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RESEARCH ARTICLE

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How does learning about the future of the ocean impact children's emotional wellbeing? Insights from ocean literacy educators in Aotearoa New Zealand

Linda Murray[1,2] | Mary Breheny[3] | Romilly Cumming[1] | Bevan Erueti[1] | Maureen Mooney[4] | Kirsty L. Nash[2] | Christina Severinsen[1] | James Shanly[1]

[1]College of Health, Te Kunenga Ki Pūrehuroa/Massey University, Aotearoa, New Zealand

[2]Centre for Marine Socioecology, University of Tasmania, Hobart, Australia

[3]School of Health, Te Herenga Waka/Victoria University of Wellington, Aotearoa, New Zealand

[4]Joint Centre for Disaster Management, Te Kunenga Ki Pūrehuroa/Massey University, Aotearoa, New Zealand

Correspondence
Linda Murray
Email: lmurray1@massey.ac.nz

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Abstract

1. Four decades of research on the health effects of 'connection to nature' identifies many wellbeing advantages for young people. Yet this literature has developed largely without reference to biophysical evidence about mass biodiversity loss, the degradation of marine environments and climate change.
2. As these interlocking planetary crises progress, children will be more likely to witness the marine environments they learn about degrade or disappear as they grow up.
3. Improving ocean literacy is important to protect marine environments into the future. However little is known about how learning about ocean degradation affects young people's emotional wellbeing.
4. We undertook qualitative research to investigate how ocean literacy educators in Aotearoa New Zealand view the content they deliver in relation to the emotional wellbeing of young people.
5. Semi-structured interviews were conducted with 21 key informants from non-government organisations (NGOs), Ministry of Education funded programmes, university-community partnerships, youth-led initiatives and local and national museums and aquariums. Transcripts were analysed using the six steps of Braun and Clarke's (2022) reflexive thematic analysis.
6. Ocean literacy education was described as positively affecting young people's emotional wellbeing through interactive experiences in coastal environments. These provided opportunities for experiencing wonder, curiosity and a shared sense of connection and belonging.
7. Educators reported witnessing distress and overwhelm in young people when some information was delivered. This resulted in educators 'not focusing on the negative' and moving straight to solutions young people could take part in.
8. Our findings provide opportunities for re-imagining ocean literacy education as a space for promoting mental wellbeing, especially when young people have the opportunity to be part of collective experiences that promote joy and wonder.

9. Intergenerational solutions where young people can be supported to take action with adults who work in solidarity with them are also recommended.
10. Further research into how educators can be resourced to acknowledge and facilitate support around young people's negative emotional responses (such as grief, overwhelm and anxiety) is required.

KEYWORDS
child, climate change, environmental education, marine, mental health, ocean, youth

1 | INTRODUCTION

The contemporary ocean literacy movement was developed in the 2000s by a grassroots collaboration of educators and scientists in the United States seeking to improve public understanding of the ocean (Kelly et al., 2022; Soares, 1998). The movement has since grown internationally in response to global recognition of the rapid deterioration of marine environments. The ocean literacy movement aims to engage the whole of society in achieving ocean sustainability by 2030 (Intergovernmental Oceanographic Commission, 2021). In order to achieve this aim, the movement facilitates knowledge exchange between the international scientific community, Indigenous peoples and local communities, and co-creates initiatives that improve social engagement with ocean issues (Kelly et al., 2019; Mustonen et al., 2022). Ocean literacy education generally focuses on one or more of the seven principles identified by Schoedinger et al. (2010): (1) The earth has one big ocean with many features; (2) the ocean and life in the ocean shape the features of Earth; (3) the ocean is a major influence on weather and climate; (4) the ocean makes the Earth habitable; (5) the ocean supports a great diversity of life and ecosystems; (6) the ocean and humans are inextricably connected; and (7) the ocean is largely unexplored (Kelly et al., 2022). The inextricable connection between the ocean and humans (ocean literacy principle 6) overlaps with research investigating the importance of connection to nature for people's physical, spiritual, social and mental health (Kelly et al., 2022; Nash et al., 2022).

1.1 | Connection to the ocean and young people's wellbeing

Four decades of research exploring the health benefits of childhood 'connection to nature' (Amoly et al., 2014; Chawla, 2020; Freeman et al., 2020; Kahn & Weiss, 2017; Mitchell et al., 2015) has produced convincing evidence that natural spaces, including coastal areas, are essential sites for development and socialisation for children (Freeman et al., 2020; Kelly et al., 2019). Such connections improve mood (Mitchell et al., 2015), concentration and behavioural development (Amoly et al., 2014). Pre-schoolers who enjoy nature have fewer hyperactivity/attention issues, and fewer peer and emotional problems (Sobko et al., 2018). For school students, exposure to natural places is associated with better general health and mental wellbeing, more positive affect, creative thinking and social confidence (Berrera-Hernandez et al., 2020; Leong et al., 2014; Whitten et al., 2018). Little and Derr (2020) argue that child development theories of attachment can be applied to place, whereby if a child has a strong attachment to a natural environment that provides a 'stable base', this will foster emotional resilience in a similar way to a secure attachment to a trusted caregiver. There is also evidence that direct experiences with nature in childhood can motivate conservation efforts later in life (Chawla, 2020). At a population level, promoting such childhood experiences has the potential to leverage societal change towards respect and care for nature (Chawla, 2020; Derr et al., 2018). Similarly, personal attachment to the ocean and marine environments is central to developing marine conservation efforts within coastal communities (Kelly et al., 2022; Nash et al., 2022).

However, the literature identifying the wellbeing benefits of childhood connection to nature has developed largely without reference to biophysical research about rapid biodiversity loss and adaptation to environmental threats (Chawla, 2020). Since the 1970s, accelerated anthropogenic threats to ecosystem integrity have occurred. These include rapid declines in animal and plant populations, and the progressively visible impacts of human industry (e.g. plastic pollution) on oceans and coastlines (Diaz et al., 2019; Hooper et al., 2012; Whitmee et al., 2015). The related concept of the 'blue acceleration' refers to the phenomena whereby human impacts on the ocean (climate change, ocean acidification, land-based pollution, shipping and over-fishing) have accumulated at a rapid pace, causing marine ecosystem collapse (Halpern et al., 2019; Jouffray et al., 2020). The United Nations has described these interlinked issues of climate change, pollution and biodiversity loss as the Triple Planetary Crisis (United Nations Climate Change, 2022). As ecosystem deterioration and anthropogenic harm become more tangible in the places young people inhabit, learning about and interacting with nature increasingly has the potential to evoke feelings of anxiety, grief, depression and loss of meaning (Ma et al., 2022).

1.2 | Mental ill-health is rising among young people

Over the past 30 years the burden of mental ill-health among young people has risen globally (Twenge et al., 2019; UNICEF, 2019; WHO, 2019). At least 13% of the world's children (aged 10–19) live with a diagnosed mental health disorder, and anxiety and depression constitute more than 40% of this prevalence (Nature, 2021). The COVID-19 pandemic provided a regrettable, yet important opportunity to draw attention to this traditionally underfunded and under-prioritised health issue (Nature, 2021; WHO, 2022). In addition, the World Health Organisation (WHO) identifies increasing mental health challenges as the leading climate change-related health risk in the Pacific (Tiata et al., 2022). Two parallel bodies of literature have endeavoured to explain the prevalence of mental ill-health among young people: First, longitudinal studies have identified how adverse childhood experiences (e.g. poverty, childhood abuse and neglect, low education, experiencing racism and other forms of discrimination) influence poor mental health outcomes later in life (Blomqvist et al., 2019; Choi, 2018; Moore & Ramirez, 2015; Paradies et al., 2015; Petruccelli et al., 2019; Weins et al., 2020); and second, observation of a global 'extinction of experience' in childhood whereby increased time indoors, use of digital devices, rapid urbanisation and environmental degradation (including within marine environments) has reduced young people's opportunities to be exposed to the deep pleasures of time in nature (Chawla, 2020; Diaz et al., 2019; Kelly et al., 2022; Louv, 2005). To date, neither body of literature has seriously examined how knowledge of accelerated environmental loss could negatively affect young people's mental health outcomes. Environmental educators, such as those providing ocean literacy education are well placed to observe how young people emotionally respond to information about the progression of the triple planetary crisis (Pikhala, 2020). Exploring young people's responses in these learning environments is a starting point for inquiry into the intersection between population mental health and living through planetary crisis.

This article presents the findings of a preliminary study exploring young people's emotional responses to ocean literacy education in Aotearoa New Zealand. Aotearoa New Zealand's national mental health burden mirrors the global rise in anxiety, depression and distress among young people (Twenge et al., 2019; UNICEF, 2019; WHO, 2019), and youth suicide rates (15–19 years) are among the highest in the OECD (Menzies et al., 2020; Ministry of Social Development, 2016). Young people (rangatahi) in Aotearoa New Zealand identify climate change and its future impacts as a primary issue affecting their mental health post-pandemic. In 2020, rangatahi named '*bleak futures about climate change*' as one of the top four determinants affecting their mental health, along with social media and technology, 'pressure' and 'risky choices' (Menzies et al., 2020). This is congruent with international evidence suggesting climate anxiety (distress relating to climate and ecological crises) impacts young people's mental health. In a study of 10,000 young people (aged 16–25) from 10 countries (Australia, Brazil, Finland, France, India, Nigeria, Philippines, Portugal, the United Kingdom and the United States), 59% of respondents were extremely worried about climate change, and 84% were at least moderately worried (Hickman et al., 2021). While such evidence from prevalence studies indicates the scale of climate anxiety among young people, very little is known about how such distress is qualitatively experienced or intersects with other facets of young people's lives (e.g. exposure to ocean literacy education).

1.3 | Study aims

Current research exploring the health effects of childhood 'connection to nature' focuses almost exclusively on positive 'wellbeing' outcomes, using measures designed to describe benefits (Chawla, 2020). Yet as the global thinning of life progresses, children will be more likely to witness the natural places they learn about degrade or disappear as they grow up. Exploration of such negative, yet crucial, facets of young people's experiences of nature is strikingly absent from child mental health research, prompting calls for inquiry that incorporate such complexity (Chawla, 2020; Tiata et al., 2022). To commence investigation of this topic, we undertook a qualitative study to explore how educators presenting ocean literacy content in Aotearoa New Zealand conceptualise their work in relation to youth mental health and emotional wellbeing. Such educators deliver information about the realities of planetary crises to young people (Pikhala, 2020), and hence are well situated to observe student's emotional reactions and engage in mental health promotion. We conducted qualitative interviews with thematic analysis guided by Braun and Clarke (2022) to understand (1) Who is currently providing ocean literacy education to children and young people across Aotearoa New Zealand, and what do they provide? (2) What emotional reactions to the state of the ocean do educators witness when working with young people? and (3) How do educators conceptualise the relationship between young people's mental and emotional wellbeing and the content they deliver? The findings provide some nascent insights about aspects of ocean literacy education that promote wellbeing, and identify future possibilities for incorporating youth mental health promotion into these educational experiences.

2 | METHODS

2.1 | Positionality statement

We are a group of human health and marine scientists with interest in planetary health, which is defined as a '*solutions-oriented, transdisciplinary field and social movement focused on analyzing and addressing the impacts of human disruptions to Earth's natural systems on human health and all life on Earth*.' (Planetary Health Alliance, 2022). We are non-Indigenous and Indigenous scholars from Australia and Aotearoa New Zealand, and each carry a uniquely personal history of living with the Pacific and Southern oceans. We acknowledge that the converging crises of biodiversity loss, climate change and social injustice are felt differently within and between coastal communities, and that these crises compound existing social inequities (Blythe et al., 2021; United Nations, 2017). We come to this study with the privilege of high levels of education in our fields, and a commitment to collaboratively using our knowledge to find ways of living well through planetary crisis. When conducting qualitative analysis, we worked from a constructivist epistemological standpoint, whereby language is understood to be implicit in the social production and reproduction of both meaning and experience (Byrne, 2022).

2.2 | Participant recruitment

We purposefully recruited knowledgeable key informants from organisations that provided ocean or coastal literacy education to school-aged children (primary school (age 5–12), high school (ages 13–19) or both) in Aotearoa New Zealand (Palinkas et al., 2015). Members of the research team (RC, LM, BE) identified potential participants by contacting all relevant organisations in the sector (identified through professional networks and web and social media searches) and via referral from other participants (snowball sampling). As recruitment occurred from August 2020 to July 2022, all initial contact and interviews was undertaken online (via zoom or Microsoft Teams), due to COVID-19 social distancing restrictions.

2.3 | Key informant characteristics

We approached key informants from 22 organisations, including non-government organisations, Ministry of Education funded programmes, university-community partnerships, youth-led initiatives and local and national museums and aquariums. Overall, 21 key informants from 19 organisations participated in an interview (see Table 1). Reasons for refusal included the organisation not currently running activities on ocean literacy, lack of volunteer capacity to participate (due to COVID-19) and technical inability to participate online (due to remote location or organisational access). While we had initially planned to offer face-to-face interviews to organisations who requested them, this was unfortunately not feasible due to COVID-19 restrictions.

2.4 | Interview schedule

Semi-structured interviews based on a question guide linked to the main research questions (Appendix S1) were undertaken. Questions were asked about the participant's professional position, the values and scope of their organisation's work (including relationships with Māori organisations or iwi (tribes)), pedagogical approaches, specific teaching activities and links to child mental health and wellbeing. Online interviews lasted between 30 min to 1 h, and were recorded with consent and transcribed.

2.5 | Ethics

This study was approved by the Massey University Human Research Ethics Committee (ID no: 4000024158). All participants provided informed consent and were provided with a copy of their interview transcript to amend if they wished.

2.6 | Thematic analysis

Qualitative data analysis was based on Braun and Clarke's six-phase analytical process for reflexive thematic analysis (RTA) (Braun & Clarke, 2022; Byrne, 2022). RTA was chosen as it provides a reflection of the intersection between (1) the dataset (interview transcripts), (2) the theoretical assumptions of the analysis (social constructivism) and (3) the analytical skills of the researcher(s) (Byrne, 2022). While a set of steps are followed to complete RTA, the process is informed by contextual decision-making, and a degree of fluidity can be retained as researchers work with the data (Braun et al., 2022). The steps followed were: (1) Familiarisation with the data: Interview transcripts were read and checked against the recordings (LM, JS, RC and participants). (2) Generating initial codes: Data were inductively coded in QSR Nvivo (version 1.4.1). This resulted in preliminary themes representing patterns of meaning across the data. (3) Generating themes: Themes were then developed by reviewing, grouping and re-grouping codes. (4) Reviewing potential themes: Members of the research team refined and collectively reviewed the themes (LM, RC, CS and BE). (5) Defining and naming

TABLE 1 Participating organisations.

Type of organisation	Number of organisations	Participants
National museums and aquariums	2	3
Marine/animal rescue organisations	2	2
Non-government conservation/education organisations (including two bilingual programmes in te reo Māori)	11	11
Ministry of Education programmes/curriculum developers (including one bilingual programme in te reo Māori)	2	2
Youth-led initiatives	1	1
University-community partnerships	1	2

themes: Final drafts of themes were written, named and organised to illustrate connections between themes. (6) Reporting back: A set of themes, whereby each theme represents facets of a central organising concept (idea) were produced (Braun et al., 2022).

3 | RESULTS AND DISCUSSION

Our RTA generated a number of thematic accounts illuminating how educators viewed their work as connected to young people's emotional wellbeing. The findings are presented below in accordance with the three main research questions. The first question '*Who is currently providing ocean literacy education to children and young people across Aotearoa New Zealand, and what do they provide?*' describes the backgrounds of participants and range of educational activities they are involved in (see Table 2). After this section, the thematic accounts emerging from the second two research questions are presented: (2) *What emotional reactions to the state of the ocean do educators witness when working with young people?* and (3) *How do educators conceptualise the relationship between young people's mental and emotional wellbeing and the content they deliver?*

3.1 | Research question (1): Who is currently providing ocean literacy education to children and young people across Aotearoa New Zealand, and what do they provide?

All participants had, or were completing, at least one degree in marine biology, zoology or environmental science. Many had additional formal teaching qualifications, or had undergone organisational training to become educators. Two participants had backgrounds in early childhood education and outdoor education/learning outside the classroom. All participants expressed a personal passion for marine conservation, which was often recounted as developing

TABLE 2 Ocean literacy activities, and topics offered by participating organisations.

Types of educational activities	Participants activity is offered to
Site-based experiential learning (e.g. snorkelling, beach and stream exploration, fishing)	Primary and secondary school students
Immersive[a] education (e.g. virtual reality 'dives', marine mammal rescue simulation)	Primary and secondary school students
National-level curriculum development on ocean literacy (two organisations)	Secondary school students
School holiday programmes	Primary and secondary school students
Multi-session programmes attached to National Certificate of Education Achievement (NCEA) credits	Secondary school students
Curriculum extension activities specifically designed for gifted learners	Secondary school students
Conservation activities (beach and/or stream clean ups, tree planting)	Whole families and sometimes wider community
Citizen science activities (e.g. plastic pollution counts, marine species observation, kelp regeneration)	Primary and secondary school students
Institution tours and education programmes (within aquariums, museums and animal rescue organisations)	School student groups as well as wider community
Single education sessions on a particular issue (e.g. plastic waste, marine mammal rescue)	Primary and secondary school students
Youth-led educational conferences	Secondary school students
Marae-based conservation activities (e.g. tree planting and coastal care)	Whole families and wider community
Expeditions on scientific vessels (single or multi-day)	Secondary school students
Topics covered	
Plastic pollution, including effects on marine life and solutions such as recycling and minimising waste	
Biodiversity and education about particular species, for example, marine mammals	
Wildlife rescue efforts (in particular, marine mammals and seabirds)	
Conducting wildlife surveys (e.g. fish and eels in streams)	
Stream water testing	
Features of the ocean and anticipated changes (e.g. acidification)	
Sustainability and sustainable fishing	
Social and equity issues within marine environments (e.g. modern slavery)	
Mental health self-care for environmental activists (youth-led organisation)	
Advocacy (e.g. writing letters to MPs)	

[a]Learning experiences that simulate experiences of the marine environment in the classroom, and generally incorporate technology such as virtual reality, or other technology to facilitate the 'immersive' nature of the lesson.

throughout their own childhoods. Some brought skills in diving, sailing or fishing to their role, and most had worked or volunteered internationally within the marine conservation movement. All were over 18 years old, with one participant running a youth-led organisation they started as a younger teenager. Most participants were Pākehā (European New Zealander) or Tauiwi (recent migrants) and one was Māori.

3.1.1 | Relationships with tangata whenua

Most of the participating organisations acknowledged they were working as manuhiri (guests) within Aotearoa New Zealand, and had many types of relationships with Māori organisations and iwi (tribes). These engagements ranged from comprehensive partnership programmes, where an educational programme or resources was bilingually available in te reo Māori (Māori language) in partner kura (schools) ($n=3$), to joint activities with iwi or marae (communal meeting houses) for coastal restoration of particular areas. Other organisations partnered with Māori guides or kaumatua (elders) when providing interactive experiences such as learning about and gathering kaimoana (seafood). Some organisations were part of conservation networks that included iwi or Māori reference groups. Most participants described how they were still learning to partner well with Māori and to incorporate mātauranga Māori (Māori knowledge) appropriately within their work. As with this study, these relationships were often described as understandably hampered due to the COVID-19 pandemic, and a process of reconnection will be necessary.

3.1.2 | Educators' personal definitions of wellbeing

All participants recounted well-conceptualised ideas about human wellbeing and applied these definitions in their work. Participant's definitions of wellbeing were multi-faceted, and referred to broad interconnections between marine environments and human health. One participant described this as a waka hourua (two-hulled canoe) whereby those working to foster or restore wellbeing must pay attention to both hulls: *'one is human health … and one is health of the marine environment. And it's all about building resilience really, among coastal communities to better manage the impacts of climate change, both from a science point of view and a well-being point of view.'*—Educator, University-Community Partnership.

When defining human wellbeing, participants identified aspects of social, emotional, physical and spiritual wellbeing. Some participants specifically referred to Te Whare Tapa Whā (the four-walled house) (Durie, 1994) a Māori model of wellbeing which outlines four cornerstones of Māori health (spiritual, physical, family and mental health). Many participants also described how a sense of agency and self-determination was crucial to the mental and emotional wellbeing of young people. This sense of agency was described in reference to addressing environmental problems and maintaining the motivation to act and effect change. Participants saw part of their role as fostering this sense of agency and self-determination, contributing to wellbeing. Table 2 summarises the types of educational activities that participating organisations offered, and the ocean literacy topics they covered.

3.2 | Research question (2): What emotional reactions to the state of the ocean do educators witness when working with young people?

Educators reported witnessing a range of emotional reactions to the content they delivered. This included positive reactions (solace through connection and wonder, igniting curiosity) as well as potentially negative emotional reactions (distress and overwhelm).

3.2.1 | Solace through connection and wonder

Many participants saw providing opportunities for young people to be immersed in nature and coastal settings as critical to child and youth wellbeing. They reported observing that such experiences enabled *'relationship to nature and our ability to get solace there in whatever way that is, whether that's spiritual or emotional solace'*—Marine Education NGO educator. Interactive educational experiences (e.g. field visits to coastal areas) were described as an important antidote to the documented 'extinction of experience' whereby children have fewer informal opportunities to connect with nature than in previous generations. Thus, educators saw themselves as part of restoring this crucial aspect of child development and wellbeing:

> We work with young people who just never get the opportunity to go to the beach or really spend any time outside …. So one of the things I really love … is to unplug them from all of that and … push them outside of their comfort zones, help them reignite that connection. I often have seen in students really cool and positive responses to being in that experience … I see kids at the end of the day snorkelling with us and they tell us "this is the best day at school I've had."
>
> —Educator, Marine Education NGO

Some participants described the benefits of this connection in spiritual terms akin to the concept of 'reverie' whereby one is so blissfully engaged in their present setting and activity they become 'lost' in the experience and feel themselves as part of an all-encompassing whole (Lane Jr, 2006). Others described their own awe and wonder in relation to particular species, and how spending time with them had enhanced their own mental health: *'If we get stressed out in the office, we just go down and watch the penguins, or the eel breathing, or the hāpuka which are growing at* *a crazy rate … the movement of water'—Marine Science Educators, National Institution*.

Participants emphasised how students reported these restorative emotions in their educational spaces even when they were involved in activities that included exposure to environmental destruction (e.g. plastic pollution and evidence of species loss):

> We've had some young people that … have not necessarily ever been out on a boat before … and immediately they're surrounded by water. You've got beautiful light refractions that are starting to happen because of the water moving as it does. I think there's proven science on how that actually has a positive impact on people's emotional state and how it makes people feel better. We're putting them into a very nice place to start with … Often they may not like getting their feet wet to start with or getting a bit muddy. Once they get into it they actually genuinely love it. When we get all of the rubbish on the boats at the end of the clean-up and they actually see 2000 L of rubbish that we've just pulled out of our ocean back on the boat, there's another emotional attachment to just having achieved something.
>
> —Leader, Conservation NGO

Previous research into the wellbeing benefits of nature has focused on time spent in 'healthy' nature (Ferreira & Venter, 2016). Therefore, observations that such restorative emotions can be experienced in degraded or polluted ecosystems challenge assumptions that environments must be 'pure' or 'unspoiled' to be beneficial to wellbeing.

3.2.2 | Igniting curiosity

Igniting a sense of curiosity was identified as crucial for strengthening connections between young people and marine environments. Interactive experiences were described as important opportunities for children to be curious, and for encouraging biophilia (a love of living beings).

> How can we support you to get out and get wet and smell the salt and slip on a rock and find a duckbill sea slug and be amazed at what is down there? … we found a nudibranch and you would have thought we'd found pirates treasure. It was just so exciting, and that is what you want people to feel when we're out in the environment, not, "Ew gross I want to run away and hide because I don't understand it", but, "That thing is amazing. What can it do? What does it eat?".
>
> —Educators, National Institution

This relates to a common response from participants that if young people were engaged and interested within a marine environment, they were more likely to want to care for it and seek out further experiences in such places:

> We went … down with flounder lights and we looked at … what creatures were there and there were these amazing squids that came by and a little barracuda, cancer crabs, etc. And this just immediately connected themselves and their body. They were saying things like "I want to get one of those flounder lights and take my family down and show them what's there". Whenever we see something that translates to kaimoana (seafood), we talk about kaimoana and the different species that we harvest and the sustainability of that.
>
> —Educator, Marine Science NGO

Such responses demonstrate that not only do interactive experiences spark curiosity and interest, but also children wanted to share their interest with others, for example, family members of other generations. This is an example of how shared experiences of marine environments can strengthen relationships among community members and motivate shared conservation efforts.

3.2.3 | Distress and overwhelm in educational spaces

Almost all educators acknowledged that the information they deliver about ocean degradation or plastic pollution had evoked distressing and disheartening emotions. Participants described young people being overwhelmed by the scale of the global problems they were being presented with. However, they acknowledged there was not often space or time within educational environments to address these feelings:

> This is exactly what we're interested in; this kind of overwhelming sense of doom if you like and the impact that has the potential to have on children. We're living in an age where eco-grief and eco-anxiety are becoming part of the everyday vernacular and they're only going to become more and more common. So, when those negative messages are being conveyed, what are the emotional wellbeing strategies being provided to children that help them process those messages? Our instinct is that there's not a lot of that happening.
>
> —National Curriculum Developer

Participants were interested in how they could facilitate the processing of such distress and overwhelm into their work to prevent young people from disengaging from what they were hearing:

> You get such a range. There's always a couple that disconnect. They hear it, they can tell you what you've just told them but in a way they've disconnected and there's no emotional connection there. The majority of the group, you see this weight settle. This is something that … I think about every day: how do I facilitate this better? How do I help lift that weight? Should I be trying to lift that weight? How do I package this? What do we do with it? … you'll get extreme responses where you'll get really vocal students that are like, excuse my language, 'everything is f**ked' … we also will see heavier emotional responses: tears etc.
>
> —Educator, Marine Education NGO

These findings reveal that while participants witness negative emotional reactions to the content they are delivering, there are currently few resources and little space to assist students to process these experiences. Participants stated they did not feel equipped to effectively facilitate this within their educational context. '*I think we really struggled to get them out of that funk. I think that the weight of the issue has more weight than the uplift of the solutions*'—Educator, Marine Science NGO. This highlights a potential need for further resources for educators, so that they feel supported when delivering such content in the future.

3.3 | Research question (3): How do educators conceptualise the relationship between young people's mental and emotional wellbeing and the content they deliver?

3.3.1 | Not focusing on the negative

When asked how such emotional reactions were conceptualised in their work, most participants mentioned 'not focusing on the negative'. This was described as acknowledging the sad nature of the content they were delivering, then swiftly moving on so that the session ended with a more positive emotional tone:

> They express it and I validate their feelings like 'yeah it is really sad, and it is something that we can and should be sad about' but we don't sit in that space for too long and we go straight in with what we can do to help and why trees are really important because they are shelter and food for birds etc.
>
> —Educator, Animal Rescue Organisation

This was described as important for not leaving students with a lasting sense of apathy or hopelessness, or a disengagement from learning science content:

> There was just so much negativity, especially for the primary school teachers who were trying to introduce climate conversations into the science that they were able to teach in senior primary school. They had to be really really careful because they kids would say, "why are we even bothering with this? The world is doomed. We're not going to have any forest to play in or trees to climb," etc. So there was that sense of needing a balance, needing a re-balance of the material.
>
> —National Curriculum Designer

Participants also worried that the information they presented could lead to further feelings of overwhelm and betrayal if students felt they were expected to take responsibility for fixing large, complex problems created by older generations:

> It has just become a lot … it's good that they are aware there are so many things that we actually can change as an individual, but I'm also worried that it is the reason we're hearing about so many of them being overwhelmed. They think it's their sole responsibility. I remember being their age, listening to people saying "your generation is the best, we have hope because your generation knows what to do". And now we've moved onto the next generation and we're saying the exact same thing … Climate change is nothing new …, but in between my parents and my nieces' generations we've lost more than half of all of our reptiles, mammals and birds so we just keep saying the same things for every generation … the pressure also builds up because we have more and more information as well.

Educators were aware of how the gravity of the information they present could emotionally affect children. International literature suggests that young people are highly aware of climate change and its future impacts (Hickman et al., 2021). As Chawla (2020) states, '*children are inheriting an unravelling biosphere, and many of them know it*' (p. 1). Yet one of the main ways educators conceptualised wellbeing in relation to their work was to lighten or avoid acknowledging these negative emotions.

3.3.2 | Focusing on individual solutions

In response to not wanting to sit in a space with negative emotions for too long, many participants described minimising or removing content that was found to be distressing. Instead, the focus of their education was on problem solving and finding solutions:

> At the beginning we'd talk about that love and connection and "what do you love about the ocean?" "What animals do you love?" And then we'd go, "they're dying!". "This seabird died of starvation

> because it ate plastic!" … you could clearly see that it was distressing. Certainly as we went on I would be far less impactful compared with how I was taught to put this message across because I didn't want anyone to feel that. It was really stressful. So we've definitely full "one eighty'ed" on that and we spend 99% talking about positives and solutions whilst giving them a few facts to rationalise why it's important.
>
> —Beach Cleanup NGO

The solutions participants most often described referred to individual actions to reduce waste such as using less plastic, swapping products for recyclable or compostable options and cleaning up natural environments. Some organisers encouraged children to go home and encourage their families to take on the actions they had learned about, or to be advocates for policy around the use of sustainable products (e.g. single-use plastic bans) via actions such as writing to Members of Parliament:

> I think we're going to have more plastic than fish in the ocean by 2030 or something … We tell them that, at the end of the day, the solution comes from your choices … If you see litter, you pick it up … We tell them to clean their milk bottles, clean their waste before they put it out, make sure you're recycling properly, make sure you're making more sustainable choices when you're at the supermarket like bring your own bag, don't even use plastic bags. We just give them a bunch of things they can do in their everyday life to help reduce the plastic problem.
>
> —NGO Educator

Providing individual solutions was seen as by some participants as more useful than simply presenting distressing information. However, others reported that if individual solutions were proposed in isolation they could cause feelings of frustration, betrayal and overwhelm. Students are not of an age where it is fair or feasible for them to take responsibility for the choices of their household, and they rarely have direct access to those in power who can effect change (Chawla, 2020; Ojala, 2016). Internationally, youth involved in individual environmental action report experiencing low subjective wellbeing, and that feelings of futility and despair arise when individuals tackle problems greater than one can solve alone (Ojala, 2016; Willams & Jaftha, 2020).

3.3.3 | Fostering community and belonging

In contrast to focusing on individual solutions, other participants spoke about creating opportunities for people to feel like they were working together on a common cause. This was described as a way of dealing with distressing emotions about the environment, and decreasing social isolation. Such opportunities include learning how to run advocacy campaigns, and developing young people's scientific skills so they could continue to participate in citizen science initiatives (e.g. stream and coastal monitoring):

> [A lot of people at our events said] "I really care about the issue but it gets so depressing and I want to meet other young people who want to make a difference". So that's kind of the reason why I started doing the stuff that I've been doing is because there were lots of people that cared but not really a platform for them to come together.
>
> —Youth-Led Organisation

Dissatisfaction with receiving education focused on individual solutions meant youth-led organisations started incorporating mental health workshops in parallel to learning about the future of the ocean. The 'solutions focused' content of their events included specific conservation and advocacy skills they could practice with their peers and other community members and contribute to local coastal restoration efforts:

> I don't feel that hope. And so yeah, this year's (youth organised conference) … has been solutions focused because that's the feedback that we've been having from the previous conferences. How can we instil as much hope as possible throughout the conference, it was very light, circular- economy focused and then also like community initiatives which are doing restoration and stuff like that … we're equipping the students with tools that they can use to actually make a difference, rather than hearing about—[sarcastic tone] "oooooohh, there's so much hope."
>
> —Youth Led Organisation

The organisers of a youth-led coastal conservation conference suggested that many young people already felt deep distress and anxiety about the environment, and to 'gloss over' this and move straight to all the 'positive' things they could try, may inadvertently lead to greater feelings of anger and powerlessness. In response, they organised events that incorporated mental health workshops in parallel to learning about the future of the ocean. They felt this balanced the need to foster a sense of hope by being 'solutions focused' with the reality that many young people needed comprehensive mental health literacy, plus encouragement and comfort from others (both young people and like-minded adults) to be able to approach such overwhelming topics.

Participants referred to interactive, yet communal, activities such as family beach clean ups or tree plantings. This was because such activities, when embedded within an ongoing community, provided the opportunity to harness the wellbeing benefits of connection to nature:

> The kids will go home and yack about what they've learned today about marine conservation…but we

> were being seen as a babysitting service and that was never the goal. And by forcing the parents to stay, they really enjoy themselves, they have a great time, they get stuck in and it's a really cool bonding experience for the parent and child … it's far better for what we're trying to achieve.
>
> —Educator, Conservation NGO

In addition, by communally participating in environmental restoration, people were contributing to positive feedbacks for human health (e.g. species regeneration contributing to sustainable food sources). While the results of such regeneration efforts are not immediately apparent, the mental and emotional benefits of such activities were evident:

> I've got no doubt that for 90% of people, most people that come to our plantings or clean-ups, they've left the activity in a better state than when they came in, for sure.
>
> —Coastal Cleanup NGO

Intergenerational activities were also viewed as having the benefit of providing support to children, so they did not feel overwhelmed by the message that young people were solely responsible for effecting change within their families or communities. Whole of family/community programmes could provide opportunities for families to bond, and avoid children feeling shame or disempowerment if their families were not willing or able to make sustainable choices at home (e.g. recycling, choosing products with less plastic).

4 | RECOMMENDATIONS: PROMOTING YOUNG PEOPLE'S EMOTIONAL WELLBEING THROUGH PLANETARY CRISIS

The WHO defines mental health as a '*state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to their community*' (WHO, 2022). Mental health exists on a complex continuum, from optimal wellbeing to debilitating states of great suffering and emotional pain (WHO, 2022). In the face of rising levels of mental distress among young people globally, the findings of this study (outlined in Figure 1) suggest some optimal ways to promote mental and emotional wellbeing through ocean literacy education: (1) Acknowledge and make space for difficult emotions, (2) create opportunities for interacting with, and restoring marine environments and (3) promote intergenerational, collective problem solving, agency and action.

1. Acknowledge and make space for difficult emotions

Our participants were very aware of the potential distress that content about the future of the oceans, biodiversity loss and climate change could cause their students. Therefore such information was often minimised or balanced with 'positive messages'. Educator's assessment of their student's feelings of distress is congruent with international evidence suggesting the majority of young people both globally, and in Aotearoa New Zealand identify worries about the future in relation to climate change as the predominant issue affecting their mental health (Hickman et al., 2021; Menzies et al., 2020). In light of this, we posit that 'raising awareness' of the issues affecting the ocean, and merely repeating the health benefits of connecting with nature is an insufficient response in our current global predicament of planetary crisis. While many of the participating organisations included some concepts of 'wellbeing' in their pedagogy, only one youth-led initiative specifically offered mental health education as part of their programme. Such novel combinations of mental health and environmental education show promise, and some international exemplars are now available. For example, the Curious Climate Schools programme in Tasmania, Australia encourages children to explore self-care and where to seek help for climate distress, and facilitates opportunities for children to learn from adults who role model excellent climate scientific practice and action (Curious Climate Schools, 2022).

2. Create opportunities for interacting with, and restoring marine environments

All participants in our study referred to the benefits of encounters with marine environments for restoring mental and emotional wellbeing. These interactive experiences elicited positive emotions such as awe, and wonder, and joy and curiosity and were seen as essential for child development. Such findings echo the four decades of research suggesting connecting with nature has a range of positive health benefits for young people (Chawla, 2020). While existing research assumes that it is time in 'unspoiled' environments that is most beneficial (Ferreira & Venter, 2016), our findings suggest that being involved in the restoration of 'spoiled' environments (e.g. beach clean ups) can be equally beneficial if they occur in a supported manner. In addition, if marine environments are not accessible, technology such as virtual reality headsets can simulate such experiences successfully (Blythe et al., 2021). Such findings are useful as they highlight the importance of connecting with the natural world even as it continues to degrade. In addition to promoting mental health, opportunities to connect with marine environments promote positive feelings, such as empathy with the beings within these environments (Blythe et al., 2021; Nash et al., 2022). This in turn can motivate those who experience such empathy to become involved in conservation efforts that spark feelings of agency and hope.

3. Promote intergenerational, collective problem solving and action

Kelly et al. (2022) note that one impediment to the diffusion of ocean literacy within communities is a focus on youth-centric ocean learning (i.e. ocean literacy curricula is taught in schools but

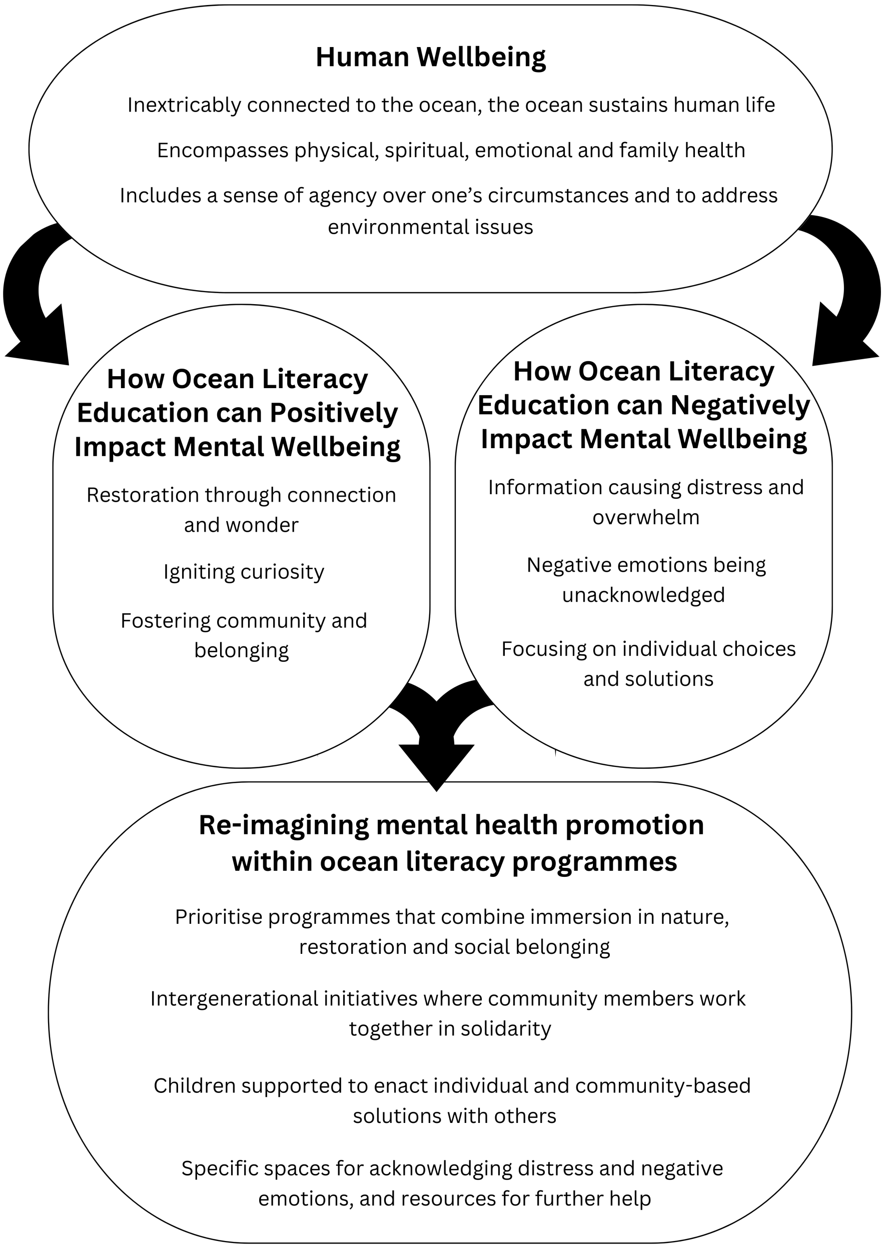

FIGURE 1 Description of how the findings of this study suggest ocean literacy education can promote mental health promotion for young people.

less available to other community members). Several participants in our study gave examples of collective activities to learn about and protect the ocean that were intergenerational. These were considered more optimal to youth mental wellbeing than youth-centric programmes alone. Hickman et al. (2021) notes that young people's feelings of eco-distress may include feelings of betrayal by past generations and power structures who appear to have failed to act. Intergenerational programmes have the potential to reduce such perceived 'us and them' tensions between generations, and enable supportive relationships between young people, and adults who wish to work in solidarity with them.

Kelly et al. (2022) also note that the 'Western-centric' development of the ocean literacy movement has inhibited its potential to be a meaningful, transformative movement within Indigenous and local communities. Mātauranga Māori (Māori knowledge) is a large body of knowledge that details the successful and harmonious philosophy of preserving and conserving local environmental knowledge, gained through 'experience-based understanding' (Harmsworth & Warmenhoven, 2002, p. 9). Understanding the interconnectedness of the knowledge held in respect to its cultural and spiritual significance provides intergenerational benefit and the progression of kaitiakitanga (stewardship) (see Erueti et al., 2023). Kaitiakitanga as it relates to taiao (environment) is a concept that describes the protection and preservation of ancestral lands and waters. Narratives collected by Erueti et al. (2023) in a recent biodiversity project indicated the weightiness of responsibility by rangatahi participants, with one expressing '*I know it depends on me not to mess it up!*' (p. 47). In response to this a kaumātua (elder) participant in the same project highlighted that:

> As I've gotten older [...] environmental perspectives and issues have become more important for our

> rangatahi (young people). It is important the next generation come home, spend time at home, so they maintain connection with our particular taiao (environment).
>
> (Erueti et al., 2023, p. 47)

Another kaumātua in their study expressed:

> What can I do for my mokopuna (grandchildren)? Well, I can give them the strength to be able to combat whatever it is they're going to face, because I don't know what kind of world it is going to be like for them. But, if I can instil in them some wairua (spiritual connection) so that when they meet situations, they can deal with it well.
>
> (p. 47)

Erueti et al. (2023) noted that mokopuna (grandchildren), tamariki (children) and rangatahi all serve as strong motivators for pākeke (adults) and kaumātua to initiate events that encourage the protection of taonga (precious) species and intergenerational transfer of knowledge. Furthermore, intergenerational immersive educational experiences based on localised environmental issues address the broader wellbeing agenda for youth.

5 | LIMITATIONS

This project occurred during the COVID-19 pandemic, and hence was affected by several limitations. First, national lockdown restrictions meant all interviews were conducted via Zoom rather than face to face. This limited the ability of the research team to meet with participants from organisations based in remote areas. Similarly, we could not reach Māori organisations we would have preferred to speak with us kanohi ki te kanohi (face to face). We acknowledge the perspectives of such organisations are under-represented in our findings. We recommend that future studies have a stronger focus on matauranga Māori and iwi-led initiatives and collaborations. This should include further Mātauranga Māori research into kaitiakitanga (the socio-environmental ethic of guardianship) (Beverland, 2022). Tiata et al. (2022) also recommend further mental health research that incorporates culture, spirituality and connection to the environment be conducted specifically by and for Pacific communities.

6 | CONCLUSION

The findings of this study are a response to the urgent need for research and community-based action that acknowledges the intersections between young people's mental wellbeing and adaptation to living through planetary crisis. Our findings are congruent with wider international evidence suggesting that environmental education aims to increase knowledge and pro-environmental behaviour, but typically gives little attention to children's emotional needs (Baker et al., 2021). We recommend the development of more resources for educators and children that support children's mental and emotional wellbeing while sustaining environmental learning and connection to nature. Further investigation of initiatives that promote young people's collective resilience, curiosity and wonder, and foster a sense of agency for undertaking constructive collective action is also required. In addition, we recommend further research centring the perspectives of children and young people from a range of communities, and how they experience learning about future changes to the ocean.

AUTHOR CONTRIBUTIONS

Dr Linda Murray was involved in conceptualisation, methodology, investigation, formal analysis and writing—original draft preparation; Associate Professor Mary Breheny was involved in conceptualisation, methodology, formal analysis and writing—review and editing; Romilly Cumming was involved in project administration, investigation and data visualisation; Dr Bevan Erueti was involved in conceptualisation and writing—original draft preparation; Dr Maureen Mooney was involved in Conceptualisation, supervision, and writing—review and editing; Dr Kirsty Nash and Associate Professor Christina Severinsen were involved in conceptualisation and writing—review and editing; and James Shanly was involved in project administration and investigation.

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CONFLICT OF INTEREST STATEMENT

No conflict of interest have been identified by any author.

DATA AVAILABILITY STATEMENT

In order to comply with the confidentiality requirements of Massey University Ethics approval, data are not publicly available as it may compromise participant confidentiality. Requests about the data and dataset may be made to the corresponding author.

ORCID

Linda Murray https://orcid.org/0000-0001-7066-656X
Mary Breheny https://orcid.org/0000-0002-1603-8033
Bevan Erueti https://orcid.org/0000-0003-0891-2891
Maureen Mooney https://orcid.org/0000-0002-6015-1746
Kirsty L. Nash https://orcid.org/0000-0003-0976-3197
Christina Severinsen https://orcid.org/0000-0003-0451-6728

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Appendix S1: Question guide.

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