

# What is Indigenous cultural health and wellbeing? A narrative review



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## Summary

Indigenous cultural health is an emerging field of research and reflects the unique connections Indigenous peoples have with their Country, culture, and knowledge systems. This narrative review explores the concept of cultural health focusing on the interplay between culture, health, and wellbeing within settler colonial contexts. The review is mostly focused on Australian research, despite its international scope. A narrative review methodology was employed, search terms were compiled, and a title and abstract search was executed across two databases (Scopus, PubMed), confined to English language papers, with a focus on Australia. Three key themes were identified: Country; culture, and Indigenous knowledges. Country is vital to health. Culture practices offer frameworks for healing nurturing the relationship between people, Country and culture. Privileging Indigenous knowledges is a means to achieving health and wellbeing. Indigenous cultural health encompasses the interconnectedness of Country, people and culture, demanding a holistic approach that integrates Indigenous knowledges and practices. In Australia, these core components of cultural health must be situated in a contemporary context of ongoing colonisation. This narrative review underscores the importance of culturally centred approaches in addressing health inequities and enhancing the wellbeing of Indigenous peoples.

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## Introduction

An emerging body of literature, including articles in this special collection,<sup>1–3</sup> has documented culture as a protective health factor among Aboriginal and Torres Strait Islander<sup>1</sup> peoples in Australia,<sup>4–6</sup> and Indigenous peoples in settler colonial contexts internationally.<sup>7</sup> This work

includes the concept of cultural health,<sup>8</sup> culture as a determinant of health,<sup>9,10</sup> and culture-as-health.<sup>7</sup> Cultural health<sup>7</sup> is an emerging concept, and research in this area seeks to understand how an individual's connection to, and practice of, culture, along with the availability and accessibility of cultural resources (people, knowledge, physical sites), and cultural governance structures, impact health and well-being among Aboriginal peoples.<sup>11</sup>

These concepts recognise that health is a cultural phenomenon which should be at the centre of health and wellbeing initiatives involving Indigenous peoples. Despite this growing awareness, there is a significant gap between the theoretical acknowledgment of cultural factors in health and the practical outcomes observed in communities.<sup>12</sup>

There are an estimated 476 million Indigenous peoples, representing 5000 different cultures, living in

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<sup>1</sup>The concept of 'Indigenous' is rooted in a colonial worldview, and scholars have called for more emphasis on self-identification and broader recognition of presettler societies (Silburn et al., 2016; United Nations, 2016). The importance of self-definition is exemplified in Australia, where each Aboriginal and Torres Strait Islander group has distinct languages, cultural practices, and traditions, with over 500 languages each representing ancestral connection to Country (AIATSIS, 2021). For the purposes of this article, Indigenous will be used to be consistent with language used in a global health context, and Aboriginal and Torres Strait Islander will be used when referring to Australia.

over 90 countries globally. Indigenous peoples make up 6.2 per cent of the world's population.<sup>13</sup> The United Nations defines Indigenous peoples as communities with enduring connections to specific ancestral territories, who are distinguished by unique cultural, social, economic, and political institutions separate from the mainstream or dominant culture.<sup>14</sup> The World Health Organization<sup>15</sup> and the United Nations Declaration on the Rights of Indigenous Peoples<sup>16</sup> position health as a fundamental human right that encompasses physical wellness, as well as mental, social, and spiritual well-being. Such definitions underscore the intrinsic right of Indigenous peoples to practice, revitalise, and develop their cultural traditions and customs, and flag the importance of cultural heritage and knowledge in the promotion of health among Indigenous peoples and places.

In Australia, where this review is concentrated, Aboriginal conceptions of health are holistic, and include physical, mental, spiritual and cultural health and wellbeing.<sup>17</sup> This view is found in the National Aboriginal Health Strategy Working Party's comprehensive definition of health,<sup>18</sup> which advocates that life and death are cyclical. It is also expressed in understandings of the determinants of Aboriginal health, which comprise spiritual, environmental, ideological, political, social, economic, mental, and physical factors.<sup>8</sup> Poorer health outcomes occur when one or more of these interrelating determinants are interrupted.<sup>19</sup>

Aboriginal knowledges of health prioritise connection to land or Country, culture, spirituality, family, historical and contemporary policies and events, and community.<sup>20,21</sup> Globally, Indigenous people have a deep, holistic and reciprocal connection to Country, which includes land, sea, waterways, sky, stars, and all entities within.<sup>8,22,23</sup> Terminology varies across different locations. While Indigenous conceptions in North America use the word 'land', in Australia, the preferred term is 'Country'.<sup>24</sup> The authors are from Australia and as such, will use 'Country' throughout the article unless we are referring to an international study wherein the term land was used by the authors.

<sup>8,22,23</sup>Country is linked to language, identity, and customs that incorporate social, spiritual and cultural links for Aboriginal peoples.<sup>25,26</sup> Many Aboriginal peoples continue to maintain their connection to Country. Gammage<sup>27</sup> showed that Aboriginal peoples' connections to Country are more complex than those of non-Indigenous people. Reconnection back with Country after being removed is shown to act as a key contributor to positive health outcomes for Aboriginal people.<sup>24</sup> And, the health and wellbeing benefits of Country are demonstrated in environmental stewardship and caring for Country programs.<sup>28,29</sup> However, connections to Country are not adequately integrated into mainstream (non-Indigenous) health approaches, policies, and programming.<sup>24,28,29</sup> Culture is theoretically recognised as

vital to improving health equity among Indigenous peoples, yet it is often marginalised in the design and delivery of health initiatives.<sup>30</sup> This is partly due to the definitional ambiguity of 'culture' in clinical health policies, spaces, and systems. This ambiguity limits progress in harnessing the therapeutic potential of culturally-centred approaches to health. The aim of this narrative review was to document previous research that explores the intersection between culture and health/wellbeing in the context of Indigenous peoples and places. In doing so, our aim is to build a clearer understanding of the concept of 'cultural health'.

## Author positionality

Positionality is used to acknowledge biases and contextualise academics' worldview and how this may impact on research.<sup>31,32</sup> Brett Biles is a Murrawarri man living on Wiradjuri Country in Albury Wodonga, Australia. Brett's worldviews centre on being a Murrawarri man, which impacts all aspects of his life. Brett has worked in academia for 14 years. Gavin Stanbrook is a Gumbanynggirr man living on Gadigal Country in Sydney. Gavin is a community organiser for Black rights and has been working in Higher Education since 2014 focusing on Indigenous Education and Research. Nina Serova is a researcher and writer living on Gadigal Country in Sydney. Nina was born in Russia and emigrated to Australia as a child. She researches culture, belonging and place in Australia's settler colonial context. Brooke Brady is a non-Indigenous, queer person living on the lands of the Gadigal people, in the Inner West of Sydney. For the past four years, she has worked as an ally with Gamilaraay, Yuwaalaraay, and Yuin peoples as a part of the Gaa-waadhi Gadudha research collaborative. Jonathan King-ley is Jewish and a second-generation immigrant from Europe. His research focuses on the intersection between ecosystems and health, of which connection to Country is fundamental. Stephanie M Topp is a non-Indigenous settler of English and Irish heritage. Her research aims to surface and challenge epistemic and institutional injustice by focussing on the intersection of trust, power and accountability in the design of health workforce policy and systems. Aryati Yashadhana is a non-Indigenous person of Southeast Asian descent and a second-generation Australian immigrant. For over a decade, she has worked as an ally with Indigenous Australian peoples, specifically the Gamilaraay, Yuwaalaraay, and Yuin peoples of New South Wales and the Marra people of Southeast Arnhem Land in health and cultural research.

## Methods

### Search strategy and selection criteria

We conducted a narrative review which includes a scholarly summary, along with interpretation and critique<sup>33</sup> on the topic of cultural health, using

systematic methods to identify peer-reviewed papers. Search terms were compiled, and a title and abstract search was executed across two databases (Scopus, PubMed), and confined to English language papers published between 2010 and 2024.

Our search produced 2494 (2194 Scopus; 300 PubMed) initial results, which were reviewed by two of the authors (NS, GS) against the selection criteria. These included: People (Indigenous); Health and wellbeing related; Cultural aspect (for example, Country, connection); and Dates (2010–2024). Our key focus was Australia, however, we included select relevant international studies returned by the search term ‘Indigenous’. The search included empirical and non-empirical studies (such as reflective articles by cultural knowledge holders, systematic reviews and protocol papers, but not book chapters, editorials and theses) and other literature reviews. The articles were identified using an inductive approach, selecting literature that brought together aspects of Indigenous peoples’ physical and mental health and culture. Culture was either directly stated as such in the literature or communicated through studies of cultural practices, land, knowledges, identity and spirituality. This part of the search produced 37 articles.

One of the authors also supplied 58 articles relevant to the topic. These articles were identified by searching the databases Informit, Scopus, PubMed and CINAHL for articles published between 2019 and 2024. The search terms applied were “Aboriginal” OR “Indigenous” OR “First Nations” AND “Country” OR “land” OR “environment” AND “health” OR “wellbeing”.

In total, 95 papers were identified by our screening process (Fig. 1) as relevant to our review. Included papers were categorised by source information (author, year, location) and overarching theme as related to cultural health (see Table 1 in Supplementary Materials). Included papers were primarily from Australia (n = 57) and largely fell within the themes of ‘connection to land and Country’ (n = 32), and ‘cultural practices’ (n = 27). The identified papers included both empirical and non-empirical work and varied in their approach: some were study protocols (e.g. Burns et al.<sup>34</sup> some acted as evaluations of various interventions (e.g. Campbell et al.<sup>35</sup>), some suggested tools for measuring wellbeing among Indigenous people (e.g. Masotti et al.<sup>36</sup>), some proposed strategies for research (e.g. Walker et al.<sup>37</sup>) and clinical practice (e.g. <sup>38</sup>) and some addressed the conceptual intersection of culture and health (e.g. Martin et al.<sup>39</sup>). Each paper was reviewed in detail and data relevant to the interconnecting concepts of culture, health and wellbeing were documented.

### Role of funding source

The funders of our study have no role in the study design, data collection, data analysis, interpretation, or writing of this manuscript.

## Results

What follows below is a narrative description of the *key themes* identified by our review. These include Country, culture, and Indigenous knowledges. While the literature separately discusses these concepts in relation to health and wellbeing, our review found that it does not necessarily present them as inter-connected and equally essential to good cultural health. Following this, we suggest a definition of cultural health which interprets these themes, and conclude by drawing attention to the necessary implications of colonial contexts in which health and culture operate.

### Country

#### *Relationship with country*

One of the key themes discussed in the literature was the relationship between health and wellbeing and connections to Country, land, or nature.<sup>5,40–43</sup> Duke et al.<sup>44</sup> argue that Indigenous people are defined by their connection to Country. Sometimes expressed as having a relationship with humankind akin to a mother earth and the people,<sup>45</sup> or as teacher,<sup>46</sup> the health of Country is necessary for the health of its people.<sup>47</sup> For example, in Māori culture, *whenua* (land) is not considered property but instead as a ‘person’ with rights and *mana* (authority), which in turn provides healing to people.<sup>6,48</sup> <sup>43,44,49–51</sup> People who are disconnected from Country experience distress<sup>49,50</sup> and Pandey et al.<sup>51</sup> argue that changes to land use and access impact psychological wellbeing.<sup>6,45–48</sup> Physical and sensory experiences on Country.

Being physically present on Country plays an important role in improving physical health and social and emotional wellbeing. Examples include improved maternal care through birthing on Country<sup>52</sup>; better dialysis outcomes when receiving treatment on Country<sup>53</sup>; and the development of a trauma-informed holistic community and land-based healing approaches.<sup>54</sup> Conversely, policies and actions that reduce access to or sovereignty over land, such as mining leases, have been shown to negatively impact Indigenous peoples’ mental health. The sensory experience of Country including sitting around a campfire, listening to birds and seeing trees and water has been seen to increase a sense of belonging and healing, which is linked to better health outcomes.<sup>12</sup> The literature documents that health is linked inextricably to sovereignty over land.<sup>55</sup> Josewski et al.<sup>56</sup> argue that the framework of ‘social determinants of health’ is insufficient if it does not account for place-based approaches.

#### *Country and culture as intertwined*

Social systems and cultural practices are entwined with Country.<sup>53</sup> Country is increasingly recognised as a central determinant of health for Indigenous people, in Canada and elsewhere.<sup>47</sup> Connection to Country, through cultural practices is an important determinant

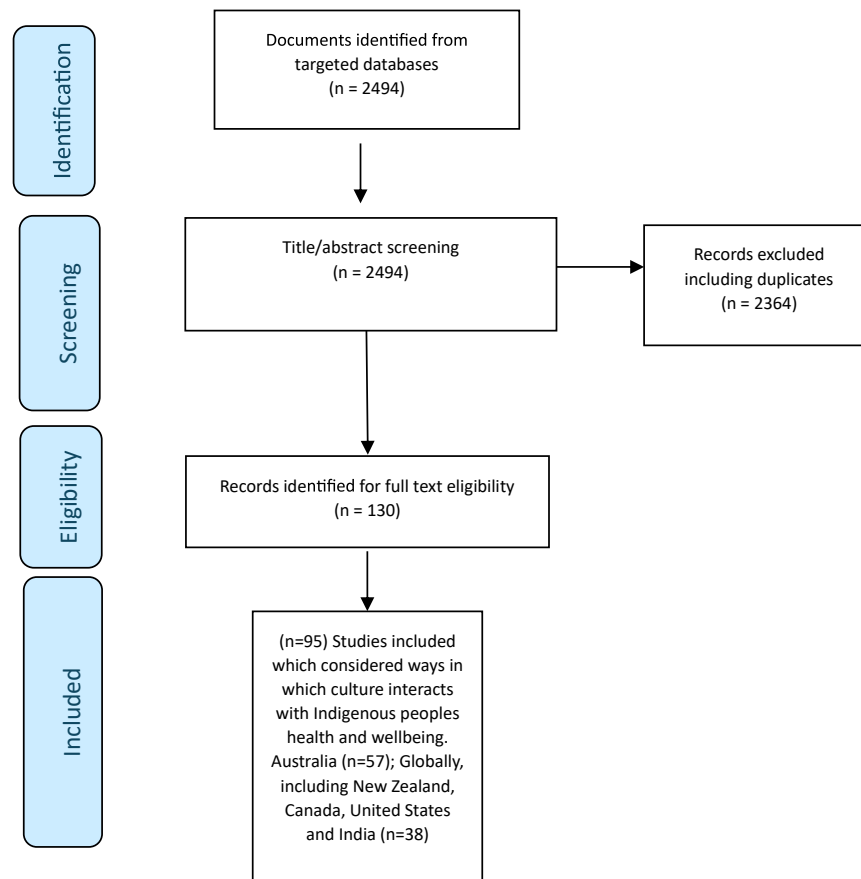


Fig. 1: Inclusion screening.

of health and healing.<sup>43,49,57–60</sup> Intricately related to Country are the teachings and lived practices of culture. Cultural connectedness, knowledge and identity are determinants of health and wellbeing,<sup>61,62</sup> as are language and collective values. Martin et al., express this ontology as follows<sup>39</sup>:

*Five core Kānaka Maoli values/concepts informed the activities for the IWR [Indigenous Writing Retreat]: aloha, pono, mana, kuleana, and 'ohana. Each value has multilayered meanings. From a Kānaka Maoli perspective, we begin with aloha (love, empathy, compassion) and work toward becoming pono (balance in mind, body, and spirit). Guided by our mana (Divine power; life force energy) and Indigenous beliefs and processes, we strive to act in a pono (balanced, fair, just, hopeful) manner and carry our kuleana (birth-right, privilege, and responsibility) graciously and authentically.*

#### Caring for country

Active participation in caring for Country was found to improve social and emotional wellbeing<sup>6</sup> through

revitalisation and healing,<sup>48,59,63,64</sup> and environmental stewardship or land management,<sup>28,29,40,57,58,65–68</sup> such as park ranger programs.<sup>69,70</sup> Redvers<sup>41</sup> notes the positive impact of a land-based healing camp in Canada for those facing substance abuse and homelessness. Land-based education and events that centralise relationships to Country were found to positively impact participants' sense of self, identity development, and mental health.<sup>45</sup> The health of the environment as a determinant of human health is a core aspect in Indigenous health and wellbeing. Climate change emerged within this narrative review as explicitly linked to disrupted connection to Country. The literature showed the intersection of climate change, Country and health from Elders' perspectives<sup>47</sup>; the impact of climate change<sup>71</sup>; and prolonged drought<sup>72</sup> on the health and wellbeing of Indigenous communities; and an Indigenous person's perspective of wildfires.<sup>73</sup> A land-based healing and wellness program which centres cultural practices on Country was shown to improve mental health outcomes.<sup>41</sup> In Australia, the use of Aboriginal gathering places highlighted the benefits of place-based initiatives in exploring the cultural determinants of health.<sup>62</sup>

## Culture

### *Cultural practices*

Indigenous cultural practices offer frameworks for holistic systems of healing,<sup>74</sup> and nurture the tangible aspects of the reciprocal relationships between people, Country and culture. Much like connection to Country, disruption of cultural practices has been shown to be detrimental to wellbeing.<sup>75</sup> Cultural practices, such as caring for Country, improve the health and resilience of environments and agency and stewardship over lands is essential.<sup>76</sup> For example, Wright et al.<sup>70</sup> hypothesise that family and life satisfaction rates detected in their study on Indigenous rangers could be partially explained by the rangers' increase in cultural practices. People have described benefits derived from ceremony, including the lifelong impact of strengthening identity, belonging and countering the impacts of ongoing settler colonialism.<sup>77</sup> A study by Newman et al.<sup>78</sup> looked at the Alaskan Athabaskans' wellbeing outcomes following a program that worked with Elder mentorship and sled dogs. Other specific cultural practices that led to improved wellbeing included: language reclamation<sup>79</sup>; land management programs that addressed food insecurity<sup>76</sup>; and a prison program that listened to sounds of Country.<sup>80</sup>

### *Cultural identity*

It is understood that due to the inter-generational traumas of colonisation, Aboriginal peoples continue to lose their cultural connections and identity, which negatively affects their health and wellbeing.<sup>81</sup> Masotti et al.<sup>82</sup> demonstrates a positive link between cultural connectedness and mental health and wellbeing by measuring culture against identity, traditions, and spirituality. In their research with Alaskan people, Newman et al.<sup>78</sup> write that as well as achieving goals, remaining busy, maintaining spirituality and passing on culture, developing a strong identity as a Native person constitutes an element of individual wellbeing. Social and emotional wellbeing scales are beginning to include cultural identity and practices such as sorry businesses.<sup>83</sup> From a Yuin (Aboriginal Nation—South Coast New South Wales, Australia) perspective, the metaphor of rekindling describes the reclamation of the self in the process of a journey—which is an integral part of the interconnection of identity, wellbeing and Country.<sup>84</sup> Land-based activities with a focus on strengthening cultural identity, facilitating intergenerational knowledge transfer, and building relationships with others were shown to improve the holistic health of Indigenous youth.<sup>85</sup>

### *Cultural safety in health services and programs*

Cultural safety in healthcare settings and health research emerged as a major topic.<sup>82</sup> The links between culture and wellbeing are clearly associated with ways of expanding Western perspectives of health, healing and

wellbeing.<sup>86–88</sup> This was documented in examples where services are informed by, and provided from within cultural practices.<sup>89</sup>

Culturally safe mentorship created a positive experience for nurses and midwives<sup>38</sup> and a model of interculturality was suggested to address health workers' racial microaggressions in remote locations.<sup>90</sup> The concept of cultural comfort was put forward to ensure health delivery happens within cultural practices<sup>91</sup> and Indigenous governance was argued to be a prerequisite for ethical health research.<sup>44</sup> The notion of resilience in health promotion was also raised by Teufel-Shone.<sup>92</sup>

When culture was centred in an early intervention program designed to address the needs of vulnerable children and families, it was found to enhance Aboriginal maternal and child health outcomes.<sup>61</sup> Reid et al.<sup>93</sup> also highlighted the benefits of integrating cultural considerations into Indigenous children's health checks. Furthermore, a decolonial approach which prioritised families, communities and culture was identified as a crucial approach to treating trauma and enhancing health and wellbeing.<sup>94</sup>

### *Communality*

Communality, or a connection to family and community, is a core cultural value that is central to good health and wellbeing.<sup>75</sup> Growing up in an Aboriginal family and community is associated with being well.<sup>95</sup> Individual and community cannot be separated, so whole families should be involved in healing,<sup>64</sup> including in making a good life for people with disability.<sup>96</sup> This is considered lore by Elders in Indigenous communities.<sup>93</sup> Care is an important dimension in the lives of children<sup>97</sup> and some advocate for the recognition of all family as care recipients, in child and family services.<sup>35</sup>

### *Traditional healing modalities*

Traditional healing was an important area explored in the literature. This included the use of traditional medicines,<sup>23,81,98</sup> including plant therapies,<sup>99</sup> use of ceremony, such as traditional sweat lodge,<sup>100</sup> and the significance of spirituality in the healing process.<sup>101</sup> In their review of such approaches across different Indigenous cultures globally, Day et al.<sup>101</sup> argue that each culture has unique ways of nurturing relationships with the Creator, the earth, and humankind through sacred rituals.

### *Indigenous knowledges*

Given the distinction drawn by the literature between Western biomedical and Indigenous conceptions of health and wellbeing and approaches to healing, it is necessary to highlight the importance of Indigenous epistemologies. Aboriginal people have described spirituality as 'at the core of Aboriginal being, their very identity'.<sup>87</sup> Spirituality involves ways of knowing that stretch beyond the cognitive (through dreams, visions, intuition)<sup>102</sup> and through ritual, spiritual knowledges



reflect unique ways of nurturing connections with the Creator, earth and humankind.<sup>101</sup>

Spiritual knowledges and the belief in the interconnectedness of all things, was found to have a significant relationship to Indigenous health and wellbeing.<sup>103</sup> An example from a review on the role of traditional medicine practice found that Aboriginal peoples within Australia may view ill health as the result of one of three causes—a natural physical cause, a spirit causing harm, or sickness due to sorcery.<sup>98</sup> Yamane et al. state that privileging cultural ways of knowing, being and doing is a means to achieving health and wellbeing and suggest a culture-as-health model to do so.<sup>7 87,98,101–103</sup> Other research in this area looked at Elders' perspectives of wellbeing,<sup>104</sup> how Elders' knowledge of the land informs health and wellbeing practices,<sup>46</sup> and considered Māori conceptions of health, as related to cardiovascular research.<sup>105</sup> Martin et al.<sup>39</sup> look at the ways health relates to the cultivation of Form (intellectual knowledge) and Essence (expression of true intention and authentic feeling) and O'Flynn et al.<sup>97</sup> explore the possibility for health educators to see children as Country—to listen to, learn from, and see the child spirit. Yarning was evidenced as a research method within a community-based Indigenous women's wellness project<sup>37</sup> and a study by Rasmus et al.<sup>106</sup> explored perspectives essential to developing culturally appropriate health interventions. Further, in the health research space, attention is drawn to how measures of wellbeing may miss culturally relevant variables, such as relationship with Country.<sup>107</sup> Rolleston et al.<sup>105</sup> argue that research and interpretation based on the Māori worldview (emphasising relationships, collectivism, and cross-disciplinarity) is essential to improving Māori health outcomes. Conceptual frameworks for wellbeing<sup>98</sup> are being developed to account for the collective and holistic view of health, with culturally informed dimensions including community, Country, culture, spirituality, and others.<sup>103</sup>

## Discussion

### What is cultural health and how might it be defined?

Although not explicitly described as such, the literature strongly supports the idea of health and wellbeing as a state of balance,<sup>1</sup> with various works describing Aboriginal health as comprising multiple, non-hierarchical components or dimensions. Burns et al. write<sup>55</sup>: 'mental health is interconnected with other dimensions of health (physical, emotional, and spiritual) and with cultural identity and place'. And, Butler et al.<sup>22</sup> specify the inextricably connected domains of wellbeing: 'autonomy, empowerment and recognition; family and community; culture, spirituality and identity; Country; basic needs; work, roles and responsibilities; education; physical health; and mental health'.

From within these integrated conceptions of health and wellbeing, three key themes characterised more specific descriptions of cultural health. First—connection to Country, with cultural health described as embedded in Country and sacred sites. Second—Indigenous people and their knowledge-making, with cultural health situated along the continuum of individual and collective past, present and future, across body, heart and spirit,<sup>40</sup> and understood as part of a cycle of life-death-life.<sup>71,108</sup> Third—culture and the cultural practices that connect people and Country, including important 'modalities' such as Indigenous ways of knowing, cultural practices, sacred sites and spirituality, as described by Yamane and Helm.<sup>728</sup>

These themes support a definition of cultural health as the outcome of the interactions between the three elements of: *Country—which includes lands, waters, skies and living and non-living entities; People—and their freedom and ability to express and maintain connections to culture and country; and Culture—which encompasses identity, language and knowledges and is maintained and strengthened through active connection to Country and cultural practices.* Of note, the resilience and strength derived from these intersecting dimensions were noted to offer pathways towards improved health outcomes and revitalising health systems in the context of ongoing settler colonialism and racism.

In Australia, these core components of cultural health must be situated in a contemporary context of ongoing colonisation. Because health and wellbeing are so closely tied to culture, Indigenous people are affected by traumas and health disparities resulting from ongoing settler colonialism, which destroys self-determination and limits access to resources.<sup>34</sup> Cullen et al.<sup>94</sup> call this 'situational, cumulative and transgenerational trauma with profound impacts on health and wellbeing.' Interference in the passing of knowledge over generations inhibit peoples' ability to fulfill their ancient teachings and cultural responsibilities, which impacts wellbeing.<sup>109</sup> The separation of peoples' bodies from their Country has removed their source of strength, health, and wellbeing.<sup>99</sup> Among increasing arguments for the need to integrate salutogenic (health protecting) approaches to health,<sup>86</sup> self-determination is cited as a counter to the continuing impacts of colonialism.<sup>110</sup>

Overall, the literature put forward a number of specific elements that are important to the health and wellbeing of Indigenous people, and the ways in which these are connected to multi-faceted definitions of culture.

## Conclusion

Indigenous cultural health encompasses the interconnectedness of Country, people and culture, demanding a holistic approach that integrates Indigenous knowledges and cultural practices. In Australia, these core components of Indigenous cultural health must be situated in

## Search terms

"Aboriginal" OR "Indigenous" OR "Torres Strait" OR "First Nations" AND cultur\* OR connection AND "Australia" OR "NSW" OR "New South Wales" OR "Queensland" OR "Qld" OR "Victoria" OR "NT" OR "Northern Territory" OR "SA" OR "South Australia" OR "Tas" OR "Tasmania" OR "WA" OR "Western Australia" AND "health" OR "wellbeing".

a contemporary context of ongoing colonisation. Cultural health is both the health of one's culture and the health of the culture itself—as the two are symbiotic. Because health and wellbeing are so closely tied to culture, Indigenous people are affected by traumas and health disparities resulting from ongoing settler colonialism, which destroys self-determination and limits access to resources. Resilience, strength and self-determination are derived from these interconnected dimensions of Country, culture, and Indigenous knowledges offer pathways to improved health outcomes and revitalising health systems.

## Contributors

BJB: Conceptualisation; Methodology; Writing—Original draft; Writing—review and editing; Funding acquisition; Supervision.

NS: Investigation; Methodology; Writing—Original draft; Writing—Review and editing; Project administration.

GS: Investigation; Methodology; Project administration.

BB: Writing—review and editing; Funding acquisition.

JK: Writing—review and editing; Funding acquisition.

ST: Writing—review and editing; Funding acquisition.

AY: Conceptualisation; Methodology; Writing—review and editing; Funding acquisition; Supervision.

## Data sharing statement

The study protocol is available elsewhere (11) The study materials are made available in the supplementary file.

## Declaration of interests

None declared.

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## Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.lanwpc.2024.101220>.

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