were made or how feedback was used to refine cultural content. For instance, Mattei et al. (2024) cited FRAME-IS but did not explain how it informed the adaptation process. Alnasser et al. (2015) conducted early focus groups but did not describe how participant input shaped revisions. Amoah et al. (2021) mentioned feedback but did not detail adaptation steps. Wilson et al. (2022) let users select culturally relevant modules but provided no evidence of iterative adaptation based on input.

While all studies implemented cultural adaptations and involved stakeholders to varying degrees, few described how adaptations evolved over time. This lack of transparent, iterative processes in 5 studies limit the ability to assess whether adaptations were genuinely responsive to user needs or grounded in lived experience. Without clear documentation of feedback collection and use, it becomes difficult to distinguish between culturally grounded adaptation and top-down design. This also complicates fidelity assessment, as it is often unclear which adaptations were core, which were flexible or which evolved during implementation. Future efforts should ensure meaningful stakeholder involvement and detailed reporting of how iterative refinement shaped cultural adaptation.

Strengths and limitations

This review is the first to specifically compare cultural adaption processes across digital weight interventions, offering a unique contribution to the literature. It provides a comparative analysis of key cultural adaption components, including framework use, process documentation, stakeholder involvement and iterative feedback. However, this review did not address other foundational cultural adaption elements, such as the role of sub-cultures, justification for adaptations or strategies for evaluating adaptation outcomes (Nittas et al., 2024), which should be considered in future evaluations of culturally adapted DWIs.

Other limitations should be acknowledged. This review included only 7 digital weight interventions, limiting generalisability. Additionally, the included studies varied in design, technology platforms, duration, level of support and participant characteristics. While these differences complicate direct comparison, they also reflect the real-world diversity of digital intervention contexts. Such heterogeneity should not be viewed solely as a limitation, but rather as a defining characteristic of digital health interventions, which are best understood as complex systems composed of multiple interacting elements.

Conclusion

This review suggests that the perceived ineffectiveness of culturally adapted DWIs stems from significant gaps in the adaptation process, rather than from a lack of potential to promote health behaviour change. This review demonstrates that inconsistent cultural adaptation practices likely contributed to the limited effectiveness observed.

Common weaknesses across studies included minimal use of cultural frameworks, inadequate process documentation and limited iterative refinement. While some interventions referenced frameworks or involved stakeholders, these efforts were often superficial and lacked meaningful integration of user feedback. These limitations likely contributed to the scarcity of deep-level digital adaptations.

Digital weight interventions are best understood as complex interventions composed of multiple, interacting elements shaped by dynamic implementation contexts. These components interact in non-linear, often unpredictable ways, making standardised outcomes difficult to isolate. Rather than relying on fixed protocols, complexity-informed approaches emphasise flexibility, responsiveness and continuous adaptation. To reflect this complexity and improve outcomes, guideline development for culturally adapted DWIs should prioritise adaptable, theory-informed processes grounded in transparency, user feedback and meaningful engagement with diverse users.

Recognising this complexity also has implications for how effectiveness is evaluated. Future research should adopt more comprehensive, theory-informed strategies that move beyond surface-level outcomes to examine how core components of cultural adaptation influence implementation success. This includes outcomes such as health impact, feasibility, usability, user engagement and cultural fit, across both DWIs and broader digital health promotion tools. A clearer understanding of how cultural adaptation functions within complex systems can inform more relevant, equitable, and sustainable intervention design.

This review is the first to specifically compare cultural adaption processes across digital weight interventions

Table 1: Inclusion and exclusion criteria for critical literature review

Domain	Inclusion criteria	Exclusion criteria
Population	Individuals from a diverse cultural group (that is, national or ethnic background differing from the initial target group) All age groups LGBTQ[1] individuals (if other criteria are met)	Participants managing chronic disease
Intervention	Culturally adapted digital weight management interventions Adaptation must include: • Content and/or technology tailored to the target group • Nutrition, physical activity/inactivity as components of weight management • Internet-, computer- or mobile-based format • Culturally adapted text-messaging interventions	Language translation alone without cultural adaptation Diagnosis-specific treatment interventions (for example, diabetes, cancer) Telehealth or telephone-only interventions Adaptations from face to face without digital tailoring Focused solely on sexually transmitted diseases, vaccinations, smoking cessation or substance abuse
Comparator	**Any**	
Outcomes	Methods or procedures used in the cultural adaptation Reach, engagement or usability of the digital tool	Outcomes from culturally diverse individuals using non-adapted interventions
Study design	All study types (qualitative/quantitative, with or without follow-up)	Editorials, narrative reviews, opinion pieces, reviews, letters to editors, commentaries, book reviews
Other	English language Published during or after 2009 Includes both peer-reviewed and grey literature	Non-English articles Published before 2009

Table 2: Electronic database search strategy (January–March 2025; Ovid syntax)**

Search term	Query
Digital health and technology-based interventions	(App* OR mobile* OR smartphone* OR phone* OR tablet* adj2 (device* OR computer*) OR digital OR virtual* OR website* OR web-based OR online OR internet OR m-health OR e-health OR telemedicine OR telehealth OR social adj2 (media OR network*) OR Facebook OR Twitter OR Instagram OR TikTok OR YouTube OR Snapchat) adj3 (intervention* OR program* OR self-help OR self-care OR coaching OR therapy OR promotion OR nutrition OR diet* OR exercise* OR physical activity).mp
Digital interventions for weight management	(program* AND (digital tool OR tools)) OR (*Telemedicine/ OR exp Mobile Applications/ OR exp Internet/ OR exp Educational Technology/) AND (exp Exercise/ OR exp Nutrition Therapy/ OR exp Eating/ OR exp Health Education/)
Cultural adaptation in digital health	(*culture/ OR exp cultural diversity/ OR exp Culturally Competent Care/ OR exp Health Equity/ OR exp Minority Health/ OR exp Social Determinants of Health/)
Cultural adaptation processes	(cultural* OR multicultural* OR sociocultural* OR transcultural*) adj3 (adapt* OR design* OR tailor* OR approach* OR sensitive OR informed).ti,ab,kf
Final search query	(1 OR 2 OR 3 OR 4) NOT (texting OR texted OR text message*).mp

****Note.** In Ovid databases, *.mp* denotes a multi purpose search across multiple fields including title, abstract, subject heading word, and keyword heading word, although exact fields vary by database. .ti,ab,kf limits the search to the title (ti), abstract (ab), and keyword heading word (kf) fields. The operators *adj2* and *adj3* specify that terms must appear within two or three words of each other, respectively. A slash '/' following a term (e.g., *Telemedicine/*) indicates a controlled vocabulary subject heading, and *exp* indicates that the term is exploded to include more specific related headings.

1 LGBTQ is an abbreviation for Lesbian, Gay, Bisexual, Transgender, Queer

Table 3: Description of study ethnicity, study design, sample size, and participant description (n =7)

Author, year	Ethnicity	Study design and intervention length (months)	Sample size	Age (years)	Body mass index (kg/m²)	Percent women (%)
Chen et al., 2017	Chinese American	Pilot RCT, 6	40 (I = 23, C = 17)	14.9 ± 1.67	28.3 ± 4.7	45%
Mattei et al., 2024	Latino (Caribbean and non-Caribbean origin)	Parallel 2-arm double-blind RCT, 4	Unreported	25–65	NR[β]	NR
Alnasser et al., 2015	Saudi	Mixed methods, 4	240	NR	29.1 (67% overweight, 23% obese, 10% severely obese)	100%
Amoah et al., 2021	Ghanaian	quasi-experimental, 3	16	Median 50.6	Median 29.9	67%
Napolitano et al., 2021	African American	Feasibility RCT, 3	136 (I = 65, C = 71)	27.8 ± 5.4	I=32.1, C=32.7	100%
Hemmingson et al., 2016	American Indian	Qualitative focus groups and interviews	3 focus groups (n = 15) + 11 interviews	Phase 1 = 22.4 ± 1.8, Phase 2 = 23.0 ± 3.2	NR	Phase 1: 73%, Phase 2: 64%
Wilson et al., 2022	African American	Retrospect-ive RCT, 2 x 2 factorial design, 6	241	Adolescents: 12.7 ± 1.8 Caregivers: 42.2 ± 6.3	Adolescents: 97.1 ± 2.4 percentile; Caregivers: 37.1 ± 8.0	NR

αRCT = randomised controlled trial βNR = not reported σI= intervention group; C=control group

Table 4: Digital tools used by each study (n =7)

Category	Number of studies
Studies with in-person component	4 (Amoah et al., 2021; Chen et al., 2017; Mattei et al., 2024; Wilson et al., 2022)
Studies with online facilitator support	3 (Chen et al., 2017; Mattei et al., 2024; Napolitano et al., 2021)
Studies with both in-person and online support	2 (Chen et al., 2017; Mattei et al., 2024)
Studies using ≥2 digital tools (multimodal)	5 (Alnasser et al., 2015; Amoah et al., 2021; Chen et al., 2017; Mattei et al., 2024; Napolitano et al., 2021)
Studies using mobile app	3 (Alnasser et al., 2015; Chen et al., 2017; Napolitano et al., 2021)
Studies using texting (SMS)	4 (Amoah et al., 2021; Chen et al., 2017; Mattei et al., 2024; Napolitano et al., 2021)
Studies using Fitbit tracking	2 (Chen et al., 2017; Napolitano et al., 2021)
Studies using social media	2 (Alnasser et al., 2015; Napolitano et al., 2021)
Studies using interactive website	3 (Hemmingson et al., 2016; Mattei et al., 2024; Wilson et al., 2022)
Fully digital interventions	3 (Alnasser et al., 2015; Hemmingson et al., 2016; Napolitano et al., 2021)
Hybrid interventions (in-person and digital)	4 (Amoah et al., 2021; Chen et al., 2017; Mattei et al., 2024; Wilson et al., 2022)
Studies with any form of support (digital or in-person)	6 (Amoah et al., 2021; Chen et al., 2017; Hemmingson et al., 2016; Mattei et al., 2024; Napolitano et al., 2021; Wilson et al., 2022)

Table 5: Surface- and deep-level cultural adaptations made by each study

Author	Surface-level adaptations	Deep-level adaptations
Chen et al., 2017	Inclusion of Chinese and western foods; acknowledged Chinese dietary practices; culturally relevant visuals and animations in education modules	Integrated yin/yang concepts into health messaging; respected cultural eating patterns and traditional beliefs; diet framed through familiar practices
Mattei et al., 2024	Bilingual and simplified SMS* messages; inclusion of culturally relevant foods and recipes; content tailored to literacy level	Messaging framed around family wellbeing, cultural norms and caregiving roles; reinforced autonomy, privacy and emotional-cultural motivators
Alnasser et al., 2015	App in Arabic; localised food and activity content; private social network; culturally neutral interface	Reflected privacy norms and gender-specific exercise barriers; promoted autonomous, balanced health approaches rooted in Islamic values
Amoah et al., 2021	Minimal digital adaptation; bilingual SMS reminders without cultural visuals or multimedia	Low digital adaptation, but in-person sessions addressed cultural beliefs about body image, family support and low health literacy using culturally tailored methods.
Napolitano et al., 2021	Culturally tailored visuals, language, and videos; featured Black women in relatable postpartum roles via app and Facebook	Tailored to postpartum roles, historical and cultural barriers, family stress and body image; used storytelling to reflect cultural learning styles
Hemmingson et al., 2016	Used traditional symbols (medicine wheel, dreamcatchers); website visual redesign with brighter colours; traditional foods and recipes	Acknowledged spiritual traditions; included Indigenous stress-relief methods and culturally significant physical activities (e.g., powwow dancing); addressed time and social structures as cultural barriers
Wilson et al., 2022	Culturally relevant visuals and tailored food recommendations in online content	Integrated spiritual and caregiving roles; emphasised ethnic identity, parenting styles and family-centred motivators for health behaviours

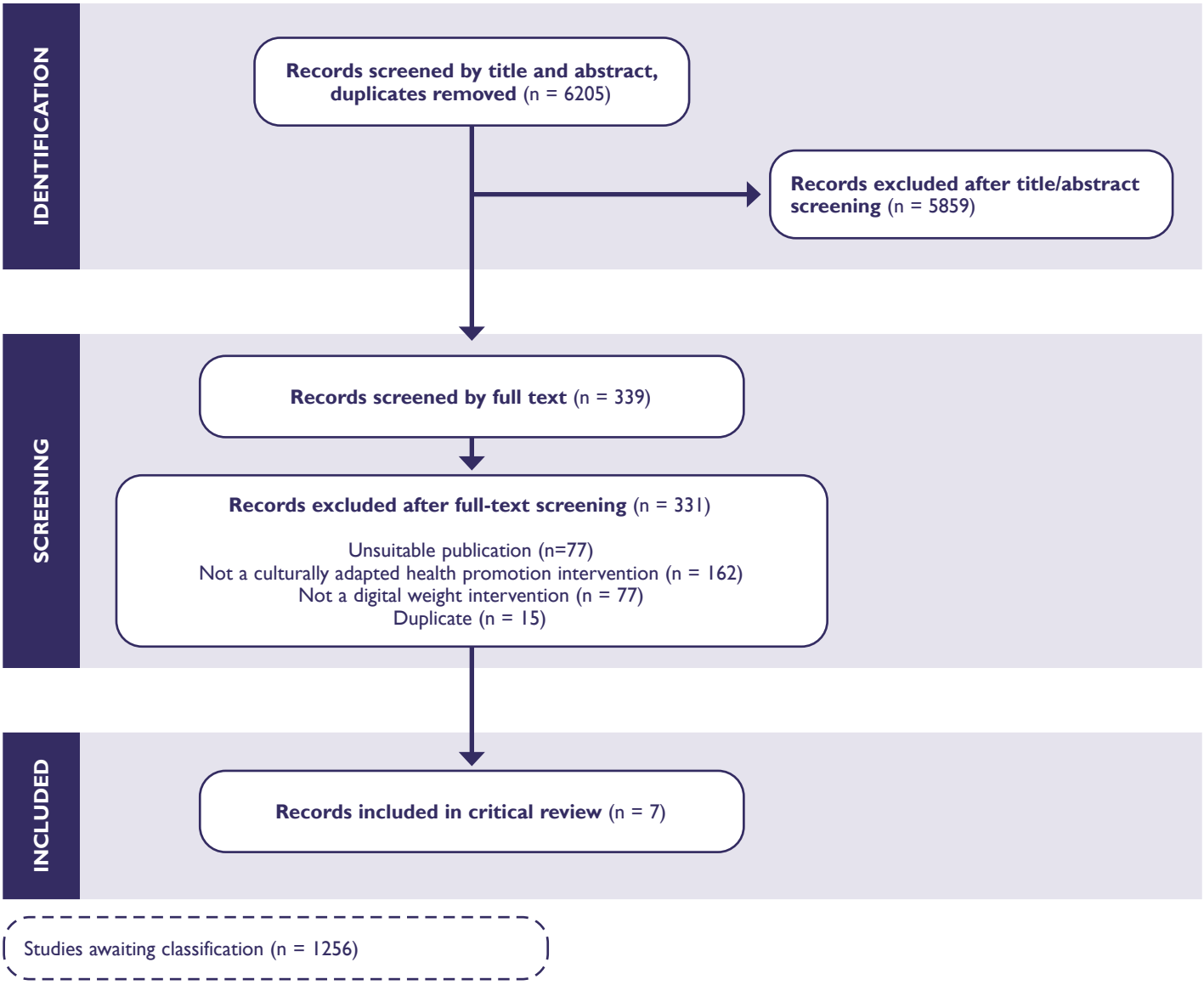
*SMS: text messaging

Table 6: Evaluation of iterative components for each study

Study	Documented iterative refinement	Stakeholder involvement	Researcher-led adjustments	Use of emerging empirical evidence	Structured feedback mechanisms
Amoah et al., 2021	Partially	Yes	Partially	Partially	Not clearly described
Chen et al., 2017	Yes	Yes	Yes	Yes	Yes
Napolitano et al., 2021	Yes	Yes	Yes	Yes	Yes
Hemmingson et al., 2016	Yes	Yes	Yes	Yes	Yes
Mattei et al., 2024	Partially	Yes	Partially	Yes	No
Alnasser et al., 2015	Partially	Yes	No	Yes	No
Wilson et al., 2022	No	Yes	No	No	Yes (non-CA*elements)

*CA = cultural adaptation

Figure 1: Prisma Flow Diagram



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