IMPROVING MENTAL WELL-BEING THROUGH CULTURE-SPECIFIC OUTDOOR LEARNING: A MIXED-METHODS STUDY

By

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ABSTRACT

Background: Green prescriptions—nature-based interventions to improve human health—are becoming increasingly popular. Research has highlighted a need for inclusion of culture in green prescriptions as how humans conceive of and engage with nature is informed by culture. This project aimed to assess the feasibility and effectiveness of a culture-specific outdoor learning program in improving mental well-being.

Methods: The biopsychosocial model guided this phenomenological concurrent mixed-method study. A purposive sample of participants (n=32) of the Shieling Project were recruited to participate in an immersive 6-day Gaelic culture-specific outdoor learning program in Scotland, UK. Data collection occurred from June 27 to September 3, 2022. Qualitative data were collected through semi-structured interviews. Quantitative data were collected at baseline and end of project, using four well-established instruments—the Self-Connection Scale (SCS), the Social Connectedness Scale-Revised (SCS-R), the Inclusion of Nature in Self Scale (INS), and the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS). Thematic and content analyses

were conducted for qualitative data. Paired t-tests and Pearson correlation were used to analyze quantitative data. Triangulation was conducted of thematic analysis with content analysis. Content analysis was triangulated with quantitative results to assess for convergence.
Results: Thematic analyses showed four key themes regarding the culture-specific impact of the program: importance of traditional knowledge, positive value of traditional ways of living, history, and personal values. Content analyses showed that all participants (100%) reported that their mental well-being and nature connectedness were improved after participation; 92% of them reported improvement in social connectedness, and 44% reported improvement in self-connectedness. Paired t-tests showed significant improvements in mental well-being from baseline to follow-up: SCS-R from 69.3 to 77.7, INS from 4.8 to 5.5, WEMWBS from 48.7 to 53.7 (all $p<0.001$), and SCS scores increased from 57.6 to 60.4 ($p=0.007$). Triangulation of thematic analysis with content analysis indicated 20 different connections between culture-specific design and desired impacts of intervention.
Conclusion: The Shieling Project is an effective green prescription in improving mental well-being and provides a template for culture-specific program design that includes outdoor living, communal living, simplicity, and traditional skills. Culture-specific green prescriptions may serve to address current concerns of equitable access and minimization of reductionistic approaches to green prescriptions. Furthermore, this project contributed innovative approaches to meet the needs for mental healthcare, including the value of short-term immersive programming.

Keywords: green prescription, public health, mental well-being, outdoor learning, biopsychosocial model, mixed methods

Improving mental well-being through culture-specific outdoor learning:

A mixed-methods study

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Chapter 1: Introduction

In the United States, the current behavioral health workforce meets only 25% of the mental health need, even less for rural populations (Matulis & Schuffman, 2022; Morales et al., 2020; National Alliance of Healthcare Purchaser Coalitions, 2019). Prevalence of adult mental illness is increasing in the United States, from 18.57% in 2019 to 20.78% in 2022. To address this mental health crisis, innovative approaches with existing resources are needed. Among rural resources, nature proximity is a key feature, and growing research indicates the benefit of time spent in nature for mental well-being (Maller et al., 2006; Huynh et al., 2022; Kuo, 2015). Green prescriptions, in which nature-based interventions are used to improve human health, applies this knowledge to the healthcare setting (Lehto et al., 2021; Shanahan et al., 2019; Sinclair & Hamlin, 2007; Thompson et al., 2019; Thomson et al., 2020). They are used to address a broad array of health concerns through targeted interactions with nature and provide a new approach to mental health (Clayton & Myers, 2015; Pyle, 2003; Soga & Gaston, 2016; Shanahan et al., 2016; Trøstrup et al., 2019; Pretty & Barton, 2020). Major types of green prescriptions include outdoor mindfulness-based stress reduction, care farming, nature walks, individual and/or community gardening, biodiversity conservation volunteering, outdoor education, wild crafts, and other nature-based activities (Jorgensen, 2020; NLM, 2021; Robinson et al., 2020; Sinclair & Hamlin, 2007; Thomson et al., 2020).

Human interaction with nature to support overall well-being is ancient knowledge (Juster-Horsfield & Bell, 2021; Robinson et al., 2020). Traditional ways of life are predicated on a connection to nature, and/or conceptualization of humans as part of nature, and modern lifestyle can separate or weaken that connection and awareness of that connection (Aikenhead & Ogawa, 2007; Burke et al., 2021; Clayton & Myers, 2015; Seymour, 2016; Kleespies et al.,

2021). Contemporary North American cultures are heavily influenced by modern western lifestyles which create disconnection in relations, from the natural world and each other (Clayton & Myers, 2015; Kellert, 1996; Pyle, 2003; Schultz, 2002; Seymour, 2016; Soga & Gaston, 2016). Extinction of experience (EOE) is one term given to describe the phenomenon in which humans are further separated from interacting with the natural world due to norms and processes of modern society (Pyle, 2003; Gaston & Soga, 2020; Soga & Gaston, 2016). Negative impacts of EOE on human and environmental health are well established with EOE cited as a key public health issue (Yamanoi et al., 2021; Soga & Gaston, 2016).

It is critical to note 'nature' itself is a disputed term with a wide variety of definitions and conceptualizations (Key, 2021; Clayton & Myers, 2015; Clayton & Opotow, 2003). The definitions of nature contain major differences in anthropocentric (which centers humans as most significant) and ecocentric (which maintains intrinsic value of the environment) approaches (Blok, 2015; Cocks & Simpston, 2015; Schultz, 2002; Slattery et al., 2022). In addition, the concept of nature connectedness is contested, as it assumes humans can be disconnected from nature. This is not only ecologically untrue, but also, can further the psychological sense of separation (Key, 2021). Therefore, this study paid careful attention to both how nature is defined for the purposes of this study, as well as the limitations of the concept of nature connectedness. How humans define and engage with nature is informed by culture (James et al., 2015; Leavell et al., 2019; O'Brien, 2018; Richardson et al., 2020b), yet only a few studies applied culture-specific interventions. Such as the Japanese practice of Shinrin-yoku, forest bathing (Tsunetsugu et al., 2010), and the Scandinavian philosophy of Friluftsliv, spiritual connectedness with the landscape (Gelter, 2000). The existing public health principle of integration of cultural values and practices in program design can strengthen green prescriptions. There is an urgent need for

inclusion of culture in green prescription research to examine the complexities of human-nature connection and relevance of culture in program design (Robinson and Breed, 2019; Bell et al., 2018; Barton & Pretty, 2010; NLM, 2021).

Problem Statement

The mental health crisis shows no signs of abating – the prevalence of major depression among youth has nearly doubled in the past 10 years (8.66% in 2012 to 16.39% in 2022) with 59.8% not receiving treatment in 2022. Of adults with mental illness, 54.7% did not receive treatment in 2022, and of those seeking treatment, 42% reported cost as the primary barrier. Less than 7% of adults with substance use disorders received treatment in 2022 with the percentage of adults reporting a substance use disorder doubling in three years (7.68% in 2019 to 15.34% in 2022). Moreover, prevalence of adult suicidal ideation has increased every year since 2011 (Reinert, Fritze, & Nguyen, 2019, 2021, 2022). The current treatment approaches remain insufficient to meet the diverse and complex mental health needs of the U.S. population (Baptiste & Talley, 2022; Matulis & Schuffman, 2022; Morales et al., 2020).

Green prescriptions may be the key, but remains primarily within the biomedical model, making the capacity for patient centered approaches limited (Leavell et al., 2019; Owens & Bunce, 2022a, 2022b; Taylor et al., 2022; Borrell-Carrió et al., 2004). What remains largely unexamined is the potential value of programs designed according to culture-specific understandings of human-nature interaction, as well as the impact of shorter-term immersive programs (Bell et al., 2018; Robinson & Breed, 2018; Thompson et al., 2019). A public health lens integrating knowledge of cultural values and practices is required to transition green prescriptions to a more diverse and inclusive practice, and in turn, a more equitable and effective one (American Public Health Association, 2021). Green prescription programming can be part

of the solution, but efficacy of culture specific approaches is not assessed. Thus this study examined impacts on mental well-being through culture-specific outdoor learning.

Research Questions

- Research Question 1: Can culture-specific outdoor learning improve mental well-being, including nature connectedness, social connectedness, and connectedness with self?
- Research Question 2: What meaning do participants ascribe to their participation in an immersive 6-day culture-specific outdoor learning program, including how they experience connection with nature, others, and themselves?

To address these research questions, a phenomenological concurrent mixed-method study was conducted, to examine the impact of short-term immersive culture-specific outdoor learning. The study was guided by the biopsychosocial model. Data collection occurred from June 27 to September 3, 2022 utilizing a purposive sample technique to rectruit participants (n=32) of the Shieling Project which offered culture-specific outdoor learning programming focused on traditional Gaelic ways of living. The Shieling Project programming included experiential components of connectedness with nature, social connectedness, and connectedness with self – each common elements of nature-based intervention (NBI) research (Coventry et al., 2021; Frumkin et al., 2017). Qualitative data were collected through semi-structured interviews (n=25). Quantitative data were collected at baseline and the end of project, using four well-established instruments—the Self-Connection Scale (SCS), the Social Connectedness Scale-Revised (SCS-R), the Inclusion of Nature in Self Scale (INS), and the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS). Thematic and content analyses were conducted for qualitative data. Paired t-tests and Pearson correlation were used to analyze quantitative data. Content analysis was triangulated with quantitative results to assess for convergence. Thematic

analysis and content analysis were assessed for relevance of culture-specific program design. As a culture-specific program, The Shieling Project was intentionally selected in order to explore a specific cultural context. However, findings were beneficial in informing future green prescription research and programming to promote health for diverse populations.

Chapter 2: Literature Review

Literature review was identified through a keyword search of databases through the East Carolina University Laupus Library *One Search* function which eliminates duplicate results – PubMed, Elsevier Scopus, ProQuest Central, Social Sciences Citation Index, Psychology Database, and Healthcare Administration Database. Results were limited to peer-reviewed journal articles in English with no restriction on publication time frame. The specific keywords were ("green prescription" OR "green prescribing") AND ("mental health" OR "mental wellbeing" OR "mental well-being") which returned 24 results. Due to the relatively recent research history for green prescriptions, a second query was conducted with keywords ("nature-based intervention") AND ("mental health" OR "mental wellbeing" OR "mental well-being"), as the term nature-based intervention (NBI) is commonly utilized to refer to interventions used in green prescriptions. This query returned 68 results for which five were duplicates from the initial query. Titles and abstracts of these 87 articles were reviewed to restrict literature review to peer-reviewed academic literature and remove nonrelevant literature, including proceedings of conferences and meetings, editorials, commentaries, and books. A total of 54 articles were reviewed – 15 qualitative studies, 15 quantitative studies, 8 mixed-methods, 3 conceptual models, 5 scoping reviews, and 8 systematic reviews (See Appendix K. List of Literature Review Studies). A thorough review of literature on the topic is included below, organized by study type, with a focus on perspectives on nature-based interventions and improving effectiveness of this intervention. Major theoretical frameworks applied in prior studies were also reviewed.

Green Prescription Research

Green prescriptions were originally developed in New Zealand with a focus on physical health, and have expanded to include promotion of mental health (Sinclair & Hamlin, 2007). A

growing number of healthcare providers are now using green prescriptions, in which individuals participate in outdoor-based activities usually occurring for a set amount of time each week over the course of several weeks (Robinson et al., 2020; Sinclair & Hamlin, 2007; Thomson et al., 2020). This dissertation did not include an examination of physical health, and therefore, literature review was focused on nature-based interventions for mental health or mental well-being.

Nature interaction as beneficial to human well-being is addressed by the biophilia hypothesis. The biophilia hypothesis was first proposed by Edward Wilson (1984), the founder of sociobiology, in the early 1980's to explain human inclination towards nature from an evolutionary perspective. Researchers continue to debate biophilia as innate or learned, but have consensus in its utility for conceptualizing human-nature relationships (Gullone, 2000; Simaika & Samways, 2010). A review of multidisciplinary studies by Gullone (2000) found continued support for Wilson's biophilia hypothesis. She summarizes the impact of humans evolving alongside and with nature, including negative impacts of the recent shift to industrialization. Gullone (2000) notes inclusion of nature and ancient ways of living as beneficial to well-being. Miyazaki (2018) stressed the way in which humans evolved along with nature and the overwhelming majority of our time as a species spent outdoors up until the Industrial Revolution – "But genes cannot change over just a few hundred years, so we live in our modern society with bodies that are still adapted to the natural environment" (Miyazaki, 2018, p. 26). While the biophilia hypothesis was developed within a Western context, research supports aspects of its universality (Marczak & Sorokowski, 2018; Simaika & Samways, 2010), with caution regarding romanticizing or oversimplifying earlier and current Indigenous peoples relationship to nature (Burgess et al., 2009; Nettleton et al., 2007; Walters et al., 2010; Hatala et al., 2019). Concern

regarding lack of prioritization of Indigenous approaches to and Indigenous scholar-led NBI research is noted below in Chapter 5: Implications for Future Research.

Green prescriptions have been shown to have positive biopsychosocial effects and intersect with traditional healthcare through collaboration with healthcare providers (Thomson et al., 2020; Robinson & Breed, 2018). Nature-based wellness programming also has the capacity to incorporate culture making it adaptable to local context (Heard et al., 2022). The support and momentum of nature-based wellness was such that the United Kingdom devoted substantial resources to include green prescriptions as part of their COVID-19 recovery strategy (NLM, 2021). Green prescriptions were also being used at a smaller scale and with a creative focus, such as the green prescription programs at Whitworth Park and the Whitworth Art Gallery in England (Thomson et al., 2020). Some green prescription research focused on provider perspectives and noted the need for specialized training or support. Authors noted this would maximize impact and reach, including enhancing environmental awareness on behalf of providers and healthcare industry (Juster-Horsfield & Bell, 2021; Powell, 2021). Interdisciplinary research teams conducted 31 of the 54 (57%) studies included in the literature review (See Appendix K). The literature review was organized according to study type – qualitative studies, quantitative studies, mixed method studies, and models or reviews. A review of these prior studies showed that culture-specific approaches to green prescriptions have not been investigated. My research intended to fill this gap in literature.

Qualitative Studies

Impact of nature-based interventions was explored in a number of qualitative studies, including phenomenology, case study, grounded theory, and assessment of provider and management perspectives. These studies were conducted in the United States, Canada, United

Kingdom, Ireland, Germany, Hungary, Spain, Norway, Denmark, Finland, Netherlands, Israel, Taiwan, China, Australia, and New Zealand. Disciplines reflected in qualitative nature-based intervention research were most often interdisciplinary, and included public health, mental health, psychology, social work, nursing, ecology, forestry, ecopsychology.

Phenomenology Studies

A review of the existing phenomenology studies showed that three of them are most relevant for this project. The first study was conducted by Haaland and Tønnessen (2022) where they explored the experiences of youth in outdoor recreation (n=8). They focused on a cultural understanding of nature, specifically friluftsliv, Norwegian terminology for free-air-life. They conducted in-depth interviews with eight youth noting participant experience of friluftsliv could be described by three key dimensions: shared experience, encountering a different existence, and departure from everyday life. Haaland and Tønnessen (2022) stressed the value of a cultural foundation for NBI's. The second study examined veterans with PTSD in a therapy garden (n=8) (Poulsen et al., 2018). They found the intervention improved stress management and stressed the value of group nature experiences for building self-concept (Poulsen et al., 2018). The third study was conducted by Richardson et al. (2020) and explored YMCA residents with a NBI including gardening and nature conservation (n=8). They, too, stressed the importance of relationship building in shared experiences in nature, and found the intervention improved self-worth of participants, as well as strengthened capacity to manage emotions through nature (Richardson et al., 2020).

Case Studies, Grounded Theory, and Pilot Studies

The stream of literature focused on case studies – a Jesuit Social Services outdoor project for young women with drug and alcohol misuse (Pryor et al., 2006), a Borderlands Earth Care

Youth Institute ecological restoration program (Nabhan et al., 2020), and the U.K. based 'A Dose of Nature' project (Bloomfield, 2017) – findings indicated the positive value of NBI programs for mental health with specific recommendations for improved success. Pryor et al. (2006) utilized self-reported health and well-being benefits for seven women with drug and alcohol misuse participating in the Outdoor Experience (TOE) program of Jesuit Social Services. TOE is a six-week program, including group work, a 12-day backpacking journey, and debriefing. They found contact with nature was a health promotion strategy with value across the healthcare spectrum, including prevention, early intervention, and treatment. Study authors recommended further research of tailored interventions for specific populations. Nabhan et al. (2020) conducted a case study of one program of the Borderlands Earth Care Youth Institute in which youth are involved in ecological restoration activities. Study findings showed restoration efforts to positively impact the psychological well-being of participants in addition to soil microbiome diversity. They stressed the importance of collaboration between restoration ecologists and ecopsychologists for effective NBI's, as well as the potential of future research to increase effectiveness through understanding of diverse cultures and ecosystems. Bloomfield (2017) conducted a case study of the A Dose of Nature project in south-west United Kingdom examining eight NBI's for health and well-being involving 48 patients. He found the following factors impacting program success: practitioner skills, clear introduction, timing and flexibility of program, participant engagement, and applicability to population.

Specific NBI programs were investigated in a number of studies, including O'Brien's (2018) examination of engagement types for NBIs at the Westonbirt, The National Arboretum in England and Marx and More (2022) SWOT analysis of Scotland's Green Health Prescription Pathway. O'Brien (2018) sought to determine if multiple visits to the Westonbirt Arboretum, a

state managed forest, impacted well-being, as well which activities contributed to positive impacts. Participants were recruited from Westonbirt Community Project which served to diversify visitors to Westonbirt Arboretum. This project focused on individuals with mental health concerns, addiction, autism, or behavioral problems who expressed interest in the project. Participants visited between four to eight times participating in nature walks and outdoor group activities, including crafts and shared food preparation and eating. She utilized focus groups, semi-structured interviews, and observation of 29 participants. Through qualitative analysis according to the established five ways to well-being, three effective engagement types were identified – social, woodland craft, and creative and sensory. She also identified key program elements contributing to effectiveness: repeat visits to nature to support familiarity; volunteer involvement; creative, sensory, and craft activities; supportive and inclusive environment; and understanding participant and organization needs. The SWOT by Marx and More (2022) examined the Green Health Prescription Pathway, an initiative launched in 2019 in the United Kingdom to link patients with NBI's through community service, self-referral, or healthcare professional prescription. They included data from National Health Service (NHS) health professionals, service-users, and delivery partners of the Green Health Prescription Pathway. SWOT analysis revealed key elements for success as solid infrastructure, up-to-date directory, two-way communication mechanism for prescriptions, and person-centered consultation, proactive engagement, and follow-up with patient. Weaknesses and threats identified included lack of sustainable NBI funding, complexity of matching patients to appropriate NBI based on mental and physical health needs, and difficulty of creating and maintaining a single information source accessible for a variety of users.

In a grounded theory study, Naor and Mayseless (2021) sought to identify nature-specific

therapeutic factors in nature-based therapies by conducting in-depth interviews with 26 nature-based practitioners from five countries and six field observations of multiday nature-based group interventions. They stressed the unique value of NBI's and identified four therapeutic factors strengthened by nature: the natural environment as a unique setting for personal growth; the challenge of a natural environment to address limiting self-perceptions; the role of nature as an active part of the therapeutic process; and capacity of a natural setting to impact perspective and increase belonging through interconnectedness and expansiveness experienced through nature (Naor & Mayseless, 2021).

Shrestha et al. (2021) conducted a qualitative pilot randomized control trial (RCT) to assess difference in university student vitality for brief nature or urban walks (n=13). They sought to determine if brief walks in nature could reduce anxiety and stress more than a walk in an urban environment. Participants were recruited through convenience and snowball sampling of university students randomly assigned to walk in either a natural or urban environment for 20-25 minutes. Immediately following the walk, participants were asked two questions regarding how they felt during the walk and anything worth reporting that occurred during the walk. Through thematic analysis of participant responses, they found that walking in nature was a more energizing experience than walking in an urban environment, and the nature walk had positive cognitive and affective impacts. Shrestha et al. (2021) stressed the value of qualitative approaches for NBI due to the subjective experience of nature. A modified consensual qualitative research (CQR) design was used by Duffy et al. (2020) to explore the impact of eco-education for counselors-in-training (n=10). Following a variety of NBI's throughout a semester-long human development class, findings indicated benefit of eco-education for counselor education across four main domains: interpersonal impact, intrapersonal impact,

whole-group impact, and nature-based activities feedback.

Studies on Provider and Management Perspectives

Prior research also investigated provider and management perspectives on NBI's, including strategic planning professionals (McHale et al., 2020), social workers in residential shelters (Peters et al., 2022), academics and educators (Slattery et al., 2022), and interdisciplinary international NBI experts (Shanahan et al., 2019). McHale et al. (2020) sought to explore views of professionals about establishing green health partnerships. Through focus groups and semi-structured telephone interviews with professionals from four Scottish health boards (n=55), they found green health partnerships to be a good fit for public health priorities, but found concerns related to sustainable funding and volunteers, equitable access, appropriate messaging, and evidence of effectiveness. In addition, they stressed the recognition of one size not fitting all in program development.

Slattery et al. (2022) conducted a focus group with 10 educators from six different countries to investigate the inclusion of nature in social work education and practice. They proposed an Integrative Environmental Model, including a socio-political-cultural context, for social work education based on findings which stressed the centrality of culture in perception of nature noting value of biopsychosocial approaches. In addition, they noted the value of local traditional ideas regarding nature in order to support community engagement with the natural world about the natural world (Slattery et al., 2022). Shanahan et al. (2019) conducted interviews with 19 NBI experts from seven countries and identified 27 specific interventions, and then formulated two broad categories: NBI's that change the environment where people engage (i.e., establish a community park or hospital garden) and those that change behavior (i.e., participant engagement in outdoor activities). They stressed the factors influencing access (e.g.,

socioeconomic variation) and the need for further research to identify features influencing success of NBI's, including understanding how different individuals experience nature based on diverse demographics. In a qualitative study by Peters et al. (2022), they conducted thematic analysis of social work case descriptions (n=99). They sought to identify a framework by which social workers chose nature activities for shelter residents. This study found social workers inclusion of nature to primarily be for stress reduction, children's play, and promotion of parent-child interaction.

Quantitative Studies

Impact of NBI's were explored in a number of different types of quantitative studies, including large-scale online survey studies, randomized control trials (RCT's), quasi-experimental pre-posttest studies, single-group studies, a feasibility study, and a social-benefit cost analysis and social network analysis. These studies were conducted in the United States, United Kingdom, Romania, Denmark, Norway, Italy, Japan, Korea, and China. Disciplines reflected in quantitative NBI research included public health, mental health, social work, psychology, nursing, environmental science, agricultural science, exercise science, and were most often interdisciplinary.

Online Surveys

Soga et al. (2021) conducted an online questionnaire survey (n=3,000) in Tokyo, Japan during the COVID-19 pandemic to assess the relationship between two measures of experiencing nature (green view from home windows and greenspace use frequency) and five mental health outcomes – loneliness (measured according to UCLA Loneliness scale), self-esteem (Rosenberg Self-Esteem Scale), life satisfaction (Liang's (1984) version of the Life Satisfaction Index A), subjective happiness (Subjective Happiness Scale), and depression (12-item General Health

Questionnaire). The anonymous survey was administered through a market research company with participants recruited from their database. They found the frequency of greenspace use and view of nature from home to be associated with increased levels of self-esteem, life satisfaction, and happiness and decreased levels of depression, anxiety, and loneliness. Study authors stressed the value of nature interaction to address worsening population mental health, including the priority of urban green infrastructure.

Marselle et al. (2019) examined if group nature walks could foster resilience for 1,506 participants recruited from Walking for Health (WfH), a country-wide network of health walk programs in England. Participants identified as Nature Group Walkers completed at least one nature walk as part of a group during the previous three months. A subset of this group was identified as Frequent Nature Group Walkers, defined as completing at least one nature group walk per week over the previous three months. The comparison group had not participated in any nature walk, WfH or others, for the previous nine months. Online questionnaires were collected at baseline and three months later. Mental health indicators included the Perceived Stress Scale, Major Depression Inventory, Positive and Negative Affect Schedule (PANAS), and Warwick Edinburgh Mental Well-being Scale (WEMWBS). Stressful life events were assessed according to the List of Threatening Experiences questionnaire (LTE-Q). They found no significant impact of group nature walks on moderation of stress. However, results indicated frequent nature group walks and recent stressful life events both impacted mental health, but the positive impact of frequent nature group walks did not offset the negative impacts of stressful life events.

Randomized Control Trials

Among the RCT's, four of them specifically assessed the impact of NBIs: audio-recorded

meditation in a nature setting to reduce depressive rumination and improve well-being in a sample of university students (n=68) (Owens & Bunce, 2022); nature connectedness in improving preschooler eating behaviors (n=241) (Sobko et al., 2020); nature-based lunch activities in enhancing office worker mental health (n=90) (Ho et al., 2022); and nature-based therapy in reducing annual visits to general practitioner (n=84) (Corazon et al., 2018). The study by Owens and Bunce (2022) to determine impact of audio-recorded meditation on university student mental health included three randomized groups – a control group, indoor meditation group, and nature-based meditation group – and collected data at time of intervention and over a two week follow-up period. They found depressive symptoms to reduce for both meditation groups, but depressive rumination reduced significantly only in the nature-based meditation group while well-being at follow-up was improved for the nature condition only. Study authors stressed the need for replication in future studies, as well as personalized approaches to improve efficacy.

Sobko et al. (2020) examined the effect of nature connectedness on preschooler eating behaviors for the 10-week Play & Grow program in Hong Kong in which children and their caregivers receive nutrition education alongside experiential outdoor activities, including growing of vegetables. The intervention group participated in the Play & Grow intervention, while the control group received only educational materials. They found the Play & Grow program to positively increase nature connectedness for children and their caregivers, as well as positive impacts to child eating behaviors.

Ho et al. (2022) conducted an RCT to test associations of psychological functioning with nature contact. Ninety university employees were randomly assigned to either the control group or the experimental group which spent their lunch break on 10 consecutive weekdays

participating in 30 minutes of nature contact according to a structured protocol. Data were collected at baseline, end of 10-day intervention, and three month follow-up. While results at three month follow-up were not significant, they found significant reduced psychological distress, improved work function, and improved well-being post-intervention. Therefore, Ho et al. (2022) noted the value in regular nature-based lunch breaks for improved office worker well-being.

The study by Corazon et al. (2018) examined the long-term efficacy of Nacadia® nature-based therapy (NNBT) in comparison to STreSS (Specialized Treatment for Severe Bodily Distress Syndromes), a validated cognitive behavioral therapy. Participants were randomly assigned to one of the two treatments with data collected over the course of 12 months from Denmark national healthcare data. Both NNBT and STreSS led to a significant reduction in visits to healthcare practitioners and sick leave. Authors concluded validation for NNBT as a treatment for stress-related illness.

Vermeesch et al. (2022) conducted a feasibility study of the NatureDose™ App to reduce burnout and compassion fatigue for undergraduate nursing students (n=59). Electronic sensor data was collected over four weeks. The intervention group downloaded the app, which included goals for time spent in nature and reminders. They found user-friendliness of the app, but no statistically significant differences in perceived stress between the intervention and control groups. Study authors noted the importance of future studies to include understanding of what nature means to the participants, including how they define it.

Quasi-experimental Pre-posttest Studies

Quasi-experimental pre-posttest studies have also be used to examine impact of NBI's. Examples most relevant for this study include: a therapeutic gardening program to improve

mental well-being (n=111) (Yang et al., 2022); a short-term planting activity for office staff (n=22) to improve emotional state (Wagenfeld et al., 2019); and a nature-based rehabilitation program to reduce stress and improve quality of life for men living with mental health concerns (n=20) (Høegmark et al., 2022) – found support for NBI's, but all noted the need for further study, including randomized control trials (RCT's). The study by Yang et al. (2022) examined effects of a multi-site therapeutic gardening program during the COVID-19 pandemic. The 30-session program occurred over six months at 10 sites throughout South Korea. All five mental health indicators (Mindful Attention Awareness Scale, Engagement in Daily Activity Scale, Mental Health Screening Tool for Depressive Disorders, Mental Health Screening Tool for Anxiety Disorders, and brief version of World Health Organization Quality of Life) improved significantly over the course of the program. Wagenfeld et al. (2019) conducted a pilot study of one time, short-term NBI for urban office staff in which employees potted a succulent plant to keep on their desks. The found a significant increase in happiness, hopefulness, and calm following the intervention. The study by Høegmark et al. (2022) examined the Danish NBI, the Wildman Programme, a 9-week nature-based rehabilitation (designed partially on the biophilia hypothesis) program for men experiencing chronic illness and mental health challenges found significant improvements in psychological health and quality of life.

Single-group Studies

Single-group studies explored impact of NBIs for people living with mental illness and found support, but variance in long-term impact. Gonzalez et al. (2010) examined a therapeutic horticulture group with 28 participants living with clinical depression. Data were collected at baseline, twice during intervention, after the 12-week group, and a 3-month follow-up. They found reduced depression in participants post-intervention, as well as 3-month follow-up

(Gonzalez et al., 2010). Bettman et al. (2022) examined the impacts of a 3-day peer-led therapeutic wilderness intensive for military veterans (n=56) living with mental illness. Depression, anxiety, PTSD, and substance use symptomology significantly reduced following intervention with diminishing impact at 6- and 12-month follow-up. A study by Hitter et al. (2019) examined a 10-day therapeutic horticulture program (n=85). They found both subjective (Beck Depression Inventory) and objective (spectrophotometric analysis) measures of depression reduced following the intervention. The recommendation for ongoing nature experiences in order to maintain and continue improvement was a common conclusion in all three studies (Bettman et al., 2022; Ho et al., 2022; Soga et al., 2021).

Social-benefit Cost Analysis and Social Network Analysis

In addition to these quantitative studies, a social-benefit cost analysis and social network analysis which examined NBI's were included in this section. Pretty and Barton (2020) conducted a social-benefit cost analysis of four NBI and mind-body intervention (MBI) programs (woodland therapy, therapeutic horticulture, ecotherapy/green care, and tai chi) for life satisfaction/happiness and costs of use of public services in the United Kingdom. They found the programs to reduce health system cost while improving well-being. Borgi et al. (2019) utilized social network analysis to map six social farms in Northern Italy and found social farms to be an important tool for community engagement, as well as rural economies.

Five of these fifteen quantitative studies stressed the need for research to incorporate cultural aspects in future studies, including benefits of personalized approaches (Owens & Bunce, 2022), nature experiences according to region (Soga et al., 2021), social context (Marselle et al., 2019), individual definition and significance of nature (Vermeesch et al., 2022), and importance of consideration of specific cultures (e.g., military culture) (Bettman et al.,

2022).

Mixed Method Studies

Mixed-method studies were conducted in the United States, United Kingdom, Sweden, and Australia and included exploratory sequential design, community-based participatory research, single-group studies, and spatial analysis. Disciplines reflected in mixed method NBI research included public health, mental health, environmental science, family medicine, psychology, forestry, biodiversity, and contained the highest prevalence of interdisciplinary research.

A key study in the formation of this dissertation was Thomson et al. (2020) exploratory sequential mixed-methods study utilizing a biopsychosocial approach. They investigated the biopsychosocial effects of a creative museum-based green prescription program. They conducted semi-structured interviews and gather diary entries with mental health service users (n=26) of the program. The program involved a combined arts and nature-based intervention, including horticulture, at the Whitworth Park and the Whitworth Art Gallery. Through an inductive thematic analysis, they found participants well-being improved as reported by increases in self-esteem and sense of community. Then, they conducted pre–post surveys of participants (n=20) with the quantitative measure University College London (UCL) Museum Wellbeing Measure, and the found a significant increase in psychological well-being. Thomson and colleagues (2020) suggested future research examine additional types of creative green prescriptions. They also recommended museums with parks consider innovating around the positive biopsychosocial impacts of combined arts and nature-based programs. Another mixed method study utilizing a biopsychosocial approach, Irvine et al. (2020) conducted a feasibility study of group outdoor health walks using activity trackers (n=13). Through examination of

interviews and Self-Assessment of Change (SAC) scale over the course of 12 weeks, results indicated improved mental and physical well-being. Authors stressed the need for a complex intervention lens in future NBI research.

Another key study in the formation of this dissertation was Sachs et al. (2022) community-based participatory research study to examine the Meeting in Nature Together (MINT) Program, a school-level nature-based social intervention. Sachs and colleagues (2020) investigated the feasibility of MINT through a pilot program a charter school for pregnant and parenting teens. They recruited participants from the student body and had two cohorts, n=8 in 2020 and n=9 in 2021. The program lasted 8-weeks for each cohort and included in-person and online educational meetings and discussions, park excursions, mindfulness activities, and nature photography. They audiovisually recorded group and individual meetings and logged observation field notes. Also, participants completed surveys and journaling. Inductive analysis of qualitative data found increased sense of belonging, stress reduction, increased motivation to be outside, and improved connection with nature. Pre and post survey with the UCLA Loneliness Scale Version 3 indicated reduction in loneliness. They stressed the importance of co-creation for culturally-sensitive approaches and diversity in the outdoors.

In interdisciplinary single group studies which utilized individual and group interviews along with site specific quantitative questionnaires, Sahlin et al. (2019) examined a 3-day and 2-day zoo-related course for caretakers for persons with disabilities (n=35), and Toews et al. (2018), a short-term, one-time NBI with incarcerated women in which they potted small plants for their individual living spaces and larger ones for communal spaces (in=16). Both studies found improved well-being through contact with nature and stressed the importance of access to NBI's for disadvantaged populations. In a randomized, controlled, cross-over study at a military

base, Ameli et al. (2021) examined the well-being impact of walks on the Green Road (nature environment intentionally designed), as compared to an urban street, for service members and families, employees, students, or retirees (n=12). Qualitative analysis of individual semi-structured post walk interviews and Wilcoxon signed-rank test of Distress Thermometer (DT) and Mindful Attention Awareness Scale-state version (MAAS) found the nature environment to provide more positive experiences than the urban street. Gunasiri et al. (2022) conducted an exploratory study to examined the impact of nature contact on climate anxiety for Australian youth (n=46 survey & n=14 for semi-structured interviews). Participants were recruited from existing groups of youth involved in climate action who completed online questionnaires and semi-structured interviews exploring their experiences with climate action, including coping strategies regarding eco-anxiety. They found nature contact to be a means of reducing climate action fatigue and climate induced stress, and thus supported improved well-being. Finally, in a larger examination of green prescription general practitioners and nature-based organizations in the United Kingdom (n=284), Robinson et al. (2020) utilized questionnaires and spatial analysis to determine barriers to green prescriptions. Authors stressed the need for a complex conceptualization of NBI's and centrality of transdisciplinary collaboration to address inequalities in nature access.

Major Conceptual Models Applied in Prior Studies

In addition to the qualitative, quantitative, and qualitative studies reviewed above, a number of NBI studies specifically explored conceptual models for NBI design and implementation. Conceptual models developed from focused literature reviews indicated strong support for use of NBI's specifically for treatment of depression (Owens & Bunce, 2022) and veteran populations (Hawkins et al., 2016; Bettman et al., 2020). However, Owens & Bunce

(2022) stressed the need for further research noting the need for personalized approaches and caution against a dose-response oversimplification for NBI's. The consensus in five interdisciplinary or public health scoping reviews indicated NBI's can be successfully implemented in a variety of settings and populations, but stressed the need for further research with improved methodological rigor and more diverse populations (Leavell et al., 2019; Maller et al., 2006; Moeller et al., 2018; Moyers et al., 2022; Touloumakos & Barrable, 2020). This was noted for a variety of foci or settings, including urban populations (Leavell et al., 2019), institutional settings (Moeller et al., 2018), addressing Adverse Childhood Experiences (ACEs) (Touloumakos & Barrable, 2020), and health promotion (Maller et al., 2006).

Systematic reviews (Coventry et al., 2021; Gritzka et al., 2020; Kondo et al., 2015; Kotera et al., 2021; Lewis et al., 2022; Taylor et al., 2022; Trøstrup et al.; 2019; van den Bogerd et al., 2020) concluded the benefits of NBI's, but the need for more rigorous research, specifically: delineation of what aspects of contact with nature are beneficial (Lewis et al., 2022); refined measures of nature and nature contact, as well as cross-sector collaboration (Kondo et al., 2015); need to address bias and potential differences in demographic characteristics (van den Bogerd et al., 2020); concern re. methodological rigor and need to explore equitable access to nature for diverse populations (Kotera et al., 2021); increasing cross-cultural applications and minimizing study bias (Taylor et al., 2022); need for theory-driven research due to complexity of research (Gritzka et al., 2020); need for randomized control trials (Trøstrup et al.; 2019); and value of and need to assess place-based approaches (Coventry et al., 2021).

A theoretical framework used in green prescription research is the biopsychosocial model due to its inclusion of biological, psychological, and social aspects of health (Irvine et al., 2020; Slattery et al., 2022; Thomson et al., 2020). Other theoretical frameworks used in green

prescription or nature-based intervention research included Stress Reduction Theory and Attention Restoration Theory (Coventry et al., 2021; Gritzka et al., 2020), Socio-ecological Theory or Framework (Maller et al., 2006; Pryor et al., 2006), and Social Cognitive Theory and Self-determination Theory (Sachs et al., 2022).

Summary of Literature

Of the research studies reviewed above, nearly half (26 of 54 or 48.1%) listed the need for consideration of culture and/or complexity as an important area for further research, and nearly one quarter (13 of 54 or 24.1%) specifically cited culture and/or local context (See Appendix K). The growing popularity of green prescriptions has led to a call from within and outside the research community to better understand not only how green prescriptions work, but also "what works best for whom" (NLM, 2021, para. 3). This included a need to take a more critical view of the oversimplification of dose and examine the complexities of human-nature connection, including the influence of culture (Robinson and Breed, 2019; Bell et al., 2018; Barton & Pretty, 2010; NLM, 2021). There is a need to specifically assess the cultural factors and context that impact nature experiences, as stressed in an expert commentary that explored the human-nature connection to identify next steps for public health research in the United States (Frumkin et al., 2017). In addition to this key literature gap, there were a dearth of mixed-methods studies in NBI research with only eight of the fifty-four articles in this literature review utilizing a mixed-method approach. Also, some researchers stressed the need for more RCTs to determine effectiveness factors and identify dose-response relationships in green prescriptions (Barton & Pretty, 2010; Bloomfield, 2017; NLM, 2021; Shanahan et al., 2016; Vermeesch et al., 2022). My study aimed to address the lack of incorporation of culture and mixed method studies in NBI literature.

Chapter 3: Methodology

This chapter outlines the methodology for this study, including the theoretical framework, research design, study setting, and participants. Research design details the phenomenological concurrent mixed-method approach, including qualitative methods (data collection and data analysis) and quantitative methods (instruments, data collection, and statistical analysis).

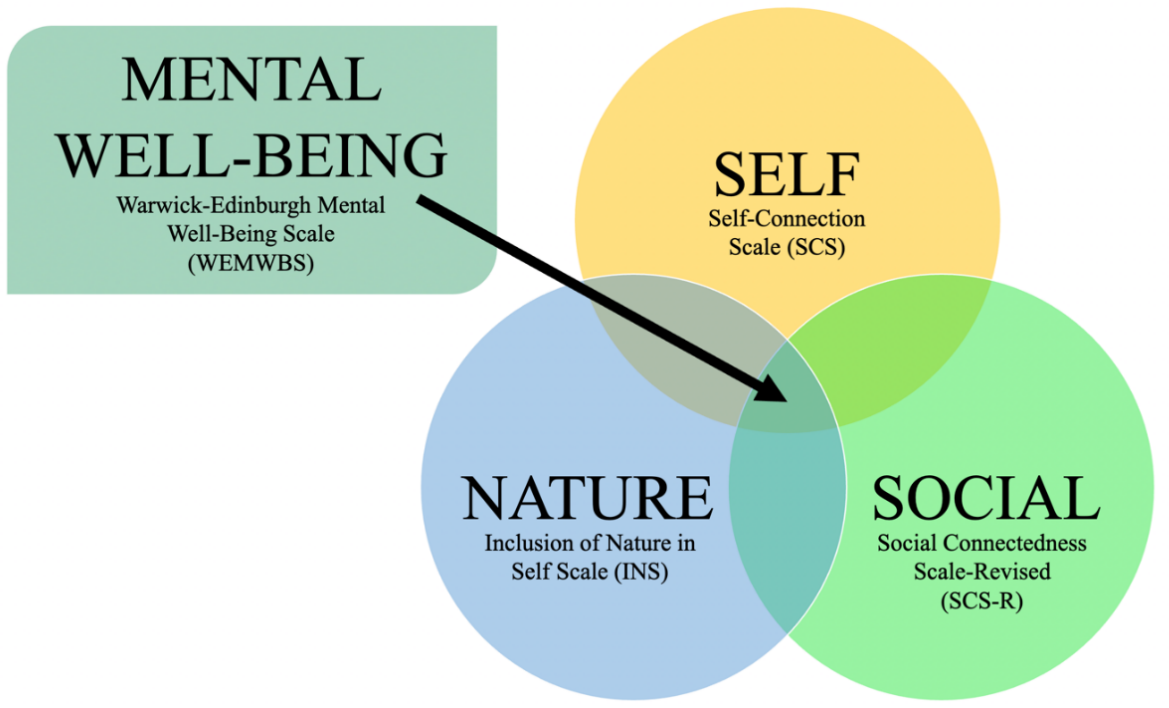
Theoretical Framework

This study was guided by the biopsychosocial model (Engel, 1977; Borrell-Carrió et al., 2004) developed in the 1970's by George Engel as a more holistic approach to healthcare in contrast to the dominant, and reductionist, biomedical model (Rocca & Anjum, 2020). Its inclusion of the biological, psychological, and social elements of health make it an excellent and common approach for public health research (Chigangaidze, 2021; Irvine et al., 2020; Kim et al., 2019; Thomson et al., 2020). Moreover, the biopsychosocial approach has been applied specifically in NBI research (Thomson et al., 2020; Irvine et al., 2020).

The biopsychosocial model is sometimes depicted visually as a Venn diagram with three overlapping circles – Psychological (e.g., self-esteem, social skills, coping), Biological (e.g., physical health, genetics, exposures), and Social (e.g., family, peers, school) – with Mental Health as the overlap of the three. For my study, the conceptual framework was adapted from the biopsychosocial model. It included a framework for the components of nature connectedness, social connectedness, and connectedness with self, as well as the conceptualization of mental well-being as a composition of the three (See Figure 1: Conceptual Model of the Study). Key to this conceptualization was the multidisciplinary approach to well-being informed by conservation psychology, mental health, and public health (Clayton & Myers,

2015; Klussman et al., 2022; Padgett, 2012; Schultz, 2002; Thomson, 2020). Conservation psychology notes the centrality of biophilia for well-being, a term reviewed above in the Literature Review, referring to the inherent value and affinity humans experience interacting with nature based on human evolution alongside nature (Clayton & Myers, 2015; Kellert, 1996; Pyle, 2003; Soga & Gaston, 2016). Mental health notes the importance of connection with self for mental well-being (Klussman et al., 2022). Public health and mental health note the critical aspect of connection with others as central to mental well-being (Padgett, 2012; Thomson, 2020). Based on my conceptual model, the culture-specific outdoor learning of my study would improve mental well-being through increased nature connectedness, social connectedness, connectedness with self, with a correlation existing between them.

Figure 1: Conceptual Model of the Study



Study Setting

The United Kingdom is currently leading the healthcare field in green prescription research with 19 of the 54 (35%) studies included in the literature review either conducted in the United Kingdom or authored by a researcher based at a U.K. university, including ongoing large-scale studies to identify characteristics of successful design and implementation (NLM, 2021). Also, the NHS prioritizes green social prescriptions in the NHS Long Term Plan, including programming for nature-based interventions for mental health (NHS, 2020; Natural England, 2016 & 2017). Within the United Kingdom, NatureScot in Scotland is spearheading stakeholder engagement for green prescriptions through the Green Health Partnership Intervention and public health nature-based interventions (Hanson et al., 2020; Marx & More, 2022). Concurrent with the United Kingdom's leadership in NBI research was the goal of cultural sensitivity and humility in research, as introduced above in the Literature Review and explored below in Chapter 5. The researcher's personal ancestry is primarily Scottish and English, with awareness of ethical considerations as a white person conducting research exploring culture-specific program design attuned to traditional cultures. Therefore, a study setting in the United Kingdom attuned to an earlier traditional culture of the British Isles was sought out by the researcher. In addition, characteristics of an appropriate study setting included nature-based programming with components of nature connectedness, social connectedness, and connectedness with self, all common characteristics of NBI research (Coventry et al., 2021; Frumkin et al., 2017). Most critically, the research topic required a setting in which programming is culture-specific and attuned to a traditional culture. The setting which met all of these criteria was The Shieling Project in Dumnaglass, Scotland.

The Shieling Project is an outdoor learning center in the Scottish Highlands which

provides place-based outdoor education programming based on the Gaelic tradition of the shieling (The Shieling Project, 2023). The Shieling Project takes its name from a traditional agricultural practice that depended on shielings. A shieling is a complex culture-specific phenomenon practiced in areas of Scotland for approximately 2,000 years (Davies & Watson, 2007; Kupiec & Milek, 2018). It is a form of agricultural land use involving seasonal migration for grazing and cultivation, and it encapsulates an example of a traditional way of living predicated on the interconnectedness of all life (Gordon, 2021; Kupiec & Milek, 2018; The Shieling Project, 2023; Newton, 2000). Participants began their experience with a walk up to The Shieling Project from the parking area, reminiscent of the seasonal walk up the shieling site (See Figure 2: Track to The Shieling Project). The shieling was a strong cultural phenomenon involving not only pastoral and agricultural practices, but also the organizing principle for Gaelic culture establishing their seasonal calendar, customs, values, and identity (Newton, 2000).

The outdoor and communal design of The Shieling Project is key to its programming. Participants stay in a bothy (a small hut, derived from the Gaelic bothan), which can sleep up to six people, with six bothies located around a central grassy field. There is a large covered communal space, An Talla, Gaelic for "the hall," and various shared outdoor spaces, including two circles of tree stumps arranged around a space for a fire. All meals are prepared and enjoyed communally in a purpose built kitchen, Am Bothan Bìdh, Gaelic for "the food bothy" (See Figure 3: An Talla and Am Bothan Bìdh). While forest and woodlands schools are a type of nature-based intervention, The Shieling Project is unique in its organization around a specific culture (Pretty & Barton, 2020). Its focus is place-based outdoor education and not currently utilized as a green prescription.

Figure 2: Track to The Shieling Project

Figure 3: An Talla and Am Bothan Bìdh

Participants

This study was approved by the ECU University and Medical Center Institutional Review Board (UMCIRB 22-000686) on June 6, 2022 (See Appendix G. ECU UMCIRB Approval Letter. The participants for this study were individuals registered for the Shieling Project for the 2022 season. The program included the following: Family Camp #1 (7/10-15), Family Camp #2 (7/31-8/5), Duke of Edinburgh (DofE) Gold Residential #1 (8/14-19), and DofE Gold Residential #2 (8/28-9/2). Study research participants were recruited from these four camps based on the following inclusion and exclusion criteria – Inclusion criteria: Individuals 16 years of age or older attending a Shieling Project camp during 2022; Exclusion criteria: Individuals under 16 years of age. Family Camps and DofE Residentials were similar in participant experience due to The Shieling Project Gaelic culture-specific program design. However, the composition of group was different due to camp focus – Children attend Family Camp with their parents, while DofE groups were composed of young adult singles. It is important to note a majority of participants of the four camps were adults; however, participation by 16 and 17-year-olds was allowed (and approved) during the two Duke of Edinburgh Gold Residentials based on the focus of those programs on older teens and young adults (ages 16 to 25). No 16-year-olds signed up for the study, but seven 17-year olds did. While data from children, teenagers and young people (CTYPs) can be included together for data analysis, there is minimal support to include data of CTYPs along with middle- and older-age adults for data analysis (Flanagan et al., 2015; Noel et al., 2021). However, research supports similar cognitive capacity for 17-year-olds to adults, but differences in psychosocial maturity (Icenogle et al., 2019). Due to the focus of this study on cognitive and psychosocial aspects of well-being, 17-year-old participants were able to be included in a meaningful way and not analyzed separately.

Sampling strategy was purposive sampling based on participants registered for outdoor learning programming at The Shieling Project. A total of 30 participants were recruited from all programs, taking into consideration of gender, age, and background to ensure a better representation of the participants (Etz & Arroyo, 2015). Demographic data (age, race, ethnicity, gender, and country of residence) were collected. Race and ethnicity were queried according to the U.K. Census Standards for Scottish populations which recommends querying national identity along with ethnic group (Office for National Statistics, 2021). Country of residence was queried with an open-ended response in order for participants to utilize national labels of their choosing. For example, individuals may identify as Scottish or British, and may identify as living in Scotland or the United Kingdom. Gender was queried as open ended response according to inclusive language guidelines appropriate for small sample size and/or qualitative research (American Counseling Association, 2010).

Research Design

This research was a phenomenological concurrent mixed-method study with qualitative semi-structured interviews and quantitative pre/post surveys. This study used a phenomenological mixed methods approach in order to explore the particular life experience of culture-specific outdoor learning for participants of programming at The Shieling Project. This allowed for examination of the impacts of outdoor learning, as well as culture-specific characteristics impacting program effectiveness. This research study was a concurrent or convergent mixed-method design in which the quantitative and qualitative components occurred simultaneously and the qualitative component is dominant to the quantitative one (Creswell et al., 2011; Kaur, 2016; Small, 2011; Onwuegbuzie & Collins, 2007; Padgett, 2012). A mixed method approach was chosen for both confirmation and complementarity functions, as

triangulation of data occurred as part of confirmation of the qualitative data by the quantitative data, as well as the strength of qualitative approaches to elucidate meaning (Onwuegbuzie & Collins, 2007; Small, 2011). Semi-structured interviews were needed in addition to validated scales in order to elucidate the richness of data exploring phenomenological meaning. Phenomenology was chosen as the qualitative approach due to its capacity for exploration of participant experience, as well as the situations and conditions of those experiences. More specifically, the assessment of participant experience with unique and complex phenomenon, such as the culture-specific programming of The Shieling Project (Padgett, 2012).

Qualitative Methods

Qualitative data from semi-structured interviews were used to determine impacts of intervention on well-being, social connectedness, self-connectedness, and connectedness with nature, as well as meaning ascribed to participation and recommendations for green prescription design. Data were analyzed utilizing NVivo for a content and thematic analysis. See below for details of data collection and analysis.

Qualitative Data Collection. Planned qualitative data included: One formal individual semi-structured interview with each research subject during the final 2 to 3 days of camp for a total of 30 interviews planned. Prior to data collection, informed consent was conducted both virtually (week prior to camp) and in-person (upon arrival to camp) with all informed consent signed prior to start of data collection. During the course of each camp, study participants were invited to participate in a one-on-one semi-structured interview exploring what activities they participated in, emotions experienced, lessons learned, and how it was to be part of a group. For example, participants were asked “How would you describe your experience this past week and what it means to you?,” “Think of one of your favorite moments from this past week, and

describe that in as much detail as possible, including any images, feelings, or sensations in your body," and "How was it to participate as part of a group?" Full semi-structure interview protocol, including script, is available in Appendix E. Twenty-one participants completed interviews. Interview length ranged from 12 to 39 minutes, and averaged 27 minutes. Interviews were audio recorded and did not contain any personally identifiable information. Five additional participants completed online qualitative questionnaires containing the interview protocol questions, as interviews were not an option due to researcher's quarantine for COVID-19 illness.

As an outdoor learning site, a majority of interviews were conducted outdoors in a private place without interruptions with attention to safety and confidentiality for participants. Data saturation was accounted for by planned formal semi-structured interviews with all participants (Guest, & Namey, & Chen, 2020). Hennink et al. (2017) note a minimum of nine interviews for code saturation and 16 to 24 for meaning saturation for purposive samples, and therefore, the goal sample size of 30 and subsequent n=25 for qualitative data was sufficient. Researcher was attentive to repetition of themes in multiple interviews to assess data saturation during data collection with discernment of personal lens to minimize bias toward saturation (Fusch & Ness, 2015). Furthermore, triangulation of data from multiple data collection methods (qualitative and quantitative) is addressed in Results (Hennink et al., 2017; Fusch & Ness, 2015).

The timeline of qualitative data collection was as follows – five participants interviewed during Family Camp #1 (7/10-15); nine participants interviewed during Family Camp #2 (7/31-8/5); six participants interviewed during DofE Gold Residential #1 (8/14-19); and completion of qualitative questionnaire by five participants (in place of interview due to researcher's COVID-19 quarantine) during DofE Gold Residential #2 (8/28-9/2).

Qualitative Data Analysis. Deidentified audio recordings of individual interviews were transcribed by SpeedScriber (Digital Heaven Limited, 2018), a secure automated transcription service, and then hand checked and corrected by researcher to ensure accuracy. Transcripts were uploaded to NVivo (Lumivero, 2017), and qualitative data analysis utilized NVivo software for manual coding, and included both content analysis and thematic analysis to have both deductive and inductive approaches.

Thematic Analysis. Thematic analysis was chosen to address Research Question 2 (What meaning do participants ascribe to their participation in an immersive 6-day culture-specific outdoor learning program, including how they experience connection with nature, others, and themselves?). Thematic analysis followed an established process of data familiarization, initial codes generation, and searching for, reviewing, and revising themes, including content, and manifest and latent content (Vaismoradi et al., 2013). This occurred through manual examinations of interview transcripts utilizing *in vivo* codes identifying themes through an inductive coding process over six cycles. These themes and corresponding subthemes were assessed for complementarity with content analysis and quantitative findings for clarification, elaboration, and/or illustration, as well as potential new perspectives and unanticipated emergent themes (Kansteiner & König, 2020; Vaismoradi et al., 2013; Fereday & Muir-Cochrane, 2006). Thematic analysis, an inductive approach, is common for phenomenology, as there may be no other published studies in a particular area. Such is the case for this study of culture-specific outdoor learning as a type of green prescription.

Content Analysis. Content analysis, a deductive approach, was chosen to address Research Question 1(Can culture-specific outdoor learning improve mental well-being, including nature connectedness, social connectedness, and connectedness with self?). Given the objective

of this study, a deductive coding process was applied. Prior research establishing outcomes of green prescription programming was used for code book determinations and included: increased calm, relaxation, social cohesion, self-esteem, and connectedness with nature; and reduced social isolation, stress, and mental distress (Lehto et al., 2021; Shanahan et al., 2019; Thompson et al., 2019; Thomson et al., 2020). The study conceptual framework was used to organize coding with main themes of nature connection, self-connection, social connection, and mental well-being. Quantitative data collection was also organized in this manner to allow for triangulation of content analysis and quantitative results.

Codebook was determined based on previous NBI research. Nature connection was coded based on the pathways to nature connectedness framework: Senses (sensory interaction), Emotion (feelings), Beauty (noticing aesthetics), Meaning (cultural relationship), and Compassion (care) (Lumbar et al., 2017; Richardson et al., 2020a). Self-connection was coded according to the subscales of the Self-Connection Scale: self-awareness, self-acceptance, and self-alignment (Klussman et al., 2022). Social connection was coded according to established green prescription outcomes of increased social cohesion and reduced social isolation. Mental well-being was coded according to established green prescription outcomes of increased calm, relaxation, and self-esteem, and reduced stress. Initial codes were developed from these established outcomes, and a coding scheme refined according to Appendix C.

Experiential components were coded based on anticipated primary impact (e.g., traditional storytelling requires community and is assigned to social connectedness, while wilderness safety enhances self-awareness and is assigned to self-connectedness). However, all experiential components were checked for relevance to each *a priori* code with similar note for open-ended semi-structured interview questions. The unit of analysis was participant interview.

Content analysis utilized manual coding to strengthen preservation of context and not rely solely on frequency of codes counted, as loss of context is often cited as a criticism of content analysis (Vaismoradi et al., 2013; Saldaña, 2013). This occurred through multiple coding cycles of interview transcripts in which words or phrases were coded according to the *a priori* codes in the codebook described above. Results of content analysis was triangulated with quantitative results to assess for convergence.

Quantitative Methods

Quantitative data was collected at baseline and conclusion of program utilizing self-report surveys containing validated scales to determine impact of intervention (6-day culture-specific outdoor learning program) (See Appendix D. Pre- and post- self-report surveys containing WEMWBS, SCS, SCS-R, INS,). Pre-survey was conducted either during the week prior to arrival to site if participant elected to utilize online Qualtrics survey or upon participant arrival to site with paper survey. Post-survey was conducted five days after baseline on the final day of program during lunch break following conclusion of programming. I used the following well-established instruments: Self-Connection Scale (SCS) (Klussman et al., 2022), Social Connectedness Scale-Revised (SCS-R) (Lee et al., 2001)), Inclusion of Nature in Self Scale (INS) (Schultz, 2002), and Warwick-Edinburgh Mental Well-Being Scale, 14-item (WEMWBS) (Tennant et al., 2007).

1) Self-connectedness was measured using the Self-Connection Scale (SCS) (Klussman et al., 2022). The SCS contains 12 statements on self-awareness, self-acceptance, and self-alignment (e.g., “It is easy for me to identify and understand how I am feeling in any given moment” and “I know myself well”), each on a 7-point Likert scale (from “Strongly Disagree” to “Strongly Agree”) (see Appendix J). Thus the total score ranges from 12 to 84.

2) Social connectedness was measured using the Social Connectedness Scale-Revised (SCS-R) (Lee et al., 2001). The SCS-R contains 20 statements on interpersonal connection with the social world (e.g., "I feel understood by the people I know" and "I find myself actively involved in people's lives"), each on a 6-point Likert scale (from "Strongly Disagree" to "Strongly Agree") (See Appendix K.) Thus the total score ranges from 20 to 120. Social connectedness also has a number of dimensions with general consensus for conceptualizing it as a type of relational schema referring to the as a whole (Lee et al., 2001). The SCS-R was chosen over other scales measuring similar phenomenon, such as the Social and Community Opportunities Profile (SCOPE) Short Version, or UCLA Loneliness Scale, due to the SCS-R as the most psychometrically sound measure designed for administration as a self-report questionnaire (Cordier et al., 2017).

3) Nature connectedness was measured using the Inclusion of Nature in Self Scale (INS) (Schultz, 2002). The INS is a visual scale of increasingly overlapping circles (one circle represents self and a second circle represents nature) ranging from 1 to 7, with 1 indicating no overlap between self and nature and 7 indicating complete overlap between self and nature (See Appendix I.). While other scales are available which measure human connectedness with nature, such as the Revised Environmental Identity Scale (EID-R), Connectedness to Nature (CTN), and Nature Relatedness (NR), the INS was chosen based on its validity, positive correlation with ecocentric attitudes, and simplicity of use for self-report questionnaires (Clayton et al., 2021; Kaur, 2016; Kleespies et al., 2021; Schultz, 2002). Nature has a wide variety of conceptualizations often discipline dependent, and for the purposes of this study, nature was defined as natural environmental features and components of environments with minimal human influence (Clayton & Myers, 2015; Clayton & Opotow, 2003). Nature was explicitly not defined

as surroundings totally absent of human impact due to the exclusion of agricultural areas, as well as lack of consideration of traditional lifestyles of Indigenous people who conceptualize humans as part of nature and engage in forms of sustainable land management (Clayton & Myers, 2015; Schultz, 2002; Cronon, 1995). Accounting for humans as part of nature, 'nature connection' becomes a misnomer, and therefore, this study acknowledges the importance of what can be mistakenly overlooked as semantics, and concurs with David Key's distinction between ecological and psychological connection (Key, 2021). The INS focuses on psychological connection with nature and assessed a person's overlap of cognitive representation of self and nature (Liefländer et al., 2013).

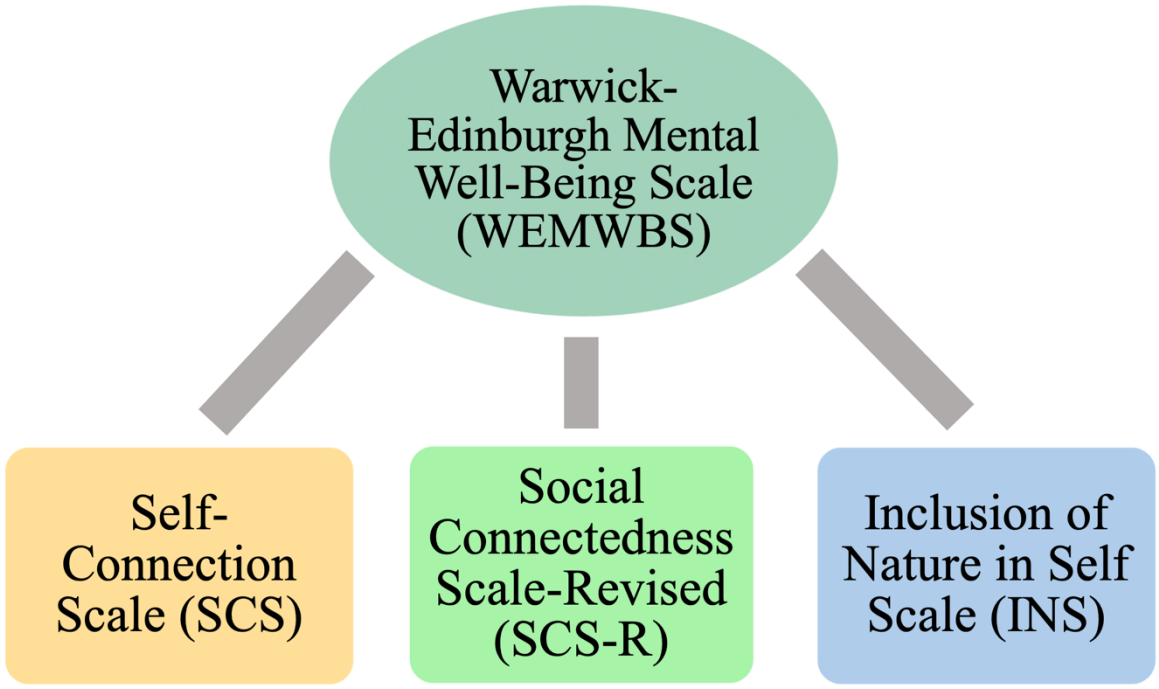
4) Mental well-being was measured using the Warwick-Edinburgh Mental Well-Being Scale, 14-item (WEMWBS) (Tennant et al., 2007). The WEMWBS contains 14 statements on mental well-being (e.g., "I've been feeling optimistic about the future" and "I've been dealing with problems well"), each on a 5-point Likert scale (from "None of the time" to "All of the time") (See Appendix M). Thus the total score ranges from 14 to 70. The WEMWBS was chosen over other measures of mental health which focus on pathology and/or mental illness, such as Patient Health Questionnaire 9-item depression scale (PHQ-9) and 7-item Generalized Anxiety Disorder scale (GAD-7) (Kroenke et al., 2016). The WEMWBS has been widely used in well-being research, including with green prescriptions (Howarth et al., 2020). Mental well-being is a multi-faceted concept without one accepted definition (Stewart-Brown & Janmohamed, 2008; Smith & Reid, 2017). In general, mental well-being includes the following dimensions: life satisfaction, happiness, positive interpersonal relationships, knowledge of self, and positive psychological functioning (Putz et al., 2012; Stewart-Brown & Janmohamed, 2008).

The independent variable is the intervention – the culture-specific outdoor learning program which is implemented in an immersive group format lasting six days. Specifically, this included experiential components of outdoor learning for The Shieling Project programming. The following activities were included: wild foraging for craft and meal preparation; farming, including livestock care and gardening; wild crafting; outdoor sustainable food preparation and storage; communal living; traditional storytelling and music; hiking; wild swimming; and wilderness safety. These experiential components reflect the traditional ways of life of the shieling (Davies & Watson, 2007; Gordon, 2021; Kupiec & Milek, 2018; Newton, 2000).

Data Collection. The self-report survey was administered at baseline (prior to start of program, either online through Qualtrics the week prior or upon arrival to site with a paper survey) and post intervention (on the final day of the 6-day program). Registrants (or parents of registrants aged 16 and 17) were contacted via email with an invitation to participate in the study. Informed consent was conducted electronically with ample opportunity for prospective participants to ask questions of PI prior to consent. After receiving parental consent for registrants aged 16 and 17, minors were contacted to complete assent process, also with ample opportunity for questions of PI prior to assent. All invitation email communication templates and electronic consent and assent documents are available in approved UMCIRB study submission. Email reminders to complete surveys were sent with a link to the electronic Qualtrics survey. Quantitative data collection was as follows – seven participants completed pre and post surveys during Family Camp #1 (7/10-15); ten participants completed pre and post surveys during Family Camp #2 (7/31-8/5); ten participants completed pre and post surveys during DofE Gold Residential #1 (8/14-19); and five participants completed pre and post surveys during DofE Gold Residential #2 (8/28-9/2).

Statistical Analysis. Paired sample t-tests were conducted for: pre- and post- for SCS, SCS-R, INS, and WEMWBS. Pearson correlation was conducted for SCS, SCS-R, and INS to WEMWBS for pre, post, and change with self-connectedness, social connectedness, and nature connectedness as components of mental well-being, as seen in Figure 4.

Figure 4: Components of Well-being



Chapter 4: Results

This chapter presents qualitative and quantitative results, including use of tables and figures to explain results. Thematic analysis themes, subthemes, and illustrative participant quotes are summarized in Table 2: Thematic Analysis. Content analysis themes, theme descriptions, codes, and number of references and participants are summarized in Table 3: Content Analysis. Paired samples t-test results are summarized in Table 5, and Pearson correlation results in Table 6. This chapter then transitions to triangulation of data findings and includes triangulation of content analysis with paired sample t-tests and Pearson correlation, as well as triangulation of thematic analysis with content analysis. In order to compare content analysis with Pearson correlation, convergence of content analysis themes was assessed by number of participants (See Table 7). From the triangulation of content and thematic analyses, aspects of culture-specific design are identified as key to positive program impacts, as summarized in Table 8: Theme Convergence by Shared References for Thematic & Content Analysis. These key findings are detailed in Table 9: Culture-specific Design and Positive Program Impacts with design element, impact, and illustrative participant quote. To visually depict the results of these two triangulations, two figures are presented with results according to conceptual model of study – Figure 5: Content Analysis Themes According to Conceptual Model and Figure 6: Culture-specific Relevance According to Conceptual Model.

Study Sample

A total of 32 participants completed this study. Participant age ranged from 17 to 50; 18 female and 12 males, one non-binary person, and one transgender person (See Table 1). A majority of participants were white (31 of 32), and in terms of national identity, a majority of participants identified as either British (13 of 32) or Scottish (11 of 32). Seventeen participants

were part of family camp programs (10 for Family Camp #1 and 7 for Family Camp #2. Fifteen participants were part of Duke of Edinburgh (DofE) Residentials (10 for DofE #1 and 5 for DofE #2). Of the 32 participants which completed quantitative pre- and post- self-report surveys, 25 complete qualitative semi-structured interviews.

Table 1: Demographics

		N (Total N=32)	%
Gender	Female	18	56.3%
	Male	12	37.5%
	Non-binary	1	3.1%
	Transgender	1	3.1%
Age	17	7	21.9%
	18-20	8	25.0%
	21-30	0	0.0%
	31-40	4	12.5%
	41-50	13	40.6%
Country of Residence	England	4	12.5%
	Scotland	11	34.4%
	Spain	2	6.3%
	United Kingdom	13	40.6%
	United States	2	6.3%
National Identity	Scottish	11	34.4%
	English	1	3.1%
	Welsh	0	0
	Northern Irish	1	3.1%
	British	13	40.6%
	Other	6	18.8%
Ethnic Group	White	31	96.9%
	Mixed/Multiple ethnic groups	0	0.0%
	Asian/Asian British	0	0.0%
	Black/African/Caribbean/Black British	0	0.0%

	Other ethnic group	1	3.1%
Program	Family Camp 1	7	21.9%
	Family Camp 2	10	31.3%
	Duke of Edinburgh Residential 1	10	31.3%
	Duke of Edinburgh Residential 2	5	15.6%

Qualitative Results

Qualitative findings were derived from inductive thematic analysis and deductive content analysis of participant semi-structured interviews (n=20) and qualitative questionnaires (n=5) using NVivo v12 to manually code and organize data (NOTE: Online qualitative questionnaires were used in place of in-person semi-structured interview for one camp, Duke of Edinburgh Residential #2, due to primary investigator contracting COVID-19). For thematic analysis, all transcripts were uploaded to NVivo and then manually coded inductively over six passes to iteratively identify themes and subthemes. For content analysis, transcripts were manually coded using NVivo according to a codebook based on prior research (see details below for Content Analysis). As noted in Research Design above, all transcripts were deidentified. Participants were assigned a participant identifier as P followed by a number 1 to 32. All participant quotes below are listed along with participant identifier (e.g., P01). Data analysis did not differentiate between types of camp (Family Camp or Duke of Edinburgh) due to similar experience based on Gaelic culture-specific program design. However, a majority of both thematic and content analysis themes were reflected by participants from both types of camps. One important exception is the content analysis subtheme of shared child-rearing, as children attendance with parents only occurred during Family Camps.

Thematic Analysis Results

Thematic analysis occurred according to the established process noted above in Chapter 3: Methodology. This results section will briefly highlight that iterative process, then detail the

themes and subthemes summarized in Table 2: Thematic Analysis.

Table 2: Thematic Analysis

Theme	Subthemes	Participant Quotes
Importance of Traditional Knowledge	Plant Knowledge	"I learned a lot about identifying flora in the Highlands" P31
	Skills	"It's about putting people in a place, allowing them to spend time here and get to know, you know, watch the swallows flit around them and feed the chickens and the. Develop a relationship and enjoy being in this place. But also there's the practical side. There's the building of infrastructure. There's the. Picking your food from the garden. The. The making food. The lighting. Fires. These kinds of things." P11
	Difficulty of Shieling Life	"But the thoughts of living somewhere a bit more rural and having more land and just, you know, doing a lot of things for yourself. That's a, it's a, we can romanticize that idea… I'll think about a little bit and then I'll sort of bring it back down to earth and say, 'Yes, but we're going to starve to death.'" P04
	Interconnectedness	"I learned a lot about…how different parts of the ecosystem interact with each other, and how important the balance between these factors are in the health of all of its parts." P31
Positive Value of Traditional Ways of Living	Simplicity	"It shows us we can slow down and just not rush around so much and then get closer to the landscape again. I think. Yeah, all kinds of ways." P16
	Sustainability/Resilience	"You know, we're not living, we wouldn't want to go back, for example, to crofting times when a shieling would have been how people lived, because of all the, you know, just disease and that kind of thing, but at the same time. That seems much more resilient. If you can farm your own food, use natural materials, what you have in the land to build your shelter. Learn to make your own clothes from things like flax, that kind of thing. Nettles make good fiber, all of that sort of stuff." P01
	Communal Ways of Living	"Yeah, just that whole thing of, you know, learning from each other and, like, [daughter's name] likes to just join, you know, she's enjoying cooking, joining, and helping in the kitchen. That whole thing of just, I guess, like, you know, potentially like an old fashion way of doing things where, you know, children might just watch and join in." P08
	More Connected	"Whereas, like when you're at home, I think, you

		know, your daily routine is just like so much more like city based. Like, you know, all your actions here are kind of linked to something." P19
History	General Interest	"I came to participate due to my decision to do gold DofE this year, as well as the fact that I have an interest in history and nature." P28
	Shieling	"I think there's a lot in popular culture about Scotland and the history of Scotland, but it'd be nice to actually find out from people who have a connection with the land around here to know a little bit more about the history rather than just what you kind of see in mainstream media and things like that." P10
	Impacts of Colonization	"I think part of that has to do with the history of the fact that Scotland was essentially colonized by, by English years ago." P16
Personal Values	Heritage	"Yeah, I mean, well, to have to have that connection and I think it's again, it's about feeling that you belong somewhere, and I think that's something that our ancestors did feel, like in particular places. So, you know, they kind of ask, like where you belong to or who you belong to rather than where are you from. You know. Yeah. For us, it can maybe. Folk can feel like they don't particularly belong anywhere or. But, yeah, maybe some time in a place like this. Can bring you a bit closer to it." P08
	Spirituality	"Everything that we create, there is suffering inherent within that. It's just that's the nature of creation, you know. But if you look at the natural world, it's that's part of it. There's no it's not that one's good and one's bad. Like spring and summer are good and autumn and winter are bad. It's all part of the same season, all part of the same cycle. All those seasons are necessary. You can't have the summer without the winter." P02
	Sustainability	"Just that we need to be more in harmony together, and we need to know where our food comes from and every structure we build. What's the impact on the birds? And we're just kind of blindly developing. Even that term, the developing world, you know, international development. It's like, we need to de-develop." P03

Initial codes generated were simply related to participant experiences, such as 'around the fire' and 'eating together.' As analysis continued the relevance of culture-specific program

design elements to participant experience became clear. Fourteen subthemes across four themes emerged following six iterative coding passes – Importance of Traditional Knowledge, Positive Value of Traditional Ways of Living, History, and Personal Values (See Table 2: Thematic Analysis). There was some overlap in subthemes across themes, but the different facets of how the participant(s) made meaning of the experience required distinction. For example, Sustainability/Resilience is a subtheme of Positive Value of Traditional Ways of Living and Sustainability a subtheme of Personal Values. Interconnectedness is a subtheme of Importance of Traditional Knowledge and More Connected a subtheme of Positive Value of Traditional Ways of Living.

When queried during the semi-structured interview, 11 of 25 participants (44%) reported culture-specific design as a factor for initial interest and/or registration for program, with higher prevalence among Family Camp than Duke of Edinburgh Residentials (57% versus 27%). However, 24 of 25 participants (96%) reported culture-specific relevance to positive experience and/or impacts of program with 175 references across four themes and 18 subthemes. Exploration of culture-specific relevance of program design is summarized in Table 2: Thematic Analysis and Table 9: Culture-specific Design and Positive Program Impacts.

Importance of Traditional Knowledge. An overwhelming majority of participants (21 of 25 participants) reported Gaelic traditional knowledge as an important part of their experience, including subthemes Plant Knowledge, Skills, Difficulty of Shieling Life, and Interconnectedness. Gaelic knowledge of plants, along with seasonality, was shared by five participants, noting positive experience of "*identifying flowers*" (P23) and "*flora*" (P31), as well as the meaningful experience of the "*Gaelic perspective of nature*" (P08). P03, who experienced severe hay fever during their time at The Shieling Project, described how Gaelic plant

knowledge would have been helpful,

> *And even my hay fever, it's like being here. It's made me think, well, my ancestors mustn't have got hay fever. Or if they did, there must be some natural remedy. Like, it exists already in the grass that's given me. There must be a way that. I must be able to eat the grasses, giving me the allergy to fight the or something natural. Not going down to the pharmacy because there must, like any illness that we have, in theory, there should be an answer to this. It's natural.*

For P01, plant knowledge was part of much larger intersecting and inter-generational traditional knowledge, noting how she experienced it while sitting around the fire one evening with other participants,

> *I'm thinking about older women. I'm thinking about. About the hags. And don't think that's a detrimental term at all. And about how they would gather their younger, probably female descendants around them and show them. This is this herb. This is what this is used for. This is what this moon means, what it means for the land and the season that we're moving into. And I think it's a wonderful phrase, the traditional ways of knowing and handing that down. And I felt that although we maybe weren't swapping knowledge like that, I feel that we were swapping a personal experience. And that felt very. Organic. That's not something you can just go in Google like, how do I do a woman's circle? You know, get the feelings from that. You have to do it. And that felt really special.*

In addition to plant knowledge, the practice of traditional skills were reported by more than half of the total sample population; 18 participants reported the practice of traditional skills to be key to their positive experience, including carving, weaving, felting, knife and axe work, animal husbandry, fire lighting, cooking, farming, composting, wild foraging, and construction. For some, like P18, the novelty of it was part of the experience, "*This morning when we cleared like the whole chicken coop and refilled it, because also I've never done anything like that before. Never even seen a chicken, in real life before*." Others, like P08 and P16 (both with relatively high levels of traditional skills at baseline), the loss of what were formerly common skills was part of how they experienced traditional skills, noting "*stuff like, uh, making rope would have been just something that everybody would have known how to do*" (P08), and P16

> *And when I'm knitting a hat, and yeah, in knitting there's, we mechanised it years ago and largely forgotten how to do it. People have said to me this week, 'Wow, that's amazing.' But actually, it's when you get worked out how to do it, it's not that hard. But we've just forgotten how to do it. So as a society. So it seems amazing when you see someone doing it. But we had to do it years ago, so we did.*

Similarly, P04 was keenly aware of how traditional skills were a means of survival and described their insights while carving,

> *We were doing it for relaxation for, you know, just to learn something new, whereas they are doing it, you know, it's for survival. This is how you make tools. This is how you make clothes. You know, if you don't do it, you're gonna to freeze or starve.*

The Difficulty of Shieling Life was stressed by P04, and is key to acknowledging the importance of not romanticizing earlier traditional ways of life. They described

> *And so, you know, part of me thinks this would be a really nice way of life. You're removed from so much stimulation, you're in this beautiful environment, and then I think. Actually, you know, it would be so hard. It'd be so hard. See, like to come and be here for a while. But then, you know, this is nice because the weather's wonderful. It's been so warm up here. But, you know, come the winter is arguably one of the last places I'd want to be. I want to be in a house with radiators.*

The subtheme of Interconnectedness was explored by five participants describing how practices founded upon Gaelic knowledge of interconnectedness of life positively impacting their experience. P19 reflected

> *It's like everything we're doing out here is like, I don't, I don't know how to describe it. It's kind of like anything you do. You see how that affects everything else. So, like with the building that's going to help out with other things, like even with, you know, going over and like feeding the cows, you know, that's either helping that species breed or like helping feed someone. Same with the chickens. Like, yeah, I just think there's like a good chain of events going on. So that's why it's quite rewarding, because you know that even though it's quite small things, it's helping.*

P02 described

> *So, you know, there's animals here and we're talking about animal care and we talk about poo. When we go to the compost toilets and we talk about the*

> *functionality of our body and why we poo. We're not embarrassed about our bodies. We talk about them. We talk about our body parts. We talk about animals mating and having babies…And, you know, we just all say, well, it's just nature. That's where we all came from. That's nature's way. And actually, we need to know about it. It's really important because if we don't know how it works, then we don't have the knowledge. And then, we can't make the right choices for ourselves.*

Positive Value of Traditional Ways of Living. Participants overwhelmingly expressed the positive value of traditional ways of living with 21 of 25 reporting value in Gaelic traditional ways of living as a key part of their experience, including subthemes Simplicity, Sustainability/Resilience, Communal Ways of Living, and More Connected. The simplicity of traditional ways of living, including slower pace and less technology (most often reported specifically as less screen time on phones or television) was noted by twelve participants. P01 shared a '*hope*' for their family "*that it imbibes us with a sense of slow living we can integrate somehow into our own lives, so we don't plop down on the couch at the end of the day and immediately turn on Netflix or something like that."* P11 also described a sense of hopefulness from more simple living describing "*I think that this is a very welcome escape. Yeah. Being able to see how possible it is. To live comfortably. In a much more minimal sort of way*." P04 reflected how simplicity can connect with another subtheme, Sustainability/Resilience, noting

> *Like, look at being here. You realise people's lives were much simpler, didn't have as much. And yet, yeah, you know, I don't feel in that sense that they're missing out. I think if everybody had a little experience here, they could go back home and realise, "you know what? We don't need to buy all these things.' You know, we can, we can grow some vegetables ourselves. Yeah, we can. We can reuse, recycle. Yeah. Nothing goes to waste here.*

Sustainability/Resilience was described as a valuable part of traditional ways of living by five participants, with P19 summarizing how this impacted them

> *I just think it's very peaceful. Like you've got time with your own thoughts. Really, I guess you could say. But no, I think the main thing for me is just not even a slower pace of life. It's just different, I suppose, like being more self-sufficient, I*

> *suppose. And it's kind of like focusing away from like the more like materialistic or like superficial things like back home here. It's just very stripped back, I guess. Like you're making your own food and you're kind of seeing where it's come from.*

The subthemes of Communal ways of Living and More Connected intersect with participants reporting value in traditional ways of living in which humans were more connected to each other, as well as more aware of their part in the larger ecosystem. Thirteen participants specifically reported communal ways of living as a key aspect of culture-specific program design, and six participants shared how a more connected way of living positively impacted them. Living communally, including eating and working together, was commonly reported by participants as a key positive aspect with P03 sharing, "*I just love the communal eating and everyone just mucking in*." Communal living was also a key part of Social Connection content analysis and is explored further below. In addition to the experience of living together with other people, others noted the value in living a way that's "*a lot closer to the land and more in contact with it*" (P16). P02 reflected on the value of Gaelic connection with seasonality,

> *So, you know, most people now aren't going to go up to the shieling site, to the top of a hill, and just live there for 3 or 4 months of the year. But that aspect of living seasonally, that's when you produce all your food through those up here, you know, in this part of the world, that's when you produce or you know, the bulk of your food and then the whole that whole practice of preserving. Um, you know, to, to feed you in the colder months and the darker months when you don't have the berries growing on the hedgerows and the bushes. Um, so it's that, it's, I think it's the cyclical, the cyclical side of shieling life that I, that I really appreciate. And I think that we as modern humans would benefit from getting back in touch with.*

History. Nine participants reported history as part of their experience of the program, including general interest, with P10 noting "*I just was really interested in finding out about the history of the place."* Other participants had specific interest in shielings with P23 describing the impact of a hill walk up to the shieling site:

> *I was very fascinated by, you know, because I quite like history, so kind of seeing, seeing stuff that would have been there and the landscape that wouldn't have*

> *changed all that much since, since they were there, and they were being in use, I think was really very eye opening.*

The complex social and political history of the area was also present, including three participants describing awareness of the impacts of colonization in the Scottish Highlands. In exploring their interest and commitment to preserving Gaelic culture, P08 noted, "*I guess the British government did a good job of killing people's culture through the language and all sorts of other ways.*"

Personal Values. Ten participants reported resonance between their personal values and the culture-specific design of the program as part of their experience, including personal values subthemes of Heritage, Spirituality, and Sustainability. While only three participants reported heritage as central to their experience, it was essential to their meaning making. P12, a female from the United States with Scottish ancestry, described

> *On my father's side, there's a bit of a sense of loss because people didn't choose to immigrate to the U.S. They really kind of left because they had to. And so I think, you know, there's some generational trauma there from the experiences that the families had while they were still here in this country and, um, the violence. And then, you know, people had to leave. And so there was never any real resolving of that. And I understand why they left and I probably would have done the same thing. But I think it, it almost sort of left these cultural pieces hanging out there like, who are we? And you know, what, what are the things that we've lost and where are we from?... You know, it's interesting because the more I travel to Scotland, the better I understand Scottish culture and the more I'm able to piece apart why my family is the way it is.*

Similar to Heritage, only two participants reported Spirituality as key to their experience, but it was foundational for both. P01 described

> *I think there's a confidence now or an added. It's added to my sense of confidence in myself and about how I am the path that I'm on just know that that's the right path for me and that I can continue to explore how I feel about the land and how I see that as magic in the purest sense of the word, and that that's not somehow out there or strange, and that there's other people who feel like that and there's their strength in that.*

Resonance between programming and personal values related to sustainability were commonly reported as key to participant experience, ranging from hopefulness (*"Projects like this sort of make you think, why couldn't we do this all the time? Everybody's doing fine using a compost toilet, for example, right? Everybody made it. Nobody died*," P12) to an escape ("*It's a definite escape from a world I'm finding quite difficult to live in. You know, that whole, once you become aware of plastic for one and fossil fuels*," P11). Others noted the importance of sharing their values of sustainability with their children ("*for our daughters to see it and live it, and know that there's other ways of being*," P16), as well as the practical value of learning skills for sustainable living. P03 described

> *I just think it's really important for us to learn about the land and ancient methods because especially with the climate crisis and what's going on in the world, feels like there might be a point in the next ten years that we need these skills anyway, even if there's no massive crisis. We do because we're messing up the earth and we need to go back to what's right for us and the land to work together.*

Content Analysis Results

Content analysis occurred according to the established process noted above in Chapter 3: Methodology. This results section will detail the themes and subthemes summarized in Table 3: Content Analysis. The biopsychosocial model was used to organize content analysis coding with main themes of Mental Well-being, Social Connection, Nature Connection, and Self-connection (as seen in the left-hand column of Table 3: Content Analysis).

Table 3: Content Analysis

Theme	Description	Codes	References	Participants
Mental Well-being (25 participants 203 references)	Assessed based on established green prescription outcomes of increased calm, relaxation, and self-esteem, and reduced stress	Calm, Peaceful, Relaxed &/or Ease	63	21
		Happiness, Joy, Excitement, &/or Contentment	34	15
		Reduced Stress	30	14
		Increased Self-	23	11

		esteem		
		Belonging &/or Connection	10	4
		Gratitude	9	6
		Anxiety	9	5
		Sadness	5	3
Social Connectedness (23 participants 141 references)	Assessed based on established green prescription outcomes of increased social cohesion and reduced social isolation	Communal Living	52	23
		Group Composition	34	18
		Sense of Community	17	7
Nature Connectedness (25 participants 135 references)	Assessed based on the pathways to nature connectedness framework: Senses (sensory interaction), Emotion (feelings), Beauty (noticing aesthetics), Meaning (cultural relationship), and Compassion (care)	Senses (sensory interaction)	48	19
		Emotion (feelings)	35	18
		Compassion (care)	19	13
		Beauty (noticing aesthetics)	18	9
		Meaning (cultural relationship)	10	6
Self-connectedness (11 participants 27 references)	Assessed based on the sub components of SCS: awareness, acceptance, and alignment.	Self-alignment	13	9
		Self-awareness	8	4
		Self-acceptance	6	4

Mental Well-being. Of the participants with qualitative data (n=25), all 25 reported improved mental well-being as identified by either increased calm, relaxation, and self-esteem, and/or reduced stress. In addition to desired green prescription outcomes, all reported aspects of mental well-being were coded and included: Calm, Peaceful, Relaxed &/or Ease; Happiness, Joy, Excitement, &/or Contentment; Reduced Stress; Increased Self-esteem; Belonging &/or Connection; Gratitude; Anxiety; and Sadness. Most commonly reported emotion was calm, peaceful, relaxed &/or ease, followed by happiness, joy, excitement, &/or contentment. The 21 participants reporting calm, peaceful, relaxed &/or ease used descriptions like "*a sense of stillness and calmness*" (P01), "*clearheaded*" (P19), "*a warm feeling, a sense of ease*" (P10), and

"*just feeling really, really very relaxed*" (P16) when reflecting upon their time spent at The Shieling Project. The 15 participants reporting happiness, joy, excitement, &/or contentment noted experiencing these emotions as part of being outdoors, engaging in tasks, and being with others. For P10, the happiness experienced was directly related to experiences of community,

> *It just feels, yeah, it makes me feel happy and part of something. Makes me feel part of a bigger picture and not just, you know, on my own. Yeah, it just brings a lot of moments of, like, happiness and laughter, where you can laugh with people about things. And, so, yeah, I really like it. It's a really nice, happy feeling, being part of a kind of community.*

Several parents described how experiencing the joy of their children during family camps was key to their own happiness. P05 described,

> *I think really quite happy and content and joyful to see the kids being happy and also, if I'm somewhere else on the site and I can hear all the kids laughing and enjoying themselves and they're chatting, it makes my heart really happy because I think, oh, they're just enjoying their childhood. So this is what it should be like. And it's lovely.*

Unpleasant emotions of anxiety and sadness were also reported. Five participants reported anxiety primarily related to insects, including ticks and midges, and two of those five participants reported general anxiety in social situations. Interestingly, all three participants reporting sadness were related to how participating in the program made them sad they did not engage in that type of experience more often. P03 reflected

> *And being out in nature makes you kind of sad that you don't do it more and. Yeah. When you're in a situation that you do feel really happy and at peace and you see your child thriving, it makes you sad that you don't, you're not doing that all the time.*

Fourteen participants reported reduced stress. P16 described how the stress of work "*feels a million miles away at the moment*," and P09 noted "*I haven't thought about, um, bills or my bank account or, you know, emails or anything like that, you know?"* P21 described how their time at the Shieling Project helped them feel less stressed,

> *It was very like my mind was very clear. I wasn't thinking about anything. It just kind of empty, which doesn't happen a lot for me, usually. A lot of stuff going on. ….It really puts into perspective things, like, your stress doesn't really matter when you can see a part of the whole galaxy in front of you, and it's just there's so many other worlds. Oh, this isn't gonna matter. It's okay if things go badly….I think it's grounding. You don't have everything pulling you in all the different directions. You're just encouraged to just be here and be where you are and pay attention to the world around you and feel really connected, I guess.*

Eleven participants reported increased self-esteem ranging from experiences of learning new skills to gaining confidence in social situations. In reflecting upon their experience completing a building project during the program, P23 described

> *So when that final nail went in and you step back and you have a look and you're like, I helped make that. I helped make that. I helped put the final thing into place. I think it was it was probably the greatest achievement, like in a while…. I felt really happy and accomplished….Yeah. So really that was, that was another favourite. Yeah, that's something that I think that out of all of them I think is the one thing that I will remember for the longest.*

For participants who reported a level of social anxiety during the group experience, they also reported increased self-esteem due to their improved "*conversational skills*" (P28) with P13 explaining, "*I still feel self-conscious, but when I have these conversations, it's nice, like kind of feeling a little bit more relaxed about it and enjoying it*."

Social Connectedness. Of the participants with qualitative data (n=25), a majority (23 participants) reported increased social connectedness as identified by positive experiences of communal living and/or sense of community, including reduced social isolation and increased social cohesion. Seven participants reported limitations or difficulties of group experience, including social anxiety or introversion ("*I don't talk to people very often. That's been a bit intense*." P22) and conflict management ("*The construction was a bit frustrating because it was like so many people trying to have their input into everything*," P21). The composition of the group was noted by most (18 of 25) participants as key to group experience. Several noted the

difficulty with new people, felt more strongly by those who self-identified as introverts. However, many participants, particularly the introverted ones, cited the positive impact of the likely self-selection bias resulting in similarities in values and interest for group composition, "*I feel like less of an outsider than I might normally have*" (P13).

Social connectedness was a key area of reporting for participants, and requires additional layers of codes to preserve context with Table 4: Codes and Quotes Associated with Social Connectedness showing how I captured this data. Positive experiences of Communal Living included Shared Work or Purpose, Shared Child-rearing, Shared Meaning or Ritual, and Shared Fun. Shared work or purpose was noted by 13 participants over 18 references, including positive experience of teamwork with building projects (P19, P21, P22, P23, P31) and communal meal preparation (P03, P09, P10, P11, P17, P23). P26 summarized

> *Well, it's a very satisfying way of looking at life. Like, just as a whole thing. You've got community, you've got struggles, you've got needs, you've got and, you know, the exploration, the creativity involved in looking at some things and working on them for other people and for yourself.*

There were 10 references by seven participants of the Family Camps of the positive impact of shared child-rearing. P10 noted the value of communal living as a parent,

> *And, you know, I think in the past we've talked about how it's it takes a village to raise a child and there was a stronger sense of community. So I think, you know, it's really nice for me to come to somewhere like this where you are living with people in a group for a while.*

Shared meaning or ritual was most often experienced and reported as time around the fire, in which the act of gathering around the fire at night created opportunity for social connection (P01, P05, P28, P30, P32). P01 described the fire as "*very symbolic and that it draws people together*." P30 reflected on one of favorite aspects of the program,

> *Sitting around the campfire at night, feeling cold on my back because it was a cold night but warm from the fire and laughing with friends. I had an odd sense of*

realisation that even though I don't really know them in terms of small talk, I feel like I can trust them. I like seeing everyone smile and also that I feel confident enough to make friends with them when a few years ago, I wouldn't have…The group I was with really had a special feel to it - everyone felt really friendly and it's nice how we all get along and share stories around the fire.

Shared fun was also central to communal living and key to social connection, as P01 described

It was just wonderful. So I don't know how I would sort of translate that into a sort of an emotion or a feeling or anything like that. But it was just the sense of having a bloody good time in the middle of the wilds….We can make our own entertainment and our own fun and we had nothing to do it with. So you don't need anything apart from people who are willing to get stuck in with you.

In addition to aspects of communal living, a "*sense of community*" (P08, P10, P23, P26) through reduced social isolation and increased social cohesion was reported by seven participants, including "*I don't feel so alone,*" but a "*profound sense of belonging and connectedness*" (P01). P10 reflected

It just feels, yeah, it makes me feel happy and part of something. Makes me feel part of a bigger picture and not just, you know, on my own. Yeah, it just brings a lot of moments of, like, happiness and laughter. Where you can laugh with people about things. And, so, yeah, I really like it. It's, it's a really nice, happy feeling, being part of a kind of community.

For P08, the sense of community was connected to not only place, but also culture,

So yeah, to me, being here is similar to when I get up to the Outer Hebrides, that I feel kind of my shoulders drop a little bit, and yeah, somewhere of belonging, I suppose, you know?... Yeah, I mean, well, to have to have that connection and I think it's again, it's about feeling that you belong somewhere, and I think that's something that our ancestors did feel, like in particular places. So, you know, they [referring to Gaelic] kind of ask, like, where you belong to or who you belong to, rather than where are you from? For us, it can maybe. Folk can feel like they don't particularly belong anywhere. But, yeah, maybe some time in a place like this. Can bring you a bit closer to it.

Table 4: Codes and Quotes Associated with Social Connectedness

Theme	Codes	Subcodes	References	Participants
Social connectedness (23 participants	Communal Living (23 participants 52 references)	Shared Work or Purpose	18	13
		Shared Child-	10	7

141 references)		rearing		
		Shared Meaning or Ritual	10	7
		Limitations or Difficulties of Group Experience	10	7
		Shared Fun	4	4
	Group Composition (18 participants 34 references)	Self-selection Bias (including benefit)	23	13
		New People or Environment	11	6
	Sense of community (7 participants 17 references)	Reduced social isolation	10	5
		Increased social cohesion	7	3

Nature Connectedness. Of the participants with qualitative data (n=25), all 25 reported increased nature connectedness. For the pathway to nature connectedness framework, the most commonly reported pathway was Senses (sensory interaction) with 48 references reported by 19 participants, followed by Emotion (feelings) with 35 references by 18 participants, then Compassion (care) with 19 references by 13 participants closely followed by Beauty (noticing aesthetics) with 18 references by nine participants, and finally Meaning (cultural relationship) with 10 references by six participants. In addition, the distinction between ecological connection and psychological connection to nature became apparent for many participants due to an increased psychological awareness of existing ecological connection to nature, with P01 stressing, "*I don't even want to say reconnecting with nature because it has become apparent to me that we are nature. We're all part of the same thing."*

Sensory interaction was exemplified by P21 in their description of time alone in nature,

> *So I went down to the river and walked along the river and found a little alcove that was kind of the bank had broken down. So there was a little tiny pebbly beach and lots of grassy lumps to sit on. So I wandered around in there for a bit and found a cool rock that was like it's like an oval with like a whole bunch of tiny micro bits in it. So it's really shimmery…. Like when you stir up the sand, the whole thing glitters. Very pretty. And then I sat on a knoll, right? Like underneath*

> *the tree. And I think it was in common Aspen, as I have learned here. It was covered in lichen and mosses. So it was really, really old. And I started reading my book and then switched to braiding grasses. So I braided the grass and a loop and like stuck the, uh, little bits of like, loose moss in it and just had a fun time weaving.*

Connection with nature through emotion was articulated by P01, "*It's a peaceful feeling. It's a. It's hard to describe in one word. It really is. It's, it's a, it's an earthy feeling. It's a feeling of being connected to the land and being of the land*," as well as by P18 who experienced unexpected laughter when faced with several rogue chickens,

> *I was just laughing. Yeah, and I was kind of laughing because it's like I was with five random people that probably never see again in my life. All trying to herd, like, random chickens that I've never experienced before also. It just felt kind of like surreal, as well. Like, I can't believe this is actually happening. Yeah, it's like something you'd never. Well, I'd never imagined back home. Imagine going back home and, like, I'll never. I'll never get in that close contact with chicken for a long time again.*

P01 reflected at length on compassion (care) as a means of connecting with nature, from their personal value prior to arriving at the Shieling Project, how they experienced it during the program, and the "*challenge*" they faced upon returning home,

> *What can you give back to the land? What's that reciprocal relationship? So that is, you know, that's a large part of why we're here as well, is just, you know, this land is providing so much for us. What can we do for the land? So myself, you know, I have done a lot of my own gardening. I'm trying to recondition my soil, give the soil what it needs in order to thrive and to be healthy and, you know, I get ridiculously excited when I see earthworms because it's a good sign. That kind of thing. That's wonderful for me…. And my challenge, my personal challenge. It's very easy to feel like that in a place like this where there's very little in the way of manmade creations. But I live in the middle of a 1970s housing estate, which is a nice enough place to live, but it's built up and it's becoming more built up as the years go by. And I think my challenge will be holding on to that, in the middle of all that concrete and brick and the roads and the traffic and that kind of thing. And, you know, going back to the commute, and holding on to that sense of connectedness. So I have I'm lucky enough to have my own front garden and back garden. Trying to remember that that land that I tend and that I'm lucky enough to have is no way inferior to the land that we have here. It's just in a different place. But I can feel as connected to that as I can to this.*

Beauty (noticing aesthetics) as a pathway to nature was exemplified by P10, who experienced an "*unexpected moment*" during a nighttime trip to the composting toilet,

> *Last night, I got up in the middle of the night. I don't know what time, to go to the toilet as you do, because there was lots of noise in our bothy….but I got up in the middle of the night and it was, it just the sun was just starting to like, you could see that band of light in the sky all along the top of these hills. And just, it was dark, but it wasn't super dark. And, I don't know, I just had a really nice moment of standing there in the middle of the night and the peace and quiet in the dark. I just stood out in the grassy area for a few minutes and just appreciated like where I was and the fact that it was so beautiful….Sounds really cheesy, but I felt this sense of awe. I really felt that sense. A sense of awe at the landscape, at the beauty. Just at, um, in nature. I just felt really lucky to, to live here, you know, not in this actual area, but to live in this country. And, I just, I felt. I just felt really peaceful. I just felt a real sense of peace. It was a really nice moment, which I wasn't expecting. I think it was a really unexpected moment.*

Meaning (cultural relationship) as a pathway to nature connection may have been the least reported pathway numerically, but for those who experienced it, it was profound. P02 shared how human relationship with nature is foundational to their worldview,

> *The root of the cause. And it's because we as humans think that we are somehow disconnected from nature, we are other than nature, we are superior to nature, we can control nature. That, to me is the deep rooted problem. Underlying pretty much every social disease we're currently experiencing.*

P03 described a key moment in which the Gaelic plant knowledge learned by them and their daughter was put to use in real time,

> *We were looking at what plants were around and what their uses are. Just seeing what Yarrow is and the little pineapple one and the children just learning about things that grow natively and that they can then identify in the future. And then I cut my finger later, and I said to [daughter's name], 'Can you get me some yarrow?' And she went off and gathered it and wrapped it around my wound. And just that she knew exactly what to find, you know, and that it has a natural healing property that I didn't know about and she didn't know about. And then we can use that knowledge in the future, which is like an ancient wisdom that we just don't get taught at school. Right?*

Self-Connectedness. Almost half of the participants with qualitative data (n=25), 11 participants, reported increased self-connectedness. For the subcomponents of the SCS, four

participants described improved Self-awareness, four improved Self-acceptance, and nine improved Self-alignment. Improved Self-awareness was noted by P19 due to not only having "*time with your own thoughts*," but also as part of their group building project,

> *I mean, it makes you, even though it is kind of a group activity, it does make you more aware of yourself as well. I guess you could say like you are. You're making sure that, you know, you're being friendly to everyone, helping everyone out. So, you know, I think it's beneficial for everyone because if you're working in a team like you get things done more quickly and you're also kind of improving your own skills. So, it's been good.*

P13 indicated improved Self-acceptance when sharing the positive experience of being able to live more authentically and feel accepted during their time at The Shieling Project,

> *You can go as at a slow pace as you want here. It seems. Which is nice because I throughout my life, really, I feel I've often felt that I need to hurry up to kind of keep up with other people's pace…. Felt really good, yeah. So being able to kind of like be yourself in those ways, which are, you know, societally maybe frowned upon, or, you know, left out.*

P01 also articulated value in having the opportunity to live more authentically, noting

> *You have communities with different people, don't you? And I think maybe I need to cultivate a bit more community around me at home. I have friends and I have really good friends. But I think I'm having a very sort of deep personal awakening and it's just, it feels very, I don't like the word, it feels a bit cringe, but a bit more authentic, you know, stepping into my authentic self and not being afraid of that and not worrying if that puts people off. Because if it puts people off, then I'm not meant for them, you know? And that's fine. That's okay. That's fine.*

Improved Self-alignment seemed to correspond to how people were living in a way congruent with their personal values (as noted above in theme Personal Values from thematic analysis). For example, P01 described

> *I think there's a confidence now or an added. It's added to my sense of confidence in myself and about how I am, the path that I'm on just now, that's the right path for me, and that I can continue to explore how I feel about the land and how I see that as magic in the purest sense of the word, and that's not somehow out there or strange, and that there's other people who feel like that and there's their strength in that. Definitely.*

Qualitative Results Summary

Qualitative results indicated support for The Shieling Project as an effective green prescription, with the culture-specific program design of particular importance. Thematic analysis revealed key areas of culture-specific design for participant experience, including Importance of Traditional Knowledge, Positive Value of Traditional Ways of Living, History, and Personal Values. Content analysis indicated desired results of green prescriptions with The Shieling Project programming, with 100% of participants with qualitative data reporting improved well-being and increased Nature Connectedness, 92% increased Social Connectedness, an 44% increased Self-connectedness.

Quantitative Results

Quantitative results were from the pre-post T tests (n=32), of changes in Self-Connection Scale (SCS), Social Connectedness Scale-Revised (SCS-R), Inclusion of Nature in Self Scale (INS), and Warwick-Edinburgh Mental Well-Being Scale, 14-item (WEMWBS). Table 5 presents the paired samples t-test results. Significant improvements were observed in the mean values of all four measurements (SCS, SCS-R, INS, and WEMWBS) from the baseline to the follow-up measurement: SCS increased from 57.6 to 60.4 (p=0.007); SCS-R increased from 69.3 to 77.7 (p<.001); INS increased from 4.8 to 5.5 (p<.001); and WEMWBS increased from 48.7 to 53.7 (p<.001) (See Table 5: Paired Samples t-test).

Table 5: Paired Samples t-test

	Mean		**Paired Differences**			**T**	**Sig. (2 tailed)**
	Pre	**Post**	**Mean**	**95% CI**			
				Lower	**Upper**		
INS	4.81	5.52	0.71	-0.966	-5.464	-5.464	<.001

SCS	57.59	60.44	2.85	-.0837	-2.890	-2.890	.007
SCS-R	69.25	77.72	8.47	-12.007	-4.930	-4.881	<.001
WEMWBS	48.72	53.66	4.94	-6.510	-3.365	-6.403	<.001

Note. N=32 for all tests.

Pearson correlation results show significant moderate positive correlation for: Pre WEMWBS & SCS, r=.591, p<.001; Pre WEMWBS & SCS-R, r=.534, p=.002; Pre WEMWBS & INS, r=.404, p=.022; and Post WEMWBS & SCS, r=.698, p<.001; Post WEMWBS & SCS-R, r=.523, p=.002. Change correlation results show significant mild positive correlation for WEMWBS & SCS-R, r=.396, p=.025 and WEMWBS & INS, r=.395, p=.025 (See Table 6: Pearson Correlation (WEMWBS, SCS, SCS-R, INS) (Pre, Post, Change)). As a study investigating an intervention, the change correlation is particularly important. Pearson correlation for change demonstrates value in outdoor group programming for well-being with improvements in nature connectedness and social connectedness positively correlated to improvements in mental well-being.

Table 6: Pearson Correlation (WEMWBS, SCS, SCS-R, INS) (Pre, Post, Change)

			INS			SCS			SCS-R			WEMWBS		
			Pre	**Post**	**Change**	**Pre**	**Post**	**Change**	**Pre**	**Post**	**Change**	**Pre**	**Post**	**Change**
INS	**Pre**	r_s	1			.469**			.038			.404*		
		Sig. (2-tailed)				.007			.837			.022		
	Post	r_s		1			.497**			.127			.275	
		Sig. (2-tailed)					.004			.490			.127	
	Change	r_s			1			.398*			.388*			.395*
		Sig. (2-tailed)						.024			.028			.025
SCS	**Pre**	r_s	.469**			1			.584**			.591**		
		Sig. (2-tailed)	.007						<.001			<.001		
	Post	r_s		.497**			1			.565**			.698**	
		Sig. (2-tailed)		.004						<.001			<.001	
	Change	r_s			.398*			1			.346			.215
		Sig. (2-tailed)			.024						.052			.238

SCS-R	**Pre**	r_s	.038		.584**		1		.534		
		Sig. (2-tailed)	.837		<.001				.002		
	Post	r_s	.127		.565**		1		.523**		
		Sig. (2-tailed)	.490		<.001				.002		
	Change	r_s	.388*		.346		1		.396*		
		Sig. (2-tailed)	.028		.052				.025		
WEMWBS	**Pre**	r_s	.404*		.591**		.534		1		
		Sig. (2-tailed)	.022		<.001		.002				
	Post	r_s	.275		.698**		.523**		1		
		Sig. (2-tailed)	.127		<.001		.002				
	Change	r_s	.395*		.215		.396*		1		
		Sig. (2-tailed)	.025		.238		.025				

*Note. N=32 for all tests. *Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).*

Triangulation of Data Findings

Triangulation of Content Analysis and Paired Sample T-Tests

Triangulation of results of content analysis and paired sample t-tests revealed strong support for the culture-specific programming of The Shieling Project as a green prescription. Paired samples t-test results show significant improvements in mean values of all four measurements and content analysis also indicated improvement in all four areas with participants indicating the program led to the improvement. For mental well-being, WEMWBS increased from 48.7 to 53.7 ($p<.001$) (n=32) and 100% of participants with qualitative date (n=25) reported improved mental well-being due to the intervention. For nature connectedness, INS increased from 4.8 to 5.5 ($p<.001$) (n=32) and 100% of participants with qualitative data (n=25) reporting improved nature connectedness due to the intervention. For social connectedness, SCS-R increased from 69.3 to 77.7 ($p<.001$) and 92% of participants with qualitative data (n=25) reporting improved social connectedness due to the intervention. For self-connectedness, SCS increased from 57.6 to 60.4 ($p=.007$) 44% of participants with qualitative data (n=25) reporting improved self-connectedness due to the intervention. Differences in percent of participants

qualitatively reporting improvement in well-being (100%), nature connectedness (100%), social-connectedness (92%) versus self-connectedness (44%) may be due to intervention (specifically program design) or design of semi-structured interview protocol which included more questions explicitly elucidating well-being, nature connectedness, and social connectedness.

Triangulation of Content Analysis and Pearson Correlation

Content analysis also indicated nature connectedness, social connectedness, and self-connectedness as dimensions of well-being. Manual assessment of converging themes was conducted after immersion in data, followed by matrix coding query utilizing NVivo to check manual assessment and identify additional convergence of themes. Shared references were hand-checked to ensure accurate context for convergence. Connections between nature connectedness, social connectedness, and self-connectedness and mental well-being are presented visually in Figure 5: Content Analysis Themes According to Conceptual Model. This visual representation of content analysis theme convergence exhibits the way in which nature connectedness, social connectedness, and self-connectedness are aspects of mental well-being for participants in this study.

Table 7: Content Analysis Theme Convergence by Number of Participants summarizes matrix coding results according to unique participants with contained in both themes. Number of participants was chosen, as opposed to number of shared references, in order to be able to compare with Pearson Correlation for change. Interestingly, matrix coding query indicated the most convergence between Mental Well-being and Social Connectedness with 17 participants reporting connection between the two, followed closely by Mental well-being and Nature Connectedness with 16 participants, and finally, Self-connectedness with 7 participants. Similar results were found through Pearson correlation for change with the strongest correlation between

Mental Well-being and Social Connectedness (r=.396, p=.025), closely followed by Mental Well-being and Nature Connectedness (r=.395, p=.025). Taken together, the content analysis and Pearson Correlation for change indicate strong support for interventions that increase social connectedness and nature connectedness in order to improve mental well-being.

Figure 5: Content Analysis Themes According to Conceptual Model

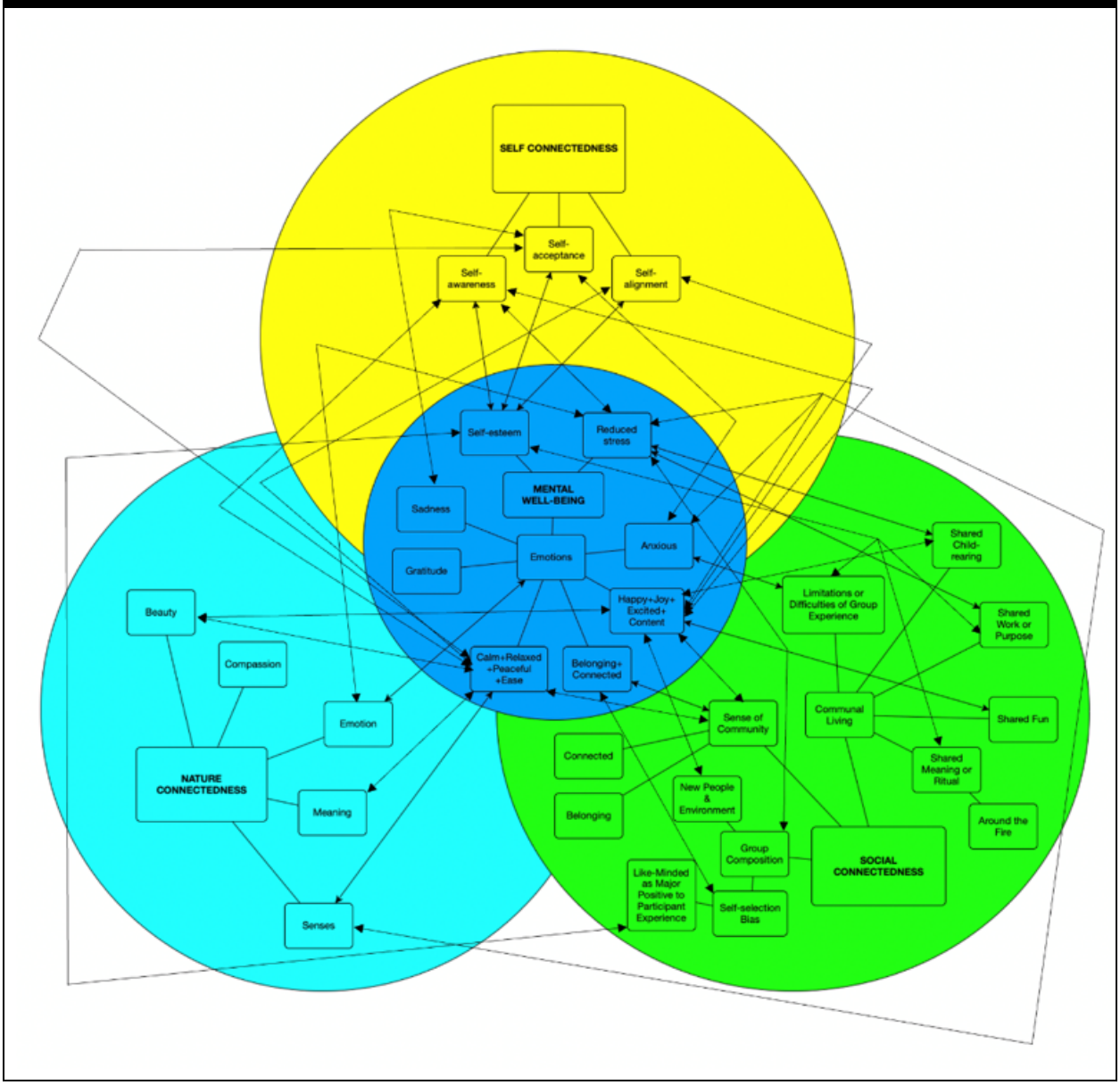


Table 7: Content Analysis Theme Convergence by Number of Participants (n=25)			
	Nature Connectedness	**Social Connectedness**	**Self-Connectedness**
Mental Well-being (Theme)	16	17	7
Subthemes			
Anxiety	4	1	1
Belonging+Connected	1	4	0
Calm+Relaxed+Peaceful+Ease	12	4	3
Gratitude	1	0	0
Happy+Joy+Excited+Contentment	7	4	2
Sadness	1	0	1
Self-esteem	0	5	3
Reduced Stress	4	5	1

Triangulation of Thematic Analysis and Content Analysis

Triangulation of thematic analysis with content analysis indicated strong intersection of culture-specific design and desired impacts of green prescription, thus supporting program design attuned to traditional cultures. There were 20 connections between subthemes of thematic analysis and the four major themes of content analysis (Mental Well-being, Nature Connectedness, Social Connectedness, and Self-connectedness). When comparing subthemes of content and thematic analysis, there were 39 different connections between subthemes. Connections between thematic and content analysis themes and subthemes were first assessed manually after immersion in data, then utilizing matrix coding query in NVivo to check accuracy and identify additional convergence. Shared references were hand-checked to ensure accurate context for convergence.

Table 8: Theme Convergence by Shared References for Thematic & Content Analysis summarizes matrix coding results with number of references which were contained in both content analysis themes and thematic analysis subthemes. Table 9: Culture-specific Design and

Positive Program Impacts details each convergence of subthemes listing the 39 areas of how Gaelic culture program design supported the desired outcomes of green prescriptions with illustrative quotes of participants. This information is then presented visually in Figure 6: Culture-specific Relevance According to Conceptual Model which maps the relationships of themes and subthemes in light of the study's conceptual model.

The three strongest connections (based on number of shared references) were: Social Connectedness and Communal Ways of Living (Positive Value of Traditional Ways of Living) (18 shared references); Mental Well-being and Simplicity (Positive Value of Traditional Ways of Living) (8 shared references); and Nature Connection and Skills (Importance of Traditional Knowledge) (6 shared references). Each of these, in addition to the remaining connections listed in Table 11: Culture-specific Design and Positive Program Impact, are further explored below according to content analysis themes: Mental Well-being, Nature Connection, Social Connection, and Self-Connection.

Table 8: Theme Convergence by Shared References for Thematic & Content Analysis

	Mental Well-Being	**Nature Connection**	**Social Connection**	**Self-Connection**
Importance of Traditional Knowledge				
Plant Knowledge	0	2	0	0
Skills	4	6	0	0
Difficulty of Shieling Life	0	0	0	0
Interconnectedness	0	4	0	0
Positive Value of Traditional Ways of Living				
Communal Ways of Living	3	0	18	1
More Connected	2	3	0	0
Sustainability/Resilience	1	0	0	1
Simplicity	8	3	4	1
Personal Values				
Heritage	1	0	1	0

Spirituality	0	0	1	1
Sustainability	0	0	1	0
History				
General Interest	0	0	0	0
Shieling	0	0	0	0
Impacts of Colonization	0	0	0	0

Culture-specific Design and Positive Program Impacts

The triangulation of data findings examined above reveals key areas of culture-specific design contributing to positive program impacts. How findings support culture-specific program design for NBI's is summarized below according to the four key outcome variables – mental well-being, nature connectedness, social connectedness, and self-connectedness.

Mental Well-being and Culture-Specific Program Design. The most commonly reported aspects of culture-specific design positively impacting mental well-being were within the theme of Positive Value of Traditional Ways of Living, with references to each subtheme Communal Ways of Living, Simplicity, Sustainability/Resilience, and More Connected. The manner of living together communally (working together, eating together, etc.) positively impacted self-esteem, feelings of gratitude and belonging, as well as reduced stress. Living more simply (at a slower pace and with less technology) reduced stress and positively impacted feelings of calm, relaxation, peace, and ease, as well as happiness, joy, excitement, and contentment. This was one of the most commonly reported connections with participants often reflecting on how they want to incorporate aspects of the program into their everyday lives. Living more sustainably also increased feelings of calm, relaxation, peace, and ease. Experiencing living more connected to each other and the surrounding ecosystem reduced stress. Mental Well-being was also positively impacted by Importance of Traditional Knowledge as part of program design with participants reporting learning and practicing of traditional skills

(farming, carving, etc.) as increasing their self-esteem and feelings of being calm, relaxed, peaceful, and at ease. When personal values resonated with program design, positive impacts were also experienced, including improved self-esteem with aligned spirituality and increased sense of belonging related to shared heritage. Taken together, these triangulated findings of content and thematic analysis indicate program design which elucidates the Positive Value of Traditional Ways of Living contributes to desired impacts of green prescriptions.

Table 9: Culture-specific Design and Positive Program Impacts

Culture-specific Design	Positive Program Impact	Participant Quotes
Importance of Traditional Knowledge-Plant Knowledge	Nature Connectedness - Compassion	"This week, I learned a lot about identifying flora in the Highlands, as well as about how different parts of the ecosystem interact with each other, and how important the balance between these factors are in the health of all of its parts." P31
Importance of Traditional Knowledge-Plant Knowledge	Nature Connectedness - Senses	"We were identifying flowers and different types of kind of growth in the wild and stuff like that." P23
Importance of Traditional Knowledge-Skills	Mental Well-being-Self-Esteem	"One of my favorite moments was finishing whittling my knife in front of the fire. I felt great satisfaction whilst finishing it." P28
Importance of Traditional Knowledge-Skills	Mental Well-being- Calm, Relaxed, Peaceful, &/or Ease	"And the spoon carving, as well, as that's calming and therapeutic. And just to sit and listen to everyone chatter about their own little bits of life, and, yeah it's a lovely thing. It's really soothing." P01
Importance of Traditional Knowledge-Skills	Nature Connectedness -Senses	"Whittling a spoon while he was picking berries and talking. You know, that was really nice." P13
Importance of Traditional Knowledge-Skills	Nature Connectedness - Compassion	"This morning when we cleared like the whole chicken coop and refilled it as because also I've never done anything like that before. Never even seen a chicken, in real life before." P18

Importance of Traditional Knowledge-Skills	Nature Connectedness - Emotion	"We did a lot of outdoor activities including whittling, building flower beds, harvesting grain and exploring nature. I most enjoyed the whittling because we could relax and talk at the same time, but also the solo nature sitting, because it gave me time to reflect and feel connected to nature." P32
Importance of Traditional Knowledge-Interconnectedness	Nature Connectedness -Compassion	"It's just like. I mean, like I was saying before, it's like everything we're doing out here is like, I don't. I don't know how to describe it. It's kind of like anything you do. You see how that affects everything else. So like with the building that's going to help out with other things, like even with, you know, going over and like feeding the cows, you know, that that's either helping that species breed or like helping feed someone. Same with the chickens. Like, yeah, I just think there's like a good chain of events going on." P19
Importance of Traditional Knowledge-Interconnectedness	Nature Connectedness -Meaning	"And, you know, we just all say, well, there's it's just nature. It's that's where we all came from. That's nature's way. And actually, we need to know about it. It's really important because if we don't know how it works, then we don't have the knowledge. And then we can't make we can't make the right choices for ourselves." P02
Positive Value of Traditional Ways of Living-Communal Ways of Living	Social Connectedness -Communal Living-Shared child-rearing	"Yeah. I mean, there is that where kind of, you know, that he's taken care of. If you step away for a minute. There's a village thing people used to have." P13
Positive Value of Traditional Ways of Living-Communal Ways of Living	Social Connectedness -Communal Living-Shared meaning or ritual	"So I think the campfire is very symbolic and that it draws people together. I mean, you saw us last night and nobody really wanted to leave. The kids were up very late and there was no sense of we have to cut this short. It's time to go. You know, it just, it ran its course and there was no urgency about it." P01
Positive Value of Traditional Ways of Living-Communal Ways of Living	Social Connectedness -Communal Living-Shared work	"Again, it's the communality of it all, that I really appreciate, you know, the eating together….And the, you know, helping out and the helping in the kitchen. And I think it's great, particularly for the kids. Everyone muck in and do things with other people. Yeah, I feel. I definitely am drawn to community and doing things with other people, and I feel like that's something that my life doesn't give me very much of." P11
Positive Value of Traditional Ways of Living-Communal Ways of Living	Social Connectedness -Composition of Group-Self-selection bias	"coming into contact with women who are in a very similar space in terms of how they think, how they relate to the land and to other women and, and to their own femininity. And that's been that's been a wonderful discovery to have. And I know it's out there, but I don't

		think I've had that in person before. So I think to be able to sit and connect with people like that in person and have that experience as a collective has been really special and one that I will carry with me for a long time." P01
Positive Value of Traditional Ways of Living-Communal Ways of Living	Social connectedness-Sense of community	"And so much of it is non-verbal and it's not even written down. And you don't get that from the modern 21st century ways of connecting. And that's what I've experienced here, is just a very it's unspoken, a very common bond. Like when we were sitting around the fire the other night and we all just we all just got down close to the fire. And it wasn't even a let's all sit down. It just happened. It was just so natural." P01
Positive Value of Traditional Ways of Living-Communal Ways of Living	Mental well-being-Self-esteem	"Sitting around the campfire at night, feeling cold on my back because it was a cold night but warm from the fire and laughing with friends. I had an odd sense of realisation that even though I don't really know them in terms of small talk, I feel like I can trust them. I like seeing everyone smile and also that I feel confident enough to make friends with them when a few years ago, I wouldn't have." P30
Positive Value of Traditional Ways of Living-Communal Ways of Living	Mental Well-being-Belonging & Connected	"I think it's helping me. I don't feel so alone." P01
Positive Value of Traditional Ways of Living-Communal ways of living	Mental Well-being-Gratitude	"And those are little treasures that you can keep in your mind and draw upon time and time again." P01
Positive Value of Traditional Ways of Living-Communal ways of living	Mental Well-being-Reduced Stress	"And remember when we just decided to make apple crumble? And it was the most amazing thing ever." P01
Positive Value of Traditional Ways of Living-Communal ways of living	Self-connectedness-Self-alignment	"It sounds really mundane as well, but I do quite like helping. I'm a bit of a helper. Where I find it. I find it quite hard, actually, to stop, stop in that role. And it makes me, you know, it gives me it's not just that I think it gives me a sense of, I don't know, purpose to kind of like help." P10
Positive Value of Traditional Ways of Living-More connected	Nature connectedness-Meaning	"What does it show us? It shows us we can slow down and just not rush around so much and then get closer to the landscape again. I think. Yeah, all kinds of ways." P16

Positive Value of Traditional Ways of Living-More connected	Nature Connectedness -Senses	"Let's go and get our own blackberries and, you know, make a potion of something or go and get our nettles or whatever it is. Just maybe trying to have a little bit more of this in our lives to temper and balance the busyness of and the routines." P05
Positive Value of Traditional Ways of Living-More Connected	Mental Well-being-Reduced Stress	"Yeah, so when I think of the word holiday, I think of sunshine and beaches and sun lotion and probably eating more and drinking more than you normally would and just kind of doing as much as you can to forget about your everyday life….But I don't think there's that sort of deep connectedness and I don't think those spaces afford for the conversations and the sort of shared purpose, the sharing your sense of purpose that we have had here." P01
Positive Value of Traditional Ways of Living-Sustainability/Resilience	Self-connectedness-Self-awareness	"I just think it's very peaceful. Like you've got time with your own thoughts. Really, I guess you could say. But no, I think the main thing for me is just not even a slower pace of life. It's just different, I suppose, like being more self-sufficient, I suppose. And it's kind of like focusing away from like the more like materialistic or like superficial things like back home. Here. It's just very stripped back, I guess." P19
Positive Value of Traditional Ways of Living-Sustainability/Resilience	Mental Well-being- Calm, Relaxed, Peaceful, &/or Ease	"I just think it's very peaceful." P19
Positive Value of Traditional Ways of Living-Simplicity	Social Connectedness -Communal Living-Shared Fun	"It was just the sense of having a bloody good time in the middle of the wilds with no technology…" P01
Positive Value of Traditional Ways of Living-Simplicity	Social Connectedness -Communal Living-Shared Work	"I mean, you know, in your day to day life, if you're with your friends, it's not uncommon for you just to all be on your phones doing different things. Whereas, it's quite nice here to be like, oh, for example with the building today, even though we were split up in smaller groups, that you're all working towards that same angle….It's just quite nice to all be like focused on the same thing for once. I think it's a bit different because you wouldn't think about it at home, but everyone's quite separated in their own ways, so it's nice to be kind of collaborating again, I would say." P19
Positive Value of Traditional Ways of Living-	Social Connectedness -Composition	"It's just a nice kind of step back from day to day life, really. I think that's the main thing, like just being away from phones, like getting to know a new group of people

Simplicity	of Group-New people & environment	being in the countryside.” P19
Positive Value of Traditional Ways of Living-Simplicity	Nature connectedness-Meaning	“It shows us we can slow down and just not rush around so much and then get closer to the landscape again. I think. Yeah, all kinds of ways.” P16
Positive Value of Traditional Ways of Living-Simplicity	Nature Connectedness -Emotion	“Feeling good. I mean, I just think. I mean, you don't notice it when you're in the city, but even the air is, like, so different. You feel like you can breathe better here. And. No, it's just. It literally. Just. Just. Feel like a breath of fresh air. Literally and metaphorically.” P19
Positive Value of Traditional Ways of Living-Simplicity	Nature Connectedness -Senses	“Let's go and get our own blackberries and, you know, make a potion of something or go and get our nettles or whatever it is. Just maybe trying to have a little bit more of this in our lives to temper and balance the busyness of and the routines.” P05
Positive Value of Traditional Ways of Living-Simplicity	Mental Well-being-Reduced Stress	“Well, I think, probably trying to take a little bit of here back home with us and try and make a bit more time. To really connect and do more things like this. You know? So. We try and put aside some of the busyness of life.” P05
Positive Value of Traditional Ways of Living-Simplicity	Mental Well-being- Calm, Relaxed, Peaceful, &/or Ease	“I just think it's very peaceful.” P19
Positive Value of Traditional Ways of Living-Simplicity	Mental Well-being- Happy, Joy, Excite, &/or Contentment	“It's just a nice setting that you can just hear. Like, for example, I think it was last night, before as the rain coming down on the roof as well. Just feeling, yeah, So you know that is been good. Because I was worried about coming out because I am so used to having that kind of day to day city lifestyle. But no, after the first night I was like, Oh, I'm quite happy here.” P19
Positive Value of Traditional Ways of Living-Simplicity	Mental Well-being- Sadness	“And so when I see my son, and I see how easy of a time he has doing things like this. Yeah. And, but then, how I know how challenging certain other activities can be for him. Yeah. It makes, you know, there's a sense of sadness right at that.” P12
Positive Value of Traditional Ways of Living-Simplicity	Self-connectedness-Self-awareness	“Like you've got time with your own thoughts.” P19
Personal values-Heritage	Social connectedness-Sense of	“Folk can feel like they don't particularly belong anywhere or. But, yeah, maybe some time in a place like this. Can bring you a bit closer to it.” P08

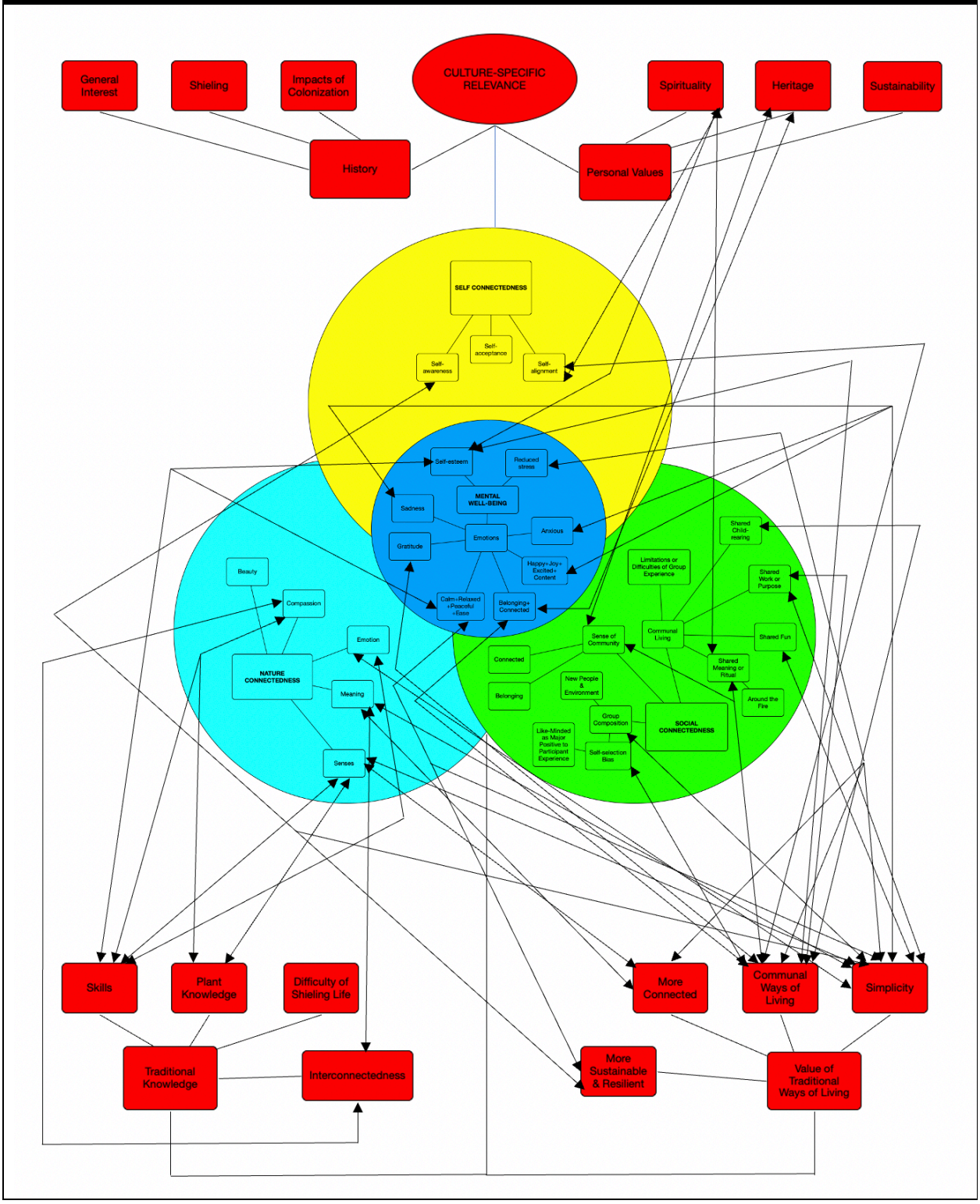
	community	
Personal Values-Heritage	Mental Well-being-Belonging & Connected	"Yeah, I mean, well, to have to have that connection and I think it's again, it's about feeling that you belong somewhere and I think that's something that our ancestors did feel, like in particular places." P08
Personal Values-Spirituality	Mental Well-being-Self-esteem	"I think there's a confidence now or an added. It's added to my sense of confidence in myself and about how I am, the path that I'm on just now, that's the right path for me…" P01
Personal Values-Spirituality	Self-connectedness-Self-alignment	"I can continue to explore how I feel about the land and how I see that as magic in the purest sense of the word, and that's not somehow out there or strange, and that there's other people who feel like that and there's their strength in that. Definitely." P01

Nature Connection and Culture-Specific Program Design. Key to increased nature connection was program design which included traditional Gaelic knowledge, including Skills, Plant Knowledge, and Interconnectedness. One of the more reported connections, nature connection and learning and practicing of traditional skills, were reported to positively impact nature connectedness through compassion, emotion, and senses. Plant knowledge was reported to increase nature connectedness via Compassion and Senses, and interconnectedness via Compassion and Meaning (as outlined by the pathways to nature connectedness framework). Similarly, Positive Value of Traditional Ways of Living positively impacted nature connectedness due to Simplicity (via Emotion, Meaning, and Senses) and More Connected (via Meaning and Senses). This is to be expected based on research which examined the extinction of experience as noted in the Problem Statement above. Extinction of experience accounts for traditional ways of living and knowledge involving more exposure to nature, as well as conceptualizing humans as part of nature. Therefore, participants experience of and exposure to traditional ways of living while engaging in Gaelic-specific outdoor learning increased their sense of nature connectedness. Participants reported short-term immersive experience in traditional ways of living increased their awareness of nature connectedness.

Social Connection and Culture-Specific Program Design. The strongest convergence of shared references occurred between Social Connectedness and Communal Ways of Living (Positive Value of Traditional Ways of Living), which is to be expected from the overlap of these ideas; however, it was unknown if or how participants would experience the shared living design of the program. Overwhelmingly, participants experienced it as positive, with Communal Ways of Living repeatedly being reported as beneficial through Shared Child Rearing, Shared Meaning or Ritual, Shared Work, as well as positively impacting a sense of belonging. Other aspects of culture-specific program design reported to contribute to social connectedness included Simplicity (Positive Value of Traditional Ways of Living), which connected with Shared Fun, Shared Work, and New People and Environment. The theme of Personal Values also connected with Social Connectedness. Specifically, Heritage which connected with Belonging, and Spirituality, which connected with Shared Meaning or Ritual.

Self-Connection and Culture-Specific Program Design. The impacts of culture-specific design on Self-connection was the least reported convergence. Increased Self-alignment was reported according to Personal Values (Spirituality) and Traditional Ways of Living (Communal Living). Increased Self-awareness was reported according to two aspects of Positive Value of Traditional Ways of Living (Sustainability/Resilience and Simplicity). As noted above in Triangulation of Qualitative and Quantitative Results, semi-structured interview protocol included more questions explicitly elucidating well-being, nature connectedness, and social connectedness, and therefore, a determination if culture-specific program design is less relevant for self-connection cannot be made. This is addressed in Implications for Future Research below.

Figure 6: Culture-specific Relevance According to Conceptual Model



Chapter 5: Conclusions and Implications

This chapter first presents a summary of the project. Then the contributions to knowledge are introduced in a summary of major findings, including the benefit of culture-specific program design and short-term immersive programming for green prescriptions – two key innovative contributions to the field. A template for culture-specific green prescription program design is presented. Finally, implications for public health practice and future research are proposed.

Project Summary

In this phenomenological concurrent mixed-methods study, the experience of Gaelic culture-specific programming of The Shieling Project was explored by assessing the impacts on well-being for 32 participants. While qualitative and quantitative approaches occurred concurrently, as is common in mixed-methods studies, there was not a balance between the two approaches in terms data collection and results. A majority of data collection, data analysis, and results were qualitative. This was necessary for the over-arching phenomenological approach, as rich qualitative data were required to explore the meaning-making of participants' experiences at The Shieling Project. The biopsychosocial model was critical in providing a theoretical orientation for this dissertation as a whole, including a framework for empirical data collection and analysis suitably complex to account for the intersecting aspects of study variables. The interdisciplinary nature of the dissertation was key to the study, as The Shieling Project provides interdisciplinary programming. In addition to the discipline of public health (represented by both the researcher and multiple dissertation committee members), the disciplines of mental health and education were also included in this study. Mental health is the area of expertise of the researcher as a licensed clinical mental health counselor supervisor, and both the study setting

and a member of dissertation committee practice within the discipline of place-based outdoor education.

Research Question 1 (Can culture-specific outdoor learning improve mental well-being, including nature connectedness, social connectedness, and connectedness with self?) was answered through paired sample t-tests of pre/post surveys, content analysis, and triangulation of the two. Both paired sample t-tests and content analysis results found significant increase in Mental Well-being, Nature Connectedness, Social Connectedness, and Self-connectedness with triangulation of the two supporting the intervention as causal for the outcome. Through triangulation of the quantitative results and content analysis, this study indicates the culture-specific programing of the Shieling Project promotes similar desirable outcomes as green prescriptions.

Research Question 2 (What meaning do participants ascribe to their participation in an immersive 6-day culture-specific outdoor learning program, including how they experience connection with nature, others, and themselves?) was answered through thematic and content analysis of participant interviews, as well as triangulation of the two. Thematic analysis revealed participant experience was strongly informed by Gaelic culture-specific program design, primarily Importance of Traditional Knowledge and Positive Value of Traditional Ways of Living. In comparing key themes to the impact identified through content analysis, it was found the Skills of Traditional Knowledge were central to improving participant Mental Well-being and Nature Connectedness. Also, Nature Connectedness increased due to Traditional Knowledge aspects of Interconnectedness and Plant Knowledge. Participants reported improved Mental Well-being through experiencing Traditional Ways of Living, including the Simplicity and communal aspects, as well as a strong positive impact to Social Connectedness due to

Communal Ways of Living. Self-connection also improved, but impact of culture-specific design was not as commonly reported as the other areas. Taken together, this study indicates that short-term immersive experiences in more traditional ways of living is beneficial to mental well-being, including improved connectedness between self, others, and nature.

Summary of Major Findings

The findings from this dissertation make valuable contributions to the current literature regarding nature-based interventions (NBI's). This section focuses on the new and unique contribution of this dissertation – primarily, the feasibility and effectiveness of culture-specific design for green prescriptions, and secondarily, the effectiveness of short-term immersive programming. It also includes a brief exploration of additional findings contributing to NBI literature through support of current knowledge.

Culture-specific Program Design

The potential value of culture-specific program design was clear from the Literature Review above. A common recommendation by current research which will be important for future studies was the need for inclusion of culture in NBI research (as summarized in Appendix K.). This study found the Gaelic culture-specific programming of The Shieling Project to be effective as a nature-based intervention. Among the 20 distinct connections between culture-specific design elements and intended outcomes for green prescriptions, the strongest themes, as seen in Table 8: Theme Convergence by Shared References for Thematic & Content Analysis were: Social Connectedness and Communal Ways of Living (Positive Value of Traditional Ways of Living); Mental Well-being and Simplicity (Positive Value of Traditional Ways of Living); and Nature Connectedness and Skills (Importance of Traditional Knowledge). Participants consistently reported positive impacts of two key aspects of Traditional Ways of Living – Simplicity and Communal Living.

Simplicity was key to participant experience of reduced stress and improved mental well-being. From a program design perspective, this included the lack of some modern technology (no electronics), rudimentary lodging (safe, but basic bothies, cold-water hand-pump showers, composting latrines), foraging and farming (including livestock care and gardening), and careful attention to open scheduling with an intentional lack of prescribed activities allowing for what participants described as a slower pace of life. While the lack of modern conveniences, and in turn, physical labor, did not make participant experience easier, they did describe it as better in many ways, particularly for improving mental well-being due to the increased sense of personal fulfillment and enjoyment of simplicity, as described in Thematic Analysis Results above. This notion of the ease of modern conveniences as not necessarily better for well-being is not without research support. In multiple studies by Jacob and Brinkerhoff (Brinkerhoff & Jacob, 1986; Jacob & Brinkerhoff, 1997; 1999), the adoption of a semi-subsistence agricultural lifestyle was found to support improved well-being; authors noting the benefits of a lifestyle more consistent with human ancestry. However, it is important to note this improvement in well-being was experienced by individuals with personal values of self-reliance and simplicity and may not reflect wider western populations. The findings of this earlier research are reflected in more recent studies exploring quality of life and ecological sustainability. In a case study of Pays de la Meije, a remote valley in which traditional farming and land management has been practice since the late Middle Ages, Bruley et al. (2021) found the co-production by people and nature to improve quality of life. In a large study using aggregate data from 152 countries, Sameer et al. (2021) found a significant association between happiness and sustainability, as measured by the United Nations Sustainable Development Goals. These earlier and more recent findings provide additional context to this study's findings, as self-selection bias related to personal values of sustainability and environmentalism were present in this study sample. The reframing of the

hardships of more sustainable lifestyles occurs through personal values in which well-being benefits from congruence in personal behavior and ideals (Jacob et al. 2009).

Communal Ways of Living were central to participant experience of improved Social Connectedness with many participants acknowledging awareness of how modern western societies have lost this approach to living. From a program design perspective, the immersive nature of The Shieling Project provides communal living with participants residing on site during the course of the program. As described in Study Setting above, participants stay in one of six bothies located around a central grassy field and can congregate in several communal spaces, including Am Bothan Bìdh (the communal kitchen), An Talla (large covered communal space), and two circles of tree stumps arranged around a space for a fire. This design afforded opportunity for participants to engage in the subthemes explored above – Shared Work or Purpose, Shared Fun, Shared Child Rearing, and Shared Ritual or Meaning. The positive impact of relationship building in shared nature experiences was a common finding for other phenomenological NBI studies, including Haaland and Tønnessen (2022), Poulsen et al. (2018), and Richardson et al. (2020). Consideration of Communal Ways of Living for program design is address below in Implications.

Traditional Knowledge Skills practiced by participants – carving, weaving, felting, knife and axe work, animal husbandry, fire lighting, cooking, farming, composting, wild foraging, and construction – were linked with increased Nature Connectedness, as many of these skills are practiced outdoors and/or involved interaction with natural elements. From a program design perspective, inclusion of activities based in cultures attuned to traditional knowledge supports a key NBI desired outcome, increased sense of connection with nature. Taken together, this study indicates there is a positive impact to mental well-being through experiencing, even temporarily,

a lifestyle more reflective of traditional cultures, in this case, Gaelic culture. This is a key finding with important implications for public health program design, as explored blow in Implications.

This study provides a template of what a culture-specific green prescription might look like. This research setting was located outside of the United States with limited generalizability due to the culture-specific nature of findings. However, this exploratory study provided key insights into how green prescriptions can be adapted to local context and cultures, and in-turn, support equitable approaches to green prescriptions for the diverse populations present in the United States. Key to this template are several elements of culture-specific design attuned to traditional ways of living. These four elements – Outdoor Programing, Communal Living, Simplicity, and Traditional Skills – are outlined in Table 10: Culture-specific Green Prescription Program Design Template. This template would be a starting point and must be adapted to local context, including historical background with consideration of social determinants of health.

Table 10: Culture-specific Green Prescription Program Design Template

Element	Description
Outdoor Programming	Participants are outside a majority of the time
Communal Living*	Participants have opportunities for social engagement and shared purpose in immersive, even if short-term, ways
Simplicity	Participants experience is characterized by the absence of modern technology and conveniences
Traditional Skills	Participants engage in tasks and/or activities based in traditional knowledge for that culture
***as part of short-term immersive programming**	

Short-term Immersive Programming

Interestingly, these improvements were experienced as a result of a short-term immersive

program versus the typical NBI program design of a set time per week across multiple weeks. While this is similar to the findings of shorter term green prescriptions, such as Hitter et al. (2019), Toews et al. (2018), and Wagenfeld et al. (2019), this study is unique in the immersive nature of programming experienced by participants. This key finding of the effectiveness of short-term immersive NBI programming has important implications. In some ways, it challenges the biomedical model of mental healthcare which focuses on outpatient encounters with a provider and inpatient or residential treatment. While this study population contained individuals who self-reported mental illness, it was not drawn from a sample of individuals with mental illness, and therefore cannot determine effectiveness of appropriateness of this type of program for individuals living with mental illness, it does provide support for innovative approaches to primary and secondary prevention for public health practitioners.

Comparison with Previous Findings

This study also provides support for NBI's through several findings similar to existing green prescription research. Like many green prescription studies explored in the Literature Review above, this intervention was found to improve mental well-being for participants, including: increased sense of connectedness with nature similar to Gunasiri et al. (2022), Sahlin et al. (2019), Sobko et al. (2020), and O'Brien (2018); increased calm and relaxation similar to Irvine et al. (2020) and Richardson et al. (2020); improved self-esteem similar to Poulsen et al. (2018) and Soga et al. (2021); increased social cohesion and reduced social isolation similar to Sachs et al. (2022) and Thomson et al. (2020); and reduced stress and mental distress similar to Gonzalez et al. (2010), Ho et al. (2022), Nabhan et al. (2020), Owens and Bunce (2022), Yang et al. (2022), and Høegmark et al. (2022). Also, Social Connectedness was found to be integral to overall participant experience, equal to and, for some participants, more than, Nature

Connectedness. It is important to note the timing of this study within the overall COVID-19 pandemic, as that may have influenced experience of social connection due to the social isolation stemming from successive lockdowns during 2020 and 2021 prior to this study in summer 2022. However, social isolation and loneliness were major public health concerns prior to the COVID-19 pandemic (Henning-Smith et al., 2018; Holt-Lunstad et al., 2015). This study highlights the potential, and possible necessity, to address social connection and nature connection simultaneously. If humans are part of, and not separate from nature, then addressing nature connection and social connection separately is not only illogical, but impossible.

Like Irvine et al. (2020) and Thomson et al. (2020), the biopsychosocial model was found to be a helpful framework for this study and its focus on for green prescription research. An unexpected finding from this study is the potential value of participant self-selection bias in informing group composition. As noted in results above, many participants noted the value in self-selection bias in creating a group in which they could feel at ease. This finding may inform green prescription program design and recruitment strategies to maximize access, particularly for individuals with less familiarity with the outdoors or who experience social anxiety. This can include attention to not only healthcare statuses, but also a wide variety of affinity groups, to facilitate shared experience. As noted by McHale et al. (2020), Shanahan et al. (2019), Kotera et al. (2021), and Frumkin et al. (2017), equitable access remains a concern for green prescriptions, and careful attention to group composition may improve aspects of access.

Strengths and Limitations

There are a number of important strengths for this study. As a mixed method study, the use of both qualitative and quantitative provide an opportunity for rich contextual data to gain a more complete picture of participant experience and impact of intervention (Creswell et al.,

2011). Another strength of this study is its interdisciplinary nature. Also, while the chosen research setting is located outside of the United States with limited generalizability due to the culture-specific nature of findings, this exploratory study provides key insights into how green prescriptions can be adapted to local context and cultures, and in-turn, support equitable approaches to green prescriptions for the diverse populations present in the United States.

There are several limitations important to note for this study. First, due to small sample size and culture-specific focus, results cannot and are not intended to be generalized to other populations. This sample was 96.9% white lacking racial diversity, but reflective of the general Scottish population which is 96% white (Scotland's Census, 2021). The small sample size was also a limitation for quantitative analyses. Second, self-selection bias was a consideration for the sample due to the purposive sampling of registrants for Shieling Project programming. Third, the nature of pre/post survey can result in a priming effect of participants. Fourth, lack of follow-up data is a limitation as sustained impacts to well-being beyond the post survey data collection could not be determined. Finally, the type of camp (Family Camp or Duke of Edinburgh) was not differentiated for analysis due to similar experience based on Gaelic culture-specific program design.

Implications

The results from this dissertation can have meaningful impact on public health practice and research. This research reports significant improvement in mental well-being through NBI, as well as key culture-specific design elements which contributed to those outcomes. Consequently, practitioners and researchers, should prioritize NBI's and culture-specific design within public health. This section outlines implications for public health practice and future research.

Implications for *Public Health Practice*

This study sought to contribute to innovative approaches to address a major challenge facing public health – the insufficient capacity of the U.S. healthcare system to meet mental health needs, particularly for rural populations. The findings from this study highlight both the value of nature for mental well-being, as well as the inclusion of culture and short-term immersive experiences for effective program design. Each of these, as well as their intersection, provide important implications for public health practice. Addressing the current mental health crisis requires culturally sensitive approaches which prioritize sustainable use of existing resources. A public health framework utilizing the biopsychosocial model and centering knowledge of cultural values and practices can support the transition of NBI's to a more diverse and inclusive practice, and in turn, a more equitable and effective one.

As noted in the Introduction above, proximity to nature is an important rural resource, a mostly untapped one, to address the current mental health crisis in rural communities partially due to shortage of mental health providers. Rural communities, including residents, community leaders, mental health practitioners, and public health leaders, may collaborate to improve beneficial uses of nature proximity. When taking into account the added value of culture-specific design, local traditional ideas and values can further tailor NBI's for a rural context. For example, there are opportunities for public health departments to collaborate with and resource farmers to elevate forms of traditional knowledge and ways of living for a type of public health agritourism, building on the Agritourism & Societal Wellbeing work of Carla Barbieri and Chantell LaPan (Kline, Barbieri, & LaPan, 2016).

The value of nature-based interventions is clear, and public health as a discipline can benefit from more incorporation of nature into programming. This may include prioritizing

green prescriptions in healthcare, but from a wider perspective, includes applying a nature-based lens to existing and new public health programs. For example, how might public health educators incorporate nature and/or utilize outdoor education for improved outcomes? As with Sobko et al. (2020) study, incorporating nature as part of existing public health goals, childhood nutrition in the case of Play & Grow, can strengthen program design and outcomes. Any number of public health initiatives – women's wellness, social isolation for senior adults, general health promotion, and more – can benefit from moving outside the classroom (or health department) and engaging local stakeholders for innovative nature-based programming. In addition, the effectiveness of short-term immersive NBI programming can support public health collaboration with other stakeholders, similar to the public health agritourism opportunity mentioned above. Public health programming should consider the health impact of shorter-term immersive programs for improving mental well-being.

Implications for Future Research

While additional research regarding NBIs, and green prescriptions specifically, is needed, including more RCT's and social benefit-cost analyses, this section will focus on implications for future research generated by this study. This study can be utilized for more in-depth research into the value of culture-specific implementation in green prescriptions. However, further research is needed to more clearly understand aspects of culture-specific design contributing to positive outcomes, how to design and implement programs for diverse cultures and populations, and potential positive and negative environmental impacts of green prescriptions.

Culture-specific Design for Green Prescriptions. While this study provides support for culture-specific design of NBIs, including a Culture-specific Green Prescription Program Design Template as seen in Table 10, future research is needed. Additional mixed-method studies are

needed to develop from this study, as well as identify additional aspects of culture-specific design relevant for improving mental well-being. As noted above, this study was unable to determine if culture-specific program design is less relevant for self-connection than nature connectedness and self-connectedness due to semi-structured interview protocol design. Future mixed-method studies with particular focus on how culture-specific design impacts self-connectedness are needed. Also, similar studies with green prescriptions designed with other cultures attuned to traditional ways of living are needed. There are important differences between the United Kingdom and United States settings in terms of historical and current context of traditional cultures. This is explored further below in the need for cultural sensitivity and humility in research and design.

Cultural Sensitivity and Humility in Research and Design. Incorporation and appreciation of culture within green prescriptions assists in strengthening patient-centered care. However, future research within and beyond western cultures is key in order to reduce oversimplification of understanding human relationship with and as a part of nature. Robinson et al. (2020) caution against viewing time in nature as a cure-all, stressing diversity of cultural experience). There are a wide variety of cultural beliefs among traditional cultures which prioritize the interconnectedness of human and environmental health preventing the sense of disconnection from nature from occurring in the first place (Cajete et al., 2023; Kimmerer, 2013; Robinson et al., 2020; Nettleton et al., 2007). As introduced briefly in the Literature Review above, future research must address how to design and adapt NBI's with cultural sensitivity and without cultural appropriation. Imperative to this research goal is that it is designed and led primarily by scholars and community members whose own identities and experiences are part of the culture being explored. Health research has included international studies between and

within countries with colonization histories, including how Indigenous people experience health, land, and culture (Hatala et al., 2019). However, decolonizing approaches to health research are needed; ones that take into account the history and current context of specific geographic areas and peoples (Cajete et al., 2023; Mundel & Chapman, 2010), including the "legacy of harmful research" by white researchers involving Black, Indigenous, and People of Color (BIPOC) in which research was extractive, coercive, injurious, and unethical (Tuck, 2022, para. 7).

The essential work of Indigenous scholars, such as Gregory Cajete and Eve Tuck, illuminates a way forward by providing a framework for Native science or Indigenous science (Cajete et al., 2023), and one that honors Indigenous ways of knowing (Tuck, 2022). Cajete (2000) summarizes Native science as "an expression of the evolutionary interrelationship of Native people with nature" (p. 58). Tuck and McKenzie's seminal text, *Place in Research: Theory, Methodology, and Methods* provides an instructional manual for decolonization in research (Tuck & McKenzie, 2015). While this is essential for research as a whole, it is particularly significant for research exploring the intersection of human and environmental health, including NBI research, sustainability research, and climate change research (Cajete, 2020). This is explored further in the concept of intersectional environmentalism, a term coined and researched by Leah Thomas, a Black female educator (Murray, 2023). Thomas applies Kimberlé Crenshaw's 1989 theory of intersectionality to environmental sciences stressing the need for BIPOC voices and leadership, particularly Black women, in environmental research and justice work (Thomas, 2022; Murray, 2023). The importance of this recommendation cannot be overstated. A recently published extensive multi-disciplinary systematic analysis of potential pathways for nature benefits to human well-being is being described by some researchers as the first of its kind due to its comprehensiveness (Chiu, 2022); the study found cultural practices to

be a main channel of human-nature interaction and cited a key gap in research to be the lack of collaboration between scientists and traditional and Indigenous communities (Huynh et al., 2022). The closing of this gap requires leadership of Indigenous scholars who hold both of these identities.

Environmental Impacts of Green Prescriptions. As the evidence base and scale of green prescriptions continues to expand, it is crucial for future research to take into account that increasing access to nature, including through green prescriptions, may have unintended negative consequences for vulnerable populations and the environment (Frumkin et al., 2017; Ricket, 2021). Without attention to culture-specific design and leadership by Indigenous communities and scholars (as explored above), green prescriptions may be scaled up according to dominant western ideals of efficiency and profit, and thus, neglect intersectional sustainable approaches.

In addition to the potential negative environmental impact, the positive environmental impact of green prescriptions is an important area for future research, as Juster-Horsfield and Bell (2021) and Powell (2021) note the benefit of green prescriptions to increase environmental awareness. Green prescriptions may be a key strategy to reducing EOE in western cultures, and in turn, promote increased attention to the reciprocal relationship between human and environmental health, as well as, reduced false distinction between the two.

Conclusions

This study found the Gaelic culture-specific programming of The Shieling Project to be a feasible and effective nature-based intervention for mental well-being, as well as support for short-term immersive programming for green prescriptions. Participants experienced improved mental well-being, nature connectedness, social connectedness, and self-connectedness, as paired sample t-tests showed significant improvement from pre to post intervention for four established

metrics – the Self-Connection Scale (SCS), the Social Connectedness Scale-Revised (SCS-R), the Inclusion of Nature in Self Scale (INS), and the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS). Content analyses showed all participants (100%) reported their mental well-being and nature connectedness were improved after participation; 92% of them reported improvement in social connectedness, and 44% reported improvement in self-connectedness. Triangulation of paired sample t-tests with content analyses supported the intervention as causal for the outcome. Thematic analyses showed four key themes regarding the culture-specific impact of the program: importance of traditional knowledge, positive value of traditional ways of living, history, and personal values. Triangulation of thematic analysis with content analysis uncovered key connections between culture-specific program design and intended NBI outcomes. Convergence of results revealed a template supporting NBI program design attuned to traditional cultures and adaptable to local context. The four key template elements are outdoor programing, communal living, simplicity, and traditional skills which occur as part of a short-term immersive experience.

Results from this study provide important implications for public health practice and future research. Public health practice can benefit from increased incorporation of nature into well-being interventions, as well as the value of short-term immersive programs. In addition, public health should consider the benefit, and possible necessity, of interventions designed to improve social connection and nature connection simultaneously. Culture-specific green prescriptions may serve to address current concerns of equitable access and minimization of reductionistic approaches to green prescriptions. However, future research must address cultural sensitivity and humility in research and design, with leadership by Indigenous scholars and communities. Furthermore, this study contributes to innovative approaches to address the

insufficient capacity of the United States healthcare system to meet the mental health needs. The disadvantages experienced by rural communities with lack of access to traditional mental healthcare could be replaced by advantages in green prescriptions due to nature proximity. Also, culture-specific nature-based interventions to improve mental well-being can provide culturally responsive and sustaining approaches for the diverse populations of the United States. Overall, this study's findings provide a much needed approach in addressing the entrenched health disparities in the United States.

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Wilson, E. O. (1984). *Biophilia*. Harvard University Press.

Yamanoi, T. Soga, M., Evans, M.J., Tsuchiya, K.; Koyanagi, T.F., Kanai, T. (2021). What environmental and personal factors determine the implementation intensity of nature-based education in elementary and lower-secondary schools?. *Sustainability, 13*, 9663. https://doi.org/10.3390/su13179663

Yang, Y., Ro, E., Lee, T. J., An, B. C., Hong, K. P., Yun, H. J., Park, E. Y., Cho, H. R., Yun, S. Y., Park, M., Yun, Y. J., Lee, A. R., Jeon, J. I., Jung, S., Ahn, T. H., Jin, H. Y., Lee, K. J., & Choi, K. H. (2022). The Multi-Sites Trial on the Effects of Therapeutic Gardening on Mental Health and Well-Being. *International journal of environmental research and public health*, *19*(13), 8046. https://doi.org/10.3390/ijerph19138046

Appendix A. Justification of ILE Topic Selection

Justification of ILE Topic Selection	
ILE Component	**Topic**
Public health problem or challenge at the individual, group, organization, community, &/or population level	Insufficient capacity of healthcare system to meet mental health needs, particularly for rural populations
Question that advances knowledge and practice of public health leadership	How might existing rural resources of nature proximity be utilized equitably and sustainably to improve mental well-being?
Identifying new approaches to existing problems, as well as existing principles to guide new efforts in public health	Green prescriptions provides a new approach to mental well-being not dependent upon the existing constraints of the healthcare system. However, research points to concerns of lack of cultural context in nature-based interventions. The existing public health principle of integration of cultural values and practices in the design of public health policies and programs can strengthen green prescriptions.
Implications for leadership at organizational, community, &/or policy levels	Study findings have potential implications for leadership at multiple levels – organizations providing mental health services may choose to incorporate culturally-appropriate green prescriptions; rural communities may improve beneficial uses of nature proximity; and public health leaders have additional support for Health in All Policies approach prioritizing the reciprocal relationship between human health and environmental health.
Leadership experience	Student designed original interdisciplinary research study evaluating mental well-being impacts of culture-specific outdoor learning and will use findings to propose avenues for future research to inform mechanisms or policy initiatives

Appendix B. ECU DrPH HPAL Competencies

Mastery of DrPH HPAL Competencies		
Competency	**Description**	**Final Written Product**
Foundational: Data & Analysis #2	Design a qualitative, quantitative, mixed methods, policy analysis or evaluation project to address a public health issue	Dissertation will detail the mixed method approach designed to address the public health issue of improving mental well-being through green prescriptions
Foundational: Leadership, Management & Governance #6	Integrate knowledge, approaches, methods, values and potential contributions from multiple professions and systems in addressing public health problems	Dissertation will include multidisciplinary design and implementation of research study, including disciplines of public health, conservation psychology, mental health, human ecology, and placed-based education
Foundational: Leadership, Management & Governance #10	Propose strategies to promote inclusion and equity within public health programs, policies and systems	Potential research findings may support the inclusion of traditional ways of living as valuable methods of green prescriptions
Foundational: Policy & Programs #15	Integrate knowledge of cultural values and practices in the design of public health policies and programs	Research setting and population were chosen due to focus on Gaelic culture
Foundational: Policy & Programs #17	Propose interprofessional team approaches to improving public health	Dissertation will include multidisciplinary design and implementation of research study, including disciplines of public health, conservation psychology, mental health, human ecology, and placed-based education
HPAL Concentration #5	Create and assess programs that facilitate improvements in rural health and to reduce health disparities	Research topic, setting, and population were chosen due to focus on methods appropriate and accessible for rural populations

Appendix C. Data for Dependent Variables

Data for Dependent Variables		
Dependent Variable	**Quantitative Data**	**Qualitative Data**
Nature Connectedness	Inclusion of Nature in Self Scale (INS)	Interview questions: • What activities did you participate in? • Why did you want to participate? • What was it like for you? What did you notice in your body? Potential follow-up probing questions re: • wild foraging for craft and meal preparation • hiking • wild swimming • farming, including livestock care and gardening
Social Connectedness	Social Connectedness Scale-Revised (SCS-R)	Interview questions: • Tell me about your experiences this past week. • What did you learn? Through the activities and interactions with others. • What did you notice about how you were feeling? Are feeling now? • How was it to participate as part of group? Potential follow-up probing questions re: • traditional storytelling and music • bothy construction and den building • wild crafting
Self-Connectedness	Self-Connection Scale (SCS)	Interview questions: • Think of one of your favorite moments from this past week, and describe that in as much detail as possible, including any images, feelings, or sensations in your body. • How did you come to participate in (insert specific camp/program) at The Shieling Project? Can you describe what past experiences led you here? Potential follow-up probing questions re: • wilderness safety • outdoor sustainable food preparation and storage
Mental Well-being	Warwick-Edinburgh Mental Well-Being Scale (WEMWBS)	Interview questions: • How would you describe your experience this past week and what it means to you? • "Is there anything else that you would like to share about your experience at The Shieling Project?" Potential follow-up probing questions re: • all activities

Appendix D. Pre- and post- self-report surveys containing WEMWBS, SCS, SCS-R, INS, and demographic questions

ECU Department of Public Health

This survey is about outdoor learning and mental well-being. The information you give will be kept confidential and used as part of a dissertation entitled *Investigation of the Impact of a Culture-specific Outdoor Learning Program on Mental Well-being*. Approved by the University & Medical Center Institutional Review Board at East Carolina University (UMCIRB 22-000686).

After you complete this survey, please return it to the field researcher.

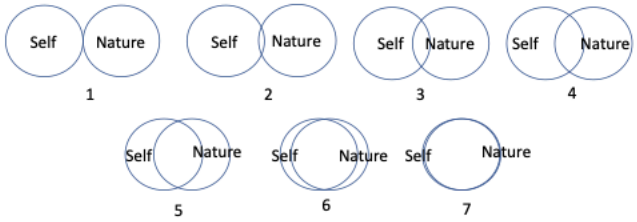
Below are some statements about feelings and thoughts. Please select the answer that best describes your experience of each over the last 2 weeks.	None of the Time	Rarely	Some of the Time	Often	All of the Time
I've been feeling optimistic about the future.	1	2	3	4	5
I've been feeling useful.	1	2	3	4	5
I've been feeling relaxed.	1	2	3	4	5
I've been feeling interested in other people.	1	2	3	4	5
I've had energy to spare.	1	2	3	4	5
I've been dealing with problems well.	1	2	3	4	5
I've been thinking clearly.	1	2	3	4	5
I've been feeling good about myself.	1	2	3	4	5
I've been feeling close to other people.	1	2	3	4	5
I've been feeling confident.	1	2	3	4	5
I've been able to make up my own mind about things.	1	2	3	4	5
I've been feeling loved.	1	2	3	4	5
I've been interested in new things.	1	2	3	4	5
I've been feeling cheerful.	1	2	3	4	5

Please select the response below that best describes you:	Strongly Disagree	←				→	Strongly Agree
I have a deep understanding of myself.	1	2	3	4	5	6	7
It is easy for me to identify and understand how I am feeling in any given moment.	1	2	3	4	5	6	7
I know myself well.	1	2	3	4	5	6	7
I am often surprised by how little I understand myself.	1	2	3	4	5	6	7
I try not to judge myself.	1	2	3	4	5	6	7
When I find out things about myself that I don't necessarily like, I try to accept those things.	1	2	3	4	5	6	7
Even when I don't like a feeling or belief that I have, I try to accept it as a part of myself.	1	2	3	4	5	6	7
I can easily forgive myself for mistakes I have made.	1	2	3	4	5	6	7
I find small ways to ensure that my life truly reflects the things that are important to me.	1	2	3	4	5	6	7
I spend time making sure that I am acting in a way that is a reflection of my true self.	1	2	3	4	5	6	7
I try to make sure that my actions are consistent with my values.	1	2	3	4	5	6	7
I try to make sure that my relationships with other people reflect my values.	1	2	3	4	5	6	7

PLEASE CONTINUE ON NEXT PAGE

Below are a number of statements that reflect various ways in which we view ourselves. Please rate your level of agreement with each statement. There is not right or wrong answer. Do not spend too much time with any one statement and do not leave any unanswered.	**Strongly Disagree**	⟷				**Strongly Agree**
I feel comfortable in the presence of strangers.	1	2	3	4	5	6
I am in tune with the world.	1	2	3	4	5	6
Even among my friends, there is no sense of brother/sisterhood.	1	2	3	4	5	6
I fit in well in new situations.	1	2	3	4	5	6
I feel close to people.	1	2	3	4	5	6
I feel disconnected from the world around me.	1	2	3	4	5	6
Even around people I know, I don't feel that I really belong.	1	2	3	4	5	6
I see people as friendly and approachable.	1	2	3	4	5	6
I feel like an outsider.	1	2	3	4	5	6
I feel understood by the people I know.	1	2	3	4	5	6
I feel distant from people.	1	2	3	4	5	6
I am able to relate to my peers.	1	2	3	4	5	6
I have little sense of togetherness with my peers.	1	2	3	4	5	6
I find myself actively involved in people's lives.	1	2	3	4	5	6
I catch myself losing a sense of connectedness with society.	1	2	3	4	5	6
I am able to connect with other people.	1	2	3	4	5	6
I see myself as a loner.	1	2	3	4	5	6
I don't feel related to most people.	1	2	3	4	5	6
My friends feel like my family.	1	2	3	4	5	6
I don't feel I participate with anyone or any group.	1	2	3	4	5	6

Please circle the number of which picture below best describes your relationship with the natural environment. How interconnected are you with nature?



Camp/Program at The Shieling Project? _____ Country of Residence? _____

In what year were you born? _____ What is your gender? _____

How would you describe your national identity? ☐ Scottish ☐ English ☐ Welsh
☐ Northern Irish ☐ British ☐ Other, please describe _____

What is your ethnic group? ☐ White ☐ Mixed/Multiple ethnic groups ☐ Asian/Asian British
☐ Black/African/Caribbean/Black British ☐ Other ethnic group

Thank you for your help! If you have questions regarding this survey, please contact:
Melissa Stancil at stancilm17@students.ecu.edu

Researcher use only

Location:	**Date:**	**Time:**	**Number:**

Online Version

Link Baseline Survey
Link Post-Intervention Survey

Appendix E. Semi-structured Interview Protocol

Study Title: Improving mental well-being through culture-specific outdoor learning
Primary Investigator: Melissa Stancil
Semi-Structured Interview Questions

Script and/or questions that will be used to guide the interviews
Semi-Structured Interview Protocol

While every question may not be asked due to the flow of a semi-structured interview, all of the topics will be covered. In addition to recording answers to the questions below, the date and location of the interview will be included, along with a participant identifier.

Introduction: "The purpose of this interview is to explore your experience participating in an outdoor learning program at The Shieling Project."

Begin the interview with the following question: "How did you come to participate in (insert specific camp/program) at The Shieling Project? Can you describe what past experiences led you here?"

I will ask the following questions when appropriate, making sure to cover each topic:

- Think of one of your favorite moments from this past week, and describe that in as much detail as possible, including any images, feelings, or sensations in your body.
- How would you describe your experience this past week and what it means to you?
    - What activities did you participate in?
    - Why did you want to participate?
    - What was it like for you? What did you notice in your body?
- Tell me about your experiences this past week.
    - What did you learn? Through the activities and interactions with others.
    - What did you notice about how you were feeling? Are feeling now?
    - How was it to participate as part of group?

I will close the interview with the following question: "Is there anything else that you would like to share about your experience at The Shieling Project?" Interview will close with acknowledgement of gratitude and next steps, if applicable.

Appendix F. ECU UMCIRB Approval Letter

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office 252-744-2914 · Fax 252-744-2284 ·
rede.ecu.edu/umcirb/

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: Melissa Stancil
CC: Huabin Luo
Date: 6/16/2022
Re: UMCIRB 22-000686
Mental Well-being and Outdoor Learning

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) occurred on 6/16/2022. The research study is eligible for review under expedited category # 6&7. The Chairperson (or designee) deemed this study no more than minimal risk.

As the Principal Investigator you are explicitly responsible for the conduct of all aspects of this study and must adhere to all reporting requirements for the study. Your responsibilities include but are not limited to:

1. Ensuring changes to the approved research (including the UMCIRB approved consent document) are initiated only after UMCIRB review and approval except when necessary to eliminate an apparent immediate hazard to the participant. All changes (e.g. a change in procedure, number of participants, personnel, study locations, new recruitment materials, study instruments, etc.) must be prospectively reviewed and approved by the UMCIRB before they are implemented;

2. Where informed consent has not been waived by the UMCIRB, ensuring that only valid versions of the UMCIRB approved, date-stamped informed consent document(s) are used for obtaining informed consent (consent documents with the IRB approval date stamp are found under the Documents tab in the ePIRATE study workspace);

3. Promptly reporting to the UMCIRB all unanticipated problems involving risks to participants and others;

4. Submission of a final report application to the UMICRB prior to the expected end date provided in the IRB application in order to document human research activity has ended and to provide a timepoint in which to base document retention; and

5. Submission of an amendment to extend the expected end date if the study is not expected to be completed by that date. The amendment should be submitted 30 days prior to the UMCIRB approved expected end date or as soon as the Investigator is aware that the study will not be completed by that date.

The approval includes the following items:

Name	Description
Assent Form - Mental Well-Being and Outdoor Learning	Consent Forms
Dissertation Proposal - Mental Well-Being and Outdoor Learning - Melissa Stancil	Study Protocol or Grant Application
Electronic Assent Form - Mental Well-being and Outdoor Learning	Consent Forms
Electronic Informed Consent Form - Mental Well-being and Outdoor Learning	Consent Forms
Electronic Parental Permission Consent Form - Mental Well-being and Outdoor Learning	Consent Forms
Informed Consent Form - Mental Well-being and Outdoor Learning	Consent Forms
Joint statement on seeking consent by electronic methods - UK	Consent Forms
Mental Well-Being and Outdoor-Learning Semi-Structured Interview Questions	Interview/Focus Group Scripts/Questions
Parental Permission Consent Form - Mental Well-being and Outdoor Learning	Consent Forms
Shieling Project Registrants Email Invitation Templates to Study - Adult, Parent of Minor, and Minor	Recruitment Documents/Scripts
Surveys - Mental Well-Being & Outdoor Learning Study	Surveys and Questionnaires

For research studies where a waiver or alteration of HIPAA Authorization has been approved, the IRB states that each of the waiver criteria in 45 CFR 164.512(i)(1)(i)(A) and (2)(i) through (v) have been met. Additionally, the elements of PHI to be collected as described in items 1 and 2 of the Application for Waiver of Authorization have been determined to be the minimal necessary for the specified research.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

Appendix G. Self-Connection Scale (SCS)

Self-Connection Scale (SCS)

Please select the response below that best describes you:

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

1. I have a deep understanding of myself.
2. It is easy for me to identify and understand how I am feeling in any given moment.
3. I know myself well.
4. I am often surprised by how little I understand myself.
5. I try not to judge myself.
6. When I find out things about myself that I don't necessarily like, I try to accept those things.
7. Even when I don't like a feeling or belief that I have, I try to accept it as a part of myself.
8. I can easily forgive myself for mistakes I have made.
9. I find small ways to ensure that my life truly reflects the things that are important to me.
10. I spend time making sure that I am acting in a way that is a reflection of my true self.
11. I try to make sure that my actions are consistent with my values.
12. I try to make sure that my relationships with other people reflect my values.

Question #4 should be reverse-scored

Awareness = 1–4; Acceptance = 5–8; Alignment = 9–12

Appendix H. Social Connectedness Scale-Revised (SCS-R)

SOCIAL CONNECTEDNESS SCALE-REVISED

Directions: Following are a number of statements that reflect various ways in which we view ourselves. Rate the degree to which you agree or disagree with each statement using the following scale (1 = Strongly Disagree and 6 = Strongly Agree). There is no right or wrong answer. Do not spend too much time with any one statement and do not leave any unanswered.

Strongly Disagree	Disagree	Mildly Disagree	Mildly Agree	Agree	Strongly Agree
1	2	3	4	5	6

		Strongly Disagree					Strongly Agree
1.	I feel comfortable in the presence of strangers.....	1	2	3	4	5	6
2.	I am in tune with the world.....	1	2	3	4	5	6
*3.	Even among my friends, there is no sense of brother/sisterhood.....	1	2	3	4	5	6
4.	I fit in well in new situations.....	1	2	3	4	5	6
5.	I feel close to people.....	1	2	3	4	5	6
*6.	I feel disconnected from the world around me.....	1	2	3	4	5	6
*7.	Even around people I know, I don't feel that I really belong.....	1	2	3	4	5	6
8.	I see people as friendly and approachable.....	1	2	3	4	5	6
*9.	I feel like an outsider.....	1	2	3	4	5	6
10.	I feel understood by the people I know.....	1	2	3	4	5	6
*11.	I feel distant from people.....	1	2	3	4	5	6
12.	I am able to relate to my peers.....	1	2	3	4	5	6
*13.	I have little sense of togetherness with my peers.....	1	2	3	4	5	6
14.	I find myself actively involved in people's lives.....	1	2	3	4	5	6
*15.	I catch myself losing a sense of connectedness with society.....	1	2	3	4	5	6
16.	I am able to connect with other people.....	1	2	3	4	5	6
*17.	I see myself as a loner.....	1	2	3	4	5	6
*18.	I don't feel related to most people.....	1	2	3	4	5	6
19.	My friends feel like family.....	1	2	3	4	5	6
*20.	I don't feel I participate with anyone or any group...	1	2	3	4	5	6
		Strongly Disagree					Strongly Agree

* reverse score

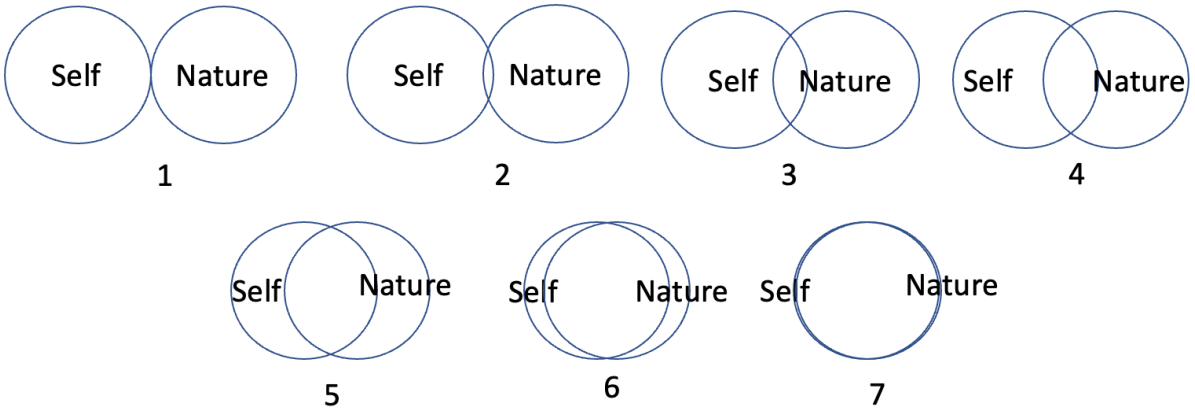
Social connectedness scale-revised has two scoring options. The original scale consists of 8 items and the revised item consists of 20 items.

a) original = reverse score items 3,6,7,11,13,15,18,20 and sum 8 items.

b) revised scale = reverse score items 3,6,7,9,11,13,15,17,18,20 and sum all 20 items.

Appendix I. Inclusion of Nature in Self Scale (INS)

Please circle the picture below that best describes your relationship with the natural environment. How interconnected are you with nature?



Appendix J. Warwick-Edinburg Mental Well-being Scale (WEMWBS)

Warwick Edinburgh Mental Wellbeing Scale (WEMWBS)

Below are some statements about feelings and thoughts.

Please select the answer that best describes your experience of each over the last 2 weeks.

	None of the Time	Rarely	Some of the Time	Often	All of the Time
I've been feeling optimistic about the future	**1**	**2**	**3**	**4**	**5**
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been feeling interested in other people	1	2	3	4	5
I've had energy to spare	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling good about myself	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been feeling confident	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5
I've been feeling loved	1	2	3	4	5
I've been interested in new things	1	2	3	4	5
I've been feeling cheerful	1	2	3	4	5

Appendix K. List of literature review studies by discipline, journal, location, methodology, and sample size

Author(s)	Year	Study Title	Journal	Discipline	Author Location	Study Location	Methodology	Sample Size
Ameli et al.	2021	A nature-based health intervention at a military healthcare center: A randomized, controlled, cross-over study	Peer J	Interdisciplinary (Public Health and Psychology)	USA	USA	Mixed-method, single site, randomized, multiple methods, and cross-over design	12
Bettman et al.	2020	Therapeutic adventure for military veterans with mental illness: A conceptual argument	Ecopsychology	Ecopsychology	USA	USA	Conceptual model	N/A
Bettman et al.	**2022**	**Mental health outcomes of peer-led therapeutic adventure for military veterans**	**Journal of Experiential Education**	**Social Work**	**USA**	**USA**	**Quantitative, single-group**	**56**
Bloomfield	2017	What makes nature-based interventions for mental health successful?	BJPsych. International	Interdisciplinary (Mental Health and Ecology)	UK	UK	Qualitative, Case study	1 project with 48 patients
Borgi et al.	2019	Nature-based interventions for mental health care: Social network analysis as a tool to map social farms and their response to social inclusion and community engagement	International Journal of Environmental Research and Public Health	Interdisciplinary (Mental Health and Public Health)	Italy	Italy	Quantitative, Social network analysis	6 farms
Corazon et al.	2018	A long-term follow-up of the efficacy of nature-based therapy for adults suffering from stress-related illnesses on levels of healthcare consumption and sick-leave absence: a randomized controlled trial	International Journal of Environmental Research and Public Health	Interdisciplinary (Geosciences and Public Health)	Denmark	Denmark	Quantitative, RCT	84

Coventry et al.	**2021**	**Nature-based outdoor activities for mental and physical health: Systematic review and meta-analysis**	**SSM - Population Health**	**Interdisciplinary (Health Sciences and Environmental Sustainability)**	**UK**	**N/A**	**Systematic review and meta-analysis**	**N/A**
Duffy et al.	2019	Eco-education: Integrating nature into counselor education	Journal of Creativity in Mental Health	Mental Health	USA	USA	Qualitative	10
Gonzalez et al.	2010	Therapeutic horticulture in clinical depression: A prospective study of active components	Journal of Advanced Nursing	Interdisciplinary (Public Health, Mental Health, and Environmental Sciences)	Norway, Sweden, and Denmark	Norway	Quantitative, single-group	28
Gritzka et al.	**2020**	**The effects of workplace nature-based interventions on the mental health and well-being of employees: A systematic review**	**Frontiers in Psychiatry**	**Interdisciplinary (Public Health, Psychology, Physical Education and Sports Science)**	**Ireland, Germany, Norway**	**N/A**	**Systematic review**	**N/A**
Gunasiri et al.	2022	Hope, coping and eco-anxiety: Young people's mental health in a climate-impacted Australia	International Journal of Environmental Research and Public Health	Public Health	Australia	Australia	Mixed-method exploratory approach	N=46 survey and N=14 for semi-structured interviews
Haaland & Tønnessen	2022	Recreation in the outdoors—exploring the Friluftsliv experience of adolescents at residential care	Child and Youth Services	Social Studies	Norway	Norway	Qualitative, Phenomenology	8
Hawkins et al.	2016	Nature-based recreational therapy for military service members: A strengths approach	Therapeutic Recreation Journal	Parks, Recreation, and Tourism Management	USA	USA	Conceptual model	N/A

Hitter et al.	2019	The effect of therapeutic horticulture activities on people in depression and kynurenine pathways	Notulae Botanicae Horti Agrobotanici Cluj-Napoca	Interdisciplinary (Psychology and Agricultural Sciences)	Romania	Romania	Quantitative, single-group, pre-posttest design	85
Ho et al.	2022	Testing a new protocol of nature-based intervention to enhance well-being: A randomized control trial	International Journal of Environmental Research and Public Health	Interdisciplinary (Public Health and Psychology)	Hong Kong	Hong Kong	Quantitative, RCT	90
Høegmark et al.	2022	The Wildman Programme - Experiences from a first implementation of a nature-based intervention designed for men with stress and chronic illnesses	Complementary Therapies in Clinical Practice	Interdisciplinary (Psychology and Agricultural Sciences)	Denmark	Denmark	Quantitative, quasi-experimental study	20
Irvine et al.	2020	Group outdoor health walks using activity trackers: Measurement and implementation insight from a mixed methods feasibility study	International Journal of Environmental Research and Public Health	Interdisciplinary (Public Health, Family Medicine, Environment and Human Health, and Social, Economic and Geographical Science)	Germany, UK, USA	UK	Mixed-method, feasibility study	13
Kondo et al.	2015	Nature-based strategies for improving urban health and safety	Journal of Urban Health	Public Health	USA	N/A	Systematic review	N/A
Kotera et al.	**2021**	**Effect of nature walks on depression and anxiety: A systematic review**	**Sustainability (Switzerland)**	**Interdisciplinary (Environmental Sustainability and Human Sciences)**	**UK**	**N/A**	**Systematic review**	**N/A**
Leavell et al.	**2019**	**Nature-based social prescribing in urban settings to improve social connectedness and mental well-being: A review**	**Current Environmental Health Reports**	**Public Health**	**USA, Spain**	**N/A**	**Scoping review, Conceptual model**	**N/A**
Lewis et al.	2022	A systematic review of nature-based counseling interventions to promote mental health and wellness	Journal of Mental Health Counseling	Mental Health	USA	N/A	Systematic review	N/A

Maller et al.	2006	Healthy nature healthy people: 'Contact with nature' as an upstream health promotion intervention for populations	Health Promotion International	Public Health	Australia	N/A	Scoping Review	N/A
Marselle et al.	**2019**	**Growing resilience through interaction with nature: Can group walks in nature buffer the effects of stressful life events on mental health?**	**International Journal of Environmental Research and Public Health**	**Interdisciplinary (Public Health and Environmental Sciences)**	**Germany, USA, UK**	**UK**	**Quantitative experimental design**	**1506**
Marx & More	2022	Developing Scotland's first Green Health Prescription Pathway: A one-stop shop for nature-based intervention referrals	Frontiers in Psychology	Public Health	UK	UK	Qualitative, SWOT of program	N/A
McHale et al.	2020	Green health partnerships in Scotland: Pathways for social prescribing and physical activity referral	International Journal of Environmental Research and Public Health	Interdisciplinary (Public Health, Health and Social Care, and Nursing)	UK, Australia	UK	Qualitative	55
Moeller et al.	2018	Nature-based interventions in institutional and organisational settings: A scoping review	International Journal of Environmental Health Research	Interdisciplinary (Psychology and Behavioral and Social Sciences)	UK	N/A	Scoping Review	N/A
Moyers et al.	2022	Context, classification and study methodologies in research into nature-based therapies: Protocol for a scoping review	BMJ Open	Interdisciplinary (Social and Behavioral Sciences, Epidemiology and Biostatistics)	USA	N/A	Scoping Review	N/A
Nabhan et al.	**2020**	**Hands-on ecological restoration as a nature-based health intervention: Reciprocal restoration for people and ecosystems**	**Ecopsychology**	**Ecopsychology**	**USA**	**USA**	**Qualitative, Case study**	**1 program**

Naor & Mayseless	2021	Therapeutic factors in nature-based therapies: Unraveling the therapeutic benefits of integrating nature in psychotherapy	Psychotherapy	Mental Health	Israel	UK, USA, Spain, Germany, and Israel	Qualitative, Grounded Theory	26
O'Brien	**2018**	**Engaging with and shaping nature: A nature-based intervention for those with mental health and behavioural problems at the Westonbirt Arboretum in England**	**International Journal of Environmental Research and Public Health**	**Interdisciplinary (Mental Health and Forestry)**	**UK**	**UK**	**Qualitative**	**29**
Owens & Bunce	2022	The potential for outdoor nature-based interventions in the treatment and prevention of depression	Frontiers in Psychology	Psychology	UK	N/A	Conceptual model	N/A
Owens & Bunce	2022	Nature-based meditation, rumination and mental wellbeing	International Journal of Environmental Research and Public Health	Public Health	UK	UK	Quantitative proof-of-principle study	68
Peters et al.	2022	Social workers' choice making in supporting nature activities by parents and children in shelters	Frontiers in Psychology	Social Work	Netherlands	Netherlands	Qualitative	99
Poulsen et al.	2018	"That Guy, Is He Really Sick at All?" An analysis of how veterans with PTSD experience nature-based therapy	Healthcare (Switzerland)	Interdisciplinary (Geosciences and Mental Health)	Denmark	Denmark	Qualitative, Phenomenology	8
Pretty & Barton	2020	Nature-based interventions and mind–body interventions: Saving public health costs whilst increasing life satisfaction and happiness	International Journal of Environmental Research and Public Health	Interdisciplinary (Public Health, Life Sciences and Sport, Rehabilitation and Exercise Sciences)	UK	UK	Quantitative, Social benefit-cost analysis	4 programs

Pryor et al.	2006	Health and well-being naturally: 'Contact with nature' in health promotion for targeted individuals, communities and populations	Health Promotion Journal of Australia	Public Health	Australia	Australia	Qualitative, Case study	1 project with 7 patients
Richardson et al.	**2020**	**Opening doors to nature: Bringing calm and raising aspirations of vulnerable young people through nature-based intervention**	**Humanistic Psychologist**	**Human Sciences**	**UK**	**UK**	**Qualitative, Phenomenology**	**8**
Robinson et al.	2020	Let nature be thy medicine: A socioecological exploration of green prescribing in the UK	International Journal of Environmental Research and Public Health	Interdisciplinary (Landscape and Public Health)	UK	UK	Mixed-method, Spatial analysis	284
Sachs et al.	**2022**	**Rationale, feasibility, and acceptability of the Meeting in Nature Together (MINT) Program: A novel nature-based social intervention for loneliness reduction with teen parents and their peers**	**International Journal of Environmental Research and Public Health**	**Public Health**	**USA, Spain**	**USA**	**Mixed-method community-based participatory research study**	**1st Cohort: 8; 2nd Cohort: 9**
Sahlin et al.	2019	Improved wellbeing for both caretakers and users from a zoo-related nature based intervention—A study at Nordens Ark Zoo, Sweden	International Journal of Environmental Research and Public Health	Interdisciplinary (Work Science, Biodiversity, Forestry, and Animal Environment and Health)	Sweden	Sweden	Mixed-method, single-group	35
Shanahan et al.	2019	Nature–based interventions for improving health and wellbeing: The purpose, the people and the outcomes	Sports	Interdisciplinary (Public Health, Psychology, Environmental Sciences, Social, Economic and Geographical Science, and Integrative Medicine)	New Zealand, Australia, UK, Sweden, Finland, Spain, USA	New Zealand, Australia, UK, Sweden, Finland, Spain, USA	Qualitative, Delphi expert elicitation process	19

Shrestha et al.	2021	Natural or urban campus walks and vitality in university students: Exploratory qualitative findings from a pilot randomised controlled study	International Journal of Environmental Research and Public Health	Interdisciplinary (Public Health and Psychology)	Ireland	Ireland	Qualitative, RCT	13
Slattery et al.	2022	Nature-based interventions in social work practice and education: Insights from six nations	International Social Work	Social Work	Australia, USA, Canada	Australia, Taiwan, China, Hungary, Canada, & USA	Qualitative	10
Sobko et al.	2020	Does connectedness to nature improve the eating behaviours of pre-schoolers? Emerging evidence from the Play&Grow randomised controlled trial in Hong Kong	Appetite	Interdisciplinary (Social Work and Biological Sciences)	Hong Kong, New Zealand	Hong Kong	Quantitative, RCT	241
Soga et al.	**2021**	**A room with a green view: The importance of nearby nature for mental health during the COVID-19 pandemic**	**Ecological Applications**	**Interdisciplinary (Public Health and Agricultural Science)**	**Japan and Australia**	**Japan**	**Quantitative**	**3000**
Taylor et al.	**2022**	**Nature-based interventions for psychological wellbeing in long-term conditions: A systematic review**	**International Journal of Environmental Research and Public Health**	**Interdisciplinary (Psychology and Health Sciences)**	**UK**	**N/A**	**Systematic review**	**N/A**
Thomson et al.	2020	Art, nature and mental health: Assessing the biopsychosocial effects of a 'creative green prescription' museum programme involving horticulture, artmaking and collections	Perspectives in Public Health	Interdisciplinary (Public Health, Mental Health, Biosciences, and Museum Studies	UK	UK	Mixed methods, exploratory sequential design	26 (qual), 20 (quant)

Toews et al.	2018	Impact of a nature-based intervention on incarcerated women	International Journal of Prisoner Health	Interdisciplinary (Mental Health, Occupational Therapy, and Landscape Architecture)	USA	USA	Mixed-method, single-group	16
Touloumakos & Barrable	2020	Adverse Childhood Experiences: The protective and therapeutic potential of nature	Frontiers in Psychology	Interdisciplinary (Psychology, Social Work, and Education)	Greece and UK	N/A	Scoping Review	N/A
Trøstrup et al.	2019	The effect of nature exposure on the mental health of patients: A systematic review	Quality of Life Research	Interdisciplinary (Nutrition, Exercise and Sports, Management, Organisation and Administration, and Oncology)	Denmark	N/A	Systematic review	N/A
van den Bogerd et al.	2020	Nature in the indoor and outdoor study environment and secondary and tertiary education students' well-being, academic outcomes, and possible mediating pathways: A systematic review with recommendations for science and practice	Health and Place	Interdisciplinary (Public Health and Psychology)	Netherlands	N/A	Systematic review	N/A
Vermeesch et al.	**2022**	**Nature-based feasibility intervention to influence mitigation strategies for perceived stress**	**International Journal of Environmental Research and Public Health**	**Public Health, Nursing**	**USA**	**USA**	**Quantitative feasibility study; Two groups - Intervention and control**	**59**
Wagenfeld et al.	2019	Measuring emotional response to a planting activity for staff at an urban office setting: A pilot study	The Open Journal of Occupational Therapy	Occupational Therapy	USA	USA	Quantitative, quasi-experimental pre-posttest design	22

Yang et al.	2022	The multi-sites trial on the effects of therapeutic gardening on mental health and well-being	International Journal of Environmental Research and Public Health	Public Health	Korea	Korea	Quantitative, multi-site, pre/posttest design	111

Note. Highlight indicates study citing importance of consideration of culture &/or complexity with studies specifically listing culture &/or local context in bold.