Measuring the health and wellbeing impacts of cultural camps among Aboriginal adults: preliminary evidence from the Gaawaadhi Gadudha Research Collaborative

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Summary

Background Aboriginal and Torres Strait Islander peoples' have sustained their cultural practices for over 60,000 years which fundamentally impacts their health and wellbeing. Recent literature emphasizes cultural connection as a contributor to good public health, yet the mechanisms through which cultural engagement promotes health and wellbeing remain underexplored. This study investigates the health and wellbeing outcomes associated with Aboriginal peoples' participation in cultural camps in New South Wales (Australia), focusing on the role of cultural determinants of health.

Methods This cohort study, part of the larger Gaawaadhi Gadudha Research Collaborative, examines the impact of camp attendance on health indicators among Aboriginal adults. Participants (N = 43) completed surveys assessing individual cultural health, access to cultural resources, resilience, and health-related quality of life pre and post camp. Paired-samples t-tests and Wilcoxon related samples signed-rank tests were employed to analyze changes.

Findings Participants reported high engagement in cultural activities and positive experiences at camps. Post-camp responses indicated significant improvements in cultural health, including increased pride in cultural identity, knowledge of traditions, and connections to Country and community. However, measures of resilience and health-related quality of life showed no reliable changes.

Interpretation The findings suggest that camps play a crucial role in enhancing cultural health among Aboriginal peoples, reinforcing the importance of knowledge of cultural determinants of health. This study underscores the need for further research to explore the long-term impacts of cultural engagement on health and wellbeing and highlights the potential of cultural camps as a model for health promotion initiatives within Aboriginal communities.

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Introduction

Continuity in Aboriginal and Torres Strait Islander (herein Aboriginal) cultures has been present for over 60,000 years; and is ever evolving.[1–3] Aboriginal models, frameworks and concepts of health are deeply connected to culture, Country (i.e., land), kin, history, protocols, language, identity, and community.[3] Although an emergent body of literature highlights cultural

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Research in context

Evidence before this study

Prior to this study, the evidence for cultural connection as a contributor to health and wellbeing was largely conceptual or qualitative.

Added value of this study

The added value of this study lies in its empirical exploration of the health and wellbeing impacts of attending cultural camps among Aboriginal peoples within the Australian context. This study employs a comprehensive evaluation protocol to quantitatively assess changes in individual cultural health, access to cultural resources, resilience, and health-related quality of life pre- and post-camp attendance. Furthermore, the study has value for policy and practice, offering empirical support for the role of cultural camps as effective public health programs that can enhance cultural connection, sense of identity, and wellbeing. This evidence is crucial for informing health policies and practices that prioritize cultural determinants and strength-based approaches.

Implications of all the available evidence

Overall, the study findings combined with existing evidence highlight the critical role of cultural connection as a determinant of health and wellbeing among Aboriginal peoples. The implications of this evidence for policy and practice include, firstly, recognition of the need to integrate cultural determinants in public health strategies and health programming, highlighting the importance of culture, Country, and community in promoting health and wellbeing. This includes the development and support of culturally centred programs, such as cultural camps, that facilitate engagement with culture and Country. Secondly these research insights aim to increase policy support and resourcing for Aboriginal-led initiatives that strengthen cultural connection. There are also implications for future research including: i) investing in longitudinal research to assess the long-term impacts and sustainability of health benefits derived from cultural engagement and participation in cultural camps; and ii) investigation of the mechanisms through which cultural connection influences health outcomes. This might include exploration of whether specific aspects of cultural engagement are most beneficial and determining if and how they interact with other determinants of health.

connection as a public health preventative measure in Aboriginal populations,[3–5] there is a lack of evidence identifying how and what mechanisms lead to these health and wellbeing benefits.[4,6–8] The concept of the cultural determinants of health allows us to better understand this relationship. Cultural determinants of health are defined by the National Institute of Aboriginal and Torres Strait Islander Health Research (Lowitja Institute) as: *"promot[ing] a strength-based perspective, acknowledging that stronger connections to culture and country build stronger individual and collective identities, a sense of self-esteem, [and] resilience"*.[9]

In this paper, we explore the relationships between Aboriginal peoples' engagement with cultural camps (herein camps) on Country, and several indicators of health and wellbeing, including individual connection to culture, access to cultural resources, resilience, and health-related quality of life. Culture and Country are intimately intertwined for Aboriginal peoples' health and wellbeing.[10–12] Specific to Australia, this is because connection to Country is unbroken for Aboriginal peoples and refers to a *"deep, intimate, holistic, complex, localized, and reciprocal relationship which includes elements of the land, sea, waterways, sky, stars, and living and nonliving entities … Country is more than something you just see as a physical entity—it is a living system tied to language, identity, and customs; it is not static or frozen in time, incorporating the social, spiritual, and cultural linkages of Aboriginal and Torres Strait Islander peoples"*.[3] Country teaches, speaks, and connects communities in a reciprocal relationship with animals, plants, rocks, water and sea through time and space and is passed on through actions, activities and protocols like songlines, language, fire, food and medicine, seasonal calendars and ceremony.[3,4,13] A separate but related body of work has also explored cultural connection and connection to Country in the context of Aboriginal constructs of resilience,[14–16] refining conceptualisations of the role of culture and Country in promoting health and resilience and developing tools to evaluate those links. Very limited research has been conducted examining the effectiveness of practices and programs designed to strengthen these links. In one notable example Dobia et al.[17] measured the effects of Aboriginal Girls' Circles on participants' resilience, connectedness, self-concept and cultural identity, evaluating the relative effectiveness of various components of the program and reporting positive impacts. However, there remain significant knowledge gaps in relation to the measurable health impacts of practices and programs designed to promote connectedness to culture and Country, such as camps.

The cultural camps

This study centres on three camps, held, respectively, on Yuwaalaraay, Gamilaraay, and Yuin-Djirringanj Country in New South Wales in 2022. The camps involve experiences with cultural lore, traditional languages, and

connection to and understanding of cultural landscapes (including learning to identify traditional foods and medicines). The camps are regularly organised by cultural knowledge holders — who are Aboriginal custodians of both Country and immaterial aspects of culture, such as language, stories and law — outside of this research. The camps form part of the knowledge holders' work that supports the continuation of culture. They welcome Aboriginal people from all nation groups. Cultural knowledge holders invite camp participants through their networks, via advertisements and word-of-mouth, in person and on social media. They welcome Aboriginal and Torres Strait Islander people from all nation groups. Families are invited, including non-Aboriginal family members. The camps, which are between three and five days in length, are held on Country, in proximity to sites that are sacred to the relevant language group. For example, Dharriwaa, where the Yuwaalaraay camp is held, is a traditional meeting place, which holds sites connected to significant ancestral stories. Women, men, and families are invited to camp separately (participants can choose their camp) and all meet for mealtimes and for cultural involvement, including gender specific activities. By facilitating connection to cultural landscapes (e.g., physical sites minimally impacted by colonisation, including natural and sacred sites protected from urbanisation or development)[3,18] and transgenerational and intercultural knowledge exchange, the camps aim to encourage cultural and kinship connection, decolonization, and healing for participants. Fig. 1 shows images from the Dhariwaa (Yuwaalaraay) and Yuin (Yuin-Djirringanj) camps.

The current study aims to honour Aboriginal models, frameworks, and concepts of health by providing initial evidence for the health and wellbeing impacts of attending cultural camps. We do so through the lens of a strength-based approach which seeks: *"... to move away from the traditional problem-based paradigm and offer a different language and set of solutions"* that centre Aboriginal cultures, and ways of being, knowing, and doing.[3] Specifically, we aim to explore pre- and post-camp quantitative indicators of individual cultural health, including access to cultural resources, individual and relational resilience, and health-related quality of life of Aboriginal adults who attended camps. This study extends previous international work[19] by exploring the health impacts of attending cultural camps using a more extensive evaluation protocol than previously undertaken in the Australian context.

Methods

Study design

This cohort study is part of the Gaawaadhi Gadudha Research Collaborative. More detailed information regarding the broader study conceptualisation, governance structure and methodology can be found in the project's study protocol paper.[8] Nonetheless, in the following paragraphs we provide a brief overview of each of these factors as relevant to the aims of the current study. Companion papers in the series explore: the need to rethink the 'health gap' between Aboriginal and non-Aboriginal populations as instead a need to strengthen cultural connection[20]; the concept of cultural health through a narrative review of the literature[21]; and how health and wellbeing are phenomenologically connected to cultural practices, foods, medicines, languages, and Country using qualitative data collected at cultural camps.[22] The current paper reports specifically on pre-to post-camp quantitative data exploring the impact of camp attendance on a range of health and wellbeing indicators. Ethics approval was obtained from the Aboriginal Health and Medical Research Council (#1851/21).

Cultural governance

The Gaawadhi Gadudha Research Collaborative (herein Research Collaborative), which this study is a part of,

Fig. 1: Images taken at Dhariwaa camp (left) and Yuin camp (right).

was conceptualised in close partnership with traditional cultural knowledge holders (TF, MO, WF) from Yuwaalaraay, Gamilaraay, and Yuin Aboriginal Nations of New South Wales (NSW) Australia. More information on the Collaborative can be found in the qualitative article in this collection (Yashadhana et al., 2024). The Gaawaadhi Gadudha Cultural Governance Group (herein Cultural Governance Group), composed of these knowledge holders, led decision-making in their respective locations in relation to research governance, design, implementation, data collection, data analysis, and dissemination. As described in the study protocol,[8] the cultural health surveys reported in the present study were developed with oversight from the Cultural Governance Group, to ensure all content was culturally appropriate and meaningful to the study aims.

Participants

Aboriginal adults aged 18 years or older were invited to participate in this research by completing at least one cultural health survey. A total of 320 adults consented to and completed at least part of the pre-camp survey. Of those, 166 indicated that they were intending to participate in an upcoming camp, and 154 indicated that they were not. We refer to these samples as the camp cohort and the comparative cohort, respectively. The camp cohort were invited to participate via email after they had registered to attend a camp, and some were invited to participate at the beginning of the camp before activities commenced. The comparative cohort was sampled from the same regions in which the camps took place. This study does not report on data from the comparative cohort. A total of 65 participants consented to and completed at least part of the post-camp survey. Some of those respondents had not completed a pre-camp survey. As the present study is interested in pre- to post-camp differences, we report only data from those who i) participated in a camp and ii) completed both the pre- and post-camp surveys (N = 43). This sample size is sufficiently powered to detect small-to-moderate effect sizes in paired-samples tests, with alpha (two-tailed) = 0.05 and power of 0.80.[23] More details of sample characteristics are reported in the results section.

Procedure

Community-based researchers were available to all participants to explain the study thoroughly and privately prior to participants providing informed consent. Those who consented had the choice of completing each survey on their own, or with assistance from a research team member. The survey was designed using Qualtrics[24] and data were collected electronically using a personal device or provided tablet. Data collected included personal characteristics, cultural identities and responsibilities, camp experiences, individual cultural health, access to cultural resources, resilience, and health-related quality of life. The pre-camp survey took approximately 40 min to complete and was administered within two weeks of attending a cultural camp. The post-camp survey took approximately 30 min to complete and was administered during the final hours of each cultural camp. Aside from eligibility questions (age, Aboriginality), all survey questions were optional, and respondents could skip any item they did not wish to answer. The pre- and post-camp surveys are included in the Supplementary Materials. Respondents received a $40 AUD grocery voucher for their time after completing each survey.

Outcomes

Personal characteristics

Participants were asked to report their age in years, gender identity ("male", "female", "non-binary or third gender", "I use another term" (text entry), "prefer not to say"), main source of income ("full time employment", "part time employment", "casual employment", "Centrelink (social welfare) payments", "I don't have an income"), housing situation ("living in own home", "living in rented home", "living in affordable housing", "living in public housing", "living in Aboriginal housing", "living temporarily with friends or family", "houseless") whether they were currently living on their own Country ("yes", "no"), and the preferred term they used when describing their cultural identity. Participants could select from a range of identities or type in their preferred identity using open text. The survey also collected some additional personal and cultural characteristics not reported here.

Overall camp experience and activities

Participants were asked to rate their overall experience at camp using a sliding scale from 1 (extremely negative) to 100 (extremely positive). They were asked if they would be interested in attending the next camp gathering, with response options including "yes", "no" or "maybe". They were also asked to indicate how much time they felt they spent on a range of activities at camp, using a Likert-type scale from 1 ("none") to 5 ("a great deal").

Individual and collective access to culture, cultural knowledge, and resources (cultural health)

Repeated measures. This study included repeated measures of cultural health that were completed both pre- and post-camp. Individual connection to culture was measured using a combination of selected items from the Mayi Kuwayu Survey,[25] and the Cultural Connectedness Scale.[26] Items were selected based on their relevance to the study aims[8] and were discussed at length with the Cultural Governance Group. Some items were modified to suit the local context. For

example, instead of using the term 'Aboriginal', the participant's self-identified cultural group was piped into questions. Items around individual and collective access to culture were developed by the Gaawaadhi Gadudha Research Collaborative and Cultural Governance Group and drew on the experience and previous work on cultural heritage previously undertaken by one of the knowledge holders (TF).

Stand-alone measures. As cultural health is of central interest in this study, we also included a series of stand-alone items which were designed to detect meaningful changes in aspects of cultural health related to attending the camps which may not be detectable using the measurement approach above. For example, we anticipated that at least a portion of the sample would rate at the highest ends of Likert-type scales on cultural health indicators prior to the camps, leaving no capacity for measures to reflect potential positive change following the camps. An example stand-alone item is "How did your knowledge of history, traditions and customs change as a result of attending the Camp?. The 5-point response scale ("decreased a lot", "decreased a little", "no change", "increased a little", "increased a lot") was designed to allow for both positive and negative changes in cultural health indicators.

Resilience

This study included two measures of resilience: an 18-item Adaptation of the Aboriginal Resilience and Recovery Questionnaire (ARRQ)[14,27] and the 10-item Connor-Davidson Resilience Scale (CD-RISC).[28] The original ARRQ was developed through a process of consultation and collaboration with Aboriginal adults and was specifically designed to be culturally appropriate and sensitive to the experiences of Aboriginal people in Australia. Permission was granted from the author of the ARRQ[14,27] to create an adapted version of selected survey items to be used in the study. Our adaptation (developed by AY and BB with iterative feedback from the Cultural Governance Group) consists of 18 items grouped into two subscales: sources of personal strength (8 items) and sources of relational-community-cultural strength (10 items). Among the current sample, responses to the pre-camp survey were used to calculate scale reliability which was found to be very good for both the personal strengths (Cronbach's $\alpha = 0.875$) and the relational-community-cultural strength subscales (Cronbach's $\alpha = 0.873$). Items within each subscale, item scores and item-total statistics are presented in Supplementary Table S1.

The 10-item CD-RISC[28] is a widely used measure of individual resilience. The scale consists of 10 items, each rated on a 5-point Likert-type scale ranging from 1 (not true at all) to 5 (true nearly all the time). Example items include "I am able to adapt when changes occur" and "I tend to bounce back after illness, injury, or other hardships." Item scores are summed to create a total resilience score ranging from 10 to 50, with higher scores indicating greater resilience. This measure has been used in previous research among Aboriginal adults[14] and demonstrated good reliability in the current sample based on pre-camp survey responses (Cronbach's $\alpha = 0.883$).

Health-related quality of life and self-rated health

The EQ-5D-5L[29] is a self-report measure of health-related quality of life. The measure includes a visual analogue scale, which allows individuals to rate their overall level of health-related quality of life on a scale from 0 to 100, with higher scores indicating better overall health-related quality of life. It also assesses an individual's health status across five dimensions of health, including: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension is measured on a five-point scale, ranging from 1 "no problems" to 5 "extreme problems." Higher scores indicate poorer health status. The EQ-5D-5L has been shown to be a suitable measure of health-related quality of life among a large sample of Aboriginal people.[30]

Statistical analysis

Descriptive statistics were used to summarize the sample characteristics and stand-alone items exploring the impact of attending camp on cultural health. Continuous variables (e.g., age) were described using means and standard deviations, while ordinal or categorical variables (e.g., gender, housing status, camp impacts) were described using frequencies and percentages. As outlined in the study protocol,[8] we aimed to conduct regression analyses to explore pre-to post-camp differences in health indicators after controlling for possible covariates such as age or gender. However, significant drop-off in the completion rates from the pre-to post-camp surveys resulted in a smaller than anticipated sample size, precluding the capacity to include covariates in statistical models (discussed later in this paper). As such, we used paired-samples t-tests (for continuous measures) and Wilcoxon related samples signed-rank tests (for ordinal measures) to explore pre-to post-camp differences in cultural health indicators, resilience, and health-related quality of life. Pairwise deletion was used to handle missing data, because complete pre-post data was important for many of the planned analyses. All statistical analyses were computed using SPSS Version 26.[31] Interpretation of results was guided by the Cultural Governance Group.

Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

This paper reports on data from 43 Aboriginal adults (29 females, 14 males; mean age = 44.3 years, age range 19–74 years) who completed both the pre- and post-camp surveys. Before attending the camp, most attendees spent at least a little time on a range of cultural activities, see Supplementary Table S2. Sample characteristics are described in Table 1.

Attendees' perceptions of the amount of time spent on a range of cultural activities at camp are summarised in Table 2, which indicated engagement across the full range of activities surveyed.

Overall, attendees rated their experience at camp as extremely positive, with an average rating of 93.85/100 (SD = 8.27, range 66–100). Responses were clustered at the highest end of the reporting scale, with 46.2% of people rating their experience 100/100 and 82.7% providing a rating of 90/100 or higher. 95.3% of people said they would like to attend the next cultural camp offered, and the remaining 4.7% said 'Maybe'.

Wilcoxon related samples signed-rank tests were used to compare ratings of specific cultural health indicators from pre-to post-camp. Table 3 shows item response frequencies and tests of pre-to post-camp differences. We did not detect any statistically significant differences in average responses to cultural health items across time, with mean scores on the high end of the response scale at each timepoint.

However, stand-alone post-camp questions revealed strong positive impacts of attending camp on all cultural health indicators we surveyed. As shown in Fig. 2, 83.7% of people experienced an increase in their own sense of pride in their cultural identity, and 69.8% an increase in their perceived importance of being recognised as Aboriginal. In terms of cultural knowledge, 93% of people said they increased their knowledge of history, traditions, and customs, 87.5% increased their knowledge of physical sites of spiritual or cultural significance, 68.3% increased knowledge of traditional foods, 70.7% increased knowledge of traditional medicines, 77.5% increased knowledge and access to cultural resources, and 85% reported an increase in knowledge of important cultural stories. When asked about the impact of camp attendance on perceived connections, 90% reported increased connection to other people, 72.1% reported increased connection to their own Mob or Nation, 86% reported increased connection to Ancestors, and 85% reported an increased connection to Country. 85.4% of people reported that they heard or learned new Aboriginal words or language at camp, and 68.3% reported that they shared words or language they knew with others. Remarkably, 97.5% of people indicated that they experienced a sense of healing as a direct result of attending the camp.

Paired-samples t-tests were used to compare scores on the CD-RISC and ARRQ before and after attending a cultural camp. The was no difference in the average CD-RISC score before (M = 27.85, SD = 6.15) and after camp (M = 28.85, SD = 7.36), t (38) = –1.05, 95% CI [–2.99, 0.99], p = 0.316, Cohen's d_{av} = 0.15, 95%CI [–0.12, 0.42].

Adapted ARRQ total scores were not significantly different pre- (M = 56.59, SD = 9.40) and post-camp (M = 58.85, SD = 7.99), t (38) = –1.79, 95% CI [–4.80, 0.29], p = 0.081, Cohen's d_{av} = 0.26, 95%CI [–0.01, 0.54]. Neither were ratings on the Sources of Personal Strength subscale pre-camp (M = 25.54, SD = 4.48) compared to post-camp (M = 26.23, SD = 3.77), t (38) = –1.22, 95% CI [–1.84, 0.46], p = 0.23, Cohen's d_{av} = 0.17 95%CI [–0.09, 0.43].

However, we found evidence of a marginally significant increase in ratings on the Sources of Relational-Community-Cultural Strength subscale following camp attendance, t (38) = –2.03, 95% CI [–3.12, –0.01], p = 0.049. The average pre-camp score was M = 31.05 (SD = 5.67), and the average post-camp score was M = 32.62 (SD = 5.03). The effect size for the difference appeared to be small, Cohen's d_{av} = 0.29, 95%CI [.02, 0.53]. The wide confidence interval suggests that we cannot rule out that this effect is either very marginal

Variable	Response	*n*	%
Preferred description of own cultural identity	Aboriginal	13	30.2
	Bigambul and Gomeroi	2	4.6
	Birrbay and Dhanggati	1	2.3
	First Nations	4	9.3
	Gamilaraay	15	34.9
	Indigenous	1	2.3
	Kooma	1	2.3
	Marra	1	2.3
	Yuin	3	7
	Yuwaalaraay	1	2.3
	Yuwaalaraay and Gamilaraay	1	2.3
Camp attended	Dharriwaa (Yuwaalaraay Country)	22	51.2
	Gomeroi (Gamilaraay Country)	9	20.9
	Yuin (Yuin-Djirringanj Country)	12	27.9
Currently living on own Country	Yes	20	46.5
	No	23	53.5
Main source of income	Full time employment	15	34.9
	Part time employment	8	18.6
	Casual employment	3	7
	Centrelink payments	16	37.2
	I don't have an income	1	2.3
Housing situation	Living in a home I own	12	27.9
	Living in a home I rent privately or through a real estate	17	39.5
	Living in affordable housing	2	4.7
	Living in public housing	2	4.7
	Living in Aboriginal housing	7	16.3
	Living temporarily with family or friends	3	7

Table 1: **Self-reported characteristics of cultural camp attendees (N = 43).**

Thinking about your time spent at camp, how much time did you spend:	Response, *n* (%)				
	None	A little bit	A fair bit	A lot	A great deal
With someone who has cultural knowledge (e.g., Elder or knowledge holder)	0 (0%)	4 (9.5%)	14 (32.6%)	9 (21.4%)	15 (35.7%)
Learning and using knowledge from Aboriginal law/lore	1 (2.4%)	10 (24.4%)	9 (22%)	10 (24.4%)	11 (26.8%)
Getting or eating bush tucker (traditional foods and fishing)	6 (14.3%)	16 (38.1%)	8 (19%)	6 (14.3%)	6 (14.3%)
Learning culture, kinship, and respect	0 (0%)	4 (9.3%)	11 (26.2%)	14 (33.3%)	13 (31%)
Making art, music, paintings	1 (2.4%)	10 (23.8%)	15 (35.7%)	9 (21.4%)	7 (16.7%)
Passing on cultural knowledge	2 (4.9%)	12 (29.3%)	16 (39%)	4 (9.8%)	7 (17.1%)
Contributing to the camp (e.g., by helping, sharing, healing)	0 (0%)	8 (19%)	12 (28.6%)	8 (19%)	14 (33.3%)
Receiving Aboriginal healing methods (traditional healers, bush medicines)	7 (16.7%)	17 (40.5%)	9 (21.4%)	4 (9.5%)	5 (11.9%)

Table 2: **Amount of time spent at camp on specific cultural activities.**

(at the low end of the confidence interval) or moderate in strength (at the high end of the confidence interval).

A paired-samples t-test was used to compare average overall subjective health ratings pre- and post-camp. There was no statistical difference between pre-camp (M = 72.18, SD = 15.67) and post-camp health ratings (M = 75.13, SD = 17.24), t (39) = –1.00, 95% CI [–8.92, 3.02], p = 0.324, Cohen's d_{av} = 0.18, 95%CI [–0.16, 0.53]. Wilcoxon matched-pair signed-rank tests were used to compare subjective ratings of specific aspects of health-related quality of life, including mobility, self-care, usual activities, pain, and anxiety/depression symptoms. As shown in Table 4, there were no significant differences in specific health-related quality of life ratings before and after the cultural camps, with most respondents indicating little to no difficulty in each domain.

This preliminary study was insufficiently powered to explore the impact of camp attendance on outcomes separately for men and women. However, following guidance from our Cultural Governance Group and to promote transparency, we provide descriptive data separately for men and women in the Supplementary materials (see Supplementary Tables S3–S10). Supplementary Table S11 displays exploratory bivariate associations between primary study outcomes measured both pre- and post-camp and three potential covariates of interest: age, gender (men, women), and living on own Country status (yes, no). These covariates were not sufficiently related to study outcomes to contribute meaningfully to exploratory regression analyses.

Sensitivity analysis

We are aware that pairwise deletion–used in this study to account for missing data–may yield biased results. Therefore, we conducted sensitivity analysis by using multiple imputations for missing parametric data and re-running analyses to examine consistency of results. Overall, 47.51% of variables, 18.6% of cases and 3.32% of values had missing data. The highest percentage of missing data (14%) was observed for questions presented at the end of the post-camp survey. The pattern of missing values suggested that the values was missing

Item	Pre-camp					Post-camp					Related-Samples Wilcoxon Signed Rank Test			
	n	Not at all	A little bit	A fair bit	A lot	*n*	Not at all	A little bit	A fair bit	A lot	*Z*	*SE*	*Std Z*	*p*
I feel proud to be Aboriginal[a].	43	0	1	0	42	43	0	1	1	41	0.00	0.50	–1.00	0.317
How important is it for you to be recognised as an Aboriginal[a] person?	43	0	2	11	30	43	0	2	6	35	32.50	8.01	1.25	0.212
I have spent time trying to find out more about being Aboriginal[a], such as the history, traditions, and customs.	43	0	11	16	16	43	1	9	13	20	136.00	26.57	0.77	0.440
I feel a strong attachment towards my Aboriginal[a] Mob/Nation.	43	0	1	15	27	42	0	1	15	26	60.00	15.91	0.00	1.000
I feel a connection to my ancestors.	43	0	4	14	25	43	0	3	12	28	114.00	22.28	0.85	0.394
I am confident in speaking my language or words[b]	25	3	15	5	2	26	4	14	4	4	33.00	8.70	0.63	0.527
It is important that I use my language or words[b]	26	0	2	14	10	26	1	2	10	13	28.00	8.02	0.69	0.493
I feel good when I use my language or words[b]	25	0	1	7	17	26	0	1	8	17	27.50	8.70	0.00	1.000
I am interested in keeping my language strong[b]	26	0	1	1	24	27	0	0	5	22	6.00	3.35	–0.45	0.655
My family is interested in keeping my language strong[b]	27	0	4	6	17	27	0	5	7	15	8.00	5.29	–1.13	0.257
My community is interested in keeping language strong[b]	27	0	3	7	17	27	1	2	13	11	21.00	12.12	–1.48	0.138

[a]Piped text was used in both the pre- and post-camp survey to replace the word 'Aboriginal' above with each individual's preferred cultural identity term. [b]Only respondents who indicated that they knew at least a little Aboriginal or Torres Strait Islander words or language(s) completed these questions, reflected by smaller sample sizes for these comparisons.

Table 3: **Pre-to post-camp tests of differences in cultural health and language indicators.**

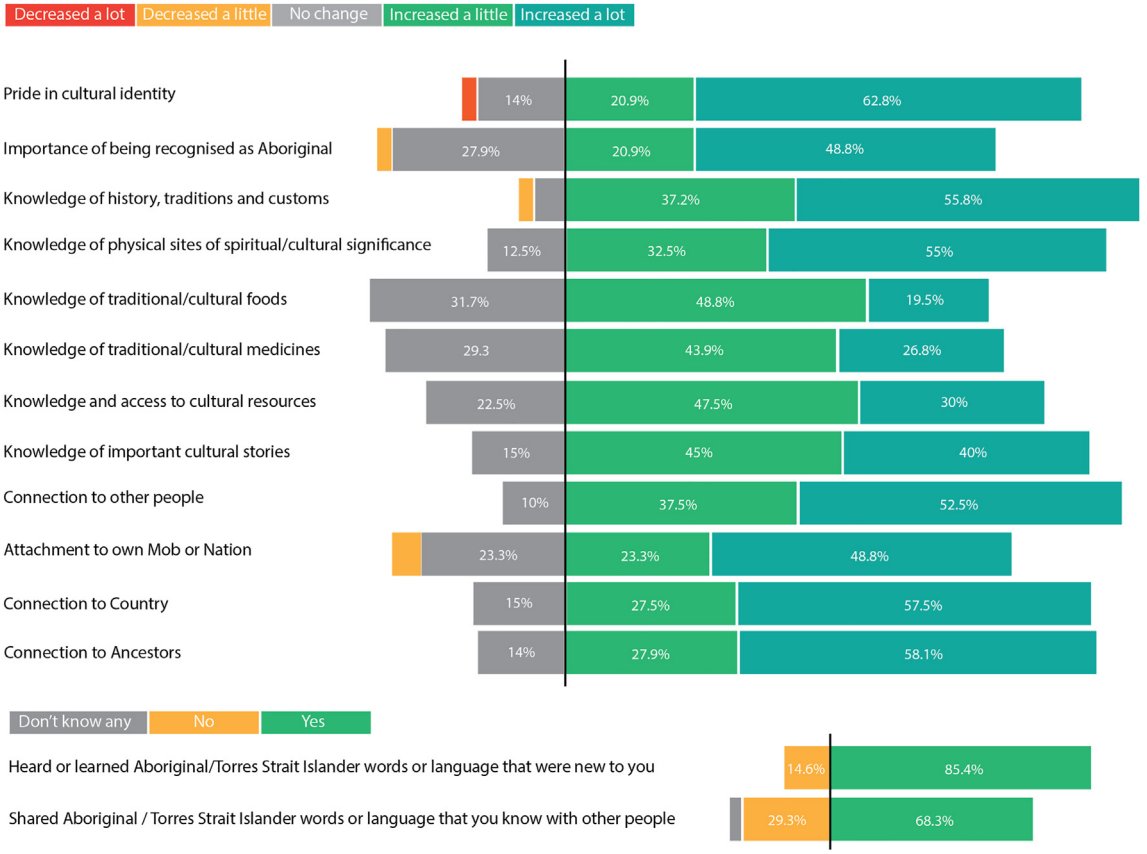

Fig. 2: Perceived impacts of attending camp on cultural health indicators (N = 43).

at random (MAR). SPSS was used to impute missing data for parametric tests using a fully conditional specification approach and five iterations. Analyses were then re-run comparing the output of the observed data to the combined imputed data following Rubin's rule. As shown in Supplementary Table S12, the mean differences for t-tests computed with pooled imputed data were consistent with those obtained using pairwise deletion. The only difference was that the aARRQ total score emerged as marginally significantly higher post-camp compared to pre-camp following multiple imputation ($p = 0.048$). Multiple imputation was not used to impute data for non-parametric tests as non-parametric data does not have variances that are properly weighted to allow for imputation. Therefore, only complete-case data is reported for Wilcoxon signed-rank tests in the main results section above.

Discussion

The connections between Country, culture, and health and wellbeing among Aboriginal peoples have been well described and conceptualised.[3,8,12] Previous studies have identified culture as a protective factor in Aboriginal health and wellbeing.[32–34] However, measuring the impact of meaningful and culturally centred initiatives that address inequitable health outcomes among Aboriginal peoples in Australia has received limited attention. This has contributed to the gap between empirical research and tangible and beneficial change.[35] Our work has built on established insights and sought to develop empirical evidence regarding the value and impact of a particular initiative focused on enhancing health and wellbeing through strengthening connections with Country and culture. While the sample size was smaller than anticipated, we have identified a range of positive outcomes that warrant attention and will be explored in further publications and initiatives.

Specifically, little research on cultural camps as a platform and mechanism to improve Aboriginal health and wellbeing exists in the Australian context.[17,36] Our study is the first in the Australian context to measure the impact of cultural camp attendance among Aboriginal peoples. In the international context, there are a few peer-reviewed studies that have measured the impact of attending an indigenous cultural camp on participant health or wellbeing.[19,26,37] Redvers and colleagues[19] explored the benefit of attending an urban land-based

Health-Related Quality of Life Domain	Pre-camp problems, *n*					Post-camp problems, *n*					N	Z	Std Z	SE	p
	None	Slight	Moderate	Severe	Extreme/ Unable	None	Slight	Moderate	Severe	Extreme/ Unable					
Mobility	31	8	3	0	1	33	5	2	0	0	40	36.00	1.73	7.80	0.08
Self-care	42	0	0	0	0	38	0	1	0	0	39	1.00	1.00	0.50	0.32
Usual activities	33	7	2	1	0	35	3	2	0	0	40	3.50	−1.90	5.50	0.06
Pain	22	14	7	0	0	18	19	2	1	0	40	49.00	−0.24	14.00	0.81
Anxiety/depression	14	22	4	3	0	12	23	4	1	0	40	81.00	0.24	19.00	0.81

Table 4: **Tests of differences in pre- and post-camp health-related quality of life measured using the EQ-5D-5L.**

healing camp among Indigenous people at high risk of homelessness and substance use living in Yellowknife, Canada. Using a two-item feedback survey, they found that people who spent time at the camp rated their emotional wellbeing as better when leaving camp compared to when arriving at camp. Their preliminary study did not collect data on any other indicators of health or wellbeing. Our Research Collaborative—which centres existing, Aboriginal-led and run cultural camps on Country at three locations in New South Wales—involved far more extensive evaluation of the health and wellbeing impacts of attending a cultural camp within a sample of Aboriginal adults in Australia (see pre- and post-camp surveys reported in the Supplementary materials). Importantly, and as expected, we found strong support for the format of camps as engaging (by virtue of offering participation in a wide range of cultural activities), enjoyable, and beneficial. Indeed, respondents indicated strong participation in the full spectrum of cultural activities we surveyed. Our results have provided clarity to the concept of 'cultural health', by evidencing measurable indicators that reflect how previously abstract notions such as connectedness to culture, Country, and mob, and strength in Aboriginal cultural identity, act as protective factors in health and wellbeing. The results presented in this paper are mirrored in qualitative results that reflect the importance of cultural health through the voices of camp attendees.[22] We also acknowledge that capturing data is always imperfect and cannot account for the many other ways in which culture is shared and expressed at camps outside of what was asked about in the survey. Perceptions of the camp were exceptionally positive and there was almost universal interest in attending again, suggesting that this is a very promising format.

Through the process of conducting this study, and in discussion with the Cultural Governance Group who oversee this work, we gained valuable insight into measurement approaches to health and wellbeing among Aboriginal adults living in Australia that reiterate the importance of flexibility noted in other international contexts[19] and the use of measures developed specifically for Aboriginal populations where available. We found that common Western-derived measures used in this study, including the CD-RISC measure of individual resilience,[28] and the EQ-5D-5L measure of health-related quality of life[29] were subject to ceiling and floor effects in this sample, respectively. This means that on average, the Aboriginal men and women in this study reported very high individual resilience and very low health-related quality of life complaints, with little capacity to detect beneficial changes in either measure over time. This suggests that these measures may not be suitable for similar future work that aims to assess health-related changes among non-clinical samples. Other recent work with Aboriginal young people suggests that the CD-RISC is not as strong of a predictor of wellbeing as other socioemotional measures,[38] affirming the need to consider alternative measures in future research.

However, we did find evidence that attending the camps resulted in a small increase in perceived sources of relational-community-cultural strength as a source of resilience, measured using the adapted Aboriginal Resilience and Recovery Questionnaire. This result serves as tentative evidence for the unique relational benefits of the camp format which facilitated intergenerational sharing and connection between people, as well as connection to ancestors and Country. While this result is encouraging, we acknowledge that the broad concept of 'resilience' is itself contested and can be challenging for Aboriginal peoples. Indeed, there was a robust discussion of the concept of 'resilience' among Aboriginal men and women who participated in the yarning circle component of the broader Research Collaborative. This will be the subject of a future paper from this work.

The repeated measures items we designed to assess changes in cultural health pre to post camp were also subject to ceiling effects, with most respondents rating themselves high on cultural health indicators both pre- and post-camp. However, given the central importance of cultural health indicators to this project, and the flexibility that comes with designing our own cultural health measure, we had the foresight to include differently worded post-camp items that would be able to detect meaningful changes because of attending camp even if pre-post items could not. This methodological decision proved to be very valuable in revealing

otherwise undetectable and extremely positive impacts of camp attendance on cultural health. These positive results align well with the many stories we heard from participants about how their connection to culture, Country, and health more broadly was impacted in a positive way by spending time at camp. Some of these stories were shared in men's and women's yarning circles conducted as a part of the broader Research Collaborative.[22] Others were shared directly with the knowledge holders who run the camps or other members of the research team. These rich accounts are critical to refining our approach to quantifying cultural health in a manner true to those we study and will help to inform our future work.

The principal limitation of this study is the smaller than anticipated sample size which prevented us from being able to explore camp impacts separately for men and women while accounting for the potential impact of covariates. Time spent on Country should be healing, and implementing extensive evaluation procedures within the camps may have risked undermining the safety of the camp experiences. Others have noted that Aboriginal communities may be resistant to evaluation which can be seen as a colonial mandate undermining the inherent value of Aboriginal ways of knowing, being and doing.[39] With that in mind, we restricted survey data collection to the weeks before the camp for the pre-camp survey and the end of the final day of camp for the post-camp survey. This approach meant that our data collection did not impede on any of the cultural activities at camp and prioritised the unobstructed experiences of participants over data collection needs. However, this approach also limited our capacity to collect post-camp surveys from all research volunteers, which resulted in the smaller than expected sample size in this study. We speculate that a range of other factors may have further contributed to reduced capacity to collect post-camp survey data, including attendees having to deconstruct the camps and clean the area before departure, and people being anxious to return home with many traveling hundreds of kilometres to/from camps. Another limitation of this study is that the increase in familywise error rate was not controlled across repeated statistical tests. As noted elsewhere, we consider this research to be preliminary and we encourage replication among larger samples. Finally, providing a research incentive always has the potential to bias responses with financial reward, or intimate that the respondents should appease the researchers by continuing to be involved. However, we chose to offer a grocery voucher nonetheless, to compensate participants for the time and labour. We believe that streamlining our evaluation will be important to improving response rates in future research. Removing measures that may not be able to capture meaningful change would be a reasonable first step.

We also had almost twice as many women completing the surveys than men. This gender imbalance is not unique to this study, with previous research showing that men are more difficult to recruit into health interventions and research.[40] Additionally, there were a greater number of female research team members on site at camps which may have contributed to a higher number of post-camp surveys from those who attended the women's camping area.

We also acknowledge the possibility of bias toward positive evaluations of the camp experience and camp benefits given the sample consisted of people already motivated to engage in a cultural camp on Country. That said, this study represents the first in a very promising new line of enquiry—Aboriginal-governed research seeking to understand the immediate and longer-term benefits of cultural camps for Aboriginal cultural health in Australia. In the future, we seek to expand this work among larger, more gender-balanced samples implementing key learnings regarding the potential for methodological improvement uncovered by this study. It would be informative for future work to explore the generalisability of the results across other Aboriginal nations around Australia, and to integrate longer term follow ups to investigate the persistence of benefits over time. Additional work assessing the impact of repeated camp attendance on indicators of cultural health (to show 'dose effect') would also be highly valuable. Nonetheless, we believe that our results offer compelling preliminary evidence for Aboriginal-led strengths-based approaches to supporting cultural health on Country for Aboriginal adults with transparent methodology and findings that can be adapted for other contexts.

Conclusion

The Gaawaadhi Gadudha Research Collaborative seeks to amplify Aboriginal ways of knowing, being and doing by evaluating existing cultural camps on Country that utilise traditional cultural knowledge and healing practices to promote the cultural health of Aboriginal men and women. Our evaluation process, which was developed according to the needs and interests of the knowledge holders who guide this work, revealed promising preliminary evidence for the impact of attending camps on cultural health, while also uncovering opportunities for methodological improvement in future research. The data presented here, in concert with other papers in this special collection,[20–22] highlights the Research Collaborative as a proof-of-concept model for supporting Aboriginal cultural health. Ultimately, we hope this work contributes to accelerated and deepening interest in strengths-based models promoting cultural health both locally and internationally.

Contributors

BB: Conceptualisation; Methodology; Formal analysis; Investigation; Writing—Original draft; Writing—review and editing; Project administration; Funding acquisition.

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

AZ: Methodology; Investigation; Writing—review and editing; Funding acquisition.

JK: Methodology; Writing—Original draft; Writing—review and editing; Funding acquisition.

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

NS: Methodology; Investigation; Project administration; Writing—review and editing.

SMT: Methodology; Writing—Original draft; Writing—review and editing; Funding acquisition.

BJB: Methodology; Writing—reviewing and editing; Funding acquisition.

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

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

BB and AY had access to the raw data. BB had final responsibility for the decision to submit for publication.

Data sharing statement

The study protocol is available elsewhere.[8] The study materials are made available in the Supplementary file. Individual participant data is not made available to external parties.

Declaration of interests

The authors declare no conflicts of interest.

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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.2024.101200.

References

1 Morrissey M, Pe-Pua R, Brown A, Latif A. Culture as a determinant of aboriginal health. In: Anderson I, Baum F, Bentley M, eds. *Beyond bandaids: exploring the underlying social determinants of aboriginal health. Papers from the social determinants of aboriginal health workshop*. Adelaide: Cooperative Research Centre for Aboriginal Health, Darwin; 2007:239–254.
2 Veth P, Ward I, Manne T, et al. Early human occupation of a maritime desert, Barrow Island, North-West Australia. *Quat Sci Rev*. 2017;168:19–29. https://doi.org/10.1016/j.quascirev.2017.05.002.
3 Thorpe A, Yashadhana A, Biles B, Munro-Harrison E, Kingsley J. Indigenous health and connection to country. In: *Oxford Research Encyclopedia of Global Public Health*. 2023. https://doi.org/10.1093/acrefore/9780190632366.013.436.
4 Kingsley J, Munro-Harrison E, Jenkins A, Thorpe A. "Here we are part of a living culture": understanding the cultural determinants of health in Aboriginal gathering places in Victoria, Australia. *Health Place*. 2018;54:210–220.
5 Kingsley J, Munro-Harrison E, Jenkins A, Thorpe A. Developing a framework identifying the outcomes, principles and enablers of "gathering places": perspectives from Aboriginal people in Victoria, Australia. *Soc Sci Med*. 2021;283:114217.
6 Hunter LM, Logan J, Goulet JG, Barton S. Aboriginal healing: regaining balance and culture. *J Transcult Nurs*. 2006;17(1):13–22.
7 Oster RT, Grier A, Lightning R, Mayan MJ, Toth EL. Cultural continuity, traditional Indigenous language, and diabetes in Alberta First Nations: a mixed methods study. *Int J Equity Health*. 2014;13(2014):92.
8 Yashadhana A, Zwi AB, Brady B, et al. Gaawaadhi Gadudha: understanding how cultural camps impact health, wellbeing, and resilience among Aboriginal adults in New South Wales (Australia) – a collaborative study protocol. *BMJ Open*. 2023;13:e073551. https://doi.org/10.1136/bmjopen-2023-073551.
9 The Lowitja Institute. *Cooperative research centre for Aboriginal and Torres Strait Islander health*. Melbourne: Aboriginal and Torres Strait Islander Health Cooperative Research Centre; 2014.
10 Arnold C, Atchison J, McKnight A. Reciprocal relationships with trees: rekindling Indigenous wellbeing and identity through the Yuin ontology of oneness. *Aust Geogr*. 2021;52(2):131–147.
11 Galway LP, Esquega E, Jones-Casey K. "Land is everything, land is us": exploring the connections between climate change, land, and health in Fort William First Nation. *Soc Sci Med*. 2022;294:114700.
12 Fatima Y, Liu Y, Cleary A, et al. Connecting the health of country with the health of people: application of "caring for country" in improving the social and emotional well-being of Indigenous people in Australia and New Zealand. The Lancet Regional Health Western Pacific. *Lancet Reg Health Western Pac*. 2023;31:100648.
13 Kingsley J, Aldous D, Townsend M, Phillips R, Henderson-Wilson C. Investigating health, economic and socio-political factors that need consideration when establishing Victorian Aboriginal land management projects. *Australas J Environ Manag*. 2009;16(2):113–123.
14 Gee G, Hulbert C, Kennedy H, et al. Development of an Aboriginal Resilience and Recovery Questionnaire–a collaboration between practitioners and help-seeking clients of a Victorian Aboriginal community controlled health service. *BMC Med Res Methodol*. 2023;23(1):290.
15 Usher K, Jackson D, Walker R, et al. Indigenous resilience in Australia: a scoping review using a reflective decolonizing collective dialogue. *Front Public Health*. 2021;9:630601.
16 Fleming J, Ledogar RJ. Resilience, an evolving concept: a review of literature relevant to Aboriginal research. *Pimatisiwin*. 2008;6(2):7.
17 Dobia B, Bodkin-Andrews G, Parada RH, et al. *Aboriginal girls circle: enhancing connectedness and promoting resilience for aboriginal girls: final pilot report*. 2013.
18 Yashadhana A, Fields T, Liu E, et al. Therapeutic aspects of Connection to Country and cultural landscapes among Aboriginal peoples from the Stolen Generations living in urban NSW, Australia. *Public Health Res Pract*. 2023;33(4):3342332.
19 Redvers N, Nadeau M, Prince D. Urban land-based healing: a northern intervention strategy. *Int J Indig Health*. 2021;16(2):322–337.
20 Fields T, Foster W, Biles BJ, Yashadhana Y. Redefining the gap in Aboriginal health: from deficit to cultural connection. *Lancet Reg Health Western Pac*. 2024:101176.
21 Biles BJ, Serova N, Stanbrook G, et al. What is Indigenous cultural health and wellbeing? A narrative literature review. *Lancet Reg Health Western Pac*. 2024:101220.
22 Yashadhana A, Biles BJ, Serova N, et al. Gaawaadhi Gadudha: exploring how cultural camps support health and wellbeing among Aboriginal adults in New South Wales Australia, a qualitative study. *Lancet Reg Health Western Pac*. 2024:101208.
23 Chow S-C, Shao J, Wang H. *Sample size calculations in clinical research*. 2nd ed. Boca Raton: Chapman & Hall/CRC; 2008. Section 3.1.1, page 50.
24 Qualtrics. *Version: October 2022 – December 2023. Provo, Utah, USA*; 2005. Available at: https://www.qualtrics.com.
25 Jones R, Thurber KA, Chapman J, et al. Study protocol: our cultures count, the Mayi Kuwayu study, a national longitudinal study of aboriginal and Torres Strait Islander wellbeing. *BMJ Open*. 2018;8:e023861. https://doi.org/10.1136/bmjopen-2018-023861.
26 Snowshoe A, Crooks CV, Tremblay PF, et al. Cultural connectedness and its relation to mental wellness for first nations youth. *J Prim Prev*. 2017;38:67–86. https://doi.org/10.1007/s10935-016-0454-3.
27 Gee GJ. *Resilience and recovery from trauma among Aboriginal help seeking clients in an urban Aboriginal community controlled health organisation (Doctoral dissertation), University of Melbourne, Melbourne School of Psychological Sciences*. 2016.
28 Connor KM, Davidson JR. Development of a new resilience scale: the Connor-Davidson resilience scale (CD-RISC). *Depress Anxiety*. 2003;18(2):76–82.
29 Herdman M, Gudex C, Lloyd A, et al. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). *Qual Life Res*. 2011;20:1727–1736.

30 Ribeiro Santiago PH, Haag D, Macedo DM, et al. Psychometric properties of the EQ-5D-5L for aboriginal Australians: a multi-method study. *Health Qual Life Outcome*. 2021;19:1–16.
31 IBM Corp. Released. *IBM SPSS statistics for Windows, version 26.0*. Armonk, NY: IBM Corp; 2019.
32 Rowley KG, O'Dea K, Anderson I, et al. Lower than expected morbidity and mortality for an Australian aboriginal population: 10-year follow-up in a decentralised community. *Med J Aust*. 2008;188:283–287. https://doi.org/10.5694/j.1326-5377.2008.tb01621.x.
33 Burgess CP, Johnston FH, Bowman DMJS, et al. Healthy country: healthy people? Exploring the health benefits of indigenous natural resource management. *Aust N Z J Public Health*. 2005;29:117–122. https://doi.org/10.1111/j.1467-842x.2005.tb00060.x.
34 Kelly K, Dudgeon P, Gee G, et al. *Living on the edge: social and emotional wellbeing and risk and protective factors for serious psychological distress among Aboriginal and Torres Strait Islander people*. Darwin: Cooperative Research Centre for Aboriginal Health; 2009.
35 Bainbridge R, Tsey K, McCalman J, et al. No one's discussing the elephant in the room: contemplating questions of research impact and benefit in Aboriginal and Torres Strait Islander Australian health research. *BMC Publ Health*. 2015;15(1):696.
36 Ngurra D, Dadd L, Norman-Dadd C, et al. Buran Nalgarra: an Indigenous-led model for walking with good spirit and learning together on Darug Ngurra. *Alternative*. 2021;17(3):357–367.
37 Barnett JD, Schmidt TC, Trainor B, Wexler L. A pilot evaluation of culture camps to increase Alaska native youth wellness. *Health Promot Pract*. 2020;21(3):363–371. https://doi.org/10.1177/1524839918824078.
38 Robinson G, Lee E, Leckning B, Silburn S, Nagel T, Midford R. Validity and reliability of resiliency measures trialled for the evaluation of a preventative Resilience-promoting social-emotional curriculum for remote Aboriginal school students. *PLoS One*. 2022;17(1):e0262406. https://doi.org/10.1371/journal.pone.0262406.
39 Wilson K. Therapeutic landscapes and First Nations peoples: an exploration of culture, health and place. *Health Place*. 2003;9(2):83–93.
40 Ryan J, Lopian L, Le B, et al. It's not raining men: a mixed-methods study investigating methods of improving male recruitment to health behaviour research. *BMC Publ Health*. 2019;19:814.