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Nature-Wellbeing Connection – A Literature Review of Measurements of Connection to Nature Within Indigenous Wellbeing.

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Abstract

Engagement with nature is a core component of wellbeing for Māori the Indigenous peoples of *Aotearoa* (New Zealand) and other Indigenous cultures worldwide. This was recently emphasised in the COVID-19 lockdown experiences of Māori who were observed engaging with nature in novel ways to maintain this connection, from sharing knowledge of nature through online platforms to re-engaging with planting food gardens around their homes.

This narrative literature review explores existing methods for describing, exploring, and measuring mental and emotional wellbeing for children and teenagers through connection with nature, with a specific focus on Indigenous peoples. This is part of a multi-site research program, Tangata Whenua Tangata Ora: Investigating health gain through whenua initiatives, funded by the Health Research Council. It recommends extending an existing health outcome measure framework, 'Hua Oranga' (Durie & Kingi, 1987, 2000; Kingi, 2002), to include a fifth dimension, *Te Taiao* (the environment or nature). Adding Te Taiao to Hua Oranga allows wellbeing to be viewed in a broader context, as a connection between the individual and their environment

Keywords: Nature, connection, Māori, indigenous, land, whenua, wellbeing, measurements.

Introduction

For Māori wellbeing is seen as a balance between all living things. This equilibrium includes active connections between peoples, and between people and *te taiao* (the environment). Illness or disaster in one area is known to affect the other. The interdependence between people and te taiao leads to a shared vulnerability (Harmsworth & Awatere, 2013). This interdependence was evident during the COVID-19 pandemic of 2020 during the associated lockdowns of government mandated stay home orders. Survival strategies involving te taiao also came to the fore for many Māori during this time, including food security

activities and moving inland and/or further away from main populations (Johnsen, 2020). Māori noted that during the lockdowns, due to reduced car and noise pollution, te taiao was rejuvenating, seen in the vibrancy of the natural environment (Waitoki & McLachlan, 2022). Novel pathways for connection with te taiao became more common during lockdown. Māori engaged in online platforms promoting, sharing and demonstrating knowledge associated with food gathering, planting, and harvesting. Other traditional *mātauranga* (knowledge) associated with te taiao, such as the *maramataka* (Māori lunar calendar), were readily shared (Waitoki & McLachlan, 2022).

Leading Māori educator and health expert Professor Tā Mason Durie's (1985) model of Māori health, *Te Whare Tapa Whā* (four-sided house) identified four dimensions which are important for Māori health*, Taha Wairua* (spiritual wellbeing); *Taha Hinengaro* (mental and emotional wellbeing); *Taha Tinana* (physical wellbeing) and; *Taha Whānau* (family and social wellbeing). This model presents the four walls of a *whare tupuna* (ancestral house), where all four sides need to be strong for wellbeing, reflecting the importance of balance and reciprocity. Other researchers have extended Te Whare Tapa Whā for use in mental and general health spaces. Glover (2005) looking at smoking added *Te Ao Tūroa*, a dimension addressing "the contextual, political, and environmental influences affecting health" (p. 14). Te Ao Tūroa is seen as the *whenua* or earth that the whare tupuna sits upon. Pitama et al. (2007) also incorporated Te Taiao along with *Iwi Katoa* (societal impacts), in their Meihana model for clinical assessment of mental health. Their expanded model was later titled Ratonga Hauora (Pitama et al., 2014). The additions of Te Ao Tūroa and Ratonga Hauroa enabled a deeper understanding of areas where people or groups are strongest that enhances wellbeing.

The importance of interdependence with nature is exemplified in Indigenous models of wellbeing. Hatala et al. (2020) described Indigenous wellbeing as incorporating a balance between four areas of life: physical, emotional, mental, and spiritual:

> Research with diverse Indigenous Peoples attests that relationships with nature and land support all four elements of life, and this in turn can: enhance overall health, resilience, and well-being; improve self-esteem and self-efficacy, increase consumption of traditional foods; foster intergenerational relationships; reduce psychological distress; and strengthen cultural identity and belonging. (p. 3)

Indigenous peoples have noted that access, and in turn connection to the land is an imperative determinant of health for Indigenous peoples (Lines & Jardine, 2019). Access to and a relationship with the land must be an area of focus for those interested in Indigenous wellbeing. For Māori, te taiao is seen as a holder and teacher of mātauranga Māori, and many of the values we as Māori use to maintain wellbeing are inherent in the values we learn from te taiao. To this point, Harmsworth and Awatere (2013) reviewed Māori environmental concepts and identified connections to te taiao through *whakapapa* (connection, lineage or genealogy), *kaitiakitanga* (stewardship or guardianship), *mana* (prestige or authority), *ki uta ki tai* (whole of landscape approach), *taonga tuku iho* (intergenerational knowledge), *te ao tūroa* (intergenerational sustainability), *mauri* (lifeforce), *ritenga* (customs and protocols related to balance), and *wairua* (spirituality). It is evident that access to te taiao is important to understand values and practices that are relevant to the wellbeing of this symbiotic relationship between people and te taiao.

An additional area of concern for Indigenous people is colonisation, which led to many Indigenous peoples being forcibly removed from their traditional lands, and in turn resulted in them being removed from their way of life. *Whenua tūpuna* (ancestral lands) are lands that provided instruction for living, a place to lay ancestors and where landmarks such as *awa* (rivers) and *maunga* (mountains) are living ancestors and guardians. Removing or preventing access to whenua tūpuna creates an additional layer of grief and constant reminder of loss. "Māori cultural identity has been traditionally linked to the connection to whenua, links to whakapapa through common *tūpuna* (ancestors), and the connection to *iwi* (tribal nation), *hapū* (clan) and *whānau* (family)" (O'Regan, 2000, as cited in Sheehan, 2017, p. 209). Te taiao is in essence a *puna* (spring), holding knowledge,

stories, and principles, from the names of maunga, awa, and other key landmarks on a journey (McRae, 2017), to the names of *manu* (birds), *rākau* (trees) and *ngāngara* (insects). Te taiao is an "encyclopaedia of mnemonic devices" (Smith, 2000) weaving a connection between the natural world and cosmological stories, with immense whakapapa and meaning shared within them. The reduced access and exposure to our ancestral lands has also had an impact on knowledge.

In Aotearoa the Tohunga Suppression Act 1907, reduced access to *traditional tohunga* (experts) and an unfathomable depth of knowledge and connection with te taiao was lost over time. A compounding factor including loss of language and land as a part of the continuing impacts of colonisation (Smith, 2000). Desjarlais (2020) introduced the term Indigenous Spiritual Microaggressions (ISM) to describe the impact of a number of forms of racism that profoundly affect the wellbeing of Indigenous people, such as seeing statues that honour colonisers, and being denied access to Indigenous lands to hunt, gather, or engage in healing rituals.

Alongside a well-established acknowledgement within Indigenous populations of the connection between people's health and the environment, there has been growing interest internationally in the relationship between nature, and the wellbeing of children and adolescents. This has informed the design of green spaces in urban and semi-urban centres in response to a reduction in outside play, increasing the wellbeing of individuals, and a growing desire to increase eco-sustainability through actions such as recycling (Chawla, 2007, 2020; Ives et al., 2018). Evidence suggests that young people's mental health is negatively impacted by a reduced connection to nature in childhood, where the more time spent inside watching television, playing digital games and following social media, resulted in less time outside connecting with nature (Larson et al., 2019; Michaelson et al., 2020).

Connection to nature has been reported to be the highest among 7 to 12-year-olds, declining during the teenage years, and then increasing again during adulthood (Hughes et al., 2019; Richardson et al., 2019). Middle childhood (6 to 11-years-old) is a time of exploring our neighbourhoods and local nature areas, such as parks, reserves, and beaches, where children seek the physical challenge of exploring, creating, or adventuring alone or with friends (Chawla, 2020). As such, middle childhood is a time for developing the foundations of wellbeing through connecting with nature. The term 'extinction experience' has been used to describe the impact of rapid urbanisation and concerns that there are reduced opportunities to experience nature and feel connected to the larger sphere of the living world (Chawla, 2020; Pyle & Lefevre, 2016). As such, a person's wellbeing is deeply connected to nature, however due to decreased access to green spaces and increased use of electronic devices and activities, young people's wellbeing as it connects with nature is likely to be impacted.

This paper seeks to clarify methods for describing, exploring, and measuring mental and emotional wellbeing and connection with nature for children and teenagers, with a specific focus on Indigenous peoples. This includes acknowledgement of the role of aspects of te taiao as ancestors in their own right, being anchors between Indigenous peoples and *atua* (gods). This is relevant in issues of access to whenua tūpuna, and food sovereignty. This project is part of the Tangata Whenua Tangata Ora research programme. This programme consists of four research projects undertaken across Māori community sites to co-create knowledge and investigate multiple ways whenua-based health initiatives provide pathways to wellbeing and Māori health gains. The Ngā Wairiki Ngāti Apa research project, 'Hei Arahi Mō Ngā Tapuwae: Exploring whenua-based knowledge and approaches to rangatahi ora' seeks to develop hapū and iwi indicators of rangatahi ora (youth wellbeing). This article is one of the first steps in understanding how rangatahi from Ngā Wairiki Ngāti Apa experience and benefit from engagement with whenua tūpuna.

Methodology

A literature review was conducted to assess the existing published knowledge related to wellbeing and nature for rangatahi Māori. Academic databases (Ovid and ProQuest) were searched. Various key search terms were used independently (e.g. 'Māori'), and in connection with each other e.g. 'Māori' AND 'green spaces'.

Our search terms included New Zealand, Aotearoa, Māori, Indigenous, wellbeing, health, whenua, taiao, environment, nature, green spaces, children, adolescents, rangatahi, and *tamariki* (children).

Ancestry searching (accessing referenced articles from key literature) and hand searching of relevant journals were also used to identify outlying relevant information that was either not available on electronic databases or would have been missed by the chosen search terms. Inclusion conditions for publications in this review included the availability of full-text publications in English or te reo Māori, with a focus on human wellbeing, engagement in nature, and rangatahi. Data was evaluated and further reduced according to authenticity, methodological quality, informational value, and relevance to the focus of the study (Whittemore & Knafl, 2005).

Results

Measuring Mental Wellbeing in Relation to Nature

Five structured literature reviews completed between 2017 and 2020 have documented the positive outcomes of strong connections between the environment and wellbeing for children and adolescents. These include Chawla (2020); McCormick (2017); Vanaken and Danckaerts, 2018; Tillmann et al., (2018); Shin et al., (2021) and Zhang et al., (2020). Due to the nature of structured literature reviews, some overlap of studies is apparent. The most recent review by Zhang et al., (2020) included 14 separate studies measuring the association between green space exposure and adolescents' wellbeing. They found beneficial associations between green space exposure and reduced stress, positive mood, fewer depressive symptoms, better emotional wellbeing, improved mental health and behaviour, and decreased psychological distress. Zhang et al., (2020) suggested there is a strong and consistent relationship between nature and improvements in mood and stress. Shin et al., (2021) also noted a stronger positive impact of exposure to nature for those who are part of vulnerable populations, including children with Autism Spectrum Disorder, those from low-income households, and those who experienced high stress.

Several of the reviews identified that some 'confounding variables' that affect the relationship between nature and wellbeing in the studies were related to access and equity (Vanaken & Danckaerts, 2018; Zhang et al., 2021). Socio-economic disadvantage was noted to be a barrier for adolescents, where those with disadvantages had less access and therefore limited engagement with green spaces (Zhang et al., 2021). Other confounding variables included the availability of activities relating to nature in the community, and the quality of air (Vanaken & Danckaerts, 2018).

Despite a strong relationship noted in the international literature between nature and mental and emotional wellbeing in children and adolescents, there is wide variability in how researchers define and measure wellbeing. Outside of the context of Aotearoa New Zealand, the applicability of these studies' findings and methodologies for rangatahi Māori (the target group for the outcome of the current study) is called into question. As an example, Shin et al., (2021) noted that of 23 studies they reviewed, there were 15 different measures of mood. A review of mental health outcome measures in environmental design research by Shin et al., (2021) classified common measures as incorporating six aspects of mental health outcomes. These are presented in Table 1.

Table 1 Mental health factors measured within environmental research. Adapted from Shin et al., (2021)

Mental Wellbeing Factor	**Description**
Affect	A momentary experience in response to something or an activity. Often related to a hedonic experience, such as pleasure or displeasure
Mood	A stable experience across time, such as being happy or sad. However, there are definitions of mood disorders that also reflect a psychiatric disorder
Vitality	Sense of alertness, being alive, an energy
Executive functioning	Cognitive tasks including working memory, inhibition, and task switching. All important for learning, self-management and planning and decision making
Mental stress (as measured by physiological signals)	These include a vast array of tests to measure the bodies response to stress, include heart rate (HR), heart rate variability (HRV), blood pressure (BP; systolic & diastolic), and salivary cortisol
General mental well-being	1) hedonic well-being (life satisfaction that focuses on present moment); (2) eudaimonic wellbeing (life satisfaction derived from living a meaningful life); and (3) general well-being for special populations (based on behavioural observations)

15 of the 23 studies reviewed by Vanaken and Danckaerts (2018) utilised the Strength and Difficulties Questionnaire (SDQ) by Goodman et al., (1998), a commonly used mental health measure in New Zealand child and adolescent mental health services (Black et al., 2010). Despite the SDQ including different reporting approaches, self-report, parent report, and teacher report, most studies used self-report questionnaires. As well as a total difficulties score, the SDQ also includes five scales addressing prosocial behaviour, hyperactivity, emotional symptoms, conduct, and peer problems. Vanaken and Danckaerts (2018) identified an association between green space exposure and the total difficulties score of the SDQ, particularly for young people with hyperactivity and inattention problems. Studies in their review showed that a shorter distance to the nearest green space and access to a private garden were strongly associated with positive SDQ outcomes, such as increased prosocial behaviour.

A study of 108 rangatahi aged 11 to 14 in Auckland, New Zealand monitored the green space access and level of activity of the rangatahi using accelerometers and portable global positioning system (GPS) receivers and analysed the results against a range of psychological measures (Ward et al., 2016). The authors of that study found increased availability of green space was associated with an increased likelihood of young people engaging in moderate to vigorous physical activity. An even stronger relationship was found between access to green space and increased emotional wellbeing (life satisfaction and happiness). While there is likely to be some improvement in emotional wellbeing through physical activity alone, this relationship highlights that emotional wellbeing is not solely related to physical activity and accessing green spaces is a major contributor to rangatahi wellbeing. These results were found despite little time spent in nature (just over 1% of monitored time). This may reflect a dose response effect, where increased access to, or time spent in nature may contribute to increased wellbeing.

In a large study conducted in 91 secondary schools across New Zealand as part of the Youth2002 survey series (Clark et al., 2013), 8,500 students (12 to 18 years old) completed a 608-

item health and wellbeing questionnaire (van Lier et al., 2017). Clark et al., (2013) found gardening was positively associated with physical activity, better social relationships, increased emotional wellbeing, and overall healthier eating habits among students. More students living in rural areas reported having a garden as compared to those living in urban areas (80% compared to 65% respectively), with at least two thirds of students reporting having a vegetable garden at home. Vegetable gardens were more likely to be on properties where the students identified themselves as being of European ethnicity, and they were less likely to be experiencing poverty than those without vegetable gardens at home. Engagement in gardening was more likely for Pasifika students, those from a rural background, and students aged 13-years-old or younger.

Models of Māori Health

Research into the relationship between engagement in nature and mental health, both internationally (Tillmann et al., 2018; Zhang et al., 2020) and in Aotearoa (Vanaken & Danckaerts, 2018), have used diverse ways to measure mental and emotional health (focused on diagnosable disorders), and also connection to nature (type of activity). These measures and approaches (such as the SDQ) are embedded in Western epistemologies, and do not integrate mātauranga Māori or a Māori worldview. The most common Māori mental health measure in New Zealand is Hua Oranga (Durie & Kingi, 1997, 2000; Kingi, 2002). This measure has been used in mental health (Bennett, 2009; McClintock et al., 2013), physical health (Boland et al., 2020), in the justice system (Chalmers & Williams, 2018; Malatest International 2019), and with stroke patients (Harwood et al., 2012). Hua Oranga is based on Mason Durie's (1985) model of wellbeing Te Whare Tapa Whā. Within Hua Oranga, four factors important for wellbeing are identified within each of the four dimensions of Te Whare Tapa Whā (see Table 2). Te Whare Tapa Whā reconceptualised as Hua Oranga reflects the Māori perspective of wellbeing as being beyond disease or disorder, incorporating physical and non-physical elements important for mental health and wellbeing. Issues of identity, spirituality, relationships, and physical capability are foundational for mental health, and should be considered holistically, as opposed to included as an afterthought.

Table 2 Revised Hua Oranga Factors (McLachlan, 2022).

Te Whare Tapa Whā dimensions	**Taha Wairua (spiritual wellbeing)**	**Taha Hinengaro (mental and emotional wellbeing)**	**Taha Tinana (physical wellbeing)**	**Taha Whānau (family and social wellbeing)**
Hua Oranga dimensions	Whakarangatira (dignity and respect)	Whakahihiko (motivation)	Herekore (mobility and pain)	Whakawhitiwhiti whakaaro (communication)
	Tuakiri (cultural identity)	Whai whakaaro, whai whanonga (cognition and behaviour)	Whakapiki oranga (opportunity for enhanced health)	Whanaungatanga (relationships)
	Tino rangatiratanga (personal contentment)	Aro ki ngā kare-āroto (management of thoughts and feelings)	Te whanaungatanga o te hinengaro ki te tinana (mind and body links)	Tauawhiawhi (mutuality)
	Mauri ora (spirituality)	Kia mōhio, kia mārama (knowledge and understanding)	Hauora tinana (physical health status)	Tūhono-ā-hapori (social participation)

Hua Oranga, as outlined in the revised manual (McLachlan, 2022), can be used as an outcome measurement tool or as a way of planning areas for focus of wellbeing interventions. As a planning tool for wellbeing interventions, at least three people work together including the primary person of focus (16-years-old or above), a whānau member who knows the primary person (not necessarily a blood relative), and a practitioner who works with the primary person to enhance their wellbeing. This approach provides a three-way perspective of each Hua Oranga factor being measured. Scoring and analysis guidelines are outlined in McLachlan (2022). Hua Oranga was revised to include changes to phrasing and scoring and earlier recommendations to simplify scoring to a 0-4 rating system were applied (Harwood et al., 2012).

A literature review covering publications from the last 10 years focused on the 16 different factors of Hua Oranga (McLachlan, 2022). The labels and descriptors for each factor were examined, and several changes to the wording of items and descriptions for the 16 factors were made. Several items within Hua Oranga were also changed to reflect the broader cultural and clinical understanding of the different factors. These changes were sent out for review to a range of kaupapa Māori health and mental health services who use Hua Oranga, as well as Te Kete Pounamu, a group of advisors who work alongside the national rōpū to amplify the voices of Māori with lived experience of mental distress and/or addiction. These changes were also reviewed with the original co-creator of Hua Oranga, Dr. Te Kani Kingi. The revision of Hua Oranga has provided further support for its usefulness and has also enabled much needed changes that may make its use more likely and helpful for those seeking to measure wellbeing in a more comprehensive and culturally valid way.

Despite the popularity of Te Whare Tapa Whā, and the wide usage of Hua Oranga, there is very little evidence of the use of Hua Oranga below the age of 16 years, particularly in a study of the relationship between nature and mental health. Hua Oranga also has not embraced te taiao as a dimension, despite this being considered in the ongoing development of Te Whare Tapa Whā in research and practice.

Measuring the relationship with nature

Nature for the purpose of this work consists of areas of green spaces, which have been defined in studies as "urban vegetated spaces such as parks, grasslands, cemeteries, sports and playing fields and near-road trees" (Vanaken & Danckaerts, 2018, p. 1). Adding to the concept of green spaces, studies have also looked at engagement such as home gardening (Clark et al., 2013; van Lier et al., 2017) and forest or wilderness (Bowen et al., 2016; Elliot et al., 2014). The design and focus of measures exploring the connection to nature are an important starting point in understanding the connection between nature and wellbeing, and the validity of these measures must also be considered. Findings from international studies have shown nature connectedness measures that work in one country can be ineffective in another. One study noted by Chawla (2020) marked almost half of the items on a connectedness scale as not applicable. Engaging in nature may be difficult or unsafe in a highly urban area and a sense of responsibility towards caring for nature would depend on the availability of opportunities to interact with it. Often young children's experiences are gathered through observation by adults, including parents and teachers. By middle and late childhood, the introduction of simple quantitative measures and qualitative approaches such as art and interviews may be useful. Chawla (2020) reported that abstract experiences such as oneness with nature are often beyond the self-awareness and self-expression abilities of children. However, these are often accessed through retrospective interviews with adults. Measures that are not validated for the local context, or are based on abstract experiences and retrospective accounts, all introduce variability into the data from which we build our understanding and knowledge.

There are many complexities for young people's engagement with nature, and in order to successfully measure the nature-wellbeing connection, it is worth exploring these complexities. As discussed earlier, not all children and adolescents have equal access to nature, and what nature is available may be less hospitable, or environments may be degraded by development or pollution.

Chawla (2020) found increased time in nature resulted in higher reported levels of connection to nature. Nature for Indigenous peoples is also a finely tuned balance between livelihood, sustenance, and wellbeing. Hatala et al., (2020) noted that Indigenous youth in Canada's north accessed nature not only to hunt and access edible plants, but also as a place for spiritual connection, healing, and personal growth.

Alongside grief due to reduced access to whenua tupuna through the process of colonisation, environmental change through global warming, economic development, and environmental disasters have continued to disrupt Indigenous communities' traditional way of life (MacDonald et al., 2015). Studies have also shown that children and adolescents have expressed concerns, anger and sadness over natural areas being damaged or destroyed, and over issues of climate change (Barros & Pinheiro, 2020; Tseng & Wang, 2019). The term 'ecological grief' has been proposed to capture this emerging experience (Cunsolo & Ellis, 2018). Ojala (2016) noted that the issues of grief and concern are often intensified for children and adolescents, as individual (rather than collective) action towards environmental change or conservation can lead to feelings of futility and reduced wellbeing. Ojala (2016) found adolescents within Inuit communities who experienced worry or concern over environmental change found solace in engaging with nature, culture and community, including seeking support from friends and family. In contrast, the same study found that those within European populations tended to use distraction and denial. This feeling of ecological grief represents and reinforces several of the dimensions discussed earlier such as 'felt connection with nature', 'vulnerability of people and nature', and 'empathy' (Chawla, 2020).

The collective dimension of connection to nature has been noted to be missing from most scales (Chawla, 2020). This is surprising, as despite research showing that children are spending increasingly less time in nature, when they are in nature it is usually in the company of others, such as family or peers (Tam, 2013). During childhood, whānau and friends enable children to connect with nature. As Chawla (2020) explained, "people around them indicate what to notice in the environment, how to value it, how to use it and how to respond to places and things" (pp. 623-624). Children require a sense of safety in order to develop a positive sense of identity and connection with nature. This sense of safety is argued to enhance their ability to venture out and explore natural areas with others and alone. Families, peers and mentors enable independent exploration by ensuring safety and encouraging "appropriate risk taking, appreciating the child's accomplishments and discoveries and promoting care for the environment" (Chawla, 2020, p. 626). It is clear that measuring the connectedness to nature considers how whānau and friends enable safe exploration when connecting with nature. Quantitative measures also neglect to consider mastery of the physical challenges encountered while engaging with nature. Some examples include mastering the challenges of uneven terrain, emotions associated with physical risk and achievement, the social context of safety, cooperation and respect for each other and the natural world (Chawla, 2020). As such, when considering the measures of nature-wellbeing connectedness, physical challenges can provide useful insights.

A photovoice study including 15 Yellowknives Dene First Nation (YKDFN) young people aged 13-18 years old in the Canadian Northwest Territories identified a range of ecological concerns, such as littering, pollution, arsenic contamination, and unsafe areas such as unfinished construction sites or infrastructure (Lines & Jardine, 2019). They also showed the benefits and healing nature of the land, identifying a range of important themes including surviving off the land, learning and passing on traditional knowledge, practicing cultural skills, understanding YKDFN history, gathering and preparing food, being out on the land, and working together. Hatala et al. (2020) conducted a related study in Canada, also using photovoice and interviews, but within an urban setting. They interviewed 28 young people between the ages of 16 and 25 years who are Plains Cree (n = 21) and Métis (n = 7). The results of this study showed that young people found nature calming, that it provided a sense of hope, and that it was a spiritual guide, providing metaphors for life.

> Herein, just like an Elder that guides and gives youth spiritual teachings and lessons in life, relationships with nature, represented by the seasons, is also acting as a teacher for these young people. The teachings learned through person-context contact with and meaning-making observations of nature within an urban landscape are seen as important for these young people—as they can guide and support youth that face and cope with the daily struggles of inner-city life" (Hatala et al., 2020, p. 8).

The above quote from a Canadian youth reinforces the role of nature as a guide, a teacher, and an important experiential aspect of life, not something merely to be studied in books or visited. Nature is to be lived, it is a place where risks are taken, where mentoring occurs, and where the land itself gives lessons. From the publications that have considered the voice of young people, it is evident that nature is critical in their lives and their wellbeing.

A number of quantitative measures addressing the different dimensions of nature connection described above have been presented and discussed in an accessible online manual by Salazar et al. (2020). These include but are not limited to: Nature connectedness inventory (Ernst & Theimer, 2011); Inclusion of Nature in Self (Schultz, 2002); Children's Environmental Attitude and Knowledge Scale (Leeming et al., 1995); and the Revised Environmental Identity (EID) Scale (Clayton, 2003). Another recent systematic review on the connection between children and nature further described nature connection dimensions (Chawla, 2020). These are summarised in Table 3. However, several factors important to Indigenous people were not commonly incorporated in quantitative analysis of nature connection described or reviewed by either Salazar et al. (2020) or Chawla (2020). These include: 'access to nature', 'social connection to nature' and 'competence in nature'. These three factors are vital for Indigenous peoples' wellbeing and understanding their connectedness to nature.

Table 3 Nature connection factors measured within environmental research

The experience of engaging with nature.	Capturing the emotional experience. This included enjoyment of nature; a desire to interact with and/or access nature; comfort, solace or feeling calm and relaxed in nature; absorption in nature
The relationship with nature	Including empathy for animals and plants, a sense of oneness or kinship; affinity; and viewing oneself as a member of the broader natural world; and that one's welfare is related to welfare of the natural world
Responsibility toward nature	Including a sense of responsibility, environmentally responsible behaviour,
Awareness of nature	Knowledge about nature, curiosity and eco-awareness
Access to nature	Distance from, quantity and quality of green space
Social connection to nature	Social engagement with and around nature, including mentoring, support and positive social attitudes towards nature.
Competence in nature	An individual's ability to utilise and benefit from nature

Note. Adapted from "Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss" by L. Chawla, 2020, People and Nature, 2(3), 619-642.

Discussion

This literature review has clarified methods and frameworks for describing, exploring, and measuring mental and emotional wellbeing and its connection with nature for children and teenagers, with a specific focus on Indigenous peoples. The mechanisms by which connection

to nature is described and measured provide some beneficial pathways to better understand the different relationships to te taiao experienced by rangatahi Māori, including factors such as a sense of responsibility towards nature, and a sense of calm and connection with nature. The reasons for this relationship may be different for rangatahi Māori who see te taiao as a tūpuna, atua, and as a source of identity, connection and sustenance, as opposed to solely a playground for exploration or relaxation. Other less prevalent factors in Western literature include social connection to nature and competence in nature which align more closely to the Indigenous perspectives of nature discussed in this article.

From Zhang et al., (2020), Tillmann et al., (2018) and Vanaken and Danckaerts (2018), it is evident that Western studies exploring mental and emotional wellbeing tend to focus on diagnosable disorders, such as depression and attention deficit hyperactivity disorder (ADHD) or symptoms of these, as opposed to more holistic issues of mental and emotional wellbeing. This does not align with Indigenous concepts of health, which acknowledge an interdependent relationship between physical, spiritual, environmental, familial, and mental and emotional wellbeing. Measures such as Hua Oranga provide a concept of wellbeing in relation to whānau, physical, mental, and emotional, along with identity and spirituality. However, to date Hua Oranga has not kept up with developments within the evolution of Te Whare Tapa Whā (Durie, 1985) model of wellbeing, particularly as it relates to the role and benefits of te taiao.

Based on the inadequacies of Western measures of mental and emotion wellbeing for use with Indigenous and potentially all other peoples it is recommended that a fifth dimension Te Taiao be added to Hua Oranga. In line with the format of Hua Oranga of four questions per dimension, four factors are described in Table 4. This includes reference to the connection to nature dimensions identified within the literature review.

Table 4 Taiao Dimension Factors Proposed for Addition to Hua Oranga

Factor	Dimension	Description
Mauri Tau: Sense of connection and belonging to and with whenua tūpuna	The relationship with nature; knowledge and awareness; the experience of engaging with nature	The special relationship with tūpuna; whenua tūpuna; the role of taiao as teacher; and a sense of calm and connection with nature
Pūkenga Taiao: Skills and abilities to access and utilise the taiao	Competence in nature	A sense of ability to take risks in nature, explore and develop skills to utilise the taiao, such as trekking, waka, swimming, gathering or growing kai, arts, hunting and fishing; and sharing the harvest and benefits of nature with whānau.
Kaiārahi Whānau: Whānau guidance and participation	Social connection to nature	Encouragement, support and teaching from peers, whānau and others; and the intergenerational transmission of knowledge (whānau sharing skills and knowledge with us)
Tiaki i te Whenua: Active engagement in caring for and protecting the taiao	Responsibility toward nature; access to nature	Acknowledging te taiao as tūpuna whenua and actively seeking to maintain and/or protect the environment.

The factors recommended above align with areas important to Indigenous cultures, including; *Kaiārahai Whānau*, recognition of collective approaches to the environment; *Mauri Tau*, addressing the importance of connection to ancestral lands as opposed to solely nature of

greens spaces; *Pūkenga Taiao* the importance of Indigenous people engaging with nature as a source of sustenance through hunting, gathering and other pursuits and *Tiaki i te Whenua*, the guardianship and care of the environment.. Adding the dimension of Te Taiao to Hua Oranga allows wellbeing to be viewed in a broader context, that is a connection between the individual and their environment. The revised Hua Oranga will allow for a deeper measurement of wellbeing, and to explore the relationship between areas of wellbeing. As an example, will rangatahi engaged with the environment through an outdoors-focused programme experience improvements in Taha Wairua (spiritual factor) and Taha Whānau (family wellbeing factor)? We suggest that enhancement and strengthening of one's wairua and whānau would foster compassion for te taiao and would deepen one's connection to nature.

The format of Hua Oranga, which includes four questions per dimension poses some limitations. Many rangatahi Māori are disenfranchised from ancestral lands, therefore questions regarding a sense of connection to te taiao may be worded in a way that considers connection to nature or greenspaces in general, rather than whenua tūpuna. Also, questions that consider access to both nature/greenspaces and whenua tūpuna would assist in understanding issues of equity and the impacts of colonisation in relation to access within te taiao.

The next part of the Ngā Wairiki Ngāti Apa research project, 'Hei Ārahi Mō Ngā Tapuwae: Exploring whenua-based knowledge and approaches to rangatahi ora' explores the reflections of our iwi taiao knowledge holders (Smith, 2010). They hold knowledge about te taiao, our traditional pursuits towards wellbeing, and oral traditions such as *waiata* (songs), *oriori* (songs of dedication) and *pūrākau* (traditional stories) that reference the role of te taiao in wellbeing. This knowledge will be analysed in connection to the recommendations of the present study (the addition of Te Taiao to Hua Oranga) and following a process of adaptation we will look at administering Hua Oranga with our rangatahi and their whānau (including community members involved in the development of those rangatahi) to better understand rangatahi ora, and to better inform iwi approaches to rangatahi ora.

References

Barros, H., & Pinheiro, J. (2020). Climate change perception by adolescents. *Psychology, 11*(2), 260–283.

Bennett, S. T. M. (2009). *Te Huanga o te ao Māori: Cognitive behavioural therapy for Māori clients with depression – development and evaluation of a culturally adapted treatment programme* (Doctoral thesis, Massey University). Massey Research Online. http://hdl.handle.net/10179/1159

Black, S., Pulford, J., Christie, G., & Wheeler, A. (2010). Differences in New Zealand secondary school students' reported Strengths and Difficulties. *New Zealand Journal of Psychology, 39*(3), 19-23.

Boland, P., Jones, B., Stanley, J., Perry, M., Graham, F., & Levack, W. (2020). Using a Māori model of health to analyse the use of adaptive equipment by New Zealand Māori post-stroke. *New Zealand Journal of Occupational Therapy, 67*(2), 19-26.

Bowen, D. J., Neill, J. T., & Crisp, S. (2016). Wilderness adventure therapy effects on the mental health of youth participants. *Evaluation and Program Planning, 58*, 49– 59. https://doi.org/10.1016/j.evalprogplan.2016.05.005

Chalmers, T., & Williams, M. W. M. (2018). Self-report versus informant-report in the measurement of Māori offenders' wellbeing. *Mai Journal*, *7*(2), 111-125.

Chawla, L. (2007). Childhood experiences associated with care for the natural world. *Children, Youth and Environments, 17(*4), 144–170.

Chawla, L. (2020). Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss. *People and Nature, 2*(3), 619-642. http://dx.doi.org/10.1002/pan3.10128

Clark, T., Fleming, T., Bullen, P., Crengle, S., Denny, S., Dyson, B., . . . & Utter, J. (2013). *Youth'12 prevalence tables: The health and wellbeing of New Zealand secondary school students in 2012*. The

University of Auckland. Faculty of Medical and Health Sciences.

Clayton, S. (2003). The revised Environmental Identity (EID) scale. In S. Clayton & S. Opotow, S. (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 45-65). MIT Press.

Cunsolo, A., & Ellis, N. R. (2018). Ecological grief as a mental health response to climate change-related loss. *Nature Climate Change, 8*, 275–281. https://www.nature.com/articles/s41558-018-0092-2

Desjarlais, C. D. (2020). *An exploration of Indigenous spiritual microaggressions* (Doctoral dissertation, The University of North Dakota). https://commons.und.edu/theses/3264

Durie, M (1985). A Māori perspective of health. *Social Science & Medicine, 20*(5), 483-486.

Durie, M., & Kingi, T. K. (1997). A framework for measuring Māori mental health outcomes: *A report prepared for the Ministry of Health by Massey University, Department of Māori Studies Te Pūmana Hauora.* Massey University

Durie, M. H., & Kingi, T. K. R. (2000). *Hua Oranga - a Māori measure of mental health outcomes: A report prepared for the Ministry of Health by Department of Māori Studies.* Massey University.

Elliot, E., Ten Eycke, K., Chan, S., & Müller, U. (2014). Taking kindergartners outdoors: Documenting their explorations and assessing the impact on their ecological awareness. *Children, Youth and Environments, 24*(2), 102–122. https://doi.org/10.7721/chilyoutenvi.24.2.0102

Ernst, J., & Theimer, S. (2011). Evaluating the effects of environmental education programming on connectedness to nature. *Environmental Education Research, 17*(5), 577-598.

Glover, M. (2005). Analysing smoking using Te Whare Tapa Whā. *New Zealand Journal of Psychology, 34*(1), 13–19.

Goodman, R., Meltzer, H., & Bailey, V. (1998). The Strengths and Difficulties Questionnaire: A pilot study on the validity of the self-report version. *European Child and Adolescent Psychiatry, 7*(3), 125-130.

Harmsworth, G., & Awatere, S (2013). Indigenous Māori knowledge and perspectives of ecosystems. In J. R. Dymond (Ed.), *Ecosystem services in New Zealand – conditions and trends* (pp.274-286). Manaaki Whenua Press.

Harwood, M., Weatherall, M., Talemaitoga, A., Barber, P. A., Gommans, J., Taylor, W., McPherson, K., & McNaughton, H. (2012). An assessment of the Hua Oranga outcome instrument and comparison to other outcome measures in an intervention study with Māori and Pacific people following stroke. *The New Zealand Medical Journal, 125*(1364), 57–67. https://pubmed.ncbi.nlm.nih.gov/23242398/

Hatala, A.R., Njeze, C., Morton, D., Pearl, T., & Bird-Naytowhow, K. (2020). Land and nature as sources of health and resilience among Indigenous youth in an urban Canadian context: A photovoice exploration. *BMC Public Health, 20*, 1-14. https://doi.org/10.1186/s12889-020-08647-z

Hughes, J., Rogerson, M., Barton, J., & Bragg, R. (2019). Age and connection to nature: When is engagement critical? *Frontiers in Ecology and the Environment, 17*(5), 265–269. https://doi.org/10.1002/fee.2035

Ives, C. D., Abson, D. J., von Wehrden, H., Dorninger, C., Klaniecki, K., & Fischer, J. (2018). Reconnecting with nature for sustainability. *Sustainability Science, 13*, 1389–1397. https://doi.org/10.1007/s11625-018-0542-9

Johnsen, M. (2020, April 22). Lockdown a chance to live off the land, whānau say. RNZ. https://www.rnz.co.nz/news/te-manu-korihi/414842/lockdown-a-chance-to-live-off-the-land-whanau-say

Kingi, T. K. R. (2002). *Hua Oranga: Best outcomes for Māori* (Doctoral thesis, Massey University). Massey Research Online. https://mro.massey.ac.nz/handle/10179/2079

Larson, L. R., Szczytko, R., Bowers, E. P., Stephens, L. E., Stevenson, K. T., & Floyd, M. F. (2019). Outdoor time, screen time, and connection to nature: Troubling trends among rural youth? *Environment and Behavior, 51*(8), 966–991. https://doi.org/10.1177/0013916518806686

Leeming, F. C., Dwyer, W. O., & Bracken, B. A. (1995). Children's environmental attitude and knowledge scale: Construction and validation. *The Journal of Environmental Education, 26*(3), 22-31.

Lines, L. A., & Jardine, C. G. (2019). Connection to the land as a youth-identified social determinant of Indigenous Peoples' health. *BMC Public Health, 19*(1), 1-13. https://doi.org/10.1186/s12889-018-6383-8

MacDonald, J. P., Willox, A. C., Ford, J. D., Shiwak, I., Wood, M., IMHACC Team, & Rigolet Inuit Community Government. (2015). Protective factors for mental health and well-being in a changing climate: Perspectives from Inuit youth in Nunatsiavut, Labrador. Social Science and Medicine, 141, 133- 141. https://doi.org/10.1016/j.socscimed.2015.07.017

Malatest International. (2019). *Court Support pilot evaluation*. https://www.msd.govt.nz/documents/about-msd-and-our-work/work-programmes/initiatives/family-and-sexual-violence/specialist-services/court-support-pilotevaluation.pdf

McClintock, K., Sokratov, A., Mellsop, G., & Kingi, T. K. (2013). Hua Oranga: Service utility pilot of a mental health outcome measurement for an Indigenous population. *International Indigenous Policy Journal*, *4*(3), 1–14. https://doi.org/10.18584/iipj.2013.4.3.7

McCormick, R. (2017). Does access to green space impact the mental well-being of children: A systematic review. *Journal of Pediatric Nursing, 37*, 3-7. 10.1016/j.pedn.2017.08.027.

McLachlan, A. (2022). *Whangaihia te hua o oranga ki o tatou whanau whanui: Ko te tikanga o te whakamahinga o Hua Oranga.* Te Rau Ora.

McRae, J. (2017). *Māori oral tradition: He kōrero nō te ao tawhito*. Auckland University Press.

Michaelson, V., King, N., Janssen, I., Sawal, S., & Pickett, W. (2020). Electronic screen technology use and connection to nature in Canadian adolescents: A mixed methods study. *Canadian Journal of Public Health, 111*, 502-514. https://doi.org/10.17269/s41997-019-00289-y

Ojala, M. (2016). Young people and global climate change: Emotions, coping, and engagement in everyday life. In N. Ansell, N. Klocker, & T. Skelton (Eds.), *Geographies of global issues: Change and threat: Geographies of children and young people* (Vol. 8, pp. 1–19). Springer Science + Business Media. https://doi.org/10.1080/00958964.2015.1021662

Pitama, S., Huria, T., & Lacey, C. (2014). Improving Māori health through clinical assessment: Waikare o te waka o Meihana. *New Zealand Medical Journal*, *127*(1393), 107–119. https://www.nzma.org.nz/journal-articles/improving-M%C4%81ori-health-through-clinicalassessment-waikare-o-te-waka-o-meihana

Pitama, S., Robertson, P., Cram, F., Gillies, M., Huria, T., & Dallas-Katoa, W. (2007). Meihana model: A clinical assessment framework. *New Zealand Journal of Psychology*, *36*(3), 118–125. https://www.psychology.org.nz/journal-archive/Pitamaetal_NZJP36-3_pg118.pdf

Pyle, R. M., & Lefèvre, M. (2016). L'extinction de l'expérience. *Écologie & Politique, 2*, 185-196.

Richardson, M., Hunt, A., Hinds, J., Bragg, R., Fido, D., Petronzi, D., … & White, M. (2019). A measure of nature connectedness for children and adults: Validation, performance, and insights. *Sustainability, 11*, 3250. https://www.mdpi.com/2071-1050/11/12/3250

Salazar, G., Kunkle, K. & Monroe, M. C. (2020). *Practitioner guide to assessing connection to nature.* North American Association for Environmental Education. https://eepro.naaee.org/resource/practitioner-guide-assessing-connection-nature

Sheehan, M. (2017). Contemporary popular waiata provide a place of belonging. *MAI Journal 6*(2), 208-218. 10.20507/MAIJournal.2017.6.2.13

Shin, J., Dennis, S., & Mohammed, H. (2021). Mental health outcome measures in environmental design research: A critical review. *HERD: Health Environments Research & Design Journal, 14*(3), 331-357. https://doi.org/10.1177/1937586721999787

Schultz, P. W. (2002). Inclusion with nature: The psychology of human-nature relations. In P. Schmuck, W. P. Schultz, & T. L. Milfont (Eds.), *Psychology of sustainable development* (pp. 61-78). Kluwer Academic.

Smith, C. (2010). *He kai rangatira: Sharing memories of Kauangaroa.* Cheryl Smith.

Smith, T. (2000). Nga tini ahuatanga o whakapapa korero. *Educational Philosophy and Theory, 32*(1), 53-60.

Tam, K. P. (2013). Concepts and measures related to connection to nature: Similarities and differences. *Journal of Environmental Psychology, 34*, 64–78. https://doi.org/10.1016/j.jenvp.2013.01.004

Tillmann, S., Tobin, D., Avison, W., & Gilliland, J., (2018). Mental health benefits of interactions with nature in children and teenagers: A systematic review. *Journal of Epidemiology and Community Health, 72*(10), 958-966.

Tseng, Y.C., & Wang, S.M. (2020). Understanding Taiwanese adolescents' connections with nature: Rethinking conventional definitions and scales for environmental education. *Environmental Education Research, 26*(1), 115-129. https://doi.org/10.1080/13504 622.2019.1668354

Vanaken, G. J., & Danckaerts, M. (2018). Impact of green space exposure on children's and adolescents' mental health: A systematic review. *International Journal of Environmental Research and Public Health, 15(*12), 2668. https://doi.org/10.3390/ijerph15122668

van Lier, L. E., Utter, J., Denny, S., Lucassen, M., Dyson, B., & Clark, T. (2017). Home gardening and the health and well-being of adolescents. *Health Promotion Practice, 18*(1), 34–43. https://journals.sagepub.com/doi/10.1177/1524839916673606

Waitoki, W., & McLachlan, A. (2022). Indigenous Māori responses to the COVID-19 pandemic: He waka eke noa? *International Journal of Psychology, 57*(5), 567-576.

Ward, J. S., Duncan, J. S., Jarden, A., & Stewart, T. (2016). The impact of children's exposure to greenspace on physical activity, cognitive development, emotional wellbeing, and ability to appraise risk. *Health & Place, 40*, 44–50.

Whittemore, R., & Knafl, K. (2005), The integrative review: Updated methodology. *Journal of Advanced Nursing, 52*, 546–553.

Zhang, Y., Mavoa, S., Zhao, J., Raphael, D., & Smith, M. (2020). The association between green space and adolescents' mental well-being: A systematic review. *International Journal of Environmental Research and Public Health, 17*(18), 6640. https://doi.org/10.3390/ijerph17186640

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