REVIEW

A Systematic Review on the State of the Art of Culturally Adapted Mindfulness-Based Interventions for First Nations Peoples: Cultural Adaptation, Effectiveness, and Feasibility

Wendy Wen Li[1] · Rebecca McIntyre[1] · Christopher Reid[1] · Marc Chao[1]

Abstract

Objectives Mindfulness-based interventions (MBIs) have demonstrated efficacy in psychological and physiological domains. However, there is a limited body of research on MBIs specifically for First Nations peoples. The current review aimed to systematically evaluate the status of culturally adapted MBIs, examining their effectiveness and feasibility when applied to First Nations peoples.

Method A systematic review was performed to synthesise the data from 10 reports of nine studies, with a combined sample size of 125 participants.

Results The MBIs demonstrated adherence to elements of cultural adaptation, encompassing the aspects of persons, metaphors, content, goals, and concepts in all included studies. Overall, the quantitative evidence measuring the effectiveness of the adapted interventions showed improvements in psychological, physiological, and mindfulness aspects, as well as cultural elements and satisfaction with the programmes. However, there were minor mixed results observed in psychological outcomes and mindfulness measures. The qualitative findings highlighted that MBIs, by aligning with First Nations' holistic spiritual beliefs, facilitated a means to reconnect with cultural and social identity. The maximum number of participants in the programmes ranged from 1 to 34. Participants were recruited through local community organisations, youth correctional facilities, long-term care facilities, Indigenous educational institutes, schools, universities, and word-of-mouth promotion. The pooled retention rate was relatively high at 85.2%, indicating that participants generally remained engaged throughout the programmes.

Conclusions MBIs appear adaptable, effective, and feasible for First Nations peoples, with consistently positive outcomes. Based on the findings of the current review, a model of culturally adapted MBIs is proposed.

Preregistration PROSPERO (Reg, CRD42023413826).

Keywords Mindfulness-based intervention · First Nations peoples · Indigenous mindfulness · White mindfulness · Cultural adaptation

Mindfulness-based interventions (MBIs) are a broad group of interventions rooted in traditional Buddhist meditation teachings that originated in the early 1980s (Hofmann & Gómez, 2017). Currently, MBIs are typically secular, with the removal of religious elements (Marx, 2015). Clinical MBIs encompass mindfulness-centred therapies, such as Mindfulness-Based Stress Reduction (MBSR), Mindfulness-Based Cognitive Therapy (MBCT), and others that are embedded in mindfulness meditation (Shapiro & Carlson, 2009). Mindfulness can be defined as a mental state and practice of holding a nonjudgmental, moment-to-moment awareness of external and internal experiences, fostering clarity, focus, and emotional balance while paying attention to purpose (Kabat-Zinn, 2003; Li et al., 2023a; Sharma & Rush, 2014). MBIs such as MBSR and MBCT typically span eight 2-hr sessions (Kabat-Zinn, 2003; Segal et al., 2004; Shapiro & Carlson, 2009), with MBSR usually including a silent all-day retreat (Santorelli & Kabat-Zinn, 2014). The MBI sessions involve various meditation practices, such as body scan, sitting, yoga, and walking

✉ Wendy Wen Li
wendy.li@jcu.edu.au

1 Department of Psychology, James Cook University, 1 James Cook Drive, Townsville, QLD 4818, Australia

meditations (Santorelli & Kabat-Zinn, 2014; Segal et al., 2004; Sharma & Rush, 2014). These are often followed by a conversational inquiry process that asks participants what they noticed during the practice. The dialogical inquiry encourages participants to reflect and explore their experiences while covering the learning themes of the MBI. These include themes such as present-moment awareness, curiosity, patterns of an automatic reaction to stress, and flexibility of thought and behaviour (Crane et al., 2015).

MBIs have been employed as therapeutic interventions to enhance mental health and psychological well-being. Systematic reviews and meta-analyses consistently report the benefits of MBIs in the psychological and physical domains. Improvements have been observed in symptom reduction for anxiety disorders (Bamber & Morpeth, 2019; Fumero et al., 2020), depression (Goldberg et al., 2019; Kuyken et al., 2016), bipolar disorder (Chu et al., 2018), eating disorders (Mercado et al., 2021), stress (Fuchs et al., 2013; Sharma & Rush, 2014), and the mitigation of the impact of COVID-19 on mental health (Li et al., 2023b). MBIs offer valuable support in coping with cancer (Cillessen et al., 2019), cardiovascular disease (Marino et al., 2021), diabetes (Fisher et al., 2023), and in promoting self-wellness such as self-compassion (Abercrombie et al., 2007), self-regulation (Bockmann & Yu, 2023), and mindfulness (Visted et al., 2015). MBIs have also been shown to be as effective as first-line depression and anxiety medications (e.g. escitalopram) with fewer adverse events (Hoge et al., 2023) and to produce results equivalent to cognitive-behaviour therapy (Goldberg et al., 2019; Karl et al., 2022).

Although MBIs primarily target adult populations, they are increasingly being tailored for youth in educational, community, and justice settings. Mindfulness cultivated through MBIs equips youth with the ability to regulate emotions, identify and manage self-destructive thoughts and behaviours, and detach themselves from negative stimuli (e.g. negative thoughts and emotions) by focusing on the present moment and paying attention to body sensations, emotions, and thoughts (Le & Proulx, 2015). Mindfulness meditation, an essential element of MBIs, also helps First Nations youth connect their strength and wisdom to their cultural heritage (Le & Gobert, 2015).

Mindfulness meditation aligns with First Nations peoples' wisdom and ways of life. First Nations peoples view cultural and spiritual traditions as integral to the holistic healing process and emphasise the importance of connections to family, community, and land for their peoples' social and emotional well-being (Griffiths et al., 2016; King et al., 2009). Many MBIs share similarities with First Nations spiritual practices that focus on harmony and unity with the natural and spiritual realms (McDonald et al., 2021). Consistent with mindfulness, First Nations traditions emphasise multisensory awareness of the present moment. For instance, they

carefully monitor patterns, changes, and cycles in nature to ensure safety and well-being and to prevent harm (McDonald et al., 2021). Therefore, mindfulness is considered to be in harmony with First Nations cultures. This alignment suggests that First Nations peoples may benefit from MBIs (Dreger et al., 2015b; Lavrencic et al., 2021; McDonald et al., 2021).

Although mindfulness is relevant to First Nations cultures, there is limited evidence of cultural adaptations in MBI curricula, teaching, and research for/with First Nations peoples. The underrepresentation of First Nations peoples in MBIs is indicative of deeper systemic disparities. Although rooted in ancient Eastern practices, MBIs are primarily grounded in a Western psychological scientific framework (Bowen et al., 2021). MBIs focus on optimising personal well-being, health, and personal performance and less on wider relational and societal benefits (Crane et al., 2023). Consequently, the prevalent discourses of post-racialism (which declares racism is ended), capitalism, and whiteness dominate the mindfulness sector (Karelse, 2023). This dominance results in the training and practice of mindfulness being greatly influenced by whiteness (Olzman, 2022). The concept of white mindfulness represents the lack of understanding of how racism, colonisation, and whiteness have shaped the conceptualisation, research, teaching, learning, and practice of mindfulness (Fleming et al., 2022; Karelse, 2023). Whiteness-based mindfulness curricula reflect an underlying belief that the standardised mindfulness curricula universally benefit people of all cultural backgrounds (Fleming et al., 2022).

White mindfulness, derived from colonialism and systemic whiteness, interplays with other social, economic, and political factors to perpetuate racism, oppression, and marginalisation (Fleming et al., 2022; Karelse, 2023) in MBI training and practices for First Nations peoples. Crane et al. (2023) argue that MBIs should evolve to address intergenerational trauma, racism, social conditioning, and power imbalances, creating a more inclusive space that promotes a shift in perspective on personal and societal dimensions, ultimately benefiting minorities and First Nations peoples. In recent years, a burgeoning movement centred on liberatory health and mindfulness with a justice-infused approach has emerged to decolonise mindfulness and decentre whiteness (Karelse, 2023).

The cultural adaptation of MBIs for First Nations peoples is essential to move beyond white mindfulness (Fleming et al., 2022; Karelse, 2023). The alignment between First Nations spiritual practices and mindfulness fundamentally assists in decolonisation and de-whitening in MBIs. This, in turn, helps to uphold cultural traditions, improves health and well-being outcomes for First Nations groups (Yellow Bird, 2016), and makes it feasible to adapt MBIs to different cultures (Bernal et al., 1995). If effective, MBIs for First

Nations peoples could offer mindful healing from intergenerational trauma, support decolonisation, and help foster connections to the land and nature (Yellow Bird, 2016), cultural identity, and social connectedness (Karl et al., 2022).

Cultural adaptation of MBIs involves making thoughtful modifications to the protocols and delivery of MBIs to enhance their cultural appropriateness and effectiveness for First Nations peoples (Stirman et al., 2019). One challenge in this process is finding the right balance between preserving the established, clinically standardised MBIs and making necessary cultural adaptations for First Nations peoples (Stirman et al., 2017). Another challenge is balancing fidelity and adaptation to maintain the sustainability of the culturally adapted MBI. Intervention fidelity refers to the consistency, quality, and integrity of the intervention as intended by its developers (Prowse & Nagel, 2014). Fidelity-consistent adaptations aim to preserve the core elements of an intervention that are critical to its effectiveness (Shelton et al., 2018). Numerous systematic reviews have identified that the core to the effectiveness of MBIs is the meditation practices (Chan et al., 2022; Chen et al., 2021; Cramer et al., 2012; Fisher et al., 2023; Pei et al., 2021), which may need to be preserved in culturally adapted MBIs.

From an adaptive lens, existing MBIs often do not consider First Nations peoples' native languages, values, traditions, ways of life, specific stressors, and/or disadvantages (Lau, 2006). Bernal et al. (1995) proposed the ecological validity and cultural sensitivity model, which emphasises cultural perspectives, language, culture, and context in culturally adapted interventions (Bernal et al., 1995, 2009; Castellanos et al., 2020). According to Bernal et al. (1995), eight dimensions are essential for culturally adapted interventions: language, persons, metaphors, content, concepts, goals, methods, and context. *Language* refers to using culturally appropriate language in the intervention; *persons* are concerned with the cultural match between the client and therapist in forming the therapeutic relationship; *metaphors* relate to symbols, concepts, old sayings, and stories shared within the culture; *content* means cultural knowledge, including beliefs, rituals, traditions, and social, cultural, economic, historical, and political uniqueness of the cultural group; *concepts* refer to the concepts that inform the intervention being accordant with the culture and from within the culture; *goals* aim to integrate the positive and adaptive cultural values to the intervention to maximise the congruence between the therapist and participant; *methods* focus on the pragmatic aspects that reflect cultural and practical needs (e.g. cultural rituals, childcare, and transportation for participants); and *context* is about the evolving context during the process of intervention that may lead to further adaptation of the intervention (Bernal et al., 1995, 2009; Castellanos et al., 2020).

To facilitate the effectiveness and appropriateness of culturally adapted MBIs, it is vital to not only apply the model

by Bernal et al. (1995) but also engage in co-design and community consultation with First Nations Elders, mindfulness practitioners, and communities. For most First Nations peoples, interventions should start at the community level, and individual treatments should come last, as these cultures derive strength from their communities (Bernal et al., 1995). Co-design is a participatory and cooperative approach where First Nations Elders, mindfulness practitioners, and communities are respected as equal partners in the design of the cultural adaptation. The co-design process leads to transformative outcomes that validate a First Nations holistic approach to social and emotional well-being and helps identify the difficulties and barriers that First Nations people may experience when practising mindfulness (McDonald et al., 2021).

Given the importance of culturally adapted MBIs for First Nations people, a systematic review of the state of the art of cultural adaptation of MBIs that reflect their unique needs will benefit First Nations peoples and advance relevant knowledge in Indigenous mindfulness training, practice, and interventions. Therefore, this systematic review aimed to elucidate the data on MBIs for First Nations peoples. The potential of MBIs for successful cultural adaptation to various First Nations groups will be explored through a narrative synthesis approach. The synthesis will evaluate the state of the art of culturally adapted MBIs for First Nations peoples using the eight dimensions in the ecological validity and cultural sensitivity model by Bernal et al. (1995); assess effectiveness from participants' perspectives and quantitative data; and evaluate feasibility based on retention, attendance, and recruitment rates. In addition, the following six research questions were explored: What was the state of the art of cultural adaptation of MBIs for First Nations peoples? How were MBIs culturally adapted? What were the protocols of culturally adapted MBIs for First Nations peoples? Were culturally adapted MBIs effective for First Nations peoples? Were culturally adapted MBIs feasible for First Nations peoples? What were the challenges and barriers to practising and implementing MBIs?

Method

The authors of this systematic review conformed to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Page et al., 2021) regulations.

Inclusion and Exclusion Criteria

The inclusion criteria for this review encompassed studies in which MBIs served as the primary treatment and the participants were First Nations peoples. The studies were to be published in English and sourced from peer-reviewed articles or unpublished theses/dissertations. The exclusion

criteria were studies that did not use MBIs or excluded First Nations peoples. Studies not published in English were also excluded from the review. In addition, conference papers, books, book chapters, government/commissioned reports, reviews, and editorials were not considered.

Search Strategy

A comprehensive search for articles was conducted using Medical Subject Headings (MeSH) terms and keywords in nine digital databases (PsycInfo, Scopus, CINAHL, MED-LINE, Emcare, PubMed, Cochrane, Informit, Embase) by authors RM and CR between 13 December 2022 and 12 January 2023. Two updated searches were conducted between 29 November and 6 December 2023, and 15 June 2024. Table 1 presents the search terms using the Cochrane's Participants, Interventions, Comparisons, and Outcomes (PICO) search tool (Higgins et al., 2019). The search results are presented in the Supplementary Information.

Study Selection

A total of 2297 articles were found across the nine digital databases (including 1892, 203, and 202 articles in the first and two updated searches, respectively). After removing duplicates, the title and abstract screenings were conducted for 1276 articles against the inclusion and exclusion criteria. Authors RM and CR screened articles independently, coding *yes*, *no*, or *maybe* for inclusion. Articles unanimously coded *yes* (2.1%) were included in the review, and articles rated *no* (94.1%) were removed from the next full-text screening stage. Authors (WL, RM, CR, and MC) discussed and reviewed the articles that differed in ratings or labelled *maybe* (3.8%) until an agreement was reached (Astridge et al., 2023; Fisher et al., 2023; Leow et al., 2024).

Twenty-three articles were retained for the second step of study selection, which involved full-text screening. After the full-text screening, 11 of the 23 articles were excluded (detailed reasons for exclusions are provided in Fig. 1). The methodological quality of the remaining 12 articles was assessed independently by the three authors (WL, RM, and CR/MC) using the Mixed Methods Appraisal Tool (MMAT) 2018 version (Hong et al., 2019). Fleiss' kappa (*k*; Fleiss, 1971) was employed to assess inter-rater reliability. All 12 articles scored $k > 0.40$; therefore, no further discussion was needed. Two dissertations (Desjarlais & Saskatchewan, 2021; Dreger et al., 2015b) were excluded because their findings were published in their corresponding published articles. Hence, nine studies in 10 articles were included in the review.

Data Extraction

The gathered data were entered into an Excel form designed for data extraction, with columns including the authors, year of publication, country of study, research design, sample size, participant demographics, dimensions of cultural adaptations and protocols, effectiveness of MBIs, retention rates, and recruitment. Two authors (WL and RM) independently assessed the extracted data to determine whether the findings were unequivocal, credible, or unsupported. An agreement index (($N_{unequivocal} + N_{credible}$) / $N_{reviewers}$) was calculated for each article (Astridge et al., 2023; Fisher et al., 2023; Li et al., 2021). All 10 articles met the agreement index of over 0.80 and were retained.

Data Synthesis

A narrative synthesis was employed to synthesise the data with the following four steps: (1) All authors familiarised

Table 1 Participants, Interventions, Comparisons, Outcomes (PICO) systematic search strategy

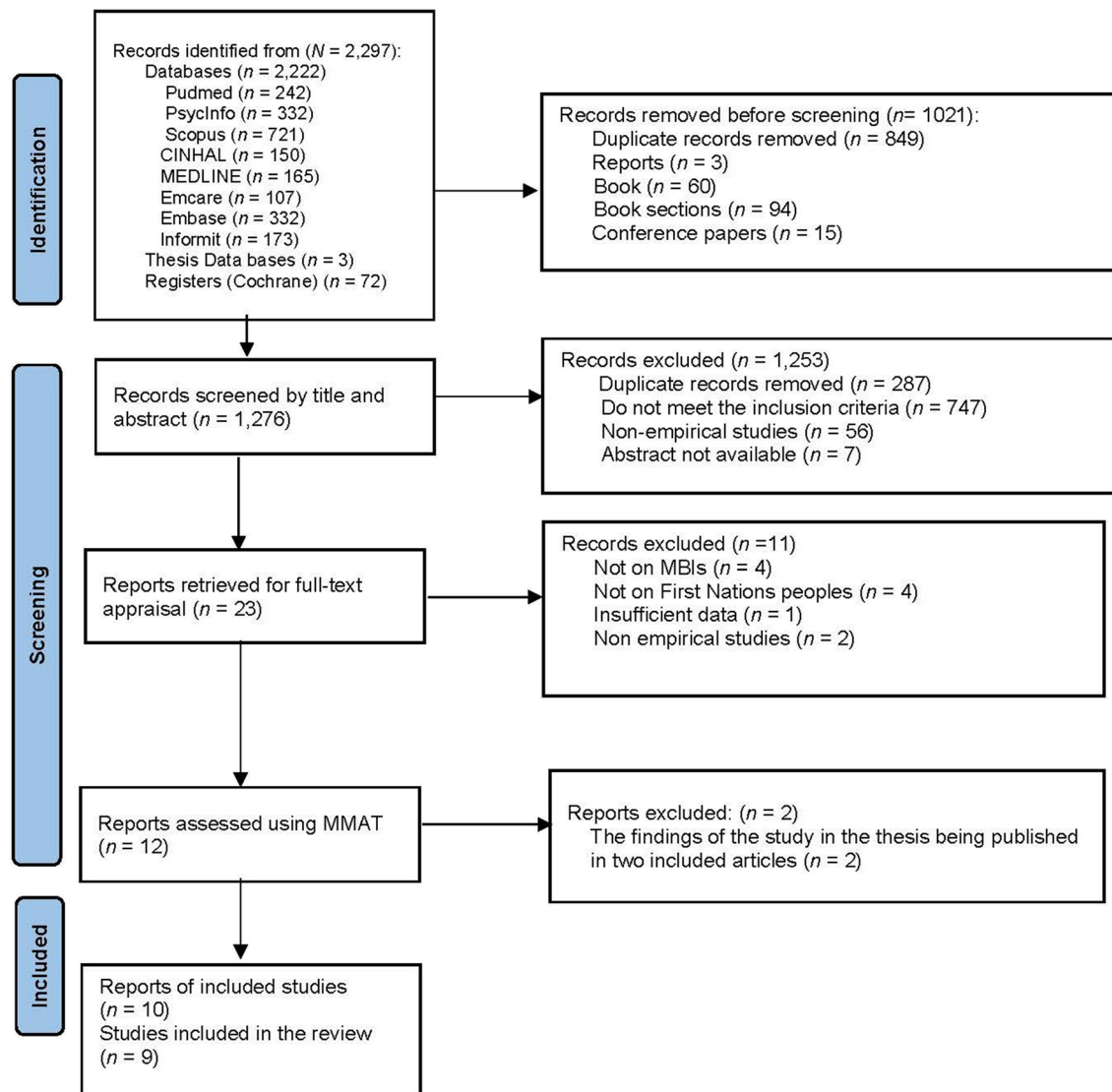| Participants	MeSH terms	Indigenous people, Health Services, Indigenous, Indians, North American, Native Hawaiian or Other Pacific Islander, Aboriginal Canadians, First Nations of Australia, Aboriginal Australians, American Indians or Alaska Natives, Alaskan Natives, Indians, South American
	Keyword search	first nation people OR "first nation peoples" OR indigenous OR native* OR tribe* OR aborig* OR "australian race" OR astraloid OR "torres strait islander" OR maori OR hawaiian* OR "pacific islander" OR "oceanic ancestry group" OR "oceanic ancestry groups" OR "pacific island american" OR "pacific island americans" OR "pacific islander american" OR "pacific islander americans" OR "indigenous canadian" OR "american native continental ancestry group" OR "american amerind" OR amerind* OR "American indian" OR aleut* OR eskimo* OR inuit* OR inupait* OR Kalaalit* OR "Taiwanese aborigine" OR "health indigenous service" OR "indigenous health" OR "Indian health services" OR "aboriginal health" OR "aborigines health"
Interventions	MeSH terms	Mindfulness, Meditation
	Keyword search	Mindful* OR "Mindfulness-based stress reduction" OR MBSR OR "Mindfulness-based intervention" OR "Mindfulness-based interventions" OR MBI OR "Mindfulness-based cognitive therapy" OR MBCT OR "self compassion" OR "self-compassion" OR meditation OR "mind body techniques" OR "mindfulness meditation"
Comparisons	N/A	N/A
Outcomes	N/A	N/A

Fig. 1 The PRISMA chart

themselves with the included studies by thoroughly reading the articles several times; (2) the data characteristics in each included study were summarised using an Excel sheet; (3) similarities and differences were identified to develop themes across the included studies; (4) the robustness of the narrative synthesis was assessed using the steps outlined below (Freedman et al., 2024; Li et al., 2024; Popay et al., 2006).

The robustness of the synthesis was assessed by evaluating the following: (1) the methodological quality of the included studies. All included studies met the standards of methodological adequacy with MMAT inter-rater agreement Fleiss' kappa $k > 0.40$, indicating fair agreements (Fleiss, 1971); (2) if the included studies' findings were supported by the data, using the agreement index shown in the previous "Data Extraction" section; (3) the risk of bias

in the included studies, as presented in the subsequent section (Popay et al., 2006).

Assessment of the Risk of Bias in the Included Studies

The Risk Of Bias In Non-Randomised Studies–of Interventions (ROBINS-I) assessment tool was employed to evaluate the overall bias concerns regarding the applicability of the included studies. ROBINS-I encompasses the following risk domains: confounding factors, participant selection, classification selection, performance bias, missing data, outcome measures, and selective reporting. The risk of bias within these domains was judged using the ratings: *Yes*, *Probably yes*, *Probably no*, *No*, and *No information*. Based on these ratings, risks of bias were categorised into

low risk, moderate risk, serious risk, and critical risk (Sterne et al., 2016). Two authors (WL and RM/MC) independently assessed and concurred that the risk of bias was low across all domains of bias for all included articles.

Results

Characteristics of the Included Studies

The PRISMA diagram in Fig. 1 represents the flow of papers included or excluded from the current systematic review. Nine studies in 10 articles were included in the review, including one dissertation (Ketu-McKenzie, 2019). Of note, the MBI in one study was co-created with Indigenous participants, but the MBI was not executed; it was deemed valuable and retained (Beshai et al., 2023). Additionally, two articles were from the same study—one presented qualitative findings (Dreger et al., 2015a), and the other presented quantitative findings (Dreger et al., 2015b). Therefore, both articles counted as one study in the current review.

The nine studies were conducted in four countries: Australia ($n = 2$), Canada ($n = 2$), New Zealand ($n = 2$), and the United States ($n = 3$). The studies encompassed findings from 11 distinct First Nations groups, including Native Americans, Canadian First Nations, Metis, Inuit, Māori, Hawaiians, Pacific Islanders, Australian First Nations, Torres Strait Islanders, Confederated Salish Tribe, and Kootenai Tribe. Sample sizes ranged from 1 to 34, with a total pooled sample size of 125 (female $n = 67$, male $n = 58$). Of nine studies, six employed a mixed methods design, with the quantitative studies being uncontrolled single-arm trials, two employed an uncontrolled single-arm trial presented in two articles, and one case study. The overview of the included studies is presented in Table 2.

What Was the State of the Art of Cultural Adaptation of MBIs for First Nations Peoples?

The state of the art of culturally adapted MBIs for First Nations peoples was synthesised by answering two questions. First, *how were MBIs culturally adapted?* This

Table 2 Overview of the included studies

Included studies	Country	Research design	Sample size and participants
Beshai et al., 2023	Canada	Uncontrolled mixed methods with qualitative data analysis	$n = 14$ First Nations students Age, $M = 28.29$ years ($SD = 6.18$); range, 19–43 years Gender, 12 females, 2 males
Dreger et al., 2015a, b*	Canada	Single-arm uncontrolled trial	$n = 11$ Aboriginals with type 2 diabetes ($n = 6$ First Nations, $n = 5$ Metis) Age, $M = 60$ years ($SD = 8.7$) Gender, 10 females, 1 male
Ketu-McKenzie, 2019 (doctoral thesis)	New Zealand	Uncontrolled mixed methods case study	$n = 8$ Māori women who have experienced adverse childhood experiences Age, $M = 43.8$ years ($SD = 5.19$)
Lavrencic et al., 2021	Australia	Mixed methods study with qualitative data analysis	$n = 7$ Aboriginal and Torres Strait Islander women Age range, 62–81 years
Le & Gobert, 2015	USA	Pilot study mixed method study, with qualitative data analysis	$n = 8$ Native American youths Age, $M = 17$ years; range, 15–20 years Gender, 3 females, 5 males
Le & Proulx, 2015	USA	Mixed methods study with qualitative data analysis	$n = 34$ Hawaiian youths (Hawaiian/part Hawaiian, 60%; mixed, 12%; Pacific Islander, 12%; Caucasian, 8%; Filipino, 6%; African American, 2%) Age range, 14–18 years Gender, 24% females, 76% males
McDonald et al., 2021	New Zealand	Mixed methods study with Kaupapa Māori qualitative data analysis	$n = 23$ Māori youth Age range, 14–18 years Gender, 12 females, 11 males
Rowland et al., 2024	Australia	Single-arm uncontrolled trial	$n = 19$ Aboriginal children Age, $M = 11.4$ years ($SD = 3.3$); range, 7–17 years Gender, 35% females, 65% males
Terry et al., 2024	USA	Case study	$n = 1$ Native American Age, 56 years Gender, male

Note: *These two papers reported the results of the qualitative (2015a) and quantitative (2015b) data of the same study

question was evaluated using the eight dimensions of cultural adaptation in the ecological validity and cultural sensitivity model by Bernal et al. (1995). Second, *what were the protocols of culturally adapted MBIs for First Nations peoples?* This question was answered by compiling the intervention procedures and examining their content against the respective intervention manuals. The cultural adaptation dimensions and protocols of culturally adapted MBIs in individual studies are presented in Table 3.

How Were MBIs Culturally Adapted?

Language The MBIs in six included studies (66.7%) were conducted entirely in English (Dreger et al., 2015a, 2015b; Ketu-McKenzie, 2019; Le & Gobert, 2015; Le & Proulx, 2015; Rowland et al., 2024; Terry et al., 2024). Three studies (Beshai et al., 2023; Lavrencic et al., 2021; McDonald et al., 2021) employed a mix of English and Indigenous languages. Indigenous languages, including Te Reo Māori (McDonald et al., 2021), Gumbaynggirr (Lavrencic et al., 2021), and an unspecified Canadian First Nations language (Beshai et al., 2023), were used for poems, quotes, and phrases.

Persons Persons include participants, consultants, instructors, and instructor qualifications. First Nations peoples were the primary participants in all included studies. The final pooled sample consisted of 96.1% of First Nations people. All studies incorporated advice from their respective First Nations populations. The cultural advisors included Aboriginal community leaders (Beshai et al., 2023; Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Le & Gobert, 2015; Le & Proulx, 2015), First Nations Elders (Lavrencic et al., 2021; Rowland et al., 2024; Terry et al., 2024), and Kaipapa Māori advisory group (McDonald et al., 2021). In six studies, Indigenous instructors had either prior MBI training or received training before the MBIs commenced (Beshai et al., 2023; Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Le & Gobert, 2015; Le & Proulx, 2015; McDonald et al., 2021). Two studies did not specify the First Nations status of the MBI-trained instructor (Lavrencic et al., 2021; Terry et al., 2024). In one study, all participants stated that they accepted non-First Nations instructors who had received Indigenous mindfulness training and practised Indigenous mindfulness (Dreger et al., 2015a, b). Five studies identified at least one author as Indigenous (Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Le & Gobert, 2015; Le & Proulx, 2015; McDonald et al., 2021).

Metaphors Seven studies used metaphors applicable to First Nations populations (Beshai et al., 2023; Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Gobert, 2015; Le & Proulx, 2015; McDonald et al., 2021). The metaphors included hau (breath of spirit), mauri (life

principle; Ketu-McKenzie, 2019), aloha and mahalo (Le & Proulx, 2015), creator myths (Beshai et al., 2023), traditional prayers (Le & Gobert, 2015), personas that the participants created based on traditional Māori stories (McDonald et al., 2021), and different nations' beliefs about the four elements of air, earth, water, and fire (Dreger et al., 2015a, b; Lavrencic et al., 2021).

Content Seven studies reported that the content of MBIs was adapted with a thorough understanding of their respective First Nations cultural groups (Beshai et al., 2023; Dreger et al., 2015a, 2015b; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Gobert, 2015; Le & Proulx, 2015; McDonald et al., 2021). Three studies were co-created with their respective First Nations participants and community members, providing further cultural insights (Beshai et al., 2023; Lavrencic et al., 2021; McDonald et al., 2021). The adaptation included the terminology reflective of Indigenous culture and the holistic health perspective (Beshai et al., 2023), the Indigenous worldview of connection to nature (Dreger et al., 2015a, b), the symbolic and spiritual definitions of aloha and mahalo (Le & Gobert, 2015; Le & Proulx, 2015), and Māori spirituality (McDonald et al., 2021).

Six out of nine (66.7%) included studies (Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Gobert, 2015; Le & Proulx, 2015; Terry et al., 2024) employed modified MBSR, five of which (Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Proulx, 2015; Terry et al., 2024) provided details of the meditation practices, including mindful eating, body scan, attention focus meditation, sitting meditation, movement meditation, walking meditation, mountain/lake meditation, and loving-kindness. These meditations mirrored the formal meditation practices in the standardised MBSR curriculum (Kabat-Zinn, 2003). Discussions on stress reaction vs. stress response and difficult communication in the standardised MBSR curriculum were also included in these studies. The most salient differences between the culturally adapted and standardised MBSR were the themes discussed in the inquiries in each class. Indigenous metaphors, values, wisdom, and spirituality were employed to guide the inquiries in the culturally adapted MBSR.

Concepts Seven out of nine studies incorporated the following traditional aspects of the respective First Nations Cultures into the conceptualisation of MBIs: (1) traditional meeting places, including sharing circles (Le & Proulx, 2015), sweat lodges (Beshai et al., 2023; Dreger et al., 2015a, 2015b), a Wharenui (a Māori meeting house; Ketu-McKenzie, 2019), a Mauao (a building designed explicitly for wānanga-style learning; McDonald et al., 2021), and council style settings (Le & Gobert, 2015); (2) traditional ceremony elements, including smoking ceremonies, Gani

Table 3 Overview of the included studies and the state of the art of culturally adapted mindfulness-based interventions (MBIs)

Study name	The state of the art of culturally adapted MBIs	
	Dimensions of cultural adaptation	Protocols
Beshai et al., 2023	*Language*: English and traditional language (unspecified) *Persons*: Participants: First Nations, Inuit, and Métis participants; facilitator: 1 Indigenous facilitator; approval person: an Indigenous Elder *Metaphors*: Discussions of creator and Indigenous concepts *Content*: Adaptations were informed explicitly by knowledge of Aboriginal culture and by the participants. For details, see the protocols *Concepts*: Cultural aspects (smudging, sweat lodges, drumming) being integrated into the conceptualisation of MBSR *Goals*: Mindfulness was employed to mitigate the race-based stress experienced by Black people *Methods*: Pragmatic and practical aspects were not explicitly stated in the programme. Childcare was recommended by participants *Context*: The effects of colonisation were discussed with the participants in the context of the MBI programme	6-week, with 40–45-min weekly sessions delivered in person. Each weekly session was recorded and accessible online. Designed for Indigenous-identified university students struggling with symptoms of depression and anxiety *Intervention description:* Students will learn mindfulness of breath, bodily sensations, sounds, smells, sights, and the contents of the mind, and traditional ceremonies, such as smudging, sweat lodges, and traditional drumming. The intervention will emphasise holistic integration of the spiritual, mental, emotional, and physical aspects of existence *Structure of intervention:* Each session will open with a traditional prayer Participants will be invited to take part in 2 talking circles Talking circle 1: Pre-intervention to discuss concerns and expectations for the intervention Talking circle 2: Post-intervention to consolidate learning and debriefing
Dreger et al., 2015a, b Note: These 2 papers reported the results of the qualitative (2015a) and quantitative (2015) data of the same study	*Language*: English *Persons*: Participants: Aboriginal participants; Instructors: 1 non-Aboriginal instructor with cultural training and experience and 1 Aboriginal instructor; cultural advisors: Aboriginal community leaders *Metaphors*: Air, earth, water, and fire *Content*: Adaptations were informed explicitly by knowledge of Aboriginal culture. For details, see the Protocols *Concepts*: Cultural aspects (sharing circles and sweat lodge ceremonies) being integrated into the conceptualisation of MBSR *Goals*: Health improvements for Aboriginal adults with type 2 diabetes by integrating the Aboriginal worldview that healing is more than just medical treatment for specific health problems *Methods*: Pragmatic and practical aspects (e.g. healthy snacks, bus fare, transportation, and childcare) were provided to the participants *Context*: How marginalised groups living with diabetes were discussed alongside the MBI	8-week modified MBSR with 2 hr per session with homework and without all-day retreat W1: Body scan and mindful eating with the themes of automatic pilot W2: Body awareness, mindful eating, and breath awareness with the theme of responding with awareness W3: Breath awareness and mindful movement with the themes of air and breath of life W4: Mountain meditation, mindful eating (nuts), and sitting meditation with the themes of earth and rooted and present W5: Walking, lake, eating (tea), and attention-focused meditations with the themes of water and fluidity/flow W6: Movement and sit meditations with the themes of fire and movement of life W7: Mindful communication, loving-kindness, and forgiveness meditation, and sitting meditation with the theme of connection W8: Choiceless awareness and body scan with the theme of wholeness

Table 3 (continued)

Study name	The state of the art of culturally adapted MBIs	
	Dimensions of cultural adaptation	Protocols
Ketu-McKenzie, 2019 (Doctoral thesis)	*Language:* English *Persons:* Māori participants; instructor: a non-First Nations mindfulness practitioner with 30 years of experience with MBSR and a First Nations facilitator; cultural advisor: Kaumatua Elders *Metaphors:* Each class incorporated multiple traditional metaphors (e.g. hau, the "breath of spirit", mauri, the "life principle") *Content:* Adaptations being informed explicitly by knowledge of Māori culture. For details, see the protocols *Concepts:* Cultural aspects (a Wharenui, a Māori meeting house and karakia, prayers/incantations) being explicitly integrated into the conceptualisation of MBSR *Goals:* Improving chronic health conditions among Māori women experiencing adverse childhood experiences informed by the traditional Māori view that the mind, body, spirit, and whānau are integral *Methods:* Pragmatic and practical aspects were not reported *Context:* Additional contextual aspects that were not targeted directly in the intervention were not reported	8-week modified MBSR with 2 hr per session, 1-day full retreat, homework included W1: Mindfulness eating of a raisin, with the themes of hau, the "breath of spirit" and mauri, the "life principle" W2: How stress is perceived and its impact on health, with the theme Te taha hinengaro (thoughts and feelings are part of health) W3: Walking meditation, Hatha yoga, with the themes of "the power and pleasure of being present" and Te taha tinana (the sacred aspects of caring for physical wellbeing) W4: How perceptions and conditioning shape how one experiences the world. With themes of Ha a kui ma a koro ma (the breath of the ancestors living on through their descendants) and Ha taonga tuku iho (the breath handed down through the generations) W5: Increasing the capacity to respond to stressful situations rather than react and themes of Te taha wairua (the spiritual aspect of wellbeing, the meeting point between the mind and body) W6: Exploring stressful communication, expression, and patterns in interpersonal communication. Using Aikido to explore conflict styles. With the themes of Te taha whānau (social relationships and the reciprocity, hospitality and love that apply to all people) Full-day workshop, Silent Retreat: Cultivating moment-to-moment awareness and revising previous formal practices and silent lunch. With the themes of Karakia Kai (blessing the food before consuming it) W7: Loving-kindness meditation and integrating mindfulness into everyday life. With the themes of atawhai and aroha (traditionally representing collectivistic values honouring reciprocity above individualistic endeavours) W8: Group sharing of experiences and review of the programme contents with discussions on how to continue to practise alone with the themes of Te whare tapa wha (the model of Māori health) with revisiting concepts of atawhai, mauri, and ha, a koro ma, a kui ma

Table 3 (continued)

Study name	The state of the art of culturally adapted MBIs	
	Dimensions of cultural adaptation	Protocols
Lavrencic et al., 2021	*Language:* English and Gumbaynggirr language	4-week modified MBSR with 8 sessions (due to time constraints), 1.5–2-hr sessions, 2 sessions per week, without an all-day retreat
	Persons: Aboriginal participants; instructor: First Nations status unreported; cultural advisors: Elders from the Yarning group from Gumbaynggirr Country	W1, Session 1 (S1): Mindful eating, mindful movement, body scan, and mindful breathing, poem, or story
	Metaphors: 4 elements without details being provided	W1, S2: Mindful movement, automatic reactions, mindful eating, walking meditation, awareness of breath meditation, and poem or story
	Content: Adaptations being informed by the First Nations Yarning group and Gumbaunggirr Elder; for details, see the protocols	W2, S3: Mindful movement 3-min breathing space, sitting meditation and awareness of breath, mindful practice using tree leaves, and poem or story. Teaching: air element and stress response vs. stress reactivity
	Concepts: Cultural aspects (smoking ceremony and Gani Buurrgi-gu (tie to body) being explicitly integrated into the conceptualisation of MBSR	W2, S4: Mindful movement, walking meditation, 3-min breathing space, sitting meditation and poem or story. Teaching Earth element and acceptance
	Goals: Ngarraanga Giinganay (thinking peacefully) being employed to reduce depression, anxiety, and stress symptoms among older First Nations Australians	W3, S5: Mindful movement, mindful eating, and poem or story. Teaching: Water element and healing. Reading: "The Guest House", Rumi
	Methods: $50 honorarium was given to the participants to cover time and travel costs	W3, S6: Gani buurrgi-gu, 3-min breathing space, mindful movement, and sitting meditation. Teaching: fire elements and thoughts are not facts
	Context: Additional contextual aspects that were not targeted directly in the intervention were not reported	W4, S7: Sitting meditation, visualisation meditation on connectedness, active listening meditation, loving-kindness meditation, and poem or story. Teaching: connection and loving-kindness
		W4, S8: Sitting meditation, mindful movement, 3-min breathing space, mindful eating, and poem or story. Teaching: wholeness and wisdom

Table 3 (continued)

Study name	The state of the art of culturally adapted MBIs	
	Dimensions of cultural adaptation	Protocols
Le & Gobert, 2015	*Language*: English *Persons*: Participants: Native American participants; instructors: First Nations members of the local community with MBI training; cultural advisors: Native American Elders *Metaphors*: Traditional prayers and metaphors (not specified) *Content*: Adaptations being informed explicitly by knowledge of Aboriginal culture and the participants. For details, see the protocols *Concepts*: Cultural aspects (traditional council-style setting and smudging) being explicitly integrated into the conceptualisation of MBSR *Goals*: MBI as a traditional healing practice *Methods*: Pragmatic and practical aspects were not reported *Context*: Additional contextual aspects that were not targeted directly in the intervention were not reported	9-week (presented over 10 weeks) modified MBSR with 9 modules, 55-min sessions, and 4 sessions per week, including homework, without an all-day retreat Each class in no specific order: Specific mindfulness practice, story, metaphor, experiential activity, discussion ending with a check-out and prayer W0: Orientation and data collection W1: Mindful breathing; awareness of senses W2: Mindful listening* W3: Mindfulness of nature* W4: Mindfulness of body W5: Mindfulness of thoughts W6: Mindfulness of emotions W7: Cultivating compassion and empathy W8: Judgment and forgiveness W9: Aligning with vision* *Modules specifically developed with Tribal Elders; other modules were also revised*
Le & Proulx, 2015	*Language*: English *Persons*: Participants: primarily Hawaiian; instructors: 2 First Nations professionals in social services with informal Indigenous mindfulness practices and MBI training; cultural advisors: Native American Elders *Metaphors*: Aloha and mahalo *Content*: Adaptations being informed explicitly by knowledge of Aboriginal culture. For details, see the protocols *Concepts*: Cultural aspects (sharing circles, aloha, and mahalo) being explicitly integrated into the conceptualisation of MBSR *Goals*: The Indigenous cultural elements of aloha and mahalo being embedded into the MBI for improving emotional regulation and reducing stress among incarcerated mixed-ethnic Native Hawaiian/Pacific Islander youths *Methods*: Pragmatic and practical aspects were not reported *Context*: Additional contextual aspects that were not targeted directly in the intervention were not reported	5-week modified MBSR with 10 modules, two 1-hr sessions per day per week and without an all-day retreat and each session ended in a personal reflection journal W1, S1: Mindful breathing and breath as anchor; topics of Aloha, Mahalo W1, S2: Mindful listening and awareness of the senses; topics of deep listening in oneself and others W2, S3: Mindfulness of body and mindful movement/walking body scan; topics of embodied knowing W2, S4: Mindfulness of thoughts and watching/observing thoughts like passing clouds; topics of nature of thoughts W3, S5: Mindfulness of emotions and watching/observing feelings/emotions like waves on the ocean; duck-diving. Topics of nature of emotions/feelings W3, S6: Balance and choice and mindful movement/walking body scan. Topics of response vs. reaction W4, S7: Compassion and empathy and loving-kindness (self and others). Topics of interconnection/interbeing W4, S8: Judgment and acceptance and loving-kindness (self and others). Topics of conditionings/habit patterns

Table 3 (continued)

Study name	The state of the art of culturally adapted MBIs	
	Dimensions of cultural adaptation	Protocols
McDonald et al., 2021	*Language:* Te Reo Māori and English *Persons:* Participants: Māori participants; instructor: a Māori instructor Cultural advisors: A Kaupapa Māori advisory group *Metaphors:* 4 fictional rangatahi personas (Oceana, Atawhai, Te Rangi Āio and Iro) *Content:* Adaptations being informed explicitly by Māori spirituality and Whakapiki. For details, see the protocols *Concepts:* Cultural concepts (Mahitahi and wānanga, Wairua Mahitahi mindsets and Whanaungatanga) and traditional spaces (Mauao: building specifically designed for wānanga-style learning) being explicitly integrated into the conceptualisation of the intervention *Goals:* The unique Māori worldview of Mātauranga Māori and Kaupapa Māori Mahitahi approach to co-design the MBI for improving Māori youth's mental health being employed *Methods:* The intervention was delivered using wananga-style learning; pragmatic and practical aspects were not reported *Context:* The unique Māori worldview, including traditional knowledge and culture that is passed down through the generations in many forms (such as stories, songs, dances, art and teachings), was integrated into the MBI	8-wananga mātauranga-Māori-informed mindfulness-based intervention sessions over 10 months 3 main activities: • Post-it whakawhiti kōrero sessions—group discussions using Post-it notes to write down thoughts and feelings • Rangatahi personas—creating fictional users or participants that give insights into the diverse lived experiences, needs, behaviours, and goals of the participants • Visual diaries—documenting participants' feelings, thoughts, and creative expressions during wānanga 3 mindfulness-based activities: • Hohou te rongo (meditations, visualisations, and karakia) • Whakapakari tinana and hinengaro (resiliency activities) • Mahi toi (creative arts)
Rowland et al., 2024	*Language:* English *Persons:* Participants: Aboriginal youth; *instructor:* First Nations status was not reported; cultural advisors: a local Elder *Metaphors:* Not reported *Content:* Not reported *Concepts:* For details, see the protocols *Goals:* MBI being employed to address the negative impacts of adverse childhood experiences (ACEs) on Aboriginal children and young people in out-of-home care (OOHC) *Methods:* The Nature Treks VR programme was used, and mindfulness interventions were delivered through audio recordings *Context:* Additional contextual aspects that were not targeted directly in the intervention were not reported	Virtual reality (VR) MBI included 2 segments: 1) The VR experience: The participants were placed just above Earth in space for 10 min, where they could create suns, planets, and blackholes and manipulate the galaxy around them 2) Body scan: A 13-min mindfulness body scan delivered through a child-language friendly recording by the primary researcher

Table 3 (continued)

Study name	The state of the art of culturally adapted MBIs	
	Dimensions of cultural adaptation	Protocols
Terry et al., 2024	*Language:* English *Persons:* Participants: Native American; instructors: First Nations status unknown; cultural advisors: Native American Elders *Metaphors:* Not reported *Content:* For details, see the protocols *Concepts:* Not reported *Goals:* Individual MBI being employed to support a long-term care facility resident to manage pain and depression *Methods:* MBI was delivered to an individual (as opposed to group); a workbook with information on weekly exercises was provided *Context:* Additional contextual aspects that were not targeted directly in the intervention were not reported	8-week individual MBSR with formal meditation practices (i.e. meditations, which include body scan, sitting meditation, and loving-kindness) with 20-min sessions (as opposed to 45 min) W1: Body scan W2: Sitting meditation W3: Loving kindness W4: Pain and stress W5: Stressful situations W6: Mindful communication W7: Mindfulness as a way of life W8: Coming full circle

Buurrgi-gu (a tie-to-body meditation; Lavrencic et al., 2021), smudging (Le & Gobert, 2015) and karakia (prayers; Ketu-McKenzie, 2019); and (3) traditional mindsets, including Mahitahi and wānanga, Wairua Mahitahi and Whanaungatanga (traditional Māori mindsets; McDonald et al., 2021), and aloha and mahalo (traditional Hawaiian mindsets; Le & Proulx, 2015).

Goals The goals of the MBIs included the following: employing mindfulness to mitigate the race-based stress experienced by Black people (Beshai et al., 2023); health improvements for Aboriginal adults with type 2 diabetes by integrating the Aboriginal worldview that healing is more than just medical treatment for specific health problems into the MBI (Dreger et al., 2015a, 2015b); improving chronic health conditions among Māori women experiencing adverse childhood experiences informed by the traditional Māori view that the mind, body, spirit, and whānau are integral (Ketu-McKenzie, 2019); better self-regulation, less mind wandering, and decreased suicidal thoughts for Native American youth by integrating Native American spirituality into the MBI (Le & Gobert, 2015); embedding the Indigenous cultural elements of aloha and mahalo into the MBI for improving emotional regulation and reducing stress among incarcerated mixed-ethnic Native Hawaiian/Pacific Islander youth (Le & Proulx, 2015); employing Ngarraanga Giinganay (thinking peacefully) in the MBI to reduce depression, anxiety, and stress symptoms among older First Nations Australians (Lavrencic et al., 2021); employing the unique Māori worldview of Mātauranga Māori and Kaupapa Māori Mahitahi approach to co-design the MBI for improving Māori youth's mental health (McDonald et al., 2021); addressing the negative impacts of adverse childhood experiences (ACEs) on Aboriginal children and young people in out-of-home care (OOHC; Rowland et al., 2024); and to support a long-term care facility resident to manage pain and depression (Terry et al., 2024).

Methods Pragmatic aspects of the studies were explicitly listed for three (33.3%) of the studies (Beshai et al., 2023; Dreger et al., 2015a, b; Lavrencic et al., 2021) and ranged from monetary support to cover travel costs (Dreger et al., 2015a, b; Lavrencic et al., 2021), to free childcare and healthy snacks (Dreger et al., 2015a, b). One study recommended childcare but was not listed in the programme's outline (Beshai et al., 2023).

Context Two studies (22.2%) discussed the evolving context with the participants (Beshai et al., 2023; Dreger et al., 2015a, b). One study discussed living with diabetes as a marginalised group (Dreger et al., 2015a, b). Another study discussed the effects of colonisation in the context of the MBSR programme (Beshai et al., 2023). However, none of the studies reported whether the discussion led to further adaptation of MBIs.

What Were the Protocols of Culturally Adapted MBIs for First Nations Peoples?

Six included studies used MBSR (Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Gobert, 2015; Le & Proulx, 2015; Terry et al., 2024). Five of these explicitly incorporated traditional MBSR elements, such as body scan meditation, mindful eating, loving-kindness meditation, and mindful sitting (Dreger et al., 2015a, 2015b; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Proulx, 2015; Terry et al., 2024), while one lacked sufficient programme details for confirmation (Le & Gobert, 2015). The remaining three studies fell under the category of MBI (Beshai et al., 2023; McDonald et al., 2021; Rowland et al., 2024). Intervention durations varied from 5 to 10 weeks, with half lasting 8 weeks, except for one study that included a single 15-min session (Rowland et al., 2024). Session lengths ranged from 40 min to 2 hr. Two studies featured full-day retreats (Ketu-McKenzie, 2019; McDonald et al., 2021). In addition, six studies included home practice (Beshai et al., 2023; Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Gobert, 2015; Terry et al., 2024).

Were Culturally Adapted MBIs Effective for First Nations Peoples?

Assessing the effectiveness of culturally adapted MBIs for First Nations peoples involved examining both quantitative and qualitative evidence. Of the nine studies, five papers provided pre-test and post-test data (Dreger et al., 2015b; Le & Proulx, 2015; McDonald et al., 2021; Rowland et al., 2024; Terry et al., 2024), while the remaining four utilised graphs or had limited statistical analysis because of sample size constraints (Beshai et al., 2023; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Gobert, 2015); the quantitative evidence was related to themes of *mental health*, *mindfulness*, and *physiological measures*. Except for one study (Rowland et al., 2024), qualitative evidence was gathered and centred on participant feedback. It encompassed several themes: *increased self-awareness*, *connection to traditional beliefs*, *positive emotions*, *improved physical health*, *cultural kinship*, *satisfaction with the programme*, and *enhanced mindfulness knowledge*. The findings of the effectiveness of culturally adapted MBIs for First Nations peoples in individual studies are presented in Table 4.

Quantitative Evidence

Mental Health Eight studies reported on mental health, with mostly positive improvements recorded (Beshai et al., 2023; Dreger et al., 2015b; Ketu-McKenzie, 2019; Le & Gobert, 2015; Le & Proulx, 2015; McDonald et al., 2021; Rowland et al., 2024; Terry et al., 2024). Significant reductions in psychological distress (McDonald et al., 2021) and perceived stress (Le & Proulx, 2015) and increases in perceived quality of life (McDonald et al., 2021) and perceived health (Dreger et al., 2015b) were reported. Participants also indicated that they gained new insights into depression, anxiety (Beshai et al., 2023), and stress management skills and four participants demonstrated improved self-regulation (Le & Gobert, 2015). Suicide ideation and self-harm were reduced completely from the pre-test, where 44% of participants reported it, to none in the post-test (Le & Gobert, 2015). Levels of depression, anxiety, chronic stress, emotional eating, and post-traumatic stress disorder were reduced (Ketu-McKenzie, 2019; Rowland et al., 2024; Terry et al., 2024). However, no significant changes were observed in depression and anxiety (Dreger et al., 2015b), feelings of impulsivity and self-regulation (Le & Proulx, 2015), or satisfaction with life and diabetes self-care (Dreger et al., 2015b).

Mindfulness Mindfulness outcomes varied, with eight studies observing mindfulness measures (Dreger et al., 2015b; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Gobert, 2015; Le & Proulx, 2015; McDonald et al., 2021; Rowland et al., 2024; Terry et al., 2024). Among the eight studies, two reported significant improvements in mindfulness (Lavrencic et al., 2021; McDonald et al., 2021) and increased ratings in mindful attention and specific meditative states measured in the MUSE application (neutral, calm, and percentage of time in the calm state) but no significance in the active state (McDonald et al., 2021). Participants also reported enhanced engagement with the present moment and reduced mind wandering (Le & Gobert, 2015). In three studies (Ketu-McKenzie, 2019; Rowland et al., 2024; Terry et al., 2024), increased mindful awareness from baseline to post-treatment was observed. In one study (Beshai et al., 2023), eight participants indicated an increased understanding of mindfulness. However, two studies reported no significant changes in facet mindfulness (Dreger et al., 2015b), mindfulness measures, or mind wandering (Le & Proulx, 2015).

Physiological Outcomes Five studies measured changes in physiological markers (Dreger et al., 2015b; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Proulx, 2015; Rowland et al., 2024). Significant improvements were observed in the biological markers of blood glucose (e.g. glycated haemoglobin; Dreger et al., 2015b), blood pressure (e.g. mean arterial pressure; Dreger et al., 2015b; Lavrencic et al., 2021), stress (e.g. levels of cortisol; Ketu-McKenzie, 2019; Le & Proulx, 2015), and heart rate (Rowland et al., 2024). A reduction in waist circumference was also observed (Ketu-McKenzie, 2019).

Table 4 Effectiveness and feasibility of culturally adapted mindfulness-based interventions (MBIs) for First Nations peoples

Study names	Measures	Effectiveness		Feasibility		
		Quantitative evidence	Qualitative evidence	Retention rate	Attendance	Recruitment
Beshai et al., 2023	Open-ended questions and talking circle	8 participants indicated they gained new insights into depression, anxiety, and mindfulness	Participants expressed overall acceptance of the programme and deemed it consistent with Indigenous worldviews; the unmodified MBI was acceptable, and the modified MBI programme was considered highly compatible with Indigenous culture Participants valued the programme's ability to facilitate connections through shared experiences	64.3%	N/A	Participants in the co-creation process were rewarded with either 1 psychology course credit or a $10 gift certificate; the recruitment strategy for the proposed intervention was not explicitly outlined, and 9 participants expressed their intention to promote the course through word of mouth
Dreger et al., 2015a, b Note: These 2 papers reported the results of the qualitative (2015a) and quantitative (2015b) data of the same study	HbA1c: Glycated haemoglobin MAP: Mean arterial pressure SF-36: The short-form Health Questionnaire DASS: Depression, Anxiety, Stress Scales SWLS: Satisfaction with Life Scale FFMQ: Five Facet Mindfulness Questionnaire SDSCA: Summary of Diabetes Self-Care Activities	Cohen's d = pre-test – post-test: HbA1c: $d = 0.37, p < 0.05$ MAP: $d = 0.85, p < 0.05$ DASS: $d = 0.32, p > 0.05$ SF-36: $d = 0.39, p < 0.05$ SWLS: $d = 0.07, p > 0.05$ FFMQ: $d = 0.18, p > 0.05$ SDSCA: $d = 0.05, p > 0.05$ Pre-test—follow-up (2 months after W8): HbA1c: $d = 0.30, p < 0.05$ MAP: $d = 0.61, p < 0.05$ DASS: $d = 0.28, p > 0.05$ SF-36: $d = 0.35, p < 0.05$ SWLS: $d = 0.01, p > 0.05$ FFMQ: $d = 0.19, p > 0.05$ SDSCA: $d = 0.05, p > 0.05$	Increased awareness of the self and the world Improvement is to health and well-being Changes in behaviour and attitudes: Smoking less, eating less, and being healthier; listening to others more and being more assertive Enjoying the MBSR programme and mindfulness practices Participants expressed high satisfaction with the programmes and their outcomes, as evidenced by social validity measures	68.75%	Average 7 out of 8 sessions and reported doing the homework 4 days a week, 20 min per day	Approximately 12 months were dedicated to recruitment. 53 potential participants expressed interest in participating in the project, with a final sample of 11 participants. Recruitment was through community advertisement referrals from health centres, community centres, and the Manitoba First Nation communities

Table 4 (continued)

Study names	Measures	Effectiveness		Feasibility			
		Quantitative evidence	Qualitative evidence	Retention rate	Attendance	Recruitment	

Study names	Measures	Quantitative evidence	Qualitative evidence	Retention rate	Attendance	Recruitment
Ketu-McKenzie, 2019 (Doctoral thesis)	ACE: Adverse Childhood Experiences questionnaire MASS: Mindful Attention and Awareness Scale SRRS: Social Readjustment Rating Scale PSS: Perceived Stress Scale CAR: Cortisol awakening response SD: Cortisol slope AS: Cortisol response to acute stress WC: Waist circumference DEBQ: Dutch Eating Behaviour Questionnaire, emotional eating and external eating subscales only DASS: Depression, Anxiety and Stress Scale PCL-C: PTSD Checklist-Civilian Version	Chronic stress (SRRS), emotional eating, and PTSD cut-off scores were reduced, and those with high depression and anxiety scores improved Cortisol dysregulation: half of the participants improved CAR and DS post-treatment, and 5 of 8 had better cortisol responses to the post-treatment stress tests Reductions were seen in waist circumference, and 3 participants scoring high on the emotional eating scale decreased post-treatment 5 participants initially above the PTSD cut-off scored below in post-treatment All participants increased mindful awareness from baseline to post-treatment Note: Results are displayed as graphs with no available statistical analysis	Exceeded expectations Mindfulness understanding evolved, showing learning and internalisation Improvements to health and well-being; enhanced ability to handle stress; increased awareness of unhelpful habits; enhanced feelings of gratitude, nonjudgment, and self-care Connections to traditional beliefs: mindfulness concepts that were seen linked to Te Ao Māori (The Māori world), mauri (life force), karakia (prayer), and tikanga (right ways of doing things); Māori collectivist values aligned with group therapy, deemed crucial; spiritual aspects of MBI aligned with Māori health concept	87.5%	6.6 out of 9 classes	Approximately 6 months were required for recruitment. 8 Māori women were recruited. 1 participant did not partake in any classes because a non-First Nations male was leading the classes. She completed all the data collection. Her data was retained for the study
Lavrencic et al., 2021	MAP: Mean arterial pressure BMI: Body mass index MAAS: The Mindful Attention Awareness Scale (14 of the 15 questions) ACE-R: The Addenbrooke's Cognitive Examination Revised DASS-21: The Depression Anxiety Stress Scales 21 items NLES: The Negative Life Events Scale	Participants' MMAS scale ratings increased from pre- to post-testing, ($n = 4$, $M = 3.27$, $SD = 0.36$ to $M = 3.86$, $SD = 0.28$) and there were improvements in some participants' blood pressure Note: Statistical analysis was not conducted due to the small sample size	Helped participants self-regulate; promoted awareness around unhealthy eating patterns, and assisted with portion sizes Promotes awareness and helps prevent falls Decreased negative health issues: depression, anxiety, stress, and chronic pain Enjoyment of programme and group setting Liked the handouts provided Felt connected to "Mother Earth"	57.14%	Ranged from 3 to 7 sessions median of 6	Participants were recruited via a partnering Aboriginal community organisation (details not provided for privacy reasons). 8 participants consented, 1 did not attend any sessions, 6 completed baseline assessments, 1 completed baseline a week into the study, 5 completed follow-up assessments, and 4 had both baseline and follow-up assessment data

Table 4 (continued)

Study names	Measures	Effectiveness		Feasibility			Recruitment
		Quantitative evidence	Qualitative evidence	Retention rate	Attendance		

Study names	Measures	Quantitative evidence	Qualitative evidence	Retention rate	Attendance	Recruitment
Le & Gobert, 2015	Mindfulness: 2 items, taken from Epel et al. (2013) Healthy self-regulation: (12 items, taken from West, 2008) Teen Conflict Survey: assessed teenage impulsivity, 4 items PHQ-9: The Patient Health Questionnaire, suicidality assessed Stress reduction: 2 questions done at termination (created by authors)	Stress management skills improved; 71% of participants responded "very much so", and 29% responded "somewhat so". Participants displayed a slight trend towards reduced impulsivity, and 4 participants demonstrated improved self-regulation Participants reported significant enhancements in their engagement with the present moment and reduced mind wandering Suicide ideation/self-harm; 44% of participants reported in pre-test, whereas in the post-test, all reported none. Depression scores showed a modest improvement from pre- to post-test Note: Results are displayed as graphs with no available statistical analysis	Helped the participants relax, settle, and improve awareness Participants established trust and experienced enjoyment through the voluntary sharing of personal histories; fostered the development of new relationships, and enhanced existing connections	100%	Not reported	Participants were recruited via assembly announcement at Two River School for an elective class in the mornings
Le & Proulx, 2015	SIgA: Salivary cortisol PSS: Perceived stress scale TCS: The Teen Conflict Survey-Impulsivity (4 items) Self-regulation: (12 items, taken from West, 2008) Mind wandering: (2 items, taken from Epel et al., 2013) CAMM: The Child and Adolescent Mindfulness Measure	Cohen's d = pre-test – post-test: Cortisol: d = 0.36, p < 0.05 SIgA(a): d = −0.42, p < 0.05 PSS (b): d = 1.00, p < 0.01 TCS-Impulsivity (b): d = 0.32, p > 0.05 Self-regulation (c): d = −0.29, p > 0.05 CAMM-Mindfulness (c): d = −0.40, p > 0.05 Mind wandering (b): d = 0.40, p > 0.05 (a) In logarithm scale (b) Lower scores indicate positive functioning (c) Higher scores indicate positive functioning	Participants reported experiencing positive emotions, a sense of calm, and feelings of love Connection to traditional beliefs: felt connected to the cultural values of pono (goodness, righteousness) and kokua (extending love, aloha) Increased understanding of mindfulness and the benefits of breathing techniques Heightened emotional regulation skills through increased awareness of their thoughts and feelings	94.4%	75% of the 10 sessions	36 youths volunteered after being referred by correctional staff from within the Youth Correctional Facility; those considered potentially disruptive or with unstable medical or neurological conditions were excluded, 2 withdrew after the first session

Table 4 (continued)

Study names	Measures	Effectiveness		Feasibility		Recruitment
		Quantitative evidence	Qualitative evidence	Retention rate	Attendance	
McDonald et al., 2021	K10: Kessler Psychological Distress Scale; MAAS-A: The Mindful Attention Awareness Scale-Adolescents; Kaupapa Māori QOL: The Māori Quality of Life Scale; MUSE headband: Measuring the time (seconds) participants spent in a calm brainwave state during a 3-min meditation	Raw mean difference D (SD)=post-test – pre-test; K10: $D = -4.3$ (4.14), $p < 0.001$; MAAS-A: $D = 0.21$ (0.41), $p=0.03$; Māori QOL: $D=8.2$ (7.65), $p<0.001$; MUSE app, secs (range/SD); Active: $D = -3$ (-13, 0), $p=0.06$; Neutral: $D = -17$ (-56, 16), $p=0.05$; Calm: $D=27$ (-18, 63), $p=0.05$; % time in calm state: $D=17$ (33.1), $p=0.02$	Experiencing safety, relaxation, and non-judgmental feelings; Cultivating peace, emotional regulation, and stress management; Gaining insights into traditional beliefs and well-being philosophies to foster connectedness and peace; Establishing connections with spiritual guides and the spirit world; Embracing and engaging with the natural environment promotes inner peace, emotional stability, and emotional regulation; Finding strength through peer support	100%	Not reported	21 participants were recruited from a Māori educational institute. 2 dropped out, and an additional 3 were recruited
Rowland et al., 2024	HRV: Heart Rate Variability; SMS-PA: State Mindfulness Scale Physical Activity; MAAS: Mindful Attention Awareness Scale	HRV: Pre-test $M=83.36$, $SD=43.36$; post-test: $M=81.87$, $SD=32.78$; SMS-PA: pre-test $M=2.89$, $SD=0.59$; post-test $M=3.12$, $SD=0.64$; MAAS: pre-test $M=2.9$, $SD=1.1$); post-test intervention ($M=3.9$, $SD=1.7$)	N/A	95%	100%	Participants were recruited from an Aboriginal Community Organisation. One dropped out due to motion sickness
Terry et al., 2024	FFMQ: Five Facet Mindfulness Questionnaire; RRS: Ruminative Response Scale; CESD-R: Epidemiological Studies Depression Scale–Revised; PQAS: Pain Quality Assessment Scale	FFMQ: Pre-test: 112/195, post-test: 102/195; RRS: Pre-test: 45/66, post-test: 15/66; CESD-R: Pre-test: 49/60, 9/60; PQAS: Pre-test: 92/200, 81/200	Reduced stress, having more stress-free time in daily life, better sleep, and improved emotional regulation	100%	100%	The participant was recruited in a long-term care facility (LTCF)

Qualitative Evidence

Increased Self-awareness In seven of the included studies, participants reported significant gains in self-awareness, emotional regulation, and positive behavioural changes resulting from MBIs (Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Gobert, 2015; Le & Proulx, 2015; McDonald et al., 2021; Terry et al., 2024). Enhancements were seen in non-judgmental behaviour (Ketu-McKenzie, 2019; McDonald et al., 2021), awareness (Le & Gobert, 2015), emotional regulation, stress management (McDonald et al., 2021), gratitude, self-care (Ketu-McKenzie, 2019), listening to others, and assertiveness (Dreger et al., 2015a, 2015b).

Connection to Traditional Beliefs In five studies, participants embraced or rekindled connections to cultural beliefs and found cultural adaptations within the MBI programmes acceptable (Beshai et al., 2023; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Le & Proulx, 2015; McDonald et al., 2021). Participants believed these programmes aligned with cultural values such as *pono* (goodness, righteousness) and *kokua* (extending love, aloha; Le & Proulx, 2015), *Te Ao Māori* (The Māori world), *mauri* (life force), *karakia* (prayer), *tikanga* (right ways of doing things; Ketu-McKenzie, 2019), and Mother Earth (Lavrencic et al., 2021). One study reported that participants developed a deeper connection with traditional beliefs and well-being philosophies, fostering inner peace and spiritual connections and strengthening their bond with the natural environment (McDonald et al., 2021).

Positive Emotions Participants of six studies reported experiencing positive and beneficial emotional states (Beshai et al., 2023; Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Le & Gobert, 2015; Le & Proulx, 2015; McDonald et al., 2021). Participants reported increases in positive emotions and expressed feelings of safety (McDonald et al., 2021), relaxation (Le & Gobert, 2015; Le & Proulx, 2015; McDonald et al., 2021), love (Le & Proulx, 2015), and peace without judgment (McDonald et al., 2021).

Increased Physical Health Two studies reported that participants expressed changes in and towards physical health (Dreger et al., 2015a, b; Lavrencic et al., 2021). Participants had physical benefits such as lower blood sugar levels and fewer headaches (Dreger et al., 2015a, b) and found that they were making better choices with meal portion control (Lavrencic et al., 2021). Improved diet and reduced smoking were also observed (Dreger et al., 2015a, b; Lavrencic et al., 2021).

Cultural Kinship Participants in four studies found that the programme facilitated their connections with peers (Beshai et al., 2023; Lavrencic et al., 2021; Le & Gobert, 2015; McDonald et al., 2021). Participants experienced enjoyment in being connected with peers (Lavrencic et al., 2021; Le & Gobert, 2015), building relationships (McDonald et al., 2021), establishing connections through shared experiences (Beshai et al., 2023), finding a safe space to share and be vulnerable, and creating trust (Le & Gobert, 2015).

Satisfaction with the Programme In four studies, participants expressed enjoyment and accomplishment in participating in the MBI (Beshai et al., 2023; Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Terry et al., 2024). Participants enjoyed the programme, desired ongoing attendance (Dreger et al., 2015a, b; Terry et al., 2024), would recommend it to others (Beshai et al., 2023; Dreger et al., 2015a, b), and found that the programme exceeded expectations (Ketu-McKenzie, 2019). Participants in two studies expressed overall acceptance of the programme and deemed it consistent with Indigenous worldviews (Beshai et al., 2023; Ketu-McKenzie, 2019). Participants in one study found the unmodified MBI acceptable, and the modified MBI programme was considered highly compatible with Indigenous culture (Beshai et al., 2023).

Increased Knowledge of Mindfulness Participants in two studies stated they had a better understanding of mindfulness (Ketu-McKenzie, 2019; Le & Proulx, 2015), the benefits of breathing techniques (Le & Proulx, 2015), and the learning and internalisation of mindfulness techniques (Ketu-McKenzie, 2019).

Were Culturally Adapted MBIs Feasible for First Nations Peoples?

Dimensions assessing the feasibility of MBIs for First Nations peoples for culturally adapted interventions included *outcomes*, *retention*, and *recruitment* (Bernal et al., 1995, 2009). The findings on the feasibility of culturally adapted MBIs for First Nations peoples in individual studies are presented in Table 4.

Outcomes

As presented in the analysis of the above research question, all included studies consistently showed that MBIs yielded positive outcomes, from physiological to psychological improvements and subjective benefits.

Recruitment

Only one study (Dreger et al., 2015a, b) reported the recruitment rate, which was 20.8% (53 potential participants were approached, and 11 participated in the intervention). Two studies reported recruitment durations ranging from 12 weeks (Dreger et al., 2015a, b) to 6 months (Ketu-McKenzie, 2019). Participants in four studies were recruited through local community organisations (Dreger et al., 2015a, b; Ketu-McKenzie, 2019; Lavrencic et al., 2021; Rowland et al., 2024), one from

youth referred by staff in the Hawaii Youth Correctional Facility (Le & Proulx, 2015), one from a long-term care facility (Terry et al., 2024), and three from school and university samples (via school announcements; Le & Gobert, 2015), from a Māori educational institute (McDonald et al., 2021), and word-of-mouth promotion (Beshai et al., 2023). No superior recruitment method emerged, but programmes recruiting from schools/corrections generally had more participants and lower attrition rates (Beshai et al., 2023; Le & Gobert, 2015; Le & Proulx, 2015; McDonald et al., 2021).

Retention

Participant retention varied from 57.14% (Lavrencic et al., 2021) to 100% (Le & Gobert, 2015; Terry et al., 2024), with an average retention rate of 85.2% (the sum of the retention rates in all studies was divided by the number of studies). The average programme completion rate was 79% in the included studies. Four studies reported session attendance, including one study that reported averaging seven out of eight sessions with participants doing home practice 4 days a week for 20 min per day (Dreger et al., 2015a, b); one study witnessed 75% attendance for the 10 classes (Le & Proulx, 2015); one showed attendance ranging from three to seven sessions with a median of six out of eight sessions (Lavrencic et al., 2021); and one study reported an attendance rate of 6.6 out of nine classes (Ketu-McKenzie, 2019).

What Were the Challenges and Barriers to Practising and Implementing MBIs?

Several studies reported that participants encountered challenges and barriers to practising and implementing MBIs. These included maintaining a regular meditation practice (Dreger et al., 2015a, b) and limited take-home resources (Lavrencic et al., 2021).

The challenges of implementing MBIs included the lack of childcare provided to the participants (Beshai et al., 2023), uncertainty about other instructors' teaching competency (Le & Gobert, 2015), miscommunication and disagreements among the instructors (Le & Gobert, 2015), the complexity and type of language used during the intervention (Lavrencic et al., 2021), cultural proficiency of the teacher (e.g. unable to pronounce the participants' Indigenous names; Ketu-McKenzie, 2019), and physical properties of the room (e.g. uncomfortable chairs; Ketu-McKenzie, 2019).

Discussion

This systematic review investigated the state of the art of culturally adapted MBIs for First Nations peoples and assessed their effectiveness and feasibility. The current review included nine studies (10 articles) with a pooled sample of 125 participants consisting primarily of First Nations individuals (96.1%). A broader theme regarding the need for culturally appropriate interventions in First Nations peoples is that despite variations in specific First Nations populations and adapted MBIs, the results showed that MBIs appear to be effective and feasible for diverse First Nations populations.

Our analysis reveals that all studies addressed dimensions of cultural adaptation with care and consideration of their respective First Nations populations and predominantly employed MBSR as the MBI. All studies addressed five out of the eight dimensions (including persons, metaphors, content, concepts, and goals) proposed in the ecological validity and cultural sensitivity model by Bernal et al. (1995). According to Griner and Smith (2006), culturally adapted interventions are four times more effective when tailored to a specific cultural group compared with mixed-race participant groups. Hence, the strong cultural alignment with the chosen cultural group in the included studies may contribute to the enhancement of intervention success (Bernal et al., 1995).

Our analysis shows that in the culturally adapted MBSR, the meditation practices in the standardised MBSR were preserved. As the meditation practices are the core elements of MBIs, which are vital for MBIs to be effective (Shelton et al., 2018), the preservation of the meditation practices enhances intervention fidelity. Moreover, the meditation practices and the concept of mindfulness are culturally aligned with First Nations peoples (Lavrencic et al., 2021). The meditation practices are adjacent to First Nations peoples' embodiment of the multisensory, meditative, and spiritual connection to nature and the world (McDonald et al., 2021). It is important to note that, in the culturally adapted MBSR, the collective history, traditional ways of life, cultural metaphors, beliefs, wisdom, and knowledge were incorporated into the inquiries and class discussion. This approach was unique in that it provided a cultural framework for the present moment, connecting it to the collective ties with the past, present, and future (McDonald et al., 2021). This finding suggests that while there is not a "universal" culturally adapted MBI for First Nations peoples, a "semi-universal" model of culturally adapted MBI for First Nations peoples, which combines meditation practices and activities from the standardised MBSR with culturally grounded themes and inquiries, appears to be appealing.

The three dimensions in the ecological validity and cultural sensitivity model by Bernal et al. (1995), which were addressed to a lesser extent, were language, methods, and context. Although three out of nine (33.3%) included studies employed First Nations languages, the MBIs in the three studies were delivered in a mix of English and Indigenous languages that were only used for poems, quotes, and phrases. This rate is lower than that in the systematic review by Castellanos et al. (2020) of cultural adaptation of MBIs for Hispanic populations, which found that 90% of the reviewed studies

adopted Hispanic languages. The lower level of the use of Native languages in our review is expected because the populations in Castellanos et al.'s study often spoke the Hispanic language and only that language. However, the First Nations participants in our review primarily spoke English, which was the dominant language in their countries. The adaptation levels for methods among First Nations peoples were 33.3%, whereas contextual aspects were 22.2%. Castellanos et al. (2020) also found similar results in their review, with methods at 30% and context at 20%, which mirror the findings of our review. Our findings show that researchers were aware of these cultural elements when adapting MBIs for First Nations peoples, but not all cultural elements have been integrated into their research designs.

The analysis in the current study shows that 66.7% of the included studies used culturally adapted MBSR, which benefit from leveraging the established strengths of MBSR (Kabat-Zinn, 2003; Sharma & Rush, 2014) while demonstrating the flexibility of MBIs to fit the unique needs and preferences of First Nations populations (Bernal et al., 1995). Notably, the findings of our review suggest that factors such as the programme length and inclusion or exclusion of the all-day retreat do not influence MBI effectiveness, which is consistent with the findings in the systematic review by Fisher et al. (2023).

Our analysis also suggests that improvements in psychological, physiological, mindfulness aspects, cultural elements, and satisfaction with the programmes were observed in the quantitative and qualitative evidence related to the effectiveness of culturally adapted MBIs for First Nations peoples. The quantitative results are consistent with comparable minority-based literature on MBIs showing positive outcomes (Fuchs et al., 2013; Sun et al., 2022). However, there were mixed results for psychological outcomes, with one included study reporting improvements in depression and anxiety scores (McDonald et al., 2021) while two did not (Dreger et al., 2015b; Le & Proulx, 2015). This contrasts with the typical pattern of significant improvements in depression and anxiety scores observed in previous studies (e.g. Fisher et al., 2023; Goldberg et al., 2019; Kuyken et al., 2016). Similarly, one included study reported improvements in self-regulation in youth (Le & Gobert, 2015), whereas another did not (Le & Proulx, 2015). This mirrors findings from a review of MBIs for youth, which also found mixed results for self-regulation, showing significant effects only for youth experiencing developmental delays in this area (Bockmann & Yu, 2023). Mindfulness measures also yielded mixed results, with most studies reporting improvements, but two studies showed no changes in specific measures (Dreger et al., 2015b; Le & Proulx, 2015). This pattern is aligned with findings from a mindfulness review, which revealed that more than half of the studies failed to detect significant changes in self-reported mindfulness from pre- to post-interventions (Visted et al., 2015). Notably, Goldberg et al. (2019) stated that studies with higher methodological quality tended to show smaller post-treatment effects in MBCT. Therefore, this incongruence in findings between our review and other reviews may be attributed to differences in adherence to MBI methods and the validity issues of the measures, as the instruments used in these studies, in general, might not be culturally sensitive for First Nations peoples. Moreover, the "social" heterogeneity (e.g. adults vs. youth participants, socio-demographic and individual differences, historical, cultural, and spatial differences among the First Nations participants) may have impacted the delivery and effectiveness of the MBIs (Popay et al., 2006), particularly in the studies with small sample sizes.

The qualitative findings from the included studies reveal increased self-awareness, connections to traditional beliefs, cultural kinship, and positive emotions. Many participants found the programmes compatible with Indigenous worldviews and felt a sense of kinship with peers, enjoyed connections, built relationships, and created trust through shared experiences. This validates the recommendations that MBIs, through their ability to align with First Nations' holistic spiritual beliefs, facilitate a way to reconnect with their cultural and social identity (Karl et al., 2022; Yellow Bird, 2016). These connections may have led to expressions of high satisfaction with the programme, including desired continued participation, recommendations of the programme to others, and often finding the programme exceeding expectations.

Our analysis suggests that culturally adapted MBIs were feasible for First Nations peoples, which led to improved psychological and physiological outcomes. The average retention rate of 85.2% is higher than the 75% or lower retention rates in other populations, as suggested by the systematic review by Zhang et al. (2021). The average programme completion rate of 79% is higher than the 56% reported in the systematic review by Winter et al. (2022). These findings provide a promising outcome for the feasibility of culturally adaptive MBIs for First Nations peoples. The lack of recruitment rate information may have reflected the challenges in recruiting First Nations participants in MBIs, which is consistent with existing findings on difficulties in recruiting Indigenous participants into psychotherapy trials (Mhurchu et al., 2009).

The analysis in the current study indicates that the primary barriers faced by First Nations peoples were systemic, cultural, and socioeconomic in nature. These included the availability and affordability of childcare, the instructors' teaching competency and cultural proficiency, and language accessibility. Such barriers prevent First Nations peoples from initially joining and fully engaging with the intervention, thereby limiting the effectiveness of culturally adapted MBIs, regardless of the adaptation quality of the content. Moreover, challenges in establishing a home practice routine

and limited take-home resources further impede effectiveness. Community initiatives that support First Nations peoples in practising mindfulness together and provide more resources to support home practice may be helpful.

Drawing on our review's findings, we propose a "semi-universal" model of culturally adapted MBIs for First Nations peoples, presented in a wheel format (Fig. 2). This model is developed from the Indigenous perspectives embedded in the included studies. The "semi-universal" model is developed by comparing the similarities and differences between the adapted MBIs reviewed in the current study. This model can be employed to guide the development and delivery of culturally adapted MBIs for First Nations peoples. In this model, Indigenous wisdom, spirituality, traditions, values, and knowledge are at the heart of the culturally adapted

MBIs for First Nations peoples. To integrate these cultural elements into the culturally adapted MBIs, co-design with Indigenous Elders, instructors and participants, and Indigenous mindfulness practitioners is essential. To achieve fidelity-consistent adaptation, four components are proposed: (1) culturally adaptive MBI instructor: Indigenous mindfulness instructor(s) with MBI training or non-Indigenous MBI instructor(s) with Indigenous mindfulness training and practice; (2) integrated Indigenous meditation practices: the mindfulness meditation practices in the standardised MBI curricula to remain, with instruction content reflecting the deep connections to the land, Indigenous traditions, and ways of life; (3) Indigenous knowledge synthesis in the inquiry themes: derived from Indigenous wisdom, spirituality, traditions, values, and knowledge with preference that metaphors,

Fig. 2 The proposed model of culturally adapted MBIs

poems, quotes, and phrases are delivered in Indigenous languages; and (4) optional Indigenous ceremony and prayer: opening the MBI programme with an Indigenous ceremony and closing each class with an Indigenous prayer.

Limitations and Future Directions

The current review has certain limitations. First, as acknowledged in all included studies, none of the studies had sufficiently large participant numbers to conduct randomised controlled trials, and they shared common issues with other MBI studies, including small sample sizes, high levels of heterogeneity, self-selection bias, non-randomisation, and the inability to perform double-blinding (Sharma & Rush, 2014). Because of the small sample size and the heterogeneity of included studies, a meta-analysis was not performed. Second, there was a lack of randomised controlled trials in the included studies, which limited the validity and generalisability of the findings. Third, there are currently no established standard measures for researchers to assess cultural adaptations, making it challenging to compare or guide the evaluation of how interventions are implemented (Castellanos et al., 2020). Fourth, although the included studies explored challenges and barriers, investigations were not conducted into what did not work in the culturally adapted MBI's curricula.

Despite the limitations, the current review significantly contributes to the direction of future research in the area of culturally adapted MBIs. At a theoretical level, the current review challenges whiteness-based mindfulness curricula by proposing a model of culturally adapted MBIs. The model points out the direction for future research and teaching in culturally adapted MBIs. It strongly advocates that the values and wisdom of First Nations peoples should be centred on culturally adapted MBIs. The proposed model offers clinical and practical guidance for clinicians and MBI instructors in developing culturally adapted MBIs that balance fidelity and cultural adaptation. At a policy level, more funding should be allocated to encourage the development of culturally appropriate MBIs for First Nations peoples rather than relying solely on well-funded mindfulness research and teaching predominately based on white mindfulness.

Declarations

References

Abercrombie, P. D., Zamora, A., & Korn, A. P. (2007). Lessons learned: Providing a mindfulness-based stress reduction program for low-income multiethnic women with abnormal pap smears. *Holistic Nursing Practice, 21*(1), 26–34. https://doi.org/10.1097/00004650-200701000-00006

Astridge, B., Li, W. W., McDermott, B., & Longhitano, C. (2023). A systematic review and meta-analysis on adverse childhood experiences: Prevalence in youth offenders and their effects on youth recidivism. *Child Abuse & Neglect, 140*, 106055. https://doi.org/10.1016/j.chiabu.2023.106055

Bamber, M. D., & Morpeth, E. (2019). Effects of mindfulness meditation on college student anxiety: A meta-analysis. *Mindfulness, 10*(2), 203–214. https://doi.org/10.1007/s12671-018-0965-5

Bernal, G., Bonilla, J., & Bellido, C. (1995). Ecological validity and cultural sensitivity for outcome research: Issues for the cultural adaptation and development of psychosocial treatments with Hispanics. *Journal of Abnormal Child Psychology, 23*(1), 67–82. https://doi.org/10.1007/BF01447045

Bernal, G., Jiménez-Chafey, M. I., & Domenech Rodríguez, M. M. (2009). Cultural adaptation of treatments: A resource for considering culture in evidence-based practice. *Professional Psychology: Research and Practice, 40*(4), 361–368. https://doi.org/10.1037/a0016401

Beshai, S., Desjarlais, S. M., & Green, B. (2023). Perspectives of Indigenous university students in Canada on mindfulness-based interventions and their adaptation to reduce depression and anxiety symptoms. *Mindfulness, 14*(3), 538–553. https://doi.org/10.1007/s12671-023-02087-7

Bockmann, J. O., & Yu, S. Y. (2023). Using mindfulness-based interventions to support self-regulation in young children: A review of the literature. *Early Childhood Education Journal, 51*(4), 693–703. https://doi.org/10.1007/s10643-022-01333-2

Bowen, S., Chawla, N., Grow, J., & Marlatt, G. A. (2021). *Mindfulness-based relapse prevention for addictive behaviors* (2nd ed.). The Guilford Press.

Castellanos, R., Yildiz Spinel, M., Phan, V., Orengo-Aguayo, R., Humphreys, K. L., & Flory, K. (2020). A systematic review and meta-analysis of cultural adaptations of mindfulness-based interventions for Hispanic populations. *Mindfulness, 11*(2), 317–332. https://doi.org/10.1007/s12671-019-01210-x

Chan, S. H., Lui, D., Chan, H., Sum, K., Cheung, A., Yip, H., & Yu, C. H. (2022). Effects of mindfulness-based intervention programs on sleep among people with common mental disorders: A systematic review and meta-analysis. *World Journal of Psychiatry, 12*(4), 636–650. https://doi.org/10.5498/wjp.v12.i4.636

Chen, X., Zhang, B., Jin, S.-X., Quan, Y.-X., Zhang, X.-W., & Cui, X.-S. (2021). The effects of mindfulness-based interventions on nursing students: A meta-analysis. *Nurse Education Today, 98*, 104718. https://doi.org/10.1016/j.nedt.2020.104718

Chu, C.-S., Stubbs, B., Chen, T.-Y., Tang, C.-H., Li, D.-J., Yang, W.-C., Wu, C.-K., Carvalho, A. F., Vieta, E., Miklowitz, D. J., Tseng, P.-T., & Lin, P.-Y. (2018). The effectiveness of adjunct mindfulness-based intervention in treatment of bipolar disorder: A systematic review and meta-analysis. *Journal of Affective Disorders, 225*, 234–245. https://doi.org/10.1016/j.jad.2017.08.025

Cillessen, L., Johannsen, M., Speckens, A. E. M., & Zachariae, R. (2019). Mindfulness-based interventions for psychological and physical health outcomes in cancer patients and survivors: A systematic review and meta-analysis of randomized controlled trials. *Psycho-Oncology, 28*(12), 2257–2269. https://doi.org/10.1002/pon.5214

Cramer, H., Lauche, R., Paul, A., & Dobos, G. (2012). Mindfulness-based stress reduction for breast cancer—A systematic review and meta-analysis. *Current Oncology, 19*(5), 343–352. https://doi.org/10.3747/co.19.1016

Crane, R. S., Stanley, S., Rooney, M., Bartley, T., Cooper, L., & Mardula, J. (2015). Disciplined improvisation: Characteristics of inquiry in mindfulness-based teaching. *Mindfulness, 6*(5), 1104–1114. https://doi.org/10.1007/s12671-014-0361-8

Crane, R. S., Callen-Davies, R., Francis, A., Francis, D., Gibbs, P., Mulligan, B., O'Neill, B., Pierce Williams, N. K., Waupoose, M., & Vallejo, Z. (2023). Mindfulness-based stress reduction for our time: A curriculum that is up to the task. *Global Advances in Integrative Medicine and Health, 12*, 27536130231162604. https://doi.org/10.1177/27536130231162604

Desjarlais, S. M., & Saskatchewan, R. (2021). *Adapting a mindfulness-based intervention for depression and anxiety for use with indigenous university students* [Doctoral thesis, University of Regina]. https://instrepo-prod7.cc.uregina.ca/server/api/core/bitstreams/dc8d1745-76fa-414e-bbb4-c2e9965da474/content

Dreger, L. C., Mackenzie, C., & McLeod, B. (2015a). Acceptability and suitability of mindfulness training for diabetes management in an Indigenous community. *Mindfulness, 6*(4), 885–898. https://doi.org/10.1007/s12671-014-0332-0

Dreger, L. C., Mackenzie, C., & McLeod, B. (2015b). Feasibility of a mindfulness-based intervention for Aboriginal adults with type 2 diabetes. *Mindfulness, 6*(2), 264–280. https://doi.org/10.1007/s12671-013-0257-z

Epel, E. S., Puterman, E., Lin, J., Blackburn, E., Lazaro, A., & Mendes, W. B. (2013). Wandering minds and aging cells. *Clinical Psychological Science, 1*(1), 75–83. https://doi.org/10.1177/2167702612460234

Fisher, V., Li, W. W., & Malabu, U. (2023). The effectiveness of mindfulness-based stress reduction (MBSR) on the mental health, HbA1C, and mindfulness of diabetes patients: A systematic review and meta-analysis of randomised controlled trials. *Applied Psychology: Health and Well-Being, 15*(4), 1733–1749. https://doi.org/10.1111/aphw.12441

Fleiss, J. L. (1971). Measuring nominal scale agreement among many raters. *Psychological Bulletin, 76*(5), 378–382. https://doi.org/10.1037/h0031619

Fleming, C. M., Womack, V. Y., & Proulx, J. (2022). *Beyond white mindfulness*. Routledge.

Freedman, B., Li, W. W., Liang, Z., Hartin, P., & Biedermann, N. (2024). The prevalence of incivility in hospitals and the effects of incivility on patient safety culture and outcomes: A systematic review and meta-analysis. *Journal of Advanced Nursing*. https://doi.org/10.1111/jan.16111

Fuchs, C., Lee, J. K., Roemer, L., & Orsillo, S. M. (2013). Using mindfulness- and acceptance-based treatments with clients from nondominant cultural and/or marginalized backgrounds: Clinical considerations, meta-analysis findings, and introduction to the special series: Clinical considerations in using acceptance- and mindfulness-based treatments with diverse populations. *Cognitive and Behavioral Practice, 20*(1), 1–12. https://doi.org/10.1016/j.cbpra.2011.12.004

Fumero, A., Peñate, W., Oyanadel, C., & Porter, B. (2020). The effectiveness of mindfulness-based interventions on anxiety disorders. A systematic meta-review. *European Journal of Investigation in Health, Psychology and Education, 10*(3), 704–719. https://doi.org/10.3390/ejihpe10030052

Goldberg, S. B., Tucker, R. P., Greene, P. A., Davidson, R. J., Kearney, D. J., & Simpson, T. L. (2019). Mindfulness-based cognitive therapy for the treatment of current depressive symptoms: A meta-analysis. *Cognitive Behaviour Therapy, 48*(6), 445–462. https://doi.org/10.1080/16506073.2018.1556330

Griffiths, K., Coleman, C., Lee, V., & Madden, R. (2016). How colonisation determines social justice and Indigenous health—A review of the literature. *Journal of Population Research, 33*(1), 9–30. https://doi.org/10.1007/s12546-016-9164-1

Griner, D., & Smith, T. B. (2006). Culturally adapted mental health intervention: A meta-analytic review. *Psychotherapy: Theory, Research, Practice, Training, 43*(4), 531–548. https://doi.org/10.1037/0033-3204.43.4.531

Higgins, J. P. T., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M. J., & Welch, V. A. (2019). *Cochrane handbook for systematic reviews of interventions* (2nd ed.). John Wiley & Sons.

Hofmann, S. G., & Gómez, A. F. (2017). Mindfulness-based interventions for anxiety and depression. *Psychiatric Clinics, 40*(4), 739–749. https://doi.org/10.1016/j.psc.2017.08.008

Hoge, E. A., Bui, E., Mete, M., Dutton, M. A., Baker, A. W., & Simon, N. M. (2023). Mindfulness-based stress reduction vs escitalopram for the treatment of adults with anxiety disorders: A randomized clinical trial. *JAMA Psychiatry, 80*(1), 13–21. https://doi.org/10.1001/jamapsychiatry.2022.3679

Hong, Q. N., Pluye, P., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M.-P., Griffiths, F., Nicolau, B., O'Cathain, A., Rousseau, M.-C., & Vedel, I. (2019). Improving the content validity of the mixed methods appraisal tool: A modified e-Delphi study. *Journal of Clinical Epidemiology, 111*, 49-59.e41. https://doi.org/10.1016/j.jclinepi.2019.03.008

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice, 10*(2), 144–156. https://doi.org/10.1093/clipsy.bpg016

Karelse, C.-M. (2023). *Disrupting white mindfulness: Race and racism in the wellbeing industry*. Manchester University Press. http://digital.casalini.it/9781526162076

Karl, J. A., Johnson, F. N., Bucci, L., & Fischer, R. (2022). In search of mindfulness: A review and reconsideration of cultural dynamics from a cognitive perspective. *Journal of the Royal Society of New Zealand, 52*(2), 168–191. https://doi.org/10.1080/03036758.2021.1915804

Ketu-McKenzie, M. D. (2019). *Ngā mea kōaro o ngā wā tamarikitanga, te taumahatanga o aua mea me ētahi mahi whakaora hinengaro mō ngā wāhine Māori= Adverse childhood experiences,*

HPA axis functioning and culturally enhanced mindfulness therapy among Māori women in Aotearoa New Zealand [Doctoral thesis, Massey University]. http://hdl.handle.net/10179/15130

King, M., Smith, A., & Gracey, M. (2009). Indigenous health part 2: The underlying causes of the health gap. *The Lancet, 374*(9683), 76–85. https://doi.org/10.1016/S0140-6736(09)60827-8

Kuyken, W., Warren, F. C., Taylor, R. S., Whalley, B., Crane, C., Bondolfi, G., Hayes, R., Huijbers, M., Ma, H., Schweizer, S., Segal, Z., Speckens, A., Teasdale, J. D., Van Heeringen, K., Williams, M., Byford, S., Byng, R., & Dalgleish, T. (2016). Efficacy of mindfulness-based cognitive therapy in prevention of depressive relapse: An individual patient data meta-analysis from randomized trials. *JAMA Psychiatry, 73*(6), 565–574. https://doi.org/10.1001/jamapsychiatry.2016.0076

Lau, A. S. (2006). Making the case for selective and directed cultural adaptations of evidence-based treatments: Examples from parent training. *Clinical Psychology: Science and Practice, 13*(4), 295–310. https://doi.org/10.1111/j.1468-2850.2006.00042.x

Lavrencic, L. M., Donovan, T., Moffatt, L., Keiller, T., Allan, W., Delbaere, K., & Radford, K. (2021). Ngarraanga Giinganay ('thinking peacefully'): Co-design and pilot study of a culturally-grounded mindfulness-based stress reduction program with older First Nations Australians. *Evaluation and Program Planning, 87*, 101929. https://doi.org/10.1016/j.evalprogplan.2021.101929

Le, T. N., & Gobert, J. M. (2015). Translating and implementing a mindfulness-based youth suicide prevention intervention in a Native American community. *Journal of Child and Family Studies, 24*(1), 12–23. https://doi.org/10.1007/s10826-013-9809-z

Le, T. N., & Proulx, J. (2015). Feasibility of mindfulness-based intervention for incarcerated mixed-ethnic Native Hawaiian/Pacific Islander youth. *Asian American Journal of Psychology, 6*(2), 181–189. https://doi.org/10.1037/aap0000019

Leow, T., Li, W. W., Miller, D. J., & McDermott, B. (2024). Prevalence of university non-continuation and mental health conditions, and effect of mental health conditions on non-continuation: A systematic review and meta-analysis. *Journal of Mental Health.* https://doi.org/10.1080/09638237.2024.2332812

Li, W. W., Chhabra, J., & Singh, S. (2021). Palliative care education and its effectiveness: A systematic review. *Public Health, 194*, 96–108. https://doi.org/10.1016/j.puhe.2021.02.033

Li, W. W., Miller, D., Leow, T., Heward, C., Li, Y., Yang, F., & Yu, H. (2023a). The relationship between mindfulness and mental distress in Chinese people during the COVID-19 pandemic: Moderating effects of infection severity of region and mediating effects of resilience and self-efficacy. *Journal of Pacific Rim Psychology, 17*, 18344909231192764. https://doi.org/10.1177/18344909231192765

Li, W. W., Miller, D., Shapiro, S., & Narayanan, A. (2023b). Editorial: Mindfulness and mental health in the time of the COVID-19 pandemic. *Frontiers in Psychology, 14*, 1209911. https://doi.org/10.3389/fpsyg.2023.1209911

Li, W. W., Heward, C., Merrick, A., Astridge, B., & Leow, T. (2024). Prevalence of experiencing public humiliation and its effects on victims' mental health: A systematic review and meta-analysis. *Journal of Pacific Rim Psychology, 18*, 18344909241252324. https://doi.org/10.1177/18344909241252325

Marino, F., Failla, C., Carrozza, C., Ciminata, M., Chilà, P., Minutoli, R., Genovese, S., Puglisi, A., Arnao, A. A., Tartarisco, G., Corpina, F., Gangemi, S., Ruta, L., Cerasa, A., Vagni, D., & Pioggia, G. (2021). Mindfulness-based interventions for physical and psychological wellbeing in cardiovascular diseases: A systematic review and meta-analysis. *Brain Sciences, 11*(6), 727. https://doi.org/10.3390/brainsci11060727

Marx, R. (2015). Accessibility versus integrity in secular mindfulness: A Buddhist commentary. *Mindfulness, 6*(5), 1153–1160. https://doi.org/10.1007/s12671-014-0366-3

McDonald, M., Waitoki, W., & Rolleston, A. (2021). Whakapiki Wairua: Co-designing and implementing a Māori mindfulness mental health intervention in a Wharekura. *MAI Journal.* https://doi.org/10.20507/MAIJournal.2021.10.2.1

Mercado, D., Robinson, L., Gordon, G., Werthmann, J., Campbell, I. C., & Schmidt, U. (2021). The outcomes of mindfulness-based interventions for obesity and binge eating disorder: A meta-analysis of randomised controlled trials. *Appetite, 166*, 105464. https://doi.org/10.1016/j.appet.2021.105464

Mhurchu, C. N., Blakely, T., Funaki-Tahifote, M., McKerchar, C., Wilton, J., Chua, S., & Jiang, Y. (2009). Inclusion of Indigenous and ethnic minority populations in intervention trials: Challenges and strategies in a New Zealand supermarket study. *Journal of Epidemiology and Community Health, 63*(10), 850–855. https://doi.org/10.1136/jech.2008.081109

Olzman, M. D. (2022). Collaging educational orientations: A whitening of mindfulness. *Western Journal of Communication, 86*(2), 241–249. https://doi.org/10.1080/10570314.2021.1949032

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., . . . Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ, 372*, n71. https://doi.org/10.1136/bmj.n71

Pei, J.-H., Ma, T., Nan, R.-L., Chen, H.-X., Zhang, Y.-B., Gou, L., & Dou, X.-M. (2021). Mindfulness-based cognitive therapy for treating chronic pain a systematic review and meta-analysis. *Psychology, Health & Medicine, 26*(3), 333–346. https://doi.org/10.1080/13548506.2020.1849746

Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., Britten, N., Roen, K., & Duffy, S. (2006). *Guidance on the conduct of narrative synthesis in systematic reviews* (Vol. 1). ESRC Methods Programme.

Prowse, P.-T., & Nagel, T. (2014). Developing an instrument for assessing fidelity of motivational care planning: The Aboriginal and Islander mental health initiative adherence scale. *International Journal of Mental Health Systems, 8*(1), 36. https://doi.org/10.1186/1752-4458-8-36

Rowland, G., Hindman, E., Jomeen, J., & Hassmén, P. (2024). Does virtual reality training increase mindfulness in Aboriginal out-of-home care children? *Mindfulness, 15*(6), 1443–1452. https://doi.org/10.1007/s12671-024-02373-y

Santorelli, S., & Kabat-Zinn, J. (2014). *Mindfulness-based stress reduction (MBSR) education and training.* University of Massachusetts Medical School. https://community.cfmhome.org/uploads/default/880/35462948847c58fa.pdf

Segal, Z. V., Teasdale, J. D., & Williams, J. M. G. (2004). Mindfulness-Based Cognitive Therapy: Theoretical rationale and empirical status. In S. C. Hayes, V. M. Follette, & M. M. Linehan (Eds.), *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition* (pp. 45–65). The Guilford Press.

Shapiro, S. L., & Carlson, L. E. (2009). The art and science of mindfulness: Integrating mindfulness into psychology and the helping professions. *American Psychological Association.* https://doi.org/10.1037/11885-000

Sharma, M., & Rush, S. E. (2014). Mindfulness-based stress reduction as a stress management intervention for healthy individuals: A systematic review. *Journal of Evidence-Based Complementary & Alternative Medicine, 19*(4), 271–286. https://doi.org/10.1177/2156587214543143

Shelton, R. C., Cooper, B. R., & Stirman, S. W. (2018). The sustainability of evidence-based interventions and practices in public health and health care. *Annual Review of Public Health, 39*(2018), 55–76. https://doi.org/10.1146/annurev-publhealth-040617-014731

Sterne, J. A., Hernán, M. A., Reeves, B. C., Savović, J., Berkman, N. D., Viswanathan, M., Henry, D., Altman, D. G., Ansari, M. T., Boutron, I., Carpenter, J. R., Chan, A.-W., Churchill, R., Deeks, J. J., Hróbjartsson, A., Kirkham, J., Jüni, P., Loke, Y. K., Pigott, T. D., . . . Higgins, J. P. (2016). ROBINS-I: A tool for assessing risk of bias in non-randomised studies of interventions. *BMJ*, *355*, i4919. https://doi.org/10.1136/bmj.i4919

Stirman, S. W., Gamarra, J., Bartlett, B., Calloway, A., & Gutner, C. (2017). Empirical examinations of modifications and adaptations to evidence-based psychotherapies: Methodologies, impact, and future directions. *Clinical Psychology: Science and Practice, 24*(4), 396–420. https://doi.org/10.1111/cpsp.12218

Stirman, S. W., Baumann, A. A., & Miller, C. J. (2019). The FRAME: An expanded framework for reporting adaptations and modifications to evidence-based interventions. *Implementation Science, 14*(1), 58. https://doi.org/10.1186/s13012-019-0898-y

Sun, S., Goldberg, S. B., Loucks, E. B., & Brewer, J. A. (2022). Mindfulness-based interventions among people of color: A systematic review and meta-analysis. *Psychotherapy Research, 32*(3), 277–290. https://doi.org/10.1080/10503307.2021.1937369

Terry, C., Dark-Freudeman, A., McIver, M., & MacKain, S. (2024). An individual mindfulness-based intervention for residents of long-term care facilities: A case study. *Cognitive and Behavioral Practice, 31*(1), 109–118. https://doi.org/10.1016/j.cbpra.2022.07.002

Visted, E., Vøllestad, J., Nielsen, M. B., & Nielsen, G. H. (2015). The impact of group-based mindfulness training on self-reported mindfulness: A systematic review and meta-analysis. *Mindfulness, 6*(3), 501–522. https://doi.org/10.1007/s12671-014-0283-5

Winter, N., Russell, L., Ugalde, A., White, V., & Livingston, P. (2022). Engagement strategies to improve adherence and retention in web-based mindfulness programs: Systematic review. *Journal of Medical Internet Research, 24*(1), e30026. https://doi.org/10.2196/30026

Yellow Bird, M. (2016). Neurodecolonization: Applying mindfulness research to decolonizing social work. In M. Gray, J. Coates, M. Yellow Bird, & T. Hetherington (Eds.), *Decolonizing social work* (pp. 293–310). Routledge. https://doi.org/10.4324/9781315576206

Zhang, D., Lee, E. K. P., Mak, E. C. W., Ho, C. Y., & Wong, S. Y. S. (2021). Mindfulness-based interventions: An overall review. *British Medical Bulletin, 138*(1), 41–57. https://doi.org/10.1093/bmb/ldab005