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Departamento de Biologia

**Ana Lúcia Ferreira
Santos Silva da
Conceição**

**Rumo a uma mudança efetiva: uma reflexão sobre o
passado, presente e futuro da Educação Ambiental**

**Towards and effective change: a reflection about
the past, present and future of Environmental
Education**



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the past, present and future of Environmental
Education**

Tese apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Doutor em Biologia e Ecologia das Alterações Globais, realizada sob a orientação científica do Doutor Amadeu M. V. M. Soares, Professor Catedrático do Departamento de Biologia da Universidade de Aveiro, e da Doutora Marlene A. V. de Matos, Professora Auxiliar do Departamento de Psicologia da Escola de Psicologia da Universidade do Minho.

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*“Education is the most powerful weapon
which you can use to change the world”*

Nelson Mandela

o júri

presidente

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Many have crossed my path over the last years. Some brought joy, others pain, some taught me many things, while others gave me the opportunity to teach. Independently, they were all part of this long journey and they all gave an important contribute to its fulfillment. So, to the good, the bad and the villains, I express my gratefulness for helping me build a life journey filled of incredible moments.

I put aside the need to identify specific names as I believe that what I could say regarding some of them would not fully express what they represent and mean to me.

So, to family, friends, co-workers, teachers, supervisors and colleagues, I give my heartfelt thanks. I am sincerely grateful for your presence in my life and for all we have built together.

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Palavras-chave

Educação ambiental, avaliação, bem-estar, serviços dos ecossistemas, intervenção

Resumo

As alterações ambientais globais, incluindo as alterações climáticas, constituem um desafio amplo e complexo que requer abordagens multiníveis e multidisciplinares. Indo além da esfera da pesquisa científica, as alterações ambientais globais precisam ser abordadas por todos os setores da sociedade, sendo essencial o envolvimento do público.

A educação ambiental, idealizada como um processo contínuo, holístico e interdisciplinar, foi perspectivada como um importante pilar na promoção da sustentabilidade e na superação dos desafios ambientais. No entanto, ao longo do tempo, desviou-se dos seus princípios e linhas-guia, tornando-se uma versão reduzida de si mesma. Vários fatores têm vindo a contribuir para esta situação, incluindo baixos níveis de integração com as comunidades.

Esta tese visa assim providenciar uma metodologia de intervenção promotora de uma integração transversal da educação ambiental na sociedade, reforçando a ligação às áreas social e de saúde. Através desta visão multidisciplinar, é estabelecida uma abordagem abrangente e compreensiva do sistema socio ecológico que integra a forma como indivíduos e comunidades interagem com o meio natural.

O primeiro estudo apresentado corresponde a uma revisão sistemática que reflete o estado da arte sobre o impacto de intervenções baseadas na natureza no bem-estar humano. Foram incluídos 26 estudos que reportam diversos benefícios da natureza para o bem-estar humano (físico, social e psicológico). Apesar de limitações metodológicas que impõem uma interpretação cautelosa dos resultados, concluiu-se que as evidências já existentes apoiam o papel benéfico dos ambientes naturais para o bem-estar geral dos seres humanos.

O segundo estudo reporta o impacto de uma metodologia de desenvolvimento holística, baseada no recurso aos serviços dos ecossistemas naturais, direcionada para a promoção do bem-estar de vítimas de violência doméstica. O *Projeto CarryOn - Serviços de ecossistemas e seu papel nos processos de apoio às vítimas de violência doméstica* foi desenvolvido tendo em conta o carácter holístico e interdisciplinar da educação ambiental, assim como o seu importante papel na esfera da intervenção social. Este projeto visou promover o bem-estar de vítimas de violências doméstica, assim como consciencializar para a importância da natureza para o bem-estar humano, fortalecendo a ligação entre indivíduos e natureza. Os resultados obtidos mostraram mudanças positivas em diversas dimensões do bem-estar das vítimas participantes, incluindo qualidade de vida em geral, ajustamento psicológico e autoestima. Estes resultados apoiam

o argumento de que a natureza deveria ser um recurso integrante de processos promocionais, restaurativos e terapêuticos.

A conexão com a natureza parece ser essencial para garantir o acesso aos seus benefícios e para o desenvolvimento de comportamentos pró-ambientais. Portanto, avaliar os níveis de conexão da natureza reveste-se de elevada importância. Dos vários instrumentos analisados, a *Nature relatedness scale* provou ser um instrumento adequado, avaliando três dimensões da conexão do indivíduo com a natureza (*self*, perspectiva e experiência). Este instrumento foi aplicado no processo de avaliação do *Projeto CarryOn*, embora não se encontrasse validado para a população portuguesa. De modo a colmatar esta lacuna, foi realizado o estudo de validação da *Nature relatedness scale* para a população portuguesa. Este estudo mostrou um bom ajustamento dos modelos propostos para ambas as versões (completa e curta) da escala original.

Apesar das importantes contribuições dadas, o potencial da educação ambiental ainda não foi totalmente explorado. Uma maior consciência da importância da natureza para o bem-estar humano pode ser um fator determinante para a adoção de comportamentos pró-ambientais e apoio à conservação da natureza. Assim, a integração da educação ambiental em intervenções sociais e na área da saúde torna-se benéfico para todos os envolvidos. Permite que a educação ambiental alcance a sociedade como um todo, dando importantes contributos para a vida comunitária e individual, reforçando o elo entre comunidades/indivíduos e natureza. Uma abordagem socioecológica pode também ser um meio para renovar a confiança e o apoio público na educação ambiental, clarificando a sua importância e utilidade.

Keywords

Environmental education, evaluation, wellbeing, ecosystem services, intervention

Abstract

Global environmental changes, including climate change, constitute a broad and complex challenge that requires multi-level and multidisciplinary approaches. Going beyond the sphere of scientific research, global environmental changes need to be addressed by all sectors of society, with public engagement being essential.

Environmental education was idealized as a holistic and interdisciplinary lifelong process that should be an important part of every citizen's life, promoting an active and informed engagement of individuals and communities in environmental issues. Nevertheless, through time, environmental education has drifted away from its core principles and guidelines, becoming a narrowed version of itself. Several factors have been contributing to the shortcoming of environmental education, including low levels of integration with communities.

Thus, this thesis aims to provide an intervention methodology that will contribute for a stronger and transversal integration of environmental education in society, strengthening the connection to social and health areas. This multidisciplinary vision allows for a broader approach of the socioecological system that comprehends the way through which individuals and communities interact with nature.

The first study corresponds to a systematic review that reflects the state of the art regarding the impact of nature-based interventions in overall human wellbeing. Twenty-six studies reporting the benefits of nature to human wellbeing (physical, social and psychological) were included. Despite the existence of methodological limitations that require results to be interpreted with caution, it was concluded that the already existent evidence sustains the beneficial role of nature for human overall wellbeing.

The second study assesses the impact of a nature-based holistic development methodology aimed at promoting domestic violence victims' wellbeing. *Project CarryOn – Ecosystem services and their role in domestic violence victims' support processes* encompassed environmental education's holistic and interdisciplinary character, and its high potential as a resource for social intervention. This project aimed to promote domestic violence victims' wellbeing, but also to raise awareness to the importance of nature to human wellbeing, contributing to strengthen the link between individuals and nature. The results reported several significant improvements in the victims' wellbeing, including improved overall life quality, psychological adjustment and self-esteem. These results support the claim that nature should be an integral part of promotional, restorative and therapeutic processes.

Connecting with nature appears to be essential to ensure access to its benefits and for the development of pro-environmental behaviors. Therefore,

assessing levels of nature connection is quite important. Nature relatedness scale proved to be a suitable instrument, assessing three dimensions of the individual's connection with nature (self, perspective and experience). This scale was applied in *Project CarryOn*, though not yet validated for the Portuguese population. In order to address the lack of an instrument to evaluate nature connection validated for the Portuguese population, the validation study of the nature relatedness scale was performed. This study showed a good adjustment of the proposed models for both forms of the scale (full and short).

Despite the positive and noteworthy contributes, environmental education's potential has not yet been fully explored. A greater awareness of the importance of nature to human wellbeing may be a determinant factor to the adoption of pro-environmental behaviors and to nature conservation support. Thus, the integration of environmental education in social and health interventions can be beneficial for all stakeholders, allowing it to reach society as whole and enhancing the bond between individuals/communities and nature. This socio-ecological approach may also be the key to renew environmental education's public trust and support, clarifying its importance and usefulness.

Index

Chapter 1 1

Conceptual framework and theoretical overview

1. Global environmental changes: much more than the sum of its parts	2
1.1 A hopeful and integrative approach	7
1.3. Following the path: structure of the thesis	9
2. Environmental education	10
2.1 Environmental education history: a chronological overview	10
2.1.1 Main international events	10
1.1.2 The national panorama	28
2.2 In search of an identity	33
2.3 Is it working?	39
2.4 Evaluation: an underestimated partner	43
3. Natural ecosystems and human wellbeing	45
3.1 Connecting with nature: an essential life experience	52
4. Domestic violence.....	53
5. Research question and goals	57
6. References.....	59

Chapter 271

Nature and human wellbeing: A systematic review of empirical evidence from nature-based interventions

Abstract	73
1. Introduction.....	74
2. Methods.....	77
2.1 Literature search strategy.....	77
2.2 Inclusion and exclusion criteria.	78
2.3 Data collection and synthesis.	78
3. Results.....	81
3.1 Studies' characterization.	81
3.2 Interventions' characteristics.	87
3.3 Evaluation procedures.	89
3.4 Quantitative outcomes.	96
3.4.1 Psychological outcomes.	96
3.4.2 Physiological outcomes.	97
3.4.3 Nature interaction outcomes.....	97
3.5 Qualitative outcomes.....	98
3.5.1 Interventions' impact in overall well-being and components.	98
3.5.2 Nature-based interventions' characteristics.....	99
3.5.3 Pathways.	100
3.6 Limitations and recommendations.....	100
4. Discussion	102
4.1 Main findings.	102
4.2 Methodological strengths and weaknesses.	103
4.2.1 Geographical location.	105
4.2.2 Sample population.	105
4.2.3 Self-report measures.....	106
4.3 Recommendations.	106
5. Conclusion	107

6. Bibliography.....	109
----------------------	-----

Chapter 3117

Domestic violence: the impact of a nature-based holistic development program on victims' well-being

Abstract	119
1. Introduction.....	120
2. Methodology	123
2.1 Procedures	123
2.2 Instruments.....	126
2.3 Data analysis	129
2.4 Participants	130
3. Results.....	132
3.1 Quantitative Results.....	132
3.2 Qualitative Results	134
4. Discussion	139
4.1 Strengths and Limitations	143
4.2 Future Recommendations and Practical Implications.....	145
5. Conclusion	146
6. References	147

Chapter 4154

Nature relatedness scale: validation for the Portuguese population

Abstract	156
----------------	-----

1. Introduction	157
2. Methodology	164
2.1 Participants	164
2.2 Materials	164
2.2.1 Questionnaire Selection and Translation.....	165
2.3 Procedures	166
2.4 Data Analysis.....	166
3. Results.....	167
3.1 Internal consistency and Item-Total Statistic.....	169
3.2 Sociodemographic and behavioral variables.....	172
4. Discussion	172
5. References	176

Chapter 5 184

Final considerations

1. Discussion	185
1.1 Drawing from experience	192
1.1.1 Has environmental education lost focus of its priorities?	193
1.1.2 Are funding programs a bias factor in EE development?	201
1.1.3 Environmental education’s integration in the school system: a success or a goal not yet fully achieved?	205
2. Conclusion	214
3. References	217

Appendix A..... 225

Nature relatedness scale: translated versions

Figure Index

Chapter 1

Figure 1. Global environmental changes word cloud. The terms were selected based on the titles of recent articles published on the journal Global Environmental Changes. This word cloud aims to provide examples of issues associated with GEC and not to constitute and exhaustive listing of terms.....	2
Figure 2. The 17 Sustainable Development Goals proposed in the declaration “Transforming Our World – the 2030 Agenda for Sustainable Development” (UN, 2015).....	6
Figure 3. Thesis chapters’ structure and content.....	9
Figure 4. Framework of the environmental action plan based on the recommendations made in the United Nations Conference on the Human Environment, held in Stockholm, in 1972 (adapted from UNCHE, 1973).....	13
Figure 5. Environmental education goals, categories of objectives and guiding lines, as presented in the Declaration of Tbilisi (UNESCO & UNEP, 1978, Chapter 3).....	16
Figure 6. Strategies, objectives and actions of the International strategy for action in the field of environmental education and training for the 1990’s, an outcome of the International Congress on Environmental Education and Training, held by UNESCO/UNEP, in 1987 (UNESCO & UNEP, 1988).....	21
Figure 7. Structure and keywords of the Johannesburg Declaration on Sustainable Development (adapted from Hens & Nath, 2003).....	26

Figure 8. Article 66 of the Constitution of the Portuguese Republic (according to the amendment of 2005).....	30
Figure 9. Chronological synthesis of the main events that marked the evolution of EE in Portugal (Morais, Pereira, & Durão, 2015; Mota et al., 2005; Pinto, 2004; Silva, 2008).....	32
Figure 10. Selected extracts from the Introduction of the State of the World 2015 report (Renner, 2015).....	40
Figure 11. Adapted eight-level hierarchy of needs, based on Maslow’s theory (Chapman, 2001).....	47
Figure 12. Health map as proposed by Barton & Grant (2006).....	50
Figure 13. Definitions of domestic violence and intimate partner violence (Matos & Machado, 2011; WHO, 2013).....	55

Chapter 2

Figure 1. Flowchart of the literature search process (adapted from the PRISMA flow Diagram; PRISMA Group, 2009).....	83
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Chapter 5

Figure 1. Story “A trip to the orchard”, a metaphor to alert that EE must not lose focus of its mains goals and guidelines.....	196
Figure 2. PDSA Cycle, composed of four interconnected steps: plan, do, study and act (Moen & Norman, 2009).....	202
Figure 3. Proposal of general guidelines for integrating EE as a distinct subject in school curricula.....	211

Table Index

Chapter 1

Table 1. <i>Main elements of Agenda 21 (Gardiner, 2002)</i>	24
Table 2. <i>Holistic education key themes and values (Hare, 2006)</i>	37
Table 3. <i>Main psychological, physical and social consequences of domestic violence to the victims (Centers for Disease Control and Prevention [CDC], 2015; Manita, Ribeiro, & Peixoto, 2009; Matheson, et al., 2015)</i>	54

Chapter 2

Table 1. <i>Studies' characterization</i>	84
Table 2. <i>Interventions' characteristics</i>	88
Table 3. <i>Evaluation procedures and statistically significant quantitative results</i>	91

Chapter 3

Table 1. <i>Criteria applied to the selection of adult participants</i>	123
Table 2. <i>Nature-based holistic development programme daily overview</i>	125
Table 3. <i>Sociodemographic and forms of violence experienced by the participants. These data were collected through the application of the following instruments: face-to-face, semi-structured interviews ⁽¹⁾, Risk Checklist ⁽²⁾ and Inventory of Marital Violence ⁽³⁾</i>	130

Table 4. *Psychopathological symptoms displayed by the sample population, in comparison with the reference values for the general population.....* 131

Table 5. *Comparison of the results obtained for the applied quantitative self-report instruments regarding both temporal moments in the analysis: pre- and post-intervention.....* 133

Table 6. *Categories of the participants' individual interviews analysis.....* 137

Chapter 4

Table 1. *Goodness of fit indexes for NRS.....* 167

Table 2. *Loadings for the confirmatory structure of NRS with modification index.....* 168

Table 3. *Loadings for the confirmatory structure of NR-6.....* 169

Table 4. *Pearson correlation matrix.....* 169

Table 5. *Item-Total Statistics for NR-6.....*171

Table 6. *Pearson correlation matrix.....*171

Table 7. *Relatedness with nature by sex and education level.....*172

Abbreviations

AAI	Animal-assisted Interventions
AC	Awareness of Adverse Consequences
AR	Ascription of Responsibility to Self
ART	Attentive Restoration Theory
ASPEA	Portuguese Association for Environmental Education
BSI	Brief Symptom Inventory
CDC	Centers for Disease Control and Prevention
CES	Cultural ecosystem services
DV	Domestic Violence
EC	European Commission
EE	Environmental Education
EEC	European Economic Community
ERDF	European Regional Development Fund
ES	Ecosystem services
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FRA	European Union Agency for Fundamental Rights
GEC	Global Environmental Changes
GEOTA	Environmental and Territorial Planning Studies Group
GSI	Global Severity Index
IEEP	International Environmental Education Programme
IPCC	Intergovernmental Panel on Climate Change
IPV	Intimate Partner Violence
MA	Millennium Ecosystem Assessment
MAI	Ministry of Internal Administration
NGO	Non-Governmental Organization
NR-6	Nature Relatedness Scale short form
NRS	Nature Relatedness Scale
IPAMB	Environmental Promotion Institute
IUCN	International Union for the Conservation of Nature and natural resources
OQ	Outcome Questionnaire
PDSA	Plan, Do, Study, Act
PICO	Participants, Interventions, Comparisons and Outcomes

PSDI	Positive Symptom Distress Index
PST	Positive Symptom Total
RSES	Rosenberg Self-Esteem Scale
SARA	Spousal Assault Risk Assessment
SDGs	Sustainable Development Goals
SET	Supporting Environment Theory
SNPRCN	National Parks, Reserves, and Nature Conservation Service
STH	Social and Therapeutic Horticulture
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCHE	United Nations Conference on Human Development
UNCSD	United Nations Conference on Sustainable Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNODC	United Nation Office on Drugs and Crime
UNDP	United Nations Development Programme
USA	United States of America
USSR	Union of Soviet Socialist Republics
WCED	World Commission on Environment and Development
WHO	World Health Organization
WHOQOL-BREF	World Health Organization Quality of Life (assessment instrument; reduced version containing 26 items)
WSSD	World Summit on Sustainable Development
WWF	World Wildlife Fund
VBN	Value-Belief-Norm
V-DASH	Victims Domestic Abuse, Stalking and Harassment and Honour Based Violence

Chapter 1

Conceptual framework and theoretical overview

1. Global environmental changes: much more than the sum of its parts

According to Kurt Koffka, one of the founders of Gestalt psychology, “The whole is ‘other’ than the sum of its parts.”, meaning by ‘other’ not greater or lesser but different (Wong, 2010). Nowadays, this has been translated into a more familiar version: “the whole is greater than the sum of its parts’ (Wong, 2010). Although Gestalt reports to how we organize visual information (Wong, 2010), the idea that the whole does not simply correspond to the sum of its parts adjusts quite well to global environmental changes (GEC). As shown in *Figure 1*, GEC encompass several issues and concepts that, when interconnected, generate a broad and complex framework that requires multi-level and multidisciplinary approaches.



Figure 1. Global environmental changes word cloud. The terms were selected based on the titles of recent articles published on the journal *Global Environmental Changes*. This word cloud aims to provide examples of issues associated with GEC and not to constitute an exhaustive listing of terms.

One of the most relatable and representative topics of GEC is climate change. Climate change has gone beyond the sphere of scientific research to become a public agenda hot topic and, more recently, a global development problem (Rahman, 2013). According to the Intergovernmental Panel on Climate Change (IPCC), climate “*in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical*

description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years” (IPCC, 2014, pp. 119). Besides the physical dimension highlighted in this definition, climate also gains meaning through cultural interpretations, thus comprehending both dimensions – physical and cultural (Hulme, Dessai, Lorenzoni & Nelson, 2009). If for scientists the physical interpretation of climate is prevalent, for individuals and communities it’s their experiences and memories that will allow them to construct their notion of climate (Hulme et al., 2009). The same happens with climate change. Its definition – *“change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer”* (IPCC, 2014, pp. 120) – represents a physical interpretation of the concept, but cultural and psychological factors also model the way we perceive climate change (Adger, Barnett, Brown, Marshall & O’Brien, 2012; Hulme et al., 2009). People’s expectations regarding the climate, including the perception of what constitutes “normal” or “abnormal” climate, are constructed upon the knowledge that arises from social and individual memory, as well as from cultural beliefs (Hulme et al., 2009). Those expectations will be a strong determinant for action. Hence, cultural and psychological factors must be equated as a priority issue when it comes to climate change, especially in approaches that intend public engagement.

As stated in the previous definition by the IPCC (2014), the impacts of climate change may be felt for an extended period of time, reinforcing the uncertainty that now looms over all life on Earth. Amplifying already existing risks and creating new ones, climate change causes impacts in physical (e.g., reduced renewable surface water and groundwater resources), biological (e.g., species’ increased extinction risk), and human-managed systems (e.g., undermined food security and production). The comprehension of its multidimensional character and of its broad range of impacts, led to the understanding that climate change is not only a problem restricted to natural ecosystems, but one of the major 21st century threats to human societies that has repercussions in all the dimensions of human life, including mental health and psychological wellbeing (Bourque & Willox, 2014; Costello et al., 2009; Cunsolo & Ellis, 2018; Fritze, Blashki, Burke & Wiseman, 2008). In fact, there is a significant body of research that shows how climate change impacts mental

health, resulting in severe psychological outcomes that are felt at individual and community levels (Berry, Waite, Dear, Capon, & Murray, 2018; Bourque & Willox, 2014; Costello et al., 2019; Keniger, Gaston, Irvine, & Fuller, 2013). Though not expected to lead to new classifications of psychiatric disorders, climate change is contributing to aggravate described risk factors for already known disorders, including (Berry et al., 2018; Bourque & Willox, 2014; Cunsolo & Ellis, 2018; Fritze et al., 2008):

- Strong emotional responses, such as sadness, distress, despair, anger, fear, helplessness, hopelessness and stress;
- Elevated rates of mood disorders, such as depression, anxiety, and pre- and post-traumatic stress;
- Increased drug and alcohol usage;
- Increased suicide ideation, attempts and death by suicide;
- Threats and disruptions to sense of place and place attachment, leading to grief reactions;
- Loss of personal or cultural identity and ways of knowing.

These outcomes may result from acute and/or long-term climate and environmental changes that impact more harshly on those that already present vulnerabilities (e.g. poverty, pre-existing mental health conditions) (Berry et al., 2018; Bourque & Willox, 2014; Fritze et al., 2008). The way they are felt is deeply linked to the type, scale and suddenness of the climate event, and to the social, historical and cultural contexts (Fritze et al., 2008).

The wide scope of the concept “climate change” and the amplitude of its effects calls for a system-thinking based analysis, incorporating the knowledge of several fields as well as cultural perspectives, societal norms and priorities (Berry et al., 2018). As Berry et al. (2018) stated, “the climate-change-mental-health system” outcomes are deeply dependent of cultural and social determinants. These outcomes may arise from direct or indirect impacts, through different pathways (Berry, 2009; Berry, Bowen & Kjellstrom, 2010):

1. Direct impacts as a consequence of a more frequent exposure to trauma due to and increased severity and incidence of natural disasters;
2. Climate change leads to a prevalence of physical health problems. The negative impacts of climate change on physical health may affect mental health, as both are related;
3. The degradation of the physical environment caused by climate change has a direct impact on human wellbeing that strongly depends on natural ecosystems.

Both climate change and mental health are growing global concerns that urge immediate answers that must go beyond traditional quantitative and knowledge-compartmentalized approaches, incorporating “new ways of thinking, communicating, and acting” (Adger et al., 2012; Frumkin & McMichael, 2008). Cross-sectoral and interdisciplinary collaboration are required at all levels of response, including in public education and awareness (Bourque & Willox, 2014). This integrative and multidisciplinary character is also evident in many official documents that address both environmental and social/health issues, including the declaration “Transforming Our World – the 2030 Agenda for Sustainable Development” (United Nations [UN], 2015), adopted by the UN Sustainable Development Summit 2015. This declaration proposes 17 ambitious and universally applicable objectives for sustainable development – the Sustainable Development Goals (SDGs) – that provide a comprehensive perspective of development, human rights and wellbeing, and responsible interaction with the natural environment (*Figure 2*).

The 17 Sustainable Development Goals

1. End poverty in all its forms everywhere;
2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture;
3. Ensure healthy lives and promote wellbeing for all at all ages;
4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;
5. Achieve gender equality and empower all women and girls;
6. Ensure availability and sustainable management of water and sanitation for all;
7. Ensure access to affordable, reliable, sustainable and modern energy for all;
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all;
9. Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation;
10. Reduce inequality within and among countries;
11. Make cities and human settlements inclusive, safe, resilient and sustainable;
12. Ensure sustainable consumption and production patterns;
13. Take urgent action to combat climate change and its impacts;
14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development;
15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss;
16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels;
17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Figure 2. The 17 Sustainable Development Goals proposed in the declaration “Transforming Our World – the 2030 Agenda for Sustainable Development” (UN, 2015).

The SDGs express a more integrative framework than the most commonly used to address sustainability, a three-pronged diagram anchored in three pillars – economic, environmental, and social (Smythe, 2014). According to Smythe (2014), this three-pronged framework lack of success is due to the influence of past ideas, where the three pillars were addressed separately, on scholars and professionals *modus operandi*. The author suggests the importance of integrating holistic human welfare, comprehending the relationship with both natural and social worlds, as a basis in the sustainability framework (Smythe, 2014). Another alert arises from Smythe’s article: the existence of conceptual integrative

frameworks doesn't necessarily lead to real integrative practices. And although the SDGs do provide a holistic framework, there must be an intensive effort to ensure that they will result in real and effective practices, operating under the premise that "a healthy planet is the foundation for the economy, human development and, ultimately, human wellbeing, including healthy people" (UN Environment, 2019, p. 474).

1.1 A hopeful and integrative approach

From what was previously mentioned, one easily concludes that overcoming assimilated habits that lead to a separation of fields, and providing integrative intervention models that reflect the holistic view present in the SDGs is essential to achieve sustainable development¹. Considering that the dominant drivers of climate change are anthropogenic (e.g., greenhouse gas emissions; IPCC,2014), public education and engagement, as well as ecosystem and health interventions, are vital to the fight against climate change (Fritze et al., 2008). Environmental education (EE) plays a key role in this process, promoting environmentally-informed and committed societies, where individuals, the community and policy makers work in an integrative way. In this process, hope is an important mediator between scientific evidence (knowledge) and action (pro-environmental behavior) (Fritze et al., 2008). Perceiving climate change as an overwhelming threat may trigger defensive responses as avoiding information about climate change, denying its relevance or refusing to act (Brügger, Dessai, Dewine-Wright, Morton, & Pidgeon, 2015). Thus, addressing climate change is to address education, awareness and health issues, promoting a multi-level (individuals, community, and policy-makers) and multidisciplinary approach, but ensuring a hopeful perspective.

As more thoroughly addressed in the next topic, EE has been striving to promote pro-environmental behaviors and ensure a strong and positive engagement between

¹ The term "development" is applied according to the definition by Daly (2008). Daly pointed out the need to distinguish between development, which he defined as a qualitative improvement, and growth (quantitative increase). This is an important distinction as it encompasses the possibility of greater quality of life without an increase in the consumption of natural resources (Smythe, 2014).

individuals/societies and nature ². Nevertheless, the achieved results are below expectations. More than ever, it is crucial to have in mind that socio-ecological systems are quite complex, reflecting the multiplicity of ways individuals and communities interact with nature. Nature experiences are mediated by several factors and may have different outcomes. Dean, Barnett, Wilson, & Turrell (2019) pointed out that the effect of nature experiences was influenced by factors as type of experience, type of environment, and behavioral and social interactions. The authors also alerted that passive exposure to nature may not be enough to achieve the necessary pro-environmental response. For that, nature experiences focused on physical activity, wellbeing and social interactions can prove to be more suitable (Dean et al., 2019). These experiences provide direct and unconditional (non-dependent on the actions of others) benefits. According to Amelung et al. (2019), direct and unconditional benefits appear to be a relevant convincing factor for the adoption of mitigation actions. The Doha Declaration on Climate, Health & Wellbeing (Global Climate and Health Alliance, 2012) also reinforced the relevance given to direct benefits, especially human health, stating that health protection is “one of the most important motivations for climate action” (pp. 1).

Although environmental changes as climate change are a severe global threat, it is not difficult to understand why Watts et al. (2015) have stated that tackling climate change can constitute a health opportunity. The way we address climate change can lead to the implementation of mitigation and adaptation actions with a direct positive impact in human health. This symbiotic interaction between ecological and social areas provides environmental and societal benefits, showing that the global changes scenario cannot be addressed in a compartmentalized way. It is in multi-level cooperation that lies hope for an environmentally and socially sound future.

² In the context of this thesis, the term “nature” assumes a comprehensive character and will be use in a broad sense, comprising a diversity of environments: of nonhuman origin and with little or no apparent evidence of human intervention, as wild forests and woods, rivers and oceans; and with strong human influence, as urban parks, public gardens, artificial beaches (Hartig, Mitchell, & Frumkin, 2014; Silva et al., 2018). It also encompasses physical and geological processes, as well as landscapes, flora and fauna (Hartig et al., 2014).

1.3. Following the path: structure of the thesis

As the most common framework for sustainability, this thesis is also based in a three-pronged thematic structure – environmental education, nature and human wellbeing, and social intervention – but it ensures a strong interconnection among the three areas. The provided theoretical overview allows for a better understanding of the areas in question and how they can benefit from interacting.

Throughout this thesis the journey of EE will be reviewed and discussed, and a new approach (Project CarryOn; see Chapter 3), linking EE and social intervention will be presented. The content of the thesis' chapters is listed on *Figure 3*.

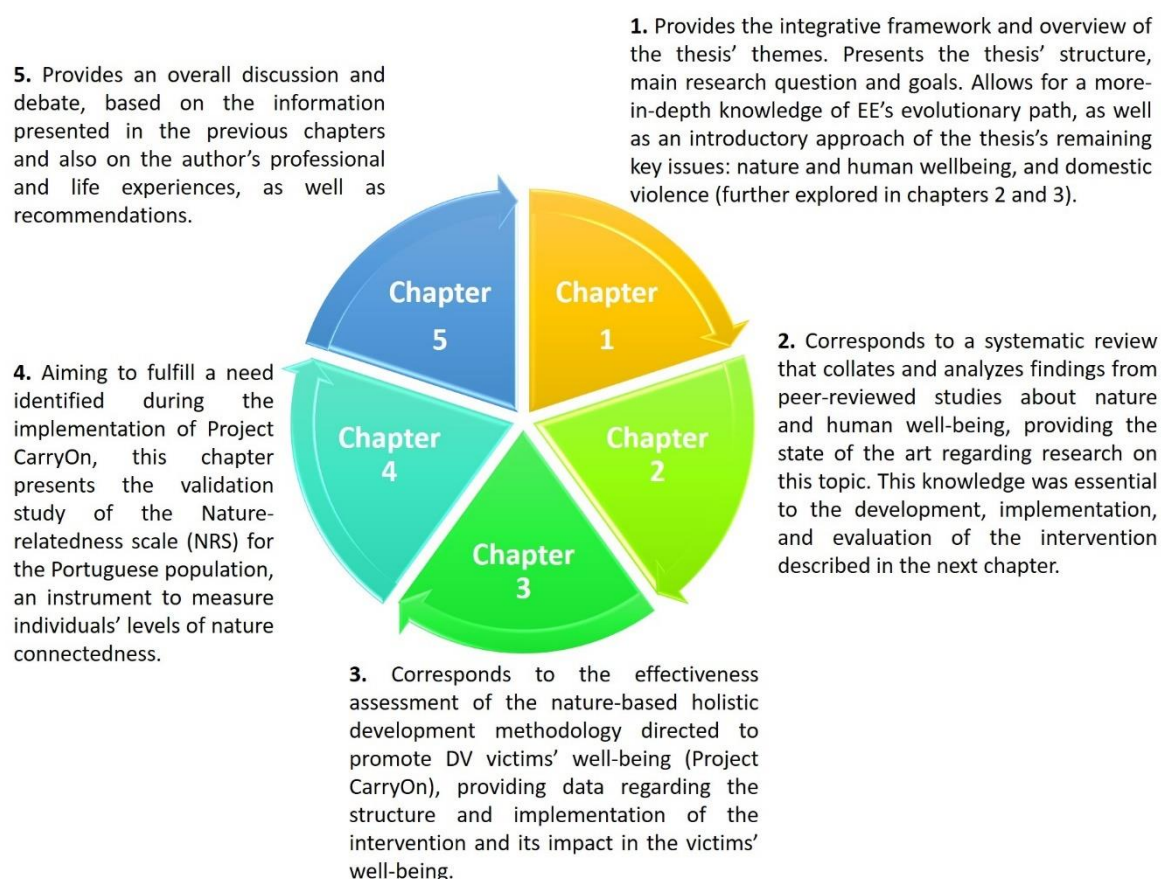


Figure 3. Thesis chapters' structure and content.

2. Environmental education

2.1 Environmental education history: a chronological overview

2.1.1 Main international events

The history of environmental education (EE) starts well before the first recognized use of the term, which occurred in 1948 (Caride & Meira, 2001, Chapter 4) or 1965, being the latest the most trustworthy date (Dillon, 2014; Dias, 2004; Palmer & Neal, 1994, Chapter 2; Gough, 2013, Chapter 2). Nevertheless, it was in the second half of the twentieth century that environmental education became an issue of international relevance. Amidst several alerts and signs of environmental problems, including the publication, by Rachel Carson, of the book “*Silent Spring*” that ignited the American environmental movement, a global concern about the environment and limits to growth emerged (Almeida, 2007; Coelho et al., 2006; Ekins, 1993; Marcatto, 2002; Palmer & Neal, 1994). Although it captured the attention not only of politicians, economists, environmental researchers, but also from the society at large, the alerts about the limits to growth were soon shadowed by economic development (Ekins, 1993). Nonetheless, the alerts and concerns were not completely in vain, leading to pressing calls for a socially and environmentally sustainable economic development (World Commission on Environment and Development [WCED], 1987). Along with demands of a complementarity (and compatibility) between economic growth and environmental sustainability, important cornerstones to promote it were also identified. One of those cornerstones was environmental education. In 1969, Stapp et al. presented the definition for a new educational approach that aimed to reach citizens of all ages, educating about man [*sic*] and his relationship with the total environment. That new educational approach was called environmental education. Stapp et al. (1969) defined EE as “aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve those problems, and motivated to work toward their solution.” (p. 31). Stapp et al. EE definition and objectives were an important basis to the development of further conceptions, including the definition of EE established at the International Working Meeting on Environmental

Education in the School Curricula, held by the International Union for the Conservation of Nature and Natural Resources (IUCN) in 1970 (Gough, 2013, Chapter 2). This definition, that became widely accepted and used, stated as follows (IUCN & UNESCO, 1970, p. 11):

“Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man [*sic*], his [*sic*] culture and his [*sic*] biophysical surroundings. Environmental education also entails practice in decision-making and self-formulating of a code of behavior about issues concerning environmental quality.”

At this conference it was also agreed that EE was a “science-centered multidisciplinary subject where most – if not all school subjects – could and should be incorporated”, including History, Social Sciences, Economics and Civic Education (IUCN, 1970, pp. 11, 14).

In Stockholm, in 1972, the United Nations Conference on the Human Environment (UNCHE) was held, considering the need for a common outlook and for common principles applied to the preservation and enhancement of the human environment. Man’s [*sic*] environment was seen as constituted by two aspects – natural and man-made [*sic*] – both essential to human wellbeing, to the access of basic human rights and to life itself (UNCHE, 1973). Human environment was also faced as a major issue in economic development and the natural human growth was considered to continuously present problems for the preservation of the environment, causing the need for the adoption of adequate policies and measures to face them (UNCHE, 1973). A warning was also made: without shaping its actions with a prudent care for their environmental consequences, humanity would do massive and irreversible harm to the environment on which its survival and wellbeing depends (UNCHE, 1973). Besides alerting to the need of a more environmental-concerned growth and way of life, this conference also highlighted the need of a more consistent knowledge, of an enthusiastic but calm state of mind, and of an intense and orderly work undertaken by individuals, communities, enterprises and institutions (UNCHE, 1973).

Though not using the specific term, this conference laid out important foundations for sustainable development, stating that:

“defend and improve the human environment for present and future generations has become an imperative goal for mankind – a goal to be pursued together with, and in harmony with, the established and fundamental goals of peace and of worldwide economic and social development.” (UNCHE, 1973, p. 3) and that “The natural resources of earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate.” (UNCHE, 1973, p. 4).

The Declaration of the United Nations Conference on Human Development, in its principle 19, defended that (UNCHE, 1973):

“Education in environmental matters, for the younger generation as well as adults, giving due consideration to the underprivileged, is essential in order to broaden the basis for an enlightened opinion and responsible conduct by individuals, enterprises and communities in protecting and improving the environment and its full human dimension.”

Together with the Declaration of the United Nations Conference on Human Development, a relevant outcome of this conference was the establishment of a framework for environmental action. It was based in three broad types of actions that included: i) a global environmental assessment program (Earth watch); ii) environmental management; and iii) international support measures (UNCHE, 1973). *Figure 4* represents the framework of the action plan, indicating the main activities included in each type of broad action.

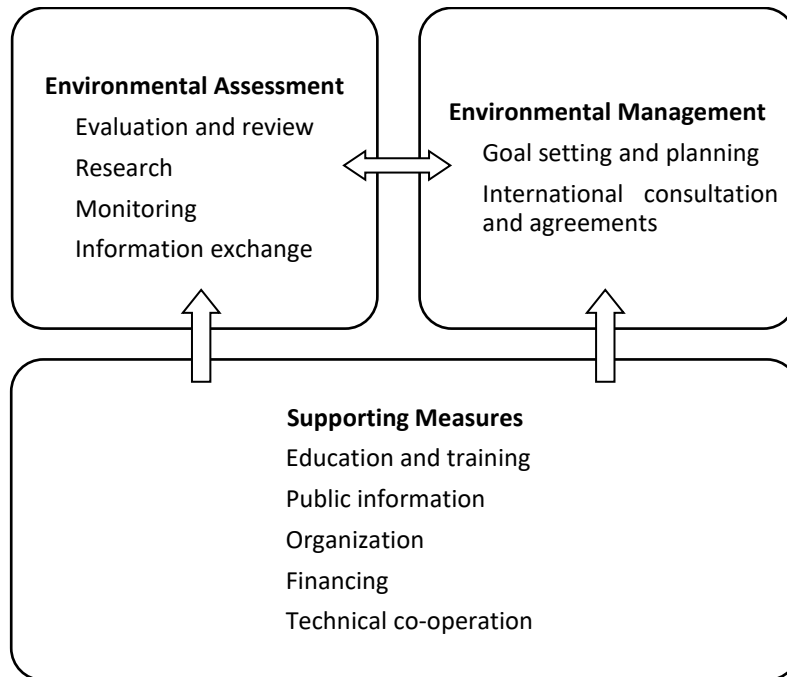


Figure 4. Framework of the environmental action plan based on the recommendations made in the United Nations Conference on the Human Environment, held in Stockholm, in 1972 (adapted from UNCHE, 1973).

Focusing on international cooperation regarding the environment, this conference resulted in the establishment of environmental ministries and agencies in over 100 countries, and marked the beginning of an elevated growth of environmental NGOs (Hens & Nath, 2003).

Following the Stockholm Conference, the United Nations Environment Programme (UNEP) was established. UNEP and UNESCO then founded, in 1975, the UNESCO/UNEP International Environmental Education Programme (IEEP), the first intergovernmental statement on EE, which was launched at the International Workshop on Environmental Education, organized by UNESCO and UNEP (Palmer & Neal, 1994, Chapter 2). Taking place in Belgrade, in 1975, this workshop produced an important output: the Belgrade Charter – a global framework for EE that listed the aims, objectives, key concepts and guiding principles of the IEEP (Palmer & Neal, 1994, Chapter 2). Stressing the need of a new global ethic, the recognition and sensitivity towards the relationship between humanity and nature and between people, the Belgrade Charter assumed an integrative character, reinforced even by the use of a more inclusive language. The reform of educational processes and systems was seen as an essential step towards the development of a new

world economic order and ethic. According to the Belgrade Charter, the goal of EE was “to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones.” (UNESCO & UNEP, 1975). Presenting six overall objectives for EE – awareness, knowledge, attitude, skills, evaluation ability and participation – it indicated that EE principal audience was the general public and listed two major categories of audiences (UNESCO & UNEP, 1975):

- “1. The formal education sector: including pre-school, primary, secondary and higher education students as well as teachers and environmental professionals in training and retraining;
2. The non-formal education sector: including youth and adults, individually or collectively from all segments of the population, such as the family, workers, managers and decision makers, in environmental as well as non-environmental fields.”

The Belgrade Charter also defined eight still prevailing and important guiding principles of EE (UNESCO & UNEP, 1975):

- “1. Environmental education should consider the environment in its totality – natural and man-made [*sic*], ecological, political, economic, technological, social, legislative, cultural and aesthetic.
2. Environmental education should be a continuous life-long process, both in-school and out-of-school.
3. Environmental education should be interdisciplinary in its approach.
4. Environmental education should emphasize active participation in preventing and solving environmental problems.
5. Environmental education should examine major environmental issues from a world point of view, while paying due regard to regional differences.

6. Environmental education should focus on current and future environmental situations.
7. Environmental education should examine all development and growth from an environmental perspective.
8. Environmental education should promote the value and necessity of local, national and international cooperation in the solution of environmental problems.”

The Belgrade Charter highlighted and strengthened some of EE’s most important characteristics, as: its multidimensional character, the fact that it should constitute a continuous life long process, not restricted to school but being directed and made available to all.

Following the International Workshop in Belgrade, UNESCO, in cooperation with UNEP, organized the world’s first Intergovernmental Conference on Environmental Education, which took place in Tbilisi, in 1977. The Declaration of Tbilisi is still considered an international reference for the development of EE actions and programs (Dias, 2004, Chapter 2). This Declaration presents several key points regarding EE, including goals, categories of objectives and guiding principles (*Figure 5*), stressing EE’s holistic character and the need to work with individuals, of all ages, and communities in order to promote environmental sensitivity, critical thinking and problem-solving skills, thus leading to a global and effective cooperation in preventing and solving environmental problems (UNESCO & UNEP, 1978, Chapter 3).

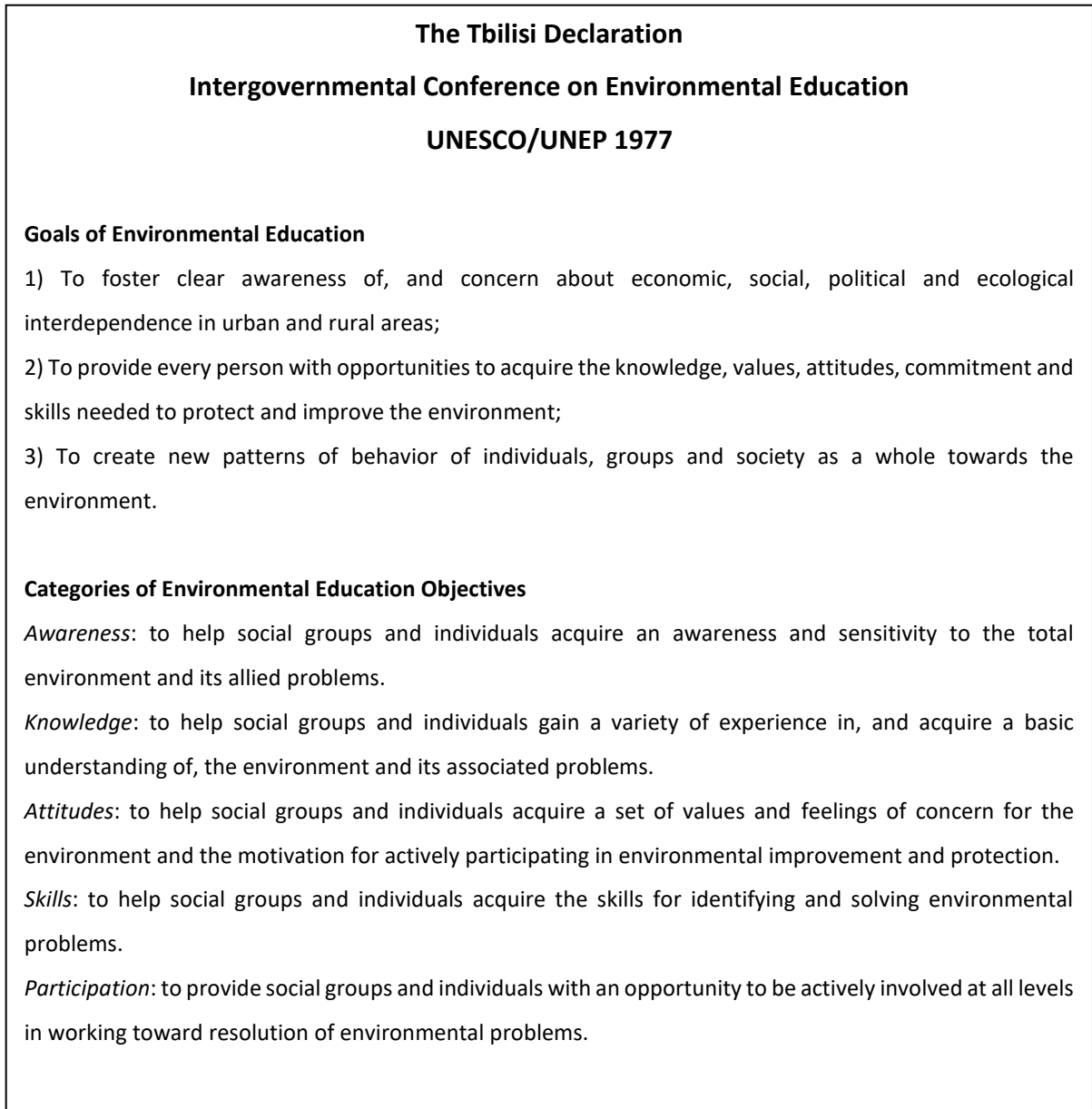


Figure 5. Environmental education goals, categories of objectives and guiding lines, as presented in the Declaration of Tbilisi (UNESCO & UNEP, 1978, Chapter 3).

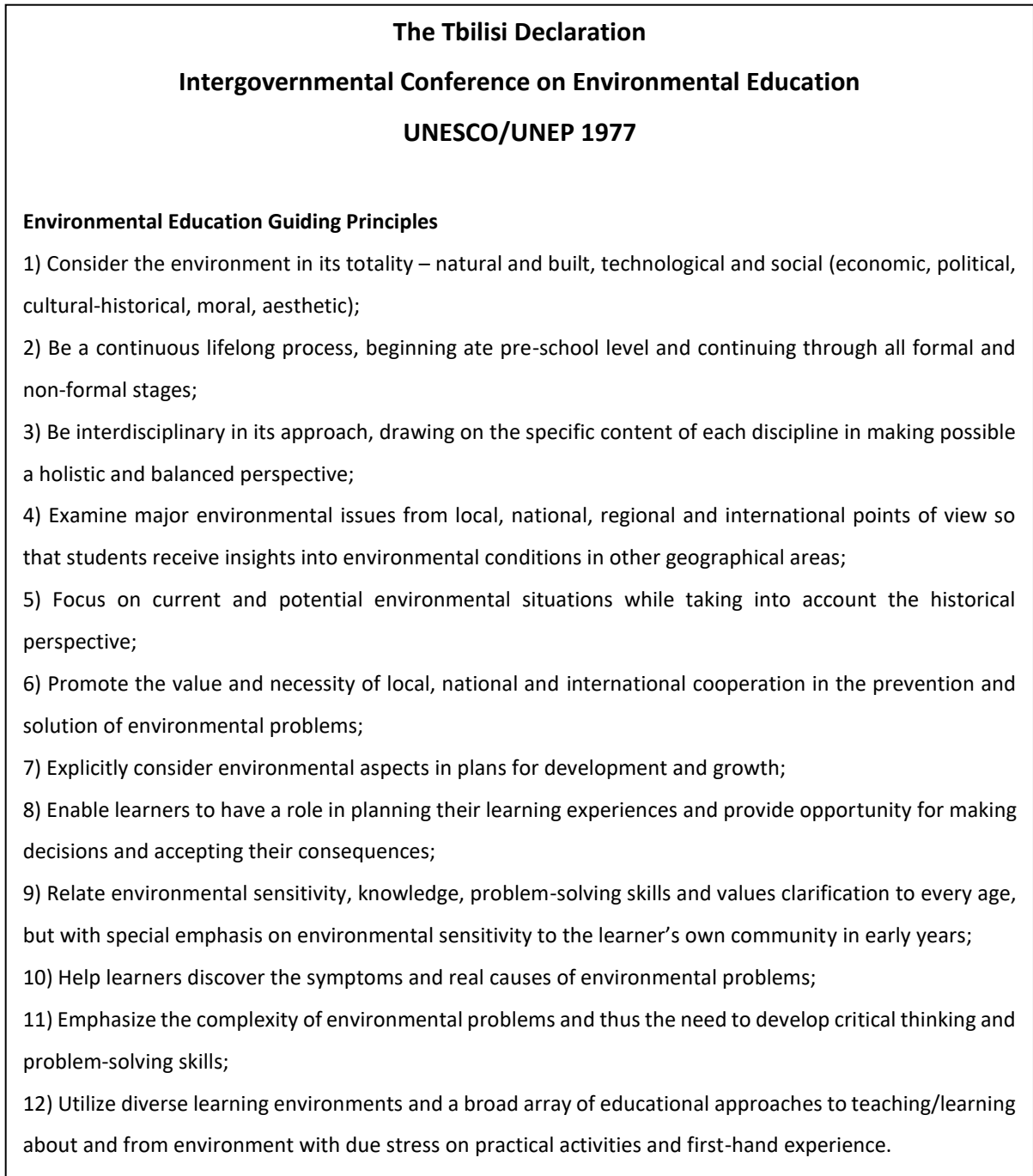


Figure 5. (cont.)

In 1980, IUCN, in cooperation with UNEP and the World Wildlife Fund (WWF), and collaboration of the Food and Agricultural Organization of the United Nations (FAO) and UNESCO, releases the World Conservation Strategy: living resource conservation for sustainable development. This document stressed the idea that nature conservation and

development are interdependent and that resource conservation is essential to sustainable development (Palmer & Neal, 1994).

In Chapter 13, dedicated to support to conservation through participation education, it is clearly stated that the entire society needs to change its behavior, adopting a new ethic of respect for all life on earth and living in harmony with the natural world on which humanity survival and wellbeing depend on (IUCN, UNEP, WWF, FAO, & UNESCO, 1980). The task of promoting these much-required changes is attributed to environmental education (IUCN, UNEP, WWF, FAO, & UNESCO, 1980). The occasional character of informal education programs directed to adult population and the small offer of formal programs directed to schools are highlighted, as well as the conclusion that the progresses already achieved are quite insufficient (IUCN, UNEP, WWF, FAO, & UNESCO, 1980).

In 1987, the report “Our common future”, by the WCED, also known as the Brundtland Report due to the name of the Chairman of the Commission, Gro Harlem Brundtland, was published. This report popularized the term *sustainable development*, presenting its classic definition: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (WCED, 1987, Chapter 2). It aimed to provide insights regarding long-term environmental strategies for achieving sustainable development, to make recommendations to strengthen international co-operation in the achievement of common and mutual supportive developmental objectives and to help define shared perceptions of long-term environmental issues and necessary efforts to successfully overcome those problems and protect and enhance the environment (WCED, 1987). Regarding EE, this report states as follows (WCED, 1987, Chapter 4, pp. 96):

“Environmental education should be included in and should run throughout the other disciplines of the formal education curriculum at all levels - to foster a sense of responsibility for the state of the environment and to teach students how to monitor, protect, and improve it. These objectives cannot be achieved without the involvement of students in the movement for a better environment, through such things as nature clubs and special interest groups.

Adult education, on-the-job training, television, and other less formal methods must be used to reach out to as wide a group of individuals as possible, as environmental issues and knowledge systems now change radically in the space of a lifetime.”

Also, in 1987, in Moscow, UNESCO and UNEP jointly organized the UNESCO/UNEP International Congress on Environmental Education and Training. This congress aimed to evaluate the nations’ difficulties and progresses in the field of EE since Tbilisi, and to assess needs and priorities that should be addressed, presenting a draft international strategy for EE and training through the 1990’s (Dias, 2004, Chapter 2; UNESCO & UNEP, 1987). Reporting to the 10 years between the Declaration of Tbilisi and the Moscow congress, several improvements in the field of EE were identified, including: a widespread awareness of the need of EE, evolution in the development of concepts, contents, teaching materials and methodological approaches, training of specialized professionals, and environmental awareness (UNESCO & UNEP, 1988). Nevertheless, and despite all the efforts and increased awareness of environmental problems, it was acknowledged that, generally, there were no signs of abatement in the environmental crisis (Dias, 2004, Chapter 2; UNESCO & UNEP, 1988). Education was once more referred as a fundamental mean of integration and of social and cultural change, being essential in order to achieve the proposed environmental goals and to overcome the persistent environmental crisis (UNESCO & UNEP, 1988). The discussions held at this congress showed that the need for greater international cooperation and effort was still a prevailing one (UNESCO & UNEP, 1987). Regarding educational programs and teaching material, it was stated that there was no need for individual countries or institutions to continuously attempt to “reinvent the wheel”, but instead to make good use of the already existing educational/informative materials and to develop effective inter-institutional collaborations (UNESCO & UNEP, 1987). The proposed International strategy for action in the field of environmental education and training *for the 1990’s*, that viewed the Tbilisi recommendations as the basic framework for EE at all levels, indicated that an effort should be made to promote the following (UNESCO & UNEP, 1988, p. 6):

- “i) the search for and implementation of effective models of environmental education, training and information;
- ii) general awareness of the causes and effects of environmental problems;
- iii) general acceptance of the need for an integrated approach to solving these problems;
- iv) training, at various levels, of the personnel needed for the rational management of the environment in view of achieving sustainable development at community, national, regional and worldwide levels.”

A strong recommendation was also made concerning at the practical character of EE, that should promote the acquisition of knowledge through observation, study and practical experience of specific environments, acting upon the individuals and communities' concerns and values (UNESCO & UNEP, 1988). Thus, EE was envisaged as “a form of educational practice attuned to the life of society”, that can only be effective “if all members of society – workers, students, specialists, decision-makers – take part (...)” (UNESCO & UNEP, 1988, p. 6). More than only a particular aspect of the educational process, EE should be considered a cornerstone in the development of a new lifestyle (UNESCO & UNEP, 1988, p. 6). *Figure 6* lists the complete set of strategies and respective objectives and actions, defined in the draft international strategy.

**International strategy for action in the field of environmental education and training
for the 1990's
UNESCO/UNEP 1988**

A – Access to information

Objective: Strengthening of the international system for information and exchange of experience of the International Environmental Education Programme (IEEP).

Actions: 1) Setting up a computerized service; 2) Strengthening regional networks of institutions of excellence and documentation centres; 3) Publication of the newsletter Connect.

B – Research and Experimentation

Objective: Strengthening of research and experimentation on educational content and methods and strategies for the organization and transmission of messages concerning environmental education and training.

Actions: 1) Research and experiments concerning educational content and methods; 2) Research and experimentation concerning other complementary aspects of environmental education; 3) Research concerning the pedagogical approach to the question of values; 4) Research concerning new strategies for the transmission of messages to develop environmental awareness, education and training; 5) Comparative evaluation research on the different components of the educational process.

Figure 6. Strategies, objectives and actions of the International strategy for action in the field of environmental education and training for the 1990's, an outcome of the International Congress on Environmental Education and Training, held by UNESCO/UNEP, in 1987 (UNESCO & UNEP, 1988).

**International strategy for action in the field of environmental education and training
for the 1990's
UNESCO/UNEP 1988**

C – Educational Programmes and Teaching Materials

Objective: Promotion of EE through the development of curricular and teaching materials for general education.

Actions: 1) Exchange of information on curriculum development; 2) Development of model (prototype) curricula; 3) Development of new teaching aids; 4) Promoting curriculum evaluation.

D – Training of Personnel

Objective: Promotion of pre- and in-service training for qualified formal and non-formal environmental education personnel.

Actions: 1) Promoting pre-service training; 2) Promoting in-service training.

E – Technical and Vocational Education

Objective: Incorporation of an environmental dimension into technical and vocational education.

Actions: 1) Development of programmes and materials for education and training; 2) Training and developing the awareness of teachers; 3) A priority activity in the service sector (tourism).

F – Educating and Informing the Public

Objective: More effectively educating and informing the public about the environment through the use of the media and the new communication and information technologies.

Actions: 1) Producing media-related education programmes; 2) Use of new communication media and activity teaching methods; 3) Creation of a bank of audiovisual programmes; 4) Development and use of exhibitions and museums.

Figure 6. (cont.)

**International strategy for action in the field of environmental education and training
for the 1990's
UNESCO/UNEP 1988**

G – General University Education

Objective: More effective incorporation of the environmental dimension into general university education through the development of study programmes, teaching materials and training, and through the establishment of appropriate institutional machinery.

Actions: 1) Developing the awareness of academic authorities; 2) Development of study programmes; 3) In-service teacher training; 4) Institutional intra-university co-operation.

H – Specialist Training

Objective: Promoting specialized scientific and technical environmental training.

Actions: 1) Initial training for environmental specialists; 2) Further training for professionals including decision-makers and administrators; 3) Training through research; 4) Development of suitable study programmes; 5) Use of natural parks, biosphere reserves and other protected areas; 6) Strengthening regional training capacity.

I – International and Regional Co-operation

Objectives: Development of environmental education through coordinated international and regional cooperation.

Actions: 1) Exchange of information; 2) Promotion of research and experimentation; 3) Promoting training; 4) Study programmes; 5) Information on legislation concerning environmental education, natural resources and environmental management; 6) Regional actions within the framework of IEEP; 7) Mobilization of technical and financial resources; 8) Inter-agency co-ordination and consultation at the international level; 8) World Decade for Environmental Education, 1990-2000; 10) International congress on EE and T for the beginning of the twenty-first century.

Figure 6. (cont.)

Before the 1997 meeting could occur, another important landmark in the path for sustainability and, hence, in the history of EE took place: the 1992 United Nations Conference on Environment and Development (UNCED), also known as Earth Summit or Rio-92 (Dias, 2004, Chapter 1; UNCED, 1992). The Brundtland report (1987) was essential to provide the momentum for the Rio-92 that “laid the foundations for the global

institutionalization of sustainable development” (Drexhage & Murphy, 2010 p. 8). With an unprecedented level of participation (172 governments, 2 400 representatives of non-governmental organizations [NGOs] and 17 000 participants in the parallel NGO Forum), the Rio-92 focused on Environment and sustainable development (UNCED, 1992), once again reinforcing the importance of the Tbilisi recommendations and following on the already highlighted need of international co-operation in order to achieve sustainability. Agenda 21 was one of the most important outputs of Rio-92, addressing not only present problems, but also aiming to prepare the world for future challenges regarding development and environment (UNCED, 1992), constituting a “wide-ranging blueprint for action to achieve sustainable development worldwide (UNCED, 1992). *Table 1* presents a synthesis of the mains elements of Agenda 21.

Table 1. *Main elements of Agenda 21 (Gardiner, 2002).*

Elements	Issues
Social and economic dimensions to development	Poverty, production and consumption, health, human settlement, integrated decision – making.
Conservation and management of natural resources	Atmosphere, oceans and seas, land, forests, mountains, biological diversity, ecosystems, biotechnology, freshwater resources, toxic chemicals, hazardous radioactive and solid wastes.
Strengthening role of major groups	Youth, women, indigenous peoples, non-government organizations, local authorities, trade unions, business, scientific and technical communities, farmers.
Means of implementation	Finance, technology transfer, information, public awareness, capacity building, education, legal instruments, institutional frameworks

The need to give developing countries and economies in transition, due to the environmental, economic and social challenges they were facing, a special attention was also reiterated (UNCED, 2001). Education was introduced not only as relevant to

environmental protection and preservation, but also to individual empowerment and to the establishment of equalitarian societies (UNCED, 2001). Environmental education should follow what was already stated in the Declaration of Tbilisi, which provided the fundamental principles of the Agenda 21 proposals towards education, public awareness and training (UNCED, 2001, chapter 36). The Rio-92 main message was “that nothing less than a transformation of our attitudes and behavior would bring about the necessary changes” (UNCED, 1992).

Five years after Rio-92 and 20-years after Tbilisi, in 1997, the International Conference on Environment and Society: Education and Public Awareness for Sustainability is held in Thessaloniki, Greece. It is acknowledged that little progress has been made and several important guidelines established in previous meetings are reaffirmed, including the importance of education and public awareness, and the need to change behaviors and lifestyles (UNESCO, 1997). Regarding EE, the Declaration of Thessaloniki reinforces the Tbilisi recommendations, comprehending the wider range of global issues included in Agenda 21, indicating that EE could also be referred as education for environment and sustainability (UNESCO, 1997). A holistic and interdisciplinary approach where all subject areas (including social sciences) should address environment and sustainability is also highlighted (UNESCO, 1997).

Aiming to set strategies for a wider and more effective implementation of Agenda 21, the World Summit on Sustainable Development (WSSD) was held in Johannesburg, South Africa, in 2002, thus being also called Earth Summit 2002 or Rio+10 (referring to the 10 years passed since Rio-92) (Gardiner, 2002; Hens & Nath, 2003). A primary concern of WSSD was the deterioration of both environmental quality and sustainability since Rio-92 and the little progress made towards achieving the goals proposed in that conference (Hens & Nath, 2003). Agenda 21 was seen as a reliable and high-quality document whose practical implementation fell short of what was needed and agreed in Rio-02 (Hens & Nath, 2003). The Johannesburg Declaration on Sustainable Development (*Figure 7*) was a conclusion and a summary of WSSD most important recommendations and commitments, clarifying the conference’s vision of sustainable development (Hens & Nath, 2003; UN & WSSD, 2003).

The Johannesburg Declaration on Sustainable Development: structure and keywords

UN/WSSD, 2002

1) From our origins to the future

- ✓ Pillars: environment, social and economic development
- ✓ Levels: local, national, regional, global
- ✓ Pledge to implement a plan for poverty eradication and human development

2) From Stockholm to Rio de Janeiro to Johannesburg

- ✓ Agenda 21, the Rio principles;
- ✓ Major UN conferences;
- ✓ Vision of sustainable development (SD).

3) The challenges we face

- ✓ Overarching objectives: poverty eradication, unsustainable patterns of production and consumption, natural resource base, and social and economic development;
- ✓ The North–South divide;
- ✓ Continuing environmental degradation;
- ✓ Globalization as a challenge;
- ✓ Credibility of democratic representatives;

4) Our Commitment to Sustainable Development

- ✓ Characteristics: multilevel policy action, long-term perspective, broad participation, respect for human diversity;
- ✓ Actors: multi-stakeholders, indigenous people, labor organizations, private sector, local governments, women, regional groupings, and alliances;
- ✓ Threats to SD: hunger, malnutrition, foreign occupation, armed conflicts, illicit drug problems, organized crime, corruption, natural disasters, illicit arms trafficking, trafficking in persons, terrorism, intolerance (racial, ethnic and religious), and diseases;
- ✓ Issues: water and sanitation, energy, health care, food security, biodiversity, and shelter;
- ✓ Regions: small island countries, and least developed countries;
- ✓ Instruments: capacity-building, technology-transfer, new partnerships, partnerships, dialogue, development of human resources, education and training, financial means, and good governance;

Figure 7. Structure and keywords of the Johannesburg Declaration on Sustainable Development (adapted from Hens & Nath, 2003).

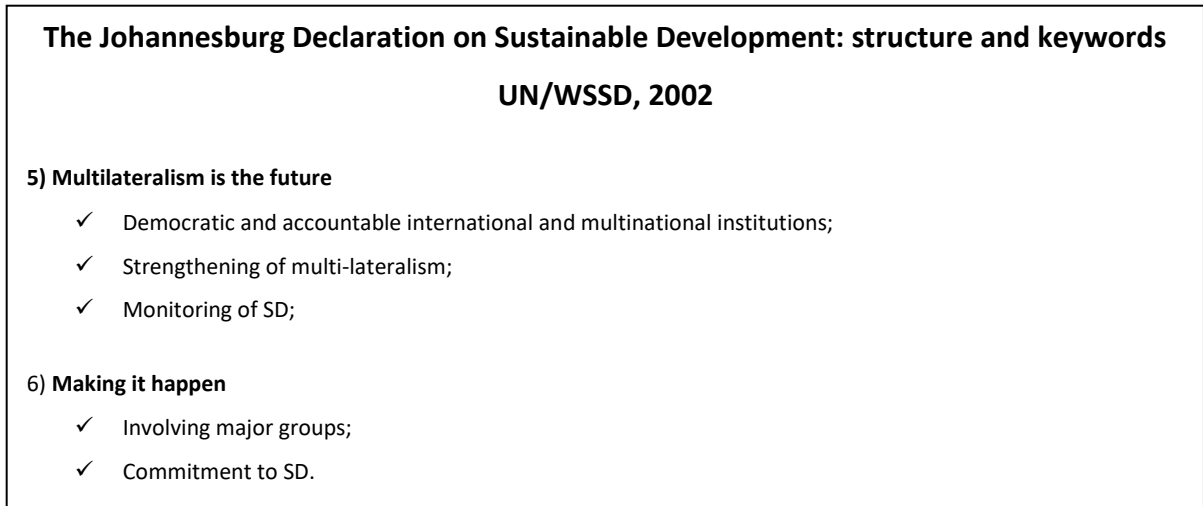


Figure 7. (cont.)

The year of 2002 was also marked the declaration by UN General Assembly, through its Resolution 57/254, of 2005-2014 as the Decade of Education for Sustainable Development (UNESCO, 2005)

In 2012, the United Nations Conference on Sustainable Development (UNCSD), also known as Rio+20, takes place in Rio de Janeiro, Brazil, with the main goal or renewing the commitment (mostly political) to sustainable development and, thus, “ensuring the promotion of an economically, socially and environmentally sustainable future for our planet and for present and future generations.” (UNCSD, 2012, p. 1). The main outcome of the Rio+20 was the document “The future we want”. In this document, many previously approached key issues, guidelines and needs regarding sustainable development were again recognized, reaffirmed, acknowledged, underlined, emphasized, underscored, stressed and encouraged (e.g., “We acknowledge the role of civil society and the importance of enabling all members of civil society to be actively engaged in sustainable development (...); “We reaffirm the need to strengthen international environmental governance within the context of the institutional framework for sustainable development (...); “We encourage action at the regional, national, subnational and local levels to promote access to information, public participation and access to justice in environmental matters, as appropriate.”) (UNCSD, 2012, pp. 8, 17, 20). Paragraphs 229 to 235 report to Education, reaffirming the Member States commitment to the right of education and to the strengthening of international cooperation to achieve universal access to primary

education. Their belief that achieve full access to quality education at all levels is an essential condition for sustainable development, poverty eradication, gender equality, women's empowerment and human development, is also emphasized (UNCSD, 2012, pp. 44-45).

The Intergovernmental Conference on Environmental Education for Sustainable Development (also known as Tbilisi+35) also takes place in 2012, in Tbilisi, Georgia. Organized by the Government of Georgia in partnership with UNESCO and UNEP, it aimed to renew the commitment to the principles of the 1977 Declaration of Tbilisi and strengthen the global appeal for education for sustainable development (Government of Georgia, UNESCO, & UNEP, 2012). The communiqué "Educate today for a sustainable future" stated acknowledgements and recommendations made by the representatives of the 98 participant countries and organizations, many of which firmly based in the 1977 Declaration of Tbilisi. A call for a more cooperative and integrative action between countries and institutions was made, as well as for a wider and more effective integration of sustainable development principles in school curricula (Government of Georgia, UNESCO, & UNEP, 2012).

In 2014, UNESCO promotes the World Conference on Education for Sustainable Development, in Aichi-Nagoya, Japan. The resulting declaration – Aichi-Nagoya Declaration on Education for Sustainable Development – is a call for urgent action to strengthen and scale up education for sustainable development.

1.1.2 The national panorama

After the Second World War, the environment became an important international issue and concern, entering the political and social agendas of many countries. In Portugal, the situation was not quite the same. Under a dictatorship, with the majority of the population presenting low incomes and educational levels, associated with a late industrialization and a rural predominance, there wasn't any encouragement for civic participation in political or associated causes (Almeida, 2007; Batista, 1994; Pinto, 2010). Civic participation and the defense of environmental causes were far from being encouraged and the country seemed

numbered towards the emergent environmental crisis (Almeida, 2007). But, even under the dictatorship, some important events took place, including the Portuguese participation in Stockholm Conference in 1972 and the creation of the first protected area – Peneda-Gerês National Park (Pinto, 2004).

In 1974, with the revolution that ended the dictatorial regime, the country suffered a rapid and disorganized urban growth that led to an increasing deterioration of the environmental quality (Almeida, 2007). Nevertheless, after the second half of the 1970's, following the fall of the regime, more systematic public demonstrations supporting the environmental cause started to occur (Almeida, 2007). Since then, many environmental measures were adopted, mainly due to external demands from the European Union and not due to pressure made by and informed and environmentally concerned population (Almeida, 2007).

In 1976, the Constitution of the Portuguese Republic already included an article regarding Environment and Life Quality (Article 66), which was reiterated in the subsequent constitutional amendments (*Figure 8*).

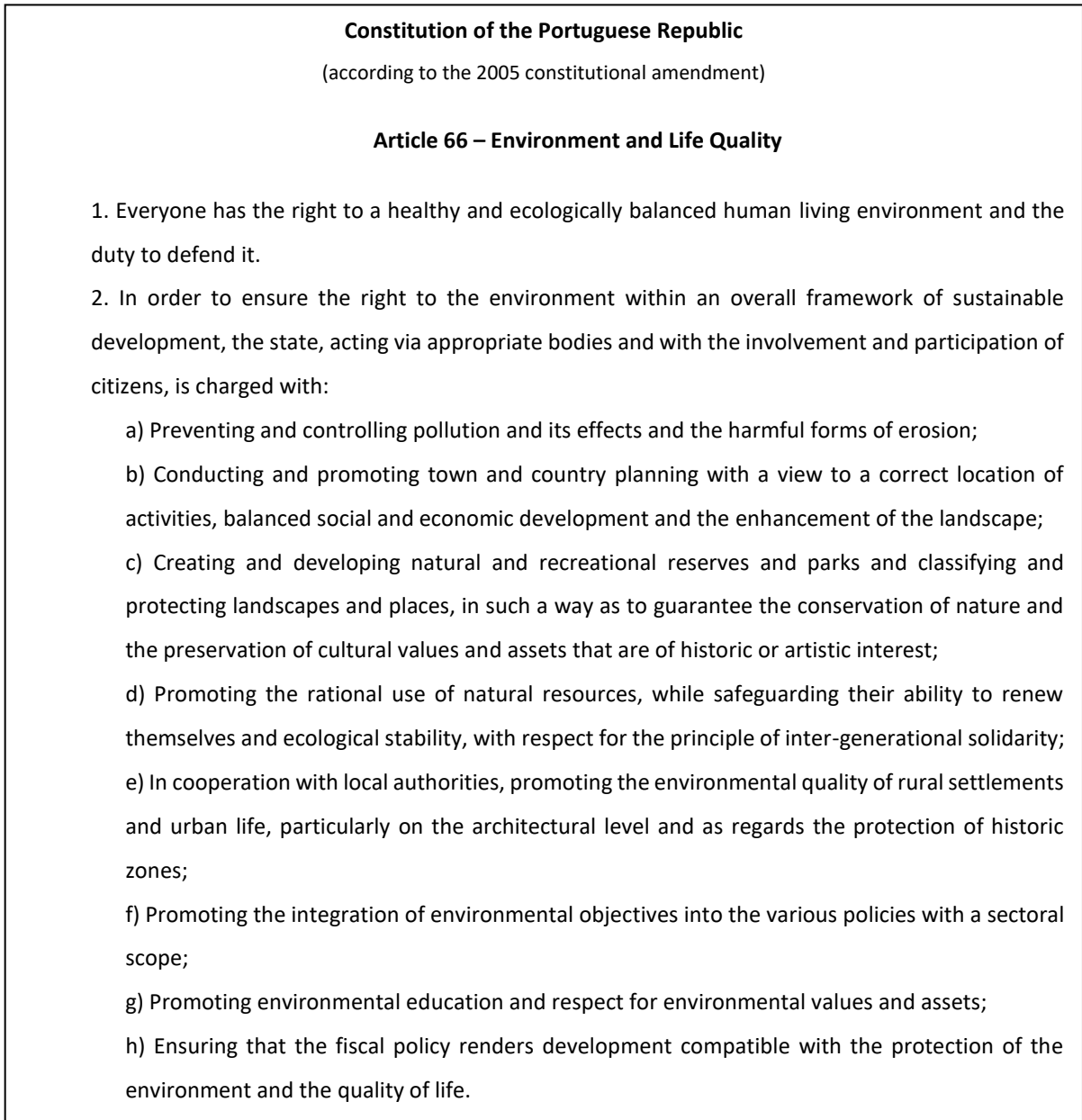


Figure 8. Article 66 of the Constitution of the Portuguese Republic (according to the amendment of 2005).

A healthy and ecologically well-preserved environment, as well as the duty to defend it, stands as a right of every citizen. The State, together with institutional and corporate bodies and civil society, including the citizens themselves, is responsible for the application of the suitable measures to ensure the right to a sound environment. The listed measures include the promotion of environmental education and respect for environmental values and resources. The idea of sustainability is also reflected: “Promoting the rational use of natural resources, while safeguarding their ability to renew themselves and ecological

stability, with respect for the principle of inter-generational solidarity” (Constitution of the Portuguese Republic, 2005).

In 1986, the same year Portugal became a member of the European Economic Community (EEC), the Basic Educational Law is published (Law no. 46/86, of October 14, subsequently amended by Law no. 115/97, of September 19, Law no. 49/2005, of August 30, and Law no. 85/2009, of August 27). With the publication of this law, Environmental Education is indirectly introduced as part of the students’ educational goals (Ferreira, 2007; Pinto, 2004), being reflected in civic, social and individual values, behaviors and personal and social evolution. In 2005, the National Strategy for Sustainable Development 2005-2015 is published, highlighting the strong connection between the economic, social and environmental dimensions, as well as the role of education in promoting the development of a truly sustainable society (Mota, Pinto, Vasconcellos e Sá, Marques, & Ribeiro, 2005). Education was positioned as crucial not only to the development of an equitable and environmentally sound society, but also to increase economic competitiveness (Mota et al., 2005).

Through a gradual institutional and civil inclusion, the evolutionary path of EE in Portugal was marked by several events that raised the political and social attention to the environment. The main ones are listed in *Figure 9*.

Environmental Education in Portugal: chronological synthesis

1948 – Creation of the League for the Protection of Nature (currently, still active);

1968 – Elaboration and approval of the III Plano de Fomento [III Development Plan], which presents the first explicit and coherent references to environmental issues. It gains relevance only after the revolution of 1974 (fall of the dictatorship);

1971 – Creation of the National Environment Commission;

Elaboration of the Monografia Nacional sobre problemas relativos ao Ambiente [National Monography about environmental problems] in response to the UN solicitation regarding Portugal participation in the Stockholm Conference (1972);

Creation of the first national protected area – Peneda-Gerês National Park;

1973 – First national commemoration of the World Environment Day (June 5);

1975 – Creation of the Secretary of State of Environment, as part of the Ministry of Social Equipment and Environment, through the Decree-Law no. 550/75, of September 30);

1981 – Creation of GEOTA - Environmental and Territorial Planning Studies Group;

1983 – Creation of the SNPRCN - National Parks, Reserves, and Nature Conservation Service;

1985 – Creation of QUERCUS - National Association for Nature Conservation;

1986 – Portugal enters the European Economic Community, the predecessor of European Union, a decisive turning point for national environmental and EE policies;

Publication of the Basic Educational Law;

Figure 9. Chronological synthesis of the main events that marked the evolution of EE in Portugal (Morais, Pereira, & Durão, 2015; Mota et al., 2005; Pinto, 2004; Silva, 2008).

Environmental Education in Portugal: chronological synthesis

- 1987 – Publication of the Environment Framework Law (or Base Law of the Environment) (Law no. 11/87, of April 7) and of the Law of Associations of Environmental Protection (Law no. 10/87, of April 4);
Creation of the National Environment Institute;
Launching of the Blue Flag Campaign;
- 1990 – Creation of the Ministry for the Environment and Natural Resources;
ASPEA-Portuguese Association for Environmental Education is founded;
- 1993 – Realization of the National Colloquium on Environmental Education, by the National Council of Education and the IPAMB-Environmental Promotion Institute;
- 1995 – Publication of the first National Environmental Plan, which dedicated an entire chapter to EE, classifying EE as a primordial task;
- 1996 – Protocol between the Ministries of Environment and Education, strengthening the presence of EE in the school system; it also generated a line of funding to EE projects to pre-school, middle and secondary levels.
- 1997 – Creation of the National Network of Ecotecas and of the National Council of Environment and Sustainable Development (in the scope of the Rio-92 Declaration);
- 1999 – Beginning of the works to the elaboration of a National Strategy for Environmental Education;
- 2001 – The Environmental Promotion Institute merges with the Environment General Direction, originating the Environment Institute;
- 2003 – New announcement of a National Environmental Education Strategy for Sustainability;
- 2005 – Creation of the Lusophone Network for Environmental Education;
Publication of the National Strategy for Sustainable Development 2005-2015

Figure 9. (cont.)

2.2 In search of an identity

There is no doubt that EE, though intrinsically connected to fields like science education, is now a matured field on its own (Dillon, 2014). Nevertheless, the complexity of environmental problems, the multidimensional meaning of environment and of EE itself still lead to difficulties in defining and framing EE. In fact, the term *Environmental Education* continues to be contested and its boundaries are still unclear (Dillon, 2014). Even now, it is

not difficult to find researchers claiming that EE requires a new redefinition, as stated by Saylan & Blumstein in their book *The failure of Environmental Education (and how we can fix it)* (2011).

Regarding the nature of EE, including objectives, principles and guidelines, there is a broad consensus in accepting those listed in the Declaration of Tbilisi, in 1977 (Figure 5) (Palmer & Neal, 1994, Chapter 3). However, defining contents and how EE should be considered is still problematic (Palmer & Neal, 1994, Chapter 3).

According to Lucie Sauvé (2002), EE is not a form of education, is not simply a tool to the resolution of environmental programs or management, but it is (or it should be) an essential dimension of fundamental education that lies in the basis of personal and social development. To Palmer & Neal (1994, Chapter 3), most aspects of education comprise an environmental dimension, leading to the statement that “environmental education may be considered to be an approach to education which incorporates considerations of the environment, rather than being a separate part of education.” (p. 18).

One essential subject of EE is then our relationship with the environment, which needs to be perceived in its entirety, namely (Sauvé, 2002):

- ✓ Environment – nature: to enjoy, respect and preserve;
- ✓ Environment – resource: to manage and share;
- ✓ Environment – problem: to solve and prevent;
- ✓ Environment – system: to understand and, thus, better decide;
- ✓ Environment – place for living: to know and improve;
- ✓ Environment – biosphere: to live together with others and other life forms, in the long-term;
- ✓ Environment – community project: to commit and establish partnerships/cooperation.

Due to the fact that the relationship with the environment is culturally and context specific, other dimensions (or representations) of environment can be established (e.g., environment – territory, environment – landscape) (Sauvé, 2002). It is within these

intertwined dimensions that the term *environment* gains its full meaning (Sauvé, 2002). Hence, EE must encompass all of the environment's dimensions in order to establish a complete and non-biased vision of the world (Sauvé, 2002).

Highlighting the multidimensional character of EE, the representations of the environment interconnect with the dimensions that result of our daily lives and social and individual dynamics. These dimensions – social, political, economic, scientific, ethical, cultural – are also a nuclear part of EE that is not restricted to the ecological/conservationist dimension (Caride & Meira, 2001, Chapter 5; Dillon, 2014).

Palmer & Neal (1994, Chapter 3) also recognize the eclectic character of EE, regarding not only possible contents, but also the dimensions it comprises. Due to the vast amplitude of the meaning of environment, several aspects must be considered, including urban and rural, technological, social, aesthetic and ethical (Palmer & Neal, 1994, Chapter 3).

According to Kyburz-Graber, Hofer, & Wolfensberger (2006), the challenge for EE “is to provide learning situations in which learners have the opportunity to explore, analyse and interpret human actions in real-life situations and to search for solutions with the participation of the people concerned.” (p.4). For these authors EE should follow a socio-ecological approach, focusing not on general environmental topics and strictly ecological impacts but in “situations (socio-economic contexts) in which people are involved in their daily lives; family households, communities, businesses, schools, supermarkets, restaurants, recreation areas, sports grounds, etc.”, thus treating environmental issues “as social-contextual constructions of the people involved” (Kyburz-Graber, Hofer, & Wolfensberger, 2006, p.4). Within this framework, learners are capable of generating local and socially relevant knowledge that they can incorporate in their daily lives, exploring possible conditions of action that will lead to individual and social changes (Kyburz-Graber, Hofer, & Wolfensberger, 2006).

The cooperation between different social actors (e.g., individuals, civil organizations, governments, research and learning institutions, media, among others) is also one of main constituents of EE's identity (Brinkman, 2000).

Environmental education is then a dimension of education that should be continuously and transversally present in the educational process (formal and non-formal),

through a socio-ecological approach, where all life's dimensions are considered, as well as representations of the self and community relationship with the environment. Facing EE as an integral part of the educational process leads to the next question: what kind of education?

More than the simple acquisition of knowledge, education is evolving towards the acquisition of skills that allow learners to have a strong comprehension of the learning process and instruments, and to the practical application of knowledge in a variety of contexts (Hare, 2006; UNESCO, 1996). There is an increasing emphasis on the need to develop personal skills, to learn how to live in a constructive and positive way in society, and on educating through the incorporation and promotion of all the dimensions of the individuals' lives – physical, intellectual, aesthetic, emotional and spiritual (Hare, 2006; Singh, 1996 in UNESCO 1996). Thus, education assumes a holistic character, addressing both cognitive and affective levels and incorporating life's multiple dimensions (Hare, 2006).

Holistic education comprehends key themes and values (*Table 2*) that should be integrated as main guidelines of youth and adults' educational processes.

Table 2. *Holistic education key themes and values (Hare, 2006).*

Holistic education	
Key Themes	Values
Our interconnectedness with all that is around us	Relationships – valued at all levels (between individuals, groups and the world)
Development of relationships	Integrity – trustworthy, standards and high expectations of self, respect of self and others
A sense of shared community	Desire to understand and learn – not threatened by new information, constant seek of new opportunities to expand knowledge, open and broad minded
A genuine sense of caring	High-achiever – desire to exceed expectations, aiming self-improvement but also of others (e.g., group, community, society), capability of applying knowledge in a range of circumstances, establishing connections between different areas
Management of personal development and growth of the whole person	Belief in own self-worth – empowerment and self-belief, but not arrogance, pro-active towards one's wellbeing and of those around them
Developing personal goals	Compassion – care and consideration for issues, circumstances and others, flexible approaches and respect for different beliefs, performance of supportive actions and guidance
The environment	Loyalty – support and not judgment, maintenance of support and contact with others through a variety of circumstances

The learner takes an active and critical role, comprehending the multiplicity of local and global scenarios in a changing world (Hare, 2006). In a holistic educational journey, both cognitive and emotional developments are promoted, in an enriching process for both

learner and educator (Fitzpatrick & Sinclair, 2003; Hare, 2006). A critical thinking that integrates reason and feelings in a unit of cognition and emotion is also encouraged (Mogensen, 1997). Personal development is highly valued, along with the sense of community, interconnectedness, and the respect and caring for others and the surrounding environment (Hare, 2006). Leading to an awareness of the impact of one's actions on others and surrounding environment, holistic education promotes the development of active citizens, capable of contributing to the solution of several problems, respecting different ideologies and caring for others and for the environment (Hare, 2006).

Holistic education and EE share many goals, principles and guidelines, being intrinsically connected.

Therefore, some key points arise regarding EE's identity:

- ✓ Environmental education should be positioned and perceived as an intrinsic part of the educational process;
- ✓ Environmental education corresponds to a holistic education, incorporating its values and key themes;
- ✓ A broad range of contents can be addressed, but all of life's dimensions and the representations of the relationship that society and individuals establish with the environment should always be taken into account;
- ✓ Contents should be explored through a connection with the learner's reality, allowing a practical application of what is being learned;
- ✓ Emotions are an important part of the educational process and should not be excluded from it;
- ✓ Environmental education should follow a socio-ecological approach, equating not only ecological issues, but also the socio-cultural context of individuals and communities.

2.3 Is it working?

Saddly, the answer to the question “Is it working?” is “no”, at least at the rate it should be. After over 40 years of efforts and investment, EE is far from achieving its goals, providing a determinant contribute to the development of sustainable societies.

This answer doesn’t require an extensive justification and it can be easily perceived through a quick glance at newspapers headlines, scientific reports or the unsustainable life that unravels around us. Many are the reports that alert to the severity of environmental problems and to the urgent need for effective actions (e.g., Millennium Ecosystem Assessment [MA], 2005; State of the World Report, 2015). Although these reports are extensive and present a wide range of information, once again, a quick glance will give us enough information to understand the gravity of the situation. We need to go no further than the Introduction of the *State of The World Report 2015: confronting hidden threats to sustainability*, by the World Watch Institute, to understand why EE has yet failed to guide humanity to a sustainable way of life. *Figure 10* lists some concerning statements made in the Introduction of this report.

State of the World Report 2015

“During the past quarter century, much has indeed changed. (...) However, lofty rhetoric has far outpaced action.”

“Strangely, we now find ourselves in an era of “sustainababble”—marked by wildly proliferating claims of sustainability. Even as adjectives like “lowcarbon,” “climate-neutral,” “environmentally friendly,” and “green” abound, there is a remarkable absence of meaningful tests for whether particular governmental and corporate actions actually merit such descriptions.”

“Endless economic growth driven by unbridled consumption is so central to modern economies and is so ingrained in the thinking of corporate and political leaders that environmental action is still often seen as in conflict with the economy, and is relegated to inferior status.”

“Ecological stress is evident in many ways, from species loss, air and water pollution, and deforestation to coral reef die-offs, fisheries depletion, and wetland losses. The planet’s capacity to absorb waste and pollutants is increasingly taxed.”

“With civilization itself hanging in the balance, however, change in the face of climate chaos should be a no-brainer. Yet the politics of climate change to date indicates just how limited society’s willingness to act on scientific advice can be. The political process through which this has to be accomplished is inevitably difficult, given that almost no aspect of human society remains untouched by efforts to stabilize the climate. (...). In the battle to do what is needed to ensure humanity’s long-term survival, a combination of denial, short-term thinking, profit interests, and human hubris is proving hard—perhaps even impossible—to overcome.”

“Yet these very circumstances could one day be swept away by the severe shocks that a destabilized climate entails, putting in question the ability of societies not just to thrive, but to adapt and possibly even survive.”

Figure 10. Selected extracts from the Introduction of the State of the World 2015 report (Renner, 2015).

Adding the findings of the MA, which reported the essential role of natural ecosystems to human wellbeing and survival and their concerning present and future levels of degradation, to the statements presented in Figure 11, it is not difficult to understand the growing concerns. Through the years, many calls for more urgent actions and alerts to insufficient improvements were made in several important meetings (e.g., Thessaloniki, 1997; Johannesburg, 2002; Aichi-Nagoya, 2014). Joining the scientific community, civil

society has also raised its voice, claiming for more effective actions (e.g., People's climate march – September 21, 2014; an estimated number of 400 000 participants demanded governments to move from rhetoric to effective action) (Renner, 2015; <http://2014.peoplesclimate.org/wrap-up/>). Nevertheless, and despite a growing environmental concern and awareness of environmental problems, in general, there is a high passiveness that culminates in an almost collective lack of action (Silva, 2008). After decades of efforts to promote an active citizenship and to increase environmental literacy and awareness, why is there still a resistance to action and the turning away from social and environmental responsibilities?

In general terms, individuals are resistant to behavioral changes, including those that would result in environmental protection (Mandel, V., 1992 as cited in Layrargues, 2007; Madruga & Silveira, 2003). But this individual resistance to change is not but one small part of the answer. Society, the educational process and the media are the main responsible for the observed apathy, which strongly derives from the following reasons (Ayres, 1999; Fien, 1997; Madruga & Silveira, 2003):

- ✓ Information transmission: high levels of low-quality information or a biased transmission, often reflecting the interests of powerful economic groups;
- ✓ Less reliable sources of belief: the main sources of belief used to be parents and other family members, teachers and close friends, trustworthy sources that aimed our wellbeing. Nowadays, internet, television, media personalities and best-sellers are being seen as legitimate source of belief by a significant part of the population;
- ✓ Social and economic destabilization: lead to a life style characterized by high levels of stress and of consumerism, with people trying to forget all that can constitute a problem or responsibility besides the ones they have to, mandatorily, face in their daily lives;
- ✓ Increasingly individualized societies: there is a strong disconnection from the natural world and the loss of sense of responsibility towards other citizens and the environment;

- ✓ Entertainment: there is an increasing search for entertainment activities, which reflects the consumerist character of current societies (especially in developed countries);
- ✓ Technology – systemic misuses and obsession with: leading to a bigger expenditure of natural resources and to the reduction of skills, and, in many cases, to the promotion of a sedentary life style. Obsession with technology is also causing a growing specialization that, in its turn, is making it more difficult for people to be able to establish global perceptions regarding, for example, environmental issues. Obsession with technology and its misuse are also one of the main contributors for the increasing prevalence of individualized life styles;
- ✓ Educational system: the current formal educational system tends to be impersonal, compartmentalized, not promoting critical thinking and active interventions.

When it comes to general population, the media have a determinant role in information dissemination, being the main source from which people obtain most of their knowledge regarding scientific and environmental issues (Lowe et al., 2006). Through newspapers, television and internet contents, the quantity of shocking images and news that reach the public is so overwhelming that, while momentarily increasing their concerns, it also reduces their pro-active initiatives, rendering them insensitive to severe and worrying situations (Nicholson-Cole, 2005; Petts et al., 2004 in Lowe et al., 2006; Singh, 1996 in UNESCO, 1996). The belief that the human being is highly adaptable and that technology will save the day also makes many people believe that there is nothing to be worried about and, hence, no action is required (Lowe et al., 2006). Thus, the common citizen quickly transfers all responsibility to the scientific community (Carvalho, 2004), continuing in a no-action-needed pathway.

It is clear that, when it comes to EE, rhetoric and non-binding agreements and recommendations are not enough and, therefore, must be put aside if we want to achieve significant outcomes. Courage and determination are needed from civil society, governments and economic groups, in order to implement the changes that will lead to sustainability.

The Portuguese reality also reflects a shortcoming of EE that may be due to several factors, including (Schmidt, Nave, O’Riordan, & Guerra, 2012): lack of financial resources, unsuitable preparation of teachers, lack of a functional and effective cooperation among organizations and sectors, low integration with communities, and insufficient participation and commitment by policy makers.

2.4 Evaluation: an underestimated partner

Evaluation is essential to assess efficacy/effectiveness and impacts, to provide useful information to better adapt programs, activities and materials, to provide funding opportunities and to strengthen EE’s professionalism (Stokking, van Aert, Meijberg, & Kaskens, 1999).

Despite the recognized importance of evaluation, there is still a strong resistance in its implementation when it comes to EE, with many EE programs failing to incorporate systemic and high-quality evaluation (Carleton-Hug & Hug, 2009; O’Neill, 2007). Regarding evaluation in EE, Carleton-Hug & Hug (2009) have identified the following challenges:

- 1) Diversity of the field, not only regarding typologies of projects and activities, but also of comprehended areas of knowledge;
- 2) Lack of clear program objectives and a recurrent mismatch between program objectives and the actual activities performed;
- 3) Evaluation requirements that go beyond summative evaluation, strengthening the need to evaluate not only the final impact but also the process and progress;
- 4) Need for greater diversity of research approaches, including the use of mixed-methods evaluation designs;
- 5) Compressed time frame with limited possibilities of a long-term and follow-up evaluations;
- 6) Institutional resistance to evaluation based on i) a lack of understanding about evaluation; ii) a failure to give evaluation its due priority; iii) concern over possible negative consequences; iv) the nature of the institution, including management and

- leadership; v) lack of incentives for implementing high quality evaluation processes, as well as a lack of consequences for avoiding evaluations;
- 7) Diversity of contextual socio-political factors due to the variety of social environments where EE programs/activities take place;
 - 8) Confounding and non-reliable information sources, which may misinform the participants of EE activities, influencing its efficacy.

Though the lack of evaluation, at least of high quality, seems to have become a tradition in EE, the need to provide factual data, inclusively to possible sponsors, of accountability and the ever more urgent necessity of presenting successful outcomes, have been reinforcing the importance of evaluation to EE's evolution and continuous improvement (Carleton-Hug & Hug, 2009). Evaluation data is essential to the credibility of environmental education toward meeting its goals (Heimlich, 2010). Without evaluation, the permanence and propagation of misconceptions, including that EE is *about students in schools and youth*, will continue, limiting EE's scope of action and efficacy, as well as restricting EE to formal education principles (Heimlich, 2010).

Evaluation is also required to deconstruct a quite common belief within EE educators which is limiting EE to only one goal: increase people's knowledge regarding environmental issues (Heimlich, 2010). In fact, many educators strongly believe that if people understand and get to know more about environmental issues, then they will change their behaviors towards environmental protection, which is far from being true (Heimlich, 2010).

More than assessing environmental literacy levels, feelings towards the environment and behavioral changes, it is imperative to evaluate if all of those changes are having an effective impact. EE evaluation must go beyond the individual and communities, to equating the most relevant beneficiary of EE action: nature and the environment itself (Heimlich, 2010). Thus, more relevant than to have citizens with a vast environmental and ecological knowledge is to have citizens and communities that implement effective actions to mitigate or solve real environmental problems.

Without a high-quality evaluation, EE is bound to succumb to its growing fragilities, responsible for weakening its professional image and the public belief of its importance. It will continue to misdirect efforts and to allow programs and activities to be carried out under unproved assumptions. In conclusion, without evaluation, EE is bound to fail.

3. Natural ecosystems and human wellbeing

Nature, in its broader sense, encompasses the organic environment where the majority of the processes essential to life occur (e.g., birth, reproduction, death, relationship between and among species), including the wide array of habitats from wilderness areas to farms and gardens, all the elements of the natural environment (e.g., plants, animals, domestic and wild, water) and the Earth-creating processes (evolutionary, biophysical, biochemical and geological) (Maller, Townsend, Pryor, Brown, & Lawrence, 2006). Thus, all biotic and abiotic elements of our planet are part of what it is globally called “nature”, being linked together. Assuring the survival of life on earth, ecosystem services (ES), i.e., the benefits people obtain from ecosystems, are also of capital importance to human wellbeing (MA, 2005).

In 2005, with the publication of the Millennium Ecosystem Assessment, a new light and renewed importance was given to ES. This report had as main goals to assess i) the consequences of ecosystem changes in human wellbeing and ii) the scientific bases to implement the required actions to help preserve natural ecosystems and iii) their important contributions to human societies (MA, 2005). Its findings highlighted the importance of ecosystems for human wellbeing through the provision of the following services: i) support (e.g., nutrient cycling, soil formation, primary production); ii) provision (e.g., freshwater, food, wood and fiber); iii) regulation (e.g., climate regulation, flood regulation, water purification); and iv) cultural (e.g., aesthetic, educational, recreational) (MA, 2005). All of these services are interconnected with the components of human wellbeing, including: i) security (e.g., personal safety, secure resource access, security from disasters); ii) basic material for good life (e.g., adequate livelihoods, shelter, sufficient nutritious food); iii) health (e.g., strength, feeling well, access to clean air and water); iv) good social relations (e.g., social cohesion, mutual respect, ability to help others); and v) freedom of choice and action (i.e. the ability of individuals to control what happens to them and to be able to achieve what they value doing or being) (MA, 2005).

Not all ecosystem services are equally perceived, as it is not easy to attribute a defined economic value to all of them (MA, 2005). Despite having a strong impact in

shaping human cultures, including their cultural identity and social stability, cultural ecosystem services (CES) – “the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences” (MA, 2005, p. 40) – are not easily recognized, nor duly appreciated by people (MA, 2005). The benefits provided by CES are vast, including cultural diversity, spiritual and religious values, knowledge systems, educational values, inspiration, aesthetic values, social relations, sense of place, cultural heritage values, and recreation and ecotourism (MA, 2005).

The MA (2005) also concluded that nearly 60% of the examined ecosystem services were being degraded or used in an unsustainable way. Though being felt globally, the harmful effects of ecosystem services degradation are not an equal burden to all and the poor are those subjected to greater privations and suffering (MA, 2005). With physical, economic and social impacts, the degradation of ecosystems services has important consequences for human wellbeing (MA, 2005).

Human health and wellbeing are highly dependent on the environment in which we live in (Barton & Grant, 2006). However, immersed in this highly transformed, built and technological world, we tend to forget that we are fully dependent of the natural world and that, despite all the concrete walls we may build, we are part of nature. Life is, in fact, rapidly becoming an urban affair with more than 54% of the population living in urban areas (World Health Organization [WHO] & UN Habitat, 2016). With the growing of urban areas and habits, the contact with natural environments has suffered a strong decrease (Pedretti-Burl, 2007; Maller et al., 2006). Due to its high importance and essential role, nature deprivation is bound to have severe outcomes on individuals, their communities and cultures (Pretty, Griffin, Sellens, & Pretty 2003).

Taking into account that “people with access to nearby natural settings have been found to be healthier” (Kaplan & Kaplan, 1989) and that the contact with nature can be considered a “powerful determinant of health and wellbeing”, the path for sustainability requires not only the preservation and recovery of natural ecosystems but also the assurance that everyone has access to well preserved natural settings (Barton & Grant, 2006; Maller et al., 2006). As stated in the Stockholm Declaration, “man has the

fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and wellbeing, and he bears a solemn responsibility to protect and improve the environment for present and future generations” (UNCHE, 1973). In this context, accessibility to nature may be considered as an integrant part of social justice paradigms, being a public health and socioeconomic development key factor (Maller et al., 2006), essential to guarantee the fulfillment of human needs. Abraham Maslow proposed a hierarchy of human needs, distributed along five categories: physiological, safety and security, belongingness and love, esteem, and self-actualization (Maslow, 1970). These needs were incorporated in a hierarchy in which basic needs, when not satisfied, supersede the higher ones (Lester, Hvezda, Sullivan, & Plourde, 1983). According to Maslow (1970), psychological health was only possible when the identified needs were satisfied. In further years, the hierarchy evolved from five to eight categories of needs, as presented on *Figure 11* (Chapman, 2001).

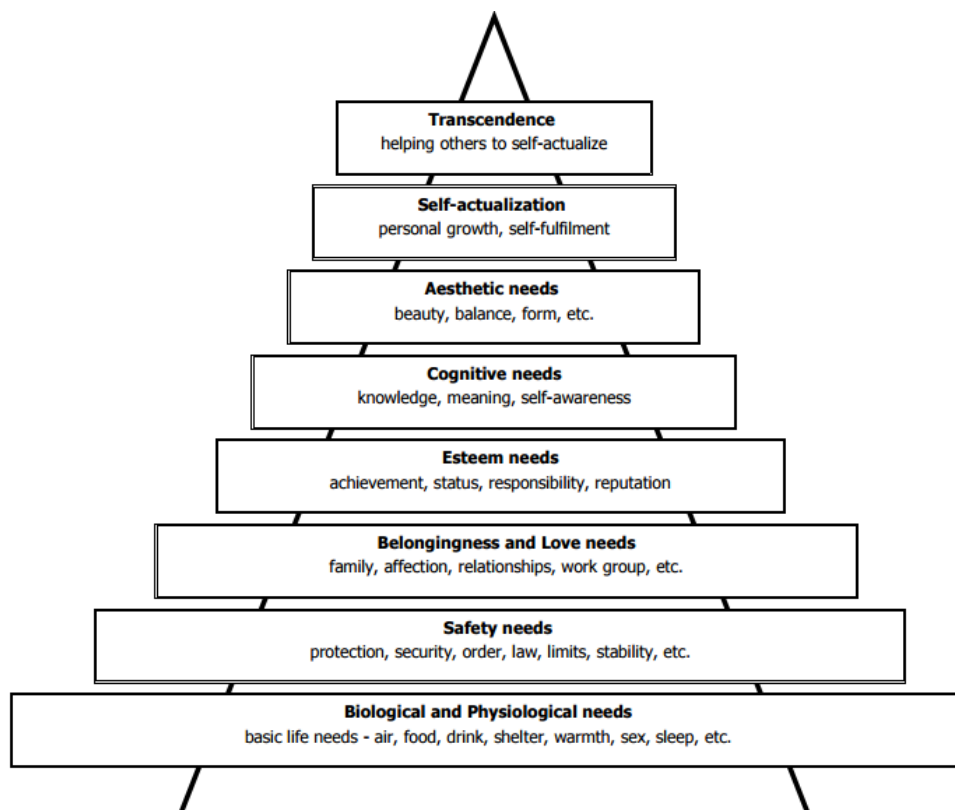


Figure 11. Adapted eight-level hierarchy of needs, based on Maslow’s theory (Chapman, 2001).

Although Maslow didn't establish a direct linkage between the identified needs and the natural environment, research shows that ecosystem services are essential to the assurance of all wellbeing constituents, including safety, basic material for good life, health, good social relations, and freedom of choice and action (MA, 2005; Kuo & Sullivan, 2001). Hence, the fulfillment of the needs identified by Maslow, essential to psychological health, can only be achieved if nature is present in people's lives.

The presence of nature, and the subsequent access to the benefits provided by natural ecosystems, can occur through different settings (e.g., urban parks, gardens, agricultural landscapes, wild forests, etc.) and through different levels of interaction, ranging from simply viewing nature, to being in the presence of nearby nature, and to active participation in nature (Pretty, 2004). Though different levels of interaction can bring different benefits to individuals, Burls (2007), Kellert and Derr (1998), highlighted nine values of nature that arise from the interaction between human and nature:

- i) Aesthetic value (physical attraction and beauty of nature): adaptability, heightened awareness, harmony, balance, curiosity, exploration, creativity and an antidote to the pressures of modern living;
- ii) Dominionistic value (mastery and control of nature): coping and mastering adversity, capacity to resolve unexpected problems, leading to self-esteem improvement;
- iii) Humanistic value (affection and emotional attachment to nature): fondness and attachment, connection and relationship, trust and kinship, co-operation, sociability and ability to develop allegiances
- iv) Moralistic value (spiritual and ethical importance of nature): understanding of the relationship between human wholeness and the integrity of the natural world, leading to a sense of harmony and logic;
- v) Naturalistic value (immersion and direct involvement in nature): immersion in the sense of authenticity of the natural rhythms and systems, leading to mental acuity and physical fitness;

- vi) Negativistic value (fear of nature): developing a healthy respect for the risks, power and dangers inherent in nature with an equivalent sense of awe, reverence and wonder, leading to learning to deal with fears and apprehensions in a constructive way;
- vii) Scientific value (knowledge and understanding of nature): developing a cognitive capacity for critical thinking, analytical abilities, problem-solving skills leading to competence;
- viii) Symbolic value (metaphorical and figurative significance of nature): being able to access the limitless opportunities offered by the processes in the natural world to develop understanding of one's own circumstances, leading to cognitive growth and adaptability;
- ix) Utilitarian value (material and practical importance of nature): emphasizing the practical and material importance of the natural world on which we rely for survival.

Establishing links with several dimensions of human health (biological, psychological, social and mental), the previously listed values reinforce the importance of ecopsychology and ecotherapy, both based in the therapeutic contact with nature to enhance mental health and wellbeing (Burls, 2007; Townsend & Weerasuriya, 2010).

As research progresses, what seemed to be general impressions, preferences and individual feelings are becoming a clear truth. That includes the views of John Muir, founder of the Sierra Club, regarding the importance of nature: "Thousands of tired, nerve-shaken, over-civilized people are beginning to find out that going to the mountains is going home; that wilderness is a necessity; and that mountain parks and reservation are useful not only as fountains of timber and irrigating rivers, but as fountains of life." (Muir, 1901).

The list of scientifically proven benefits provided by nature is already a vast one. From the promotion of self-empowerment (Hine et al., 2001), social interaction (Maas et al., 2009) and social connectedness (Pretty et al., 2007), self-esteem and performance improvement, to the alleviation of stress symptoms (Hartig & Marcus, 2006) and potentiating mental fatigue recovery (Hartig, Evans, Jamner, Davis, & Gärling, 2003), nature is a helpful resource in both salutogenic and pathogenic perspectives. Thus, nature can

constitute an extremely relevant, affordable, accessible and equitable resource for preventive and restorative public health strategies (Maller et al., 2006).

Reflecting the ever-growing perception of nature's importance to human health and wellbeing, Barton & Grant (2006) proposed a health map (*Figure 12*) that emphasized the role of natural features as determinants to health and wellbeing.

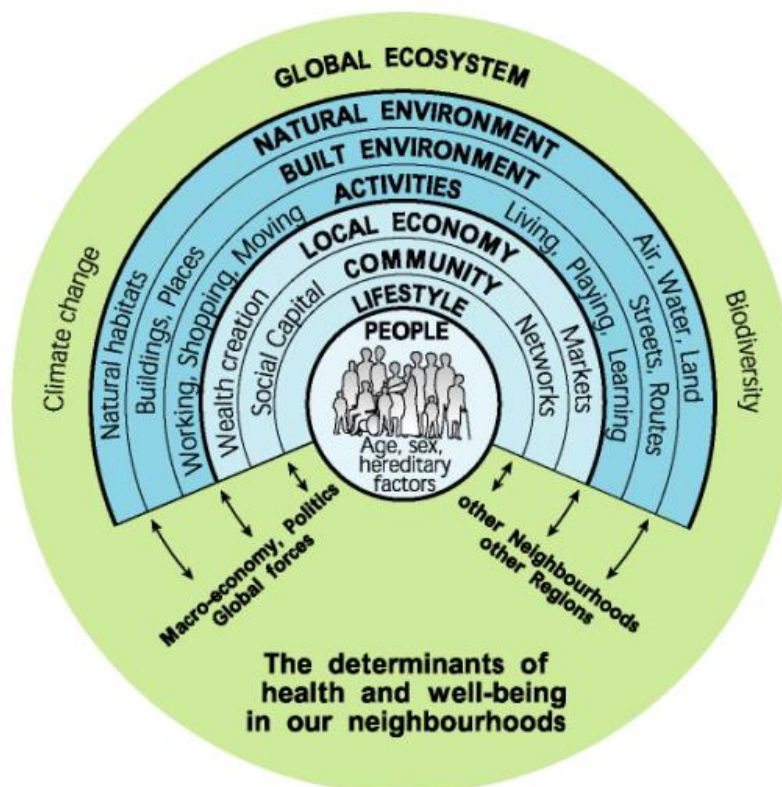


Figure 12. Health map as proposed by Barton & Grant (2006).

The authors gave the following description of the health map (Barton & Grant, 2006):

“It has been deliberately composed to provide a focus for collaboration across practitioner professions – such as planners, public health, service providers, ecologists, urban designers and across topics transport, air quality, community development, economic development. People are at the heart of the map, reflecting not only the focus on health, but also the anthropogenic definition of sustainable development (Brundtland, 1987). All the different facets of a

human settlement are reflected in the series of spheres which move through social, economic and environmental variables. The settlement is set within its bioregion and the global ecosystem on which it ultimately depends. Broader cultural, economic and political forces which impact on wellbeing are represented.”

Through the analyses of this health map, a connection arises between environmental education and human health and wellbeing, guided by the requirement of a sustainable way of life, the need of cooperation and dialogue between different social actors, and the strong interconnection between all of human life’s dimensions and nature.

Though more research is needed in order to fully understand the connection of nature and human health and wellbeing, the already existing evidence is more than sufficient to support the inclusion of nature interaction in the health strategies for worldwide populations, especially urban ones (Maller et al., 2006). But despite the benefits of nature, the inclusion of this important resource in therapeutic, promotional and restorative processes is still far from occurring at desirable levels and nature remains an under-utilized resource (Maller et al., 2006). The same happens regarding urban planning that does not yet reflects the importance of nature and access to ecosystem services to human wellbeing (Barton & Grant, 2006; Burls, 2007). Thus, the need stated by Frumkin (2001) that, due to the benefits of nature in health, medicine and other health-related fields should broaden their vision of environmental health and start to collaborate and integrate other fields of knowledge, including urban planning and ecology, it’s still a prevailing one. Frumkin (2001) also pointed that there is a need to act upon the scientific findings of the role of nature in human health and wellbeing, at clinical level and public health level.

Being a restorative environment that integrates the four main elements of such environments – a sense of being away (temporary escape from one’s usual setting or situation, routine activities and thoughts), soft fascination (an effortless form of attention that allows the mind to engage thought about other things than the involving natural features), extent (providing scope or depth to the experience, a sense of being part of a

larger whole, that allows the mind to drift away from other concerns), and compatibility with an individual's inclinations and desires (opportunities provided by the setting and whether they satisfy the individual's purposes)(Kaplan & Kaplan, 1989; Kaplan, 1995; Maller et al., 2006; Townsend & Weerasuriya, 2010) – nature can play a determinant role in vulnerable groups support processes. In fact, natural environments provide substantial therapeutic, restorative and promotional benefits to the overall human wellbeing (Wells, 2000) and are considered a highly effective and low-cost instrument for intervention on public health (Kuo, 2015).

3.1 Connecting with nature: an essential life experience

As stated before, access to natural settings and a direct contact with nature are essential for the fulfillment of human needs. Schultz (2002, 2004), defined nature connectedness as the extent to which nature is included in the representation of the self, i.e., the degree to which people believe they are part of nature. Drawing upon the results of a collection of studies, connectedness to nature appears to be a relevant trait in the development of an eco-friendly behavior and of biospheric-orientated values, being also associated with several components of wellbeing (Howell, Dopko, Passmore, & Buro, 2011; Mayer & Franz, 2004). Reporting to a broader construct – nature relatedness –, which comprehends individual levels of nature connectedness based on the perception of all aspects of nature, Nisbet, Zelenski, and Murphy (2010) also reported an association with pro-environmental behaviour, as well as a positive correlation with positive affect, vitality, autonomy, personal growth and purpose in life (meaning), and life satisfaction. The potential of nature connectedness as a predictor of behavioral positive changes and its role in promoting human wellbeing, makes its assessment quite important. In addition, this construct allows the establishment of a collaborative bridge between ecologists and psychologists, reinforcing an ecopsychological perspective of the human-nature relationship (Mayer & Franz, 2004).

As the levels of urbanization increase and people spend the vast majority of their time indoors, a direct contact with nature becomes scarcer (Capaldi, Dopko, Zelesnki, 2014;

MacKerron & Mourato, 2013). Therefore, the lack of connecting with nature may be depriving many of us of the beneficial effects of natural ecosystems, and making it more difficult to develop pro-environmental values and behaviors (Capaldi et al., 2014). As Aldo Leopold (1949) said, “We can be ethical only in relation to something we can see, feel, understand, love, or otherwise have faith in” (pp. 214).

4. Domestic violence

The World Health Organization defines violence as “the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation” (WHO, United Nation Office on Drugs and Crime [UNODC], & United Nations Development Programme [UNDP], 2014, Part I). Violence constitutes a complex and serious social issue, that affects not only victims and perpetrators but also families, communities and society as a whole (Magalhães, 2010; Kaur & Garg, 2008). Worldwide, violence is a major contributor to death, disease and disability, also leading to several other health and social consequences (WHO, UNODC, & UNDP, 2014, Part II). Victims are deeply affected in their lives, including their physical and mental health (WHO, UNODC, & UNDP, 2014, Part I), but a heavy burden is also placed in economy, communities, health and criminal justice systems, and social and welfare services (WHO, UNODC, & UNDP, 2014, Part I). Women, children and elderly people constitute the majority of victims of non-fatal physical, sexual and psychological abuse (WHO, 2014). Regarding women, the numbers reflect a dark reality: “one in five women reports having been sexually abused as a child” and “one in three women has been a victim of physical or sexual violence by an intimate partner at some point in her life” (WHO, UNODC, & UNDP, 2014). Despite its global and severe negative impact, not all violence was always regarded as a public issue. Until recently, domestic violence (DV), that corresponds to the violence that occurs within the family relationship, regardless of gender, age and sexual orientation of both victim and aggressor, was mostly seen as a private matter (European Union Agency

for Fundamental Rights [FRA], 2014; Matos, Machado, Santos & Machado, 2012). This only started to effectively change in the 1990's, when "violence against women emerged as a fundamental rights concern that warrants legal and political recognition at the highest level, and as an area where State Parties, as those with a duty to protect, have an obligation to safeguard victims" (FRA, 2014, p. 7). Besides social and economic negative impacts, DV has strong psychological, physical and social consequences on the victims (*Table 3*) (Manita, Ribeiro, & Peixoto, 2009).

Table 3. *Main psychological, physical and social consequences of domestic violence to the victims (Centers for Disease Control and Prevention [CDC], 2015; Manita, Ribeiro, & Peixoto, 2009; Matheson, et al., 2015).*

Psychological	Physical	Social
Emotional ambivalence;	Fractures and other type of injuries;	Stigmatization;
Emotional detachment;	Loss of energy;	Avoidance of public places;
Fear of intimacy;	Muscular pain;	Isolation from social networks;
Low self-esteem;	High blood pressure;	Homelessness;
Depression;	Amenorrhea;	Strained relationships with family members, health providers or employers
Anxiety;	Eating disorders;	
Irritability;	Sleep disorders;	
Inability to trust others;	Chemical dependency;	
Lack of motivation;	Gastrointestinal disorders;	
Feelings of guilt and shame;	Endocrine system disorders;	
Difficulties in decision-making;	Cardiovascular disease;	
Suicidal ideation;	Irritable bowel syndrome;	
Cognitive damages	Migraines and headaches.	
Symptoms of post-traumatic stress disorder.		

Although they are not fully synonymous, as it can be concluded by the definitions presented on *Figure 13*, the elevated rate of prevalence of intimate partner violence (IPV) within DV leads to an interchangeable character between both expressions (Rutherford, Zwi, Grove, Butchart, 2007). Associating the fact that women represent the majority of victims, DV and IPV are usually applied to report situations of violence against women,

perpetrated by current or former intimate partner or spouse (Rutherford et al., 2007; WHO, 2012).

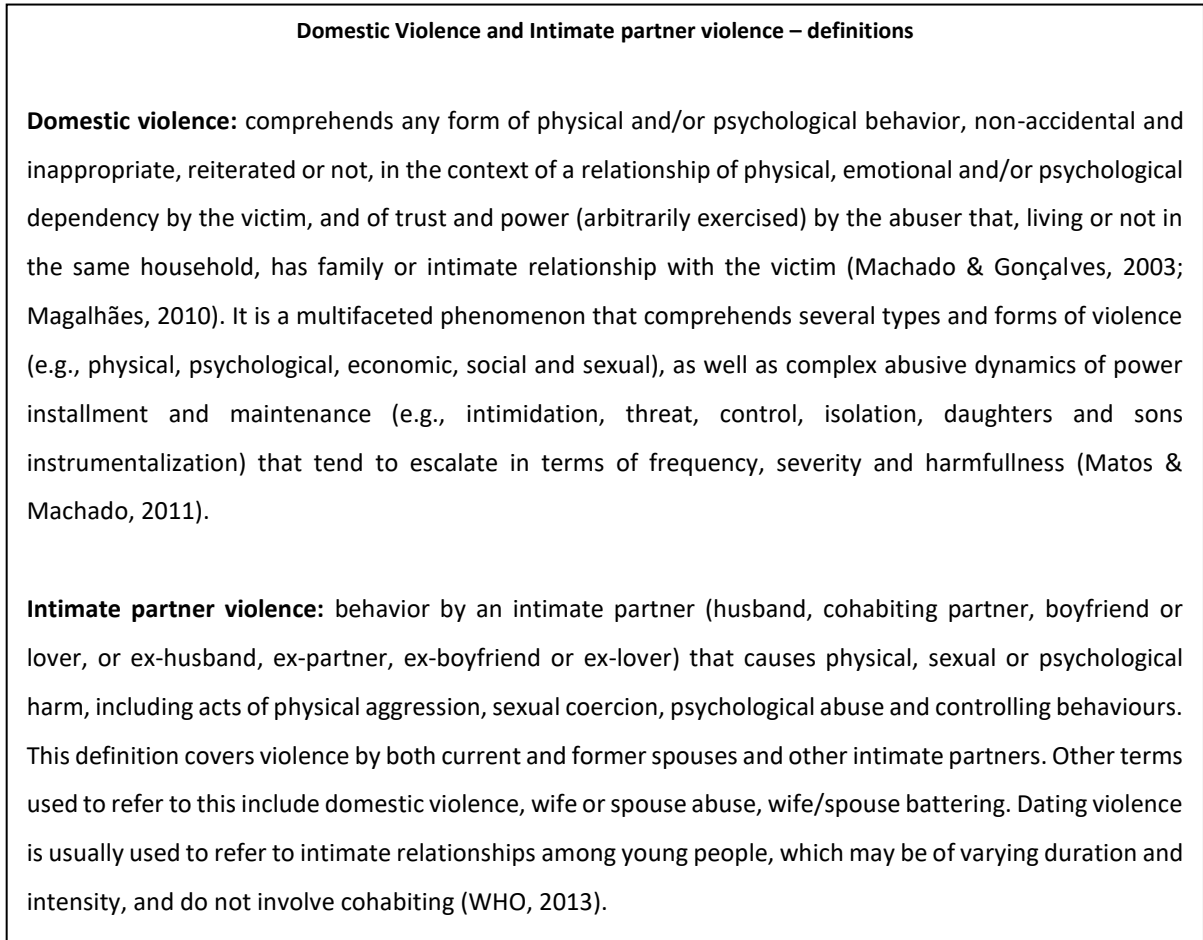


Figure 13. Definitions of domestic violence and intimate partner violence (Matos & Machado, 2011; WHO, 2013).

Reflecting the worldwide scenario, most reported DV cases in Portugal also correspond to IPV, being women the majority of victims (Ministry of Internal Administration [MAI], 2015). From the 27 317 DV complaints registered by the law enforcement agencies in 2014, 84% of the victims were women and 77% of the reported cases corresponded to IPV (MAI, 2015). According to the last national inquiry, in average one in three women is a victim of DV (Lisboa, Barroso, Patrício, & Leandro, 2009), which is consistent with the European average (FRA, 2014).

Considered an act of gender-based violence and a severe human rights violation of global proportion, violence against women is an obstacle to the achievement of goals of equality, development and peace (UN, 1995; WHO, 2005). As with violence in general, violence against women costs are a heavy burden not only to the victim, but to family, friends and society (Manuel, Barros & Cerejo, 2008; Matos & Machado, 2011). This is reflected, for example, in the victim's physical and psychological health, professional activities and interpersonal relationships, and overall economy (e.g., medical care, social support, law enforcement) (Manuel, Barros & Cerejo, 2008; Matos & Machado, 2011). Even the victims' parenting skills and the quality of the mother-child relationship can be jeopardized in cases of severe and continuous exposure to DV (Matos & Machado, 2011). With the entry of the new penal code (Law no. 59/2007, of 4 September), DV became a public crime in Portugal, no longer requiring a formal complaint by the victim for the legal procedures to take place (Manita, Ribeiro, & Peixoto, 2009). Thus, anyone who has knowledge of a domestic violence crime can, even anonymously, alert the authorities (Manita, Ribeiro, & Peixoto, 2009).

Despite the awareness and information efforts, there is still a cultural prevalence of several myths regarding DV that create obstacles to public involvement and to the denunciation of the crime (Manita, Ribeiro, & Peixoto, 2009). Parallel to the obstacles raised by the sociocultural framework of DV, there also significant worldwide information gaps regarding this social scourge (WHO, UNODC, & UNDP, 2014), making it difficult to prepare answers that effectively address and include all important aspects of the problem. More efforts are also required in providing innovative intervention modalities, as well as the corresponding effectiveness evaluation data (Matos et al., 2012).

As Sunita Kishor (2005, pp. 78) firmly stated,

“domestic violence is not a scourge like most other scourges; its harmful effects do not disappear with the generation that was directly involved. The scourge will be resurrected in every successive generation, unless we treat it as a public health emergency and make concerted efforts to eliminate it.”

Thus, efforts to ensure an effective and continuous public awareness, to fund research regarding the reality of DV in different countries and cultures, and to develop and implement diverse intervention modalities are essential. Evaluation is also a requirement that should be included in every performed action, measure or program.

Ignoring our current knowledge and the persisting needs is done “at the peril of our societies, economies, and, if I may say so without sounding overly dramatic, humanity” (Kishor, 2005, pp. 78).

5. Research question and goals

In this context of global environmental changes and threats, where efforts have yet to reach the necessary objectives, and considering what was previously discussed, a question arises: how can EE intervene, providing an effective and integrative answer to increase social and environmental engagement, leading to a higher human wellbeing and adoption of pro-environmental behaviors?

This thesis makes an effort to provide an answer to this question, giving a concrete example of how to develop and implement an intervention that tackles both the environmental and social/health dimensions.

Thus, this thesis goals were:

1. Perform a critical overview of the historical journey of EE, highlighting key moments, achievements and difficulties;
2. Assess the state of the art regarding the role of nature in the promotion of human wellbeing (physical, psychological, and social);
3. Develop and implement a nature-based holistic intervention, focusing on promoting the wellbeing of a vulnerable group through natural ecosystem services and strengthening individual and community connection with nature;

4. Promote the relevance of EE in social/health interventions, through integrative and multidisciplinary practices that encourage a positive view of one-self and of the relationship with nature;
5. Provide an instrument validated to the Portuguese population that would allow for the measurement of an individual's nature connectedness, thus facilitating the incorporation of this dimension in future studies;
6. Provide practical recommendations to promote EE efficacy and its transversal integration in society.

As it will be discussed in subsequent chapters, human wellbeing and, more specifically, mental health are closely linked to natural ecosystems. This was an essential premise in the design of *Project CarryOn – Ecosystem services and their role in domestic violence victims' support processes* (see Chapter 4). Aiming to promote domestic violence victim's wellbeing through the use of natural ecosystems as a main resource and to provide a new methodological approach to be integrated in the already existing and more traditional support processes, Project CarryOn also aimed to be an answer to several pressing needs, including:

- Alert to the importance of natural ecosystems to human wellbeing and to emphasize the relevance of community engagement in environmental protection;
- Strengthen the bond between individuals and communities and the natural environment, promoting the adoption of nature-linked life habits;
- Alert to the fact that climate changes impacts, including environmental degradation, may be depriving us of an essential resource for restorative and therapeutic processes regarding physical and psychological health;
- Integrate Environmental Education (EE) in people's lives in a relevant way, bringing them direct benefits and presenting issues and recommendations easily relatable and applicable.

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Chapter 2

Nature and human wellbeing: A systematic review of empirical evidence
from nature-based interventions

Silva, A., Gonçalves, M., & Matos, M. (submitted). Nature and human wellbeing: A systematic review of empirical evidence from nature-based interventions. *Environment & Behavior*.

Nature and human wellbeing: A systematic review of empirical evidence from nature-based interventions

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Abstract

Nature's role in human overall well-being and specific dimensions has become a hot topic in research of several fields of knowledge. Consequently, there is a growing number of studies that report data on this topic. This systematic review provides relevant information regarding the current state of the art, performing an analysis of the findings of peer-reviewed articles, and methodological practices. Thus, it constitutes an important resource for researchers and other professionals that are working with nature-based interventions. Twenty-six studies met the inclusion criteria. In sum, the majority of the studies took place in the USA and Europe, being published in the last four years, and presented quantitative data regarding the impact of nature-based interventions in overall well-being or specific psychological and/or physiological features. Although results should be carefully interpreted, the existing evidence strongly supports the beneficial role of natural environments to human well-being.

Keywords: wellbeing, nature, evaluation, review, intervention

1. Introduction

With a current world population of over 7,5 billion, our planet's natural environment is under an intensified pressure, resulting in natural resources depletion and in an increasing environmental degradation (Berck, 2012). The paramount need of a healthy planet to ensure the future of humanity and overall well-being, added to the current environmental scenario, lead to a higher concern regarding the planet's environmental state and lifestyle changes that result in a strong decrease of possibilities for human contact with nature (Hartig, Mitchell, & Frumkin, 2014; Millennium Ecosystem Assessment [MA], 2005; United Nations [UN], 2019). Reflecting this growing concern, many researchers from fields as environmental psychology, ecology, biology, and psychiatry, have developed studies about the link between natural environments and human well-being (Biedenweg, Scott, & Scott, 2017; Maller et al., 2009).

The expansion of research on this topic was also possible due to: i) the comprehension of health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (World Health Organization [WHO], 2006, pp. 1), which allowed for the integration of a wider variety of actors and fields of knowledge, reflecting the multidimensional and subjective character of health; ii) methodological and conceptual advances, allowing for in-depth study of topics as the effect of nature-based experiences in stress reduction (Hartig et al., 2014). As a result, there is a significant body of knowledge that highlights the positive role of nature in improving and promoting broad positive outcomes regarding human well-being (Bowler, Buyung-Ali, Knight & Pullin, 2010; Cleary, Fielding, Bell, Murray, & Roiko, 2017; Hartig et al., 2014; Keniger, Gaston, Irvine, & Fuller, 2013; Ray & Jakubec, 2014). Benefits can derive from indirect, incidental or intentional exposure and can report to physiological (e.g., reduced blood pressure and cortisol levels, reduced mortality rates from circulatory and respiratory diseases, reduced stress symptoms) (e.g., Hartig, Evans, Jamner, Davis, & Garling, 2003; Triguero-Mas et al., 2017; Tsunetsugu et al., 2007; Tsunetsugu et al., 2013; Villeneuve et al., 2012), psychological (e.g., improved mood states, reduced anxiety, increased self-esteem, lower levels of aggression; e.g., Berto, 2005; Hartig et al., 2003; Hine, 2011; Kuo &

Sullivan, 2001a; Triguero-Mas et al., 2017; Tsunetsugu et al., 2013; van der Berg, Jorgensen & Wilson, 2014), cognitive (e.g., attentional restoration, reduced mental fatigue, improved cognitive function; e.g., Hartig et al., 2003; Kaplan & Kaplan, 1989; Kaplan, 2001; Shin, Shin, Yeoun, & Kim, 2011), and social/behavioral (e.g., improved social interaction, lower crime rates, perceived social safety, enhanced social cohesion and support) (e.g., Kingsley & Townsend, 2006; Kuo & Sullivan, 2001a; Kuo & Sullivan, 2001b; Maas, Spreeuwenberg, Winsum-Westra, Verheij, & Groenewegen, 2009) benefits. Nature can also constitute an important resource for children development, leading to opportunities for self-discovery and self-efficacy promotion, as well as having positive impacts in cognitive, affective, and moral maturation (Kellert, 2002; Taylor, Willey, Kuo & Sullivan, 1998; Wells, 2000).

Despite the high number of studies reporting the effects of nature in components of or overall well-being, the underpinning mechanisms responsible for individual and collective responses to natural environments and stimuli are not yet fully understood (Cleary et al., 2017; Bowler et al., 2010). Psychological restoration is widely accepted as a key mechanism to explain the positive outcomes of contact with nature (Scopelliti et al., 2016). Kaplan and Kaplan's attention restoration theory (ART) emphasizes the role of nature in attention fatigue recovery processes (Kaplan & Kaplan, 1989). The authors propose that nature's restorative qualities, which allow for feelings of "being away" and "soft fascination", promote involuntary attention, enabling recovery and restoration of voluntary attention capacities (Bowler et al., 2010; Kaplan & Kaplan, 1989; Ohly et al., 2016). In the stress reduction theory (SRT), Ulrich proposes that the restorative advantage of natural environments derives from our species evolutionary past and innate connection with nature (Ulrich, 1981; Ulrich, 1983; Ulrich, 1984). Psychological well-being and stress recovery can be fostered by innate and adaptive responses to attributes of natural environments (e.g., spatial openness, water features) that elicit positive emotional reactions (Bowler et al., 2010; Ulrich et al., 1991). More recently, Hartig et al., (2014) proposed four intertwined pathways through which natural environments can affect human health and well-being: air quality, physical activity, social cohesion; stress-reduction. These pathways interact simultaneously as nature constitutes a physical

environment, a setting for the expression of individual or social behavior, and an experience (Hartig et al., 2014).

In a world of rapidly rising urbanization and consumption rates, and as interaction with nature is perceived as more than a survival need (Keniger et al., 2013), it is essential to systematize reliable data that sustain decision-making at different levels (e.g., policy, planning, management), relevant to ensure human well-being. Due to the wide variety of studies' features (e.g., aims, type of population, settings, employed intervention and evaluation methodologies) it is difficult to compare results and assess effect sizes. Even when possible to perform a meta-analysis, results must be interpreted cautiously as the included number of studies tends to be low (Bowler et al., 2010).

Updated systematic reviews are required to ensure a well-defined view of the available information, providing an assessment of the quality of evidence, information regarding possible bias (e.g., geographical, type of population), gaps and needs. In the last decade, several systematic reviews were published regarding the relationship between nature and human health and well-being. They mainly focused on: i) physical health and behaviour (e.g., Calogiuri & Chroni, 2014; Lachowycz & Jones, 2010; Thompson Coon et al., 2011; Twohig-Bennett & Jones, 2018); ii) mental health (e.g., Clatworthy, Hinds, & Camic, 2013; Gascon et al., 2015; Ohly et al., 2016; Thompson Coon et al., 2011); iii) child development (e.g., Gill, 2014); iv) overall benefits (e.g., Bowler et al., 2010; Di Nardo, Saulle, La Torre, 2010; Keniger et al., 2013). While some reviews included a broad range of natural settings and features (e.g., Di Nardo, Saulle, La Torre, 2010; Keniger et al., 2013; Thompson Coon et al., 2011), others were concerned with specific settings, as blue spaces (e.g., Britton, Kindermann, Domegan, & Carlin, 2018; Gascon et al., 2017; Völker & Kistemann, 2011). Other reviews also investigated evidence about nature-assisted therapy (e.g., Annerstedt & Hrborg, 2011), gardening (e.g., Clatworthy et al., 2013), nature conservation (e.g., McKinnon et al., 2016), and biodiversity (e.g., Lovell et al., 2014) relationships with human health and well-being.

So, the growing number of studies that analyze the relationship between nature and human well-being, and their high variability (both in methods and results), reinforce the need of systematic syntheses that allow for updated states of the art. Thus, we conducted

a systematic review in order to collate and synthesize available evidence regarding the effects of direct outdoor interaction with nature on human overall well-being (physical, psychological, social). To ensure methodological quality, we focused on peer reviewed articles that analyzed the impact of nature-based interventions through a structured evaluation methodology that included continuous and/or pre/post evaluation procedures.

2. Methods

This systematic review was conducted following the PRISMA statement guidelines for reporting systematic reviews and meta-analyses (Liberati et al., 2009; Moher et al., 2009).

2.1 Literature search strategy.

In order to prevent a biased sample of literature, a comprehensive search was performed in multiple search engines and databases - Web of Science, Scopus, Pubmed, Science Direct, and PsycInfo/PsychArticles - using the following search expression: (Health OR Well-being OR Wellbeing) AND (Mental OR Psychological OR Emotional OR Physical OR Social OR Adjustment) AND (“Nature experience” OR “Nature intervention”) AND (Impact OR Effect* OR Efficacy). The final keywords and expressions were selected after a brief overview of relevant literature to select commonly used terms. Taking into account the high heterogeneity of the studies’ characteristics, general commonly used keywords and expressions were used in order to reduce the probability of exclusion, due to the lack of a specific keyword or expression and to ensure that a wide variety of studies ensuring that a wide diversity (e.g., field of knowledge, intervention and evaluation methods, measured outcomes) of studies would be included. The bibliographies of included articles and of other relevant reviews were also screened for additional references. Searches were conducted from January 2019 to April 2019. The accepted languages were Portuguese, English, French and Spanish. To establish inter-rater reliability, the literature search was conducted by two researchers that independently screened titles, abstracts and full texts

of potentially eligible studies identified by the search strategy detailed above, and applied the established eligibility criteria. Any discrepancies were resolved by discussion with a third researcher.

2.2 Inclusion and exclusion criteria.

In order to be included, studies had to: i) report primary empirical evidence regarding the impact of a nature-based outdoor intervention in overall human well-being and/or well-being specific components; ii) integrate activities that allowed participants to have a direct contact with nature; iii) present data from continuous or pre/post evaluation; iv) be published in a peer-reviewed scientific journal. There was no limitation regarding year of publication or study design, which could be qualitative, quantitative or used a mixed-methods approached. Regarding participants' characteristics, there were no limitation of age and sex. If an article presented more than one study and only one corresponded to the inclusion criteria, both were included only if the author(s) compared results to withdraw general conclusions.

Studies were excluded if they only focused on indoor or virtual nature or if the participants presented serious mental health conditions or severe physical disorders. Grey literature, including master and PhD thesis, reviews, conference proceedings, books and book chapters were also not included.

2.3 Data collection and synthesis.

Two reviewers worked independently on data extraction and quality evaluation of the studies. Posteriorly, information was compared and agreement was reached via consensus. In order to ensure a controlled analysis and data extraction from each included article, a standardized data extraction sheet was used. Information was retrieved about the article (authors, journal and year of publication, DOI, title) and the studies (country; participants - number, age, type; intervention - goal(s), setting(s), type of activities,

evaluation methods and outcomes measures; results and main findings; limitations; future recommendations). After an overview of the intervention(s)' data presented by the included studies, categories of classification were established regarding three overall themes: studies' characterization (Table 1), interventions' characteristics (Table 2), and evaluation procedures and statistically significant quantitative results (Table 3). Outdoor environments were categorized according to Mausner's five levels-classification, due to its usability in the selected articles' context: (1) totally natural environment – environment with no visible evidence of human presence. Includes, for example, forested wilderness, deserts, and oceans. Access is very difficult making recreational activities less likely to occur; (2) civilized natural environment – characterized by the predominance of natural elements unaffected by human interventions (e.g., forests with hiking trails, secluded ocean beaches). More accessible to human presence and closer to human-made structures and amenities. Recreational activities may occur but without having an impact on the environment; (3) quasi-natural environment – presents a readily apparent human impact, being predominantly composed of natural elements intended to make the environment appear natural. Designed to enhance aesthetic qualities, aesthetic appreciation tends to be the main human activity performed in such environment. For example, small landscaped parks, and cultivated flower gardens; (4) semi-natural environment – natural and non-natural elements coexist, enabling a balanced interaction between people and the environment. Closer to densely populated areas, it allows for the performance of several activities, including living (e.g., living on a farm) and recreational activities (e.g., skiing). May afford a limited experience of being-in-nature; and (5) non-natural environment – urban settings without open, undeveloped land (e.g., buildings, roadways, bridges). If natural elements appear, they seem out of place and exposed to high degradation rates. On another conceptualization, it can also correspond to settings with abundant natural elements but where human action has a severe and destructive impact (e.g., degraded areas due to mining or logging practices). Though some level of experimenting “being-in-nature” can occur, feelings of sadness are more likely to prevail (Mausner, 1996). In this study indoor environments, with the exception of indoor gardens, greenhouses or similar, will be considered non-natural environments. Regarding duration, interventions were

classified as occasional (occurred for a time period inferior to six months), or continuous if their duration was equal or superior to six months. For the activities' level of structure three categories were established: structured, semi-structured, and non-structured activities. In structured activities participants, in group or individually, were accompanied and guided throughout the activity. Semi-structured activities could be performed in group or individually, and comprised two types: i) participants were instructed on how to perform the activity, which they would do on their own; or ii) participants were accompanied throughout the activity but with only an occasional intervention and guidance from researchers and/or monitors. The category "non-structured" corresponds to activities with no intervention of the researcher/monitor (e.g., participants are questioned about their nature-interaction daily habits). Data was collected taking into account three major dimensions: methods (quantitative, qualitative, mixed-methods), evaluation moments (pre-/post-, continuous, follow-up) and measures (psychological, physiological, nature interaction).

Due to the studies' scarcity and heterogeneity, especially in study design, population, evaluation methods and outcomes measures, a meta-analysis for the determination of robust effect-sizes, extendable to larger populations, was not possible. Though some parameters were assessed by the same instruments in more than one study (e.g., positive and negative affect as measured by PANAS, five studies; perceived stress, measured by the PSS, three studies; self-esteem, measured by RSES, three studies; blood pressure, three studies; and cortisol, three studies), the available data were insufficient for a strong meta-analysis and, due to methodological differences, not suitable for comparison. Thus, a narrative synthesis was undertaken to summarize and discuss the overall results of the included studies.

3. Results

The 26 included studies were analysed taking into account five levels: i) study characteristics (year of publication, country, main goals, participants, and evaluation method(s)); ii) interventions' characteristics (duration, level of structure, settings, and season); iii) evaluation procedures (moments, measures, parameters, instruments) ; iv) outcomes (quantitative and qualitative); and v) limitations and recommendations. When information only allowed for a partial classification (e.g., description of some but not all settings), the parameters were classified as "not enough information" (NEI). Some studies (e.g., Anderson, Monroy, & Keltner, 2018; Berman, Jonies, & Kaplan, 2008; Pasanen, Johnson, Lee, & Korpela, 2018; Ryan et al., 2010) reported data regarding more than one experiment. In those cases, overall information was presented. If information was only partially presented (for only one of the experiments), the parameter was classified as NEI. This was decided after verifying that no relevant changes occurred in the results of the studies' overall analysis.

3.1 Studies' characterization.

Twenty-six studies were included in the present review (*Table 1, Figure 1*). With the exception of two studies, that occurred in Asia (Japan and South Korea), all others were implemented in North America (50%) and Europe (40%). The majority of the studies took place in the United States of America (USA; 40%) and United Kingdom (UK; 20%). Despite no limit regarding the year of publication, all selected studies were relatively recent, with the majority being published between 2015 and 2018 ($n = 14$; 53.8%). Studies' main goals were related with four general types of outcomes: i) psychological (e.g., affect, mood states, attention, stress, recovery; e.g., Berman et al., 2008; Bratman, Daily, Levy & Gross, 2015; Hamann, & Ivtzan, 2016; Pasanen et al., 2018; Silva et al., 2018; South, Hohl, Kondo, MacDonald, & Branas, 2018); ii) physiological (e.g., blood pressure, heart rate, cortisol levels, neural activity; e.g., So; Jeon, Yeon & Shin, 2018; Lee, Park, Tsunetsugu, Kagawa, &

Miyazaki, 2009; Pretty, Peacock, Sellens, South, & Griffin, 2007; Stigsdotter, Corazon, Sidenius, Kristiansen, & Grahn, 2017); iii) “nature interaction” (e.g., pro-environmental behaviour, connection; e.g., Hamann & Ivtzan, 2016; Hinds, 2011; Richardson, McEwan & Garip, 2018); and iv) pathways that link nature to well-being (e.g., Anderson et al., 2018). Overall, the studies included a total of 3 834 participants. Twenty-five studies reported information regarding participants’ sex, totalizing 3 804 participants of which 60.7% ($n = 2310$) were female, 39.2% ($n = 1493$) were male, and 0.03% ($n = 1$) were described as “other”. The 18-35 age group was the most represented ($n = 1 884$; 49.1%). Of the 26 studies, eight (30.8%) had as participants only university students, and two (7.7%) integrated university students and other type of participants. In total, 1077 (28.1%) of the studies’ participants were university students. A significant number of participants ($n = 1579$; 41.2%) were more nature-oriented than the general population and/or were already participating in activities that promoted a direct contact with natural environments (e.g., regular participants of a group walk program, green exercise practitioners). In most cases, the evaluation method was quantitative ($n = 18$; 69.2%). Mixed-methods evaluation was applied in eight studies (30.8%) and no study presented only qualitative methods.

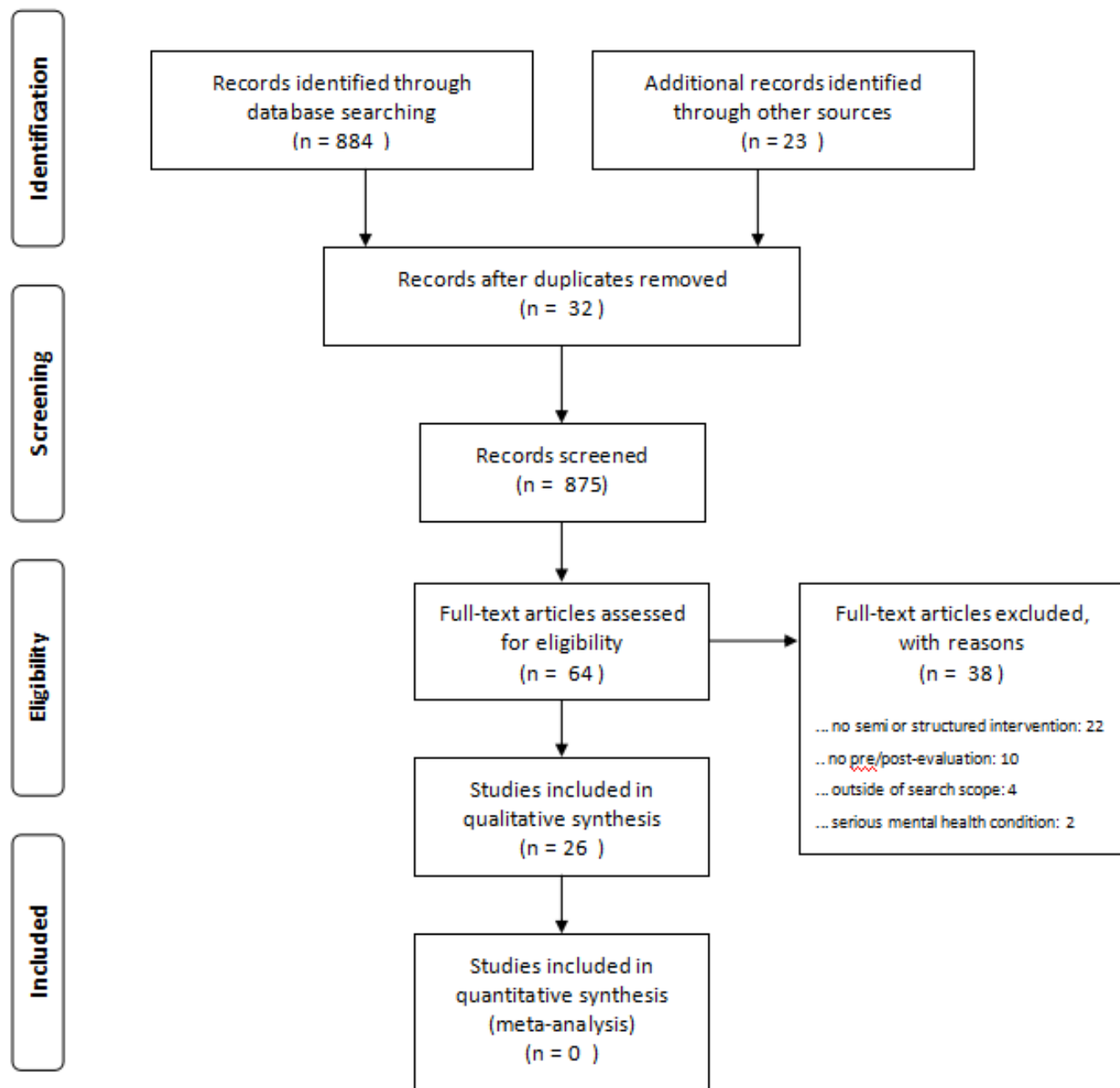


Figure 1. Flowchart of the literature search process (adapted from the PRISMA flow Diagram; PRISMA Group, 2009).

Table 1. Studies' characterization.

Authors	Year	Country	Main goals	Sample size	Age range or mean age	Sex	Type of participants	Evaluation methods
Anderson, Monroy & Keltner	2018	USA	Examine how the impact of nature on well-being and stress-related symptoms is explained by experiences of awe.	243	NEI	56% (136) female 44% (107) male	Military veterans and youth from underserved communities (124); university students (119)	Mixed-methods
Berman, Jonies & Kaplan	2008	USA	Explore impact on affect cognitive performance	50	23.4	62% (31) female 38% (19) male	University students	Quantitative
Bratman, Daily, Levy & Gross	2015	USA	Investigate the impact of nature experience on affect and cognition, clarifying the specific impacts that directed attention replenishment may have on cognitive function.	60	22.9	55% (33) female 45% (27) male	Urban/suburban residents (community participants: 16; university students: 44)	Quantitative
Bratman, Hamilton, Hahn, Daly & Gross	2015	USA	Verify the impacts of a brief nature experience on rumination and neural activity	30	26.4	53.3% (16) female 46.7% (14) male	Urban/suburban residents	Quantitative
de Bloom et al.	2017	Finland	Explore and evaluate the effects of two different lunch break interventions on employees' recovery from job stress: park walks and relaxation exercises	153	47.2	89.5% (137) female 10.5% (16) male	Workers with knowledge-intensive and emotionally demanding jobs	Quantitative
Diessner, Woodward, Stacy & Mobasher	2015	USA	Determine if the directed-attention beauty walks would cause (a) an increase in noticing and paying attention to natural beauty, (b) an increase in levels of the trait of engagement with natural beauty, and (c) a lessening of depressive and anxiety symptoms.	61	21	52% (32) female 48% (29) men	University students	Quantitative
Gatersleben & Andrews (only study 2 was included)	2013	UK	Examine restoration in natural settings with different levels of accessibility, prospect and refuge.	34	23.18/20.88	58.8% (20) female 41.2% (14) male	University students	Quantitative
Hamann & Ivrtzan	2016	USA, Canada, UK, other	Investigate the effects of a nature-based intervention programme on well-being, meaning, mindfulness and environmentally friendly behaviour.	62	40.12	74.4% (46) female 24.2% (15) male 1.9% (1) "other"	Individuals interested in nature, well-being or self-improvement, presenting a relatively high level of connectedness with nature.	Mixed-methods
Hartig, Evans, Jammer, Davis & Gärling	2003	USA	Test the relative restorative values of natural and urban settings	112	20.8	50% (56) female 50% (56) male	University students	Quantitative

NEI – not enough information; NI – no information.

Table 1. (cont.)

Authors	Year	Country	Main goals	Sample size	Age range or mean age	Sex	Type of participants	Evaluation methods
Hinds	2011	UK	Assess the effects of a residential woodland education program on proenvironmental attitudes and aspects of well-being.	25	12-15	52% (13) female 48% (12) male	Young people of disadvantage and socioeconomic backgrounds	Mixed-methods
Hoag, Massey, Roberts & Logan	2013	USA	Assess the effectiveness of wildlife therapy	297	20.2	27% (80) female 73% (217) male	Young adult clients at a wilderness therapy program	Quantitative
Jeon, Yeon & Shin	2018	South Korea	Compare the effects of direct and indirect nature experience on psychological and physiological influence	30	21.2	NI	University students	Quantitative
Lee, Park, Tsunetsugu, Kagawa & Miyazaki	2009	Japan	Examine human physiological and psychological responses to exposure to real forest landscapes.	12	20-23	100% (12) male	University students	Quantitative
Marselle, Irvine, Lorenzo-Arribas & Warber	2015	UK	Explore the health benefits of nature and investigate the effect of environment type and indicators of perceived environmental quality on emotional well-being; investigate whether perceived restorative quality of an environment moderates the effect of perceived environment type or perceived environmental quality on emotional well-being.	127	55-74	55.5% (70) female 44.5% (57) male	Participants of a group walk program	Quantitative
Mutz, Müller & Göring	2018	France	Investigate if outdoor programs can serve as an antidote to negative health impacts of exaggerated screen time.	76	17.8	36.8% (28) female 63.2% (48) male	Adolescents participating in a 10-days outdoor and adventure program	Quantitative
Pasanen, Johnson, Lee & Korpela	2018	Finland	Explore whether affective and attention restoration could be enhanced by psychological instructions that aim to deepen the different phases of a restorative experience.	246	55	83.3% (205) female 16.7% (41) male	Volunteers; more nature-oriented than the general population	Quantitative
Passmore & Holder	2016	Canada	Measure the effects of a nature intervention.	364	20.09	67.6% (246) female 32.4% (118) male	University students	Mixed-methods
Pretty, Peacock, Sellens, South & Griffin	2007	UK	Quantify the effects of countryside activities on participants' mental and physical health.	263	47.8	49% (129) female 51% (134) male	Green exercise activities participants	Quantitative

NEI – not enough information; NI – no information.

Table 1. (cont.)

Authors	Year	Country	Main goals	Sample size	Age range or mean age	Sex	Type of participants	Evaluation methods
Razani et al.	2018	USA	To test if park prescriptions will improve stress and other behavioural and health outcomes for parents.	78	38	87% (68) female 13% (10) male	Parent child pairs were eligible if the child was a clinic patient between 4±18 years old	Mixed-methods
Richardson, McEwan & Garip	2018	UK	Confirm and understand the benefits to nature connectedness, conservation behaviours, health, and happiness, and establish who benefits most.	273	44.62	89% (243) female 11% (30) male	Participants of a nature engagement intervention	Mixed-methods
Ryan et al.	2010	Canada/USA	Assess the vitalizing effects of being outdoors and nature exposure in actual and imagined contexts.	251	20	75.3% (189) female 24.7% (62) male	University students	Quantitative
Silva et al.	2018	Portugal	Assess the effectiveness of a nature-based intervention in promoting domestic violence victims' wellbeing.	32	43.47	100% (32) female	Women victims of domestic violence	Mixed-methods
South et al.	2018	USA	To evaluate whether interventions to green vacant urban land can improve self-reported mental health.	342	44.6	59.7% (204) female 40.3% (138) male	Urban/suburban residents	Quantitative
Stigsdotter, Corazon, Sidenius, Kristiansen & Grahn	2017	Denmark	To gain further knowledge of the restorativeness of the two environments - urban and natural - and their possible impact on physiological and psychological processes.	51	20-36	100% (51) female	University students	Quantitative
van der Berg & Custers	2011	Netherlands	Determine whether gardening has a causal impact on recovery from stress.	30	57.6	73.3% (22) female 26.7% (8) male	Urban/suburban residents	Quantitative
Wolf & Housley	2017	USA	Assess how an outdoor work environment may serve as a path to personal effectiveness and provide healing opportunities.	532	18-34 (majority; 22-24)	42% (223) female 58% (309) male	Young adults conservation workers'	Mixed-methods

NEI – not enough information; NI – no information.

3.2 Interventions' characteristics.

Table 2 features the included studies interventions' characteristics. The majority of the interventions ($n = 24$; 92.3%) had an occasional character, having a duration of less than six months. Only two studies (7.7%) referred to continuous interventions. Semi-structured interventions were present in 21 studies (72.4%), while structured interventions were only performed in eight studies (27.6%). Three studies (11.5%) presented mixed interventions regarding the level of structure. Fourteen studies (53.8%) reported mixed settings, nine (34.6%) with two different types of settings and five (19.2%) with three or more. Two studies (7.7%) didn't present sufficient information to classify all settings, and five (19.2%) didn't have any information regarding the settings where the activities (or experiments) occurred. Eleven studies (42.3%) feature quasi-natural environments, nine (34.6%) civilized and semi-natural environments, eight (30.8%) non-natural environments, and only one study (3.8%) featured totally natural environments. From the 26 studies, only seven (26.9%) offered information of comparison between different environments, mainly comparing natural with non-natural environments ($n = 5$; 71.4%). The majority of the studies ($n = 19$; 73.1%) gave information about the time of the year when the activities and/or data collection took place. Of those, ten (38.5%) were performed during only one season: Summer ($n = 3$), Fall ($n = 3$) or Spring ($n = 4$). The remaining nine (34.6%) were implemented during two ($n = 4$), three ($n = 3$) or four seasons ($n = 2$). Winter was the less studied season, featuring in only three studies (11.5%). Of the studies that comprehend more than one season, only two (Berman et al., 2008; De Bloom et al., 2017) verified if a seasonal effect occurred. While Berman et al. (2008) concluded that the season had no effect, the results obtained by De Bloom et al. (2017) showed differences between Spring and Fall, not being clear if the differences were actually due to season or to other factors such as the group of participants (different for both seasons).

Table 2. Interventions' characteristics.

Authors	Type of intervention	Activities	Settings	Season
Anderson et al. (2018)	Occasional	Structured Semi-structured	NEI	NEI
Berman et al. (2008) (only experiment 1 was included)	Occasional	Semi-structured	Quasi-natural and non-natural environments	Summer, Fall, Winter
Bratman et al. (2015)	Occasional	Semi-structured	Semi-natural and non-natural environments	All seasons (low climate variation)
Bratman et al. (2015)	Occasional	Semi-structured	Semi-natural and non-natural environments	NI
de Bloom et al. (2017)	Occasional	Semi-structured	Quasi-natural environment	Spring, Fall
Diessner et al. (2015)	Occasional	Structured Semi-structured	Quasi-natural environment	Fall
Gatersleben & Andrews (2013) (only study 2 was included)	Occasional	Structured Semi-structured	Civilized, quasi-natural, and non-natural environments	NI
Hamann & Ivrtan (2016)	Occasional	Semi-structured	Civilized, quasi-natural, and semi-natural environments	NI
Hartig et al. (2003)	Occasional	Semi-structured	Civilized and non-natural environments	Spring
Hinds (2011)	Occasional	Structured	Civilized natural environment	Summer
Hoag et al. (2013)	Occasional	Structured	NI	NI
Jeon et al. (2018)	Occasional	Semi-structured	Civilized natural environment	NI
Lee et al. (2009)	Occasional	Semi-structured	Civilized and non-natural environments	Summer
Marselle et al. (2015)	Occasional	Semi-structured	NI	Summer, Fall
Mutz et al. (2018)	Occasional	Structured	NI	Spring
Pasanen et al. (2018)	Occasional	Semi-structured	Quasi-natural and semi-natural environments	Spring, Summer
Passmore & Holder (2016)	Occasional	Semi-structured	NI	Fall
Pretty et al. (2007)	Occasional	Semi-structured	Quasi-natural and semi-natural environment	Fall
Razani et al. (2018)	Occasional	Semi-structured	Civilized and semi-natural environment	Summer
Richardson et al. (2018)	Occasional	Semi-structured	NI	Spring
Ryan et al. (2010)	Occasional	Semi-structured	NEI	NEI
Silva et al. (2018)	Occasional	Structured	Civilized, quasi, and semi-natural environments	Spring, Summer, Fall
South et al. (2018)	Continuous	Semi-structured	Semi-natural environment	All seasons
Stigsdotter et al. (2017)	Occasional	Semi-structured	Civilized, quasi and non-natural environments	Spring, Fall
van der Berg & Custers (2011)	Occasional	Semi-structured	Quasi and non-natural environments	Spring
Wolf & Housley (2017)	Continuous	Structured	Totally natural, civilized, quasi and semi-natural environments	Spring, Summer and Fall

NEI – not enough information; NI – no information.

3.3 Evaluation procedures.

Evaluation procedures and statistically significant quantitative results are presented on *Table 3*. For studies presenting, for example, urban and nature settings, results here reported refer only to the nature settings.

As it was one of the inclusion criteria, all studies presented data regarding pre- and post-intervention moments. From the 26 studies, 14 (53.8%) performed follow-up evaluation, corresponding to continuous monitoring during the intervention ($n = 9$; 34.6%) and/or to evaluation after the end of the intervention ($n = 5$; 19.2%). The follow-up period after intervention completion was quite diverse among studies, ranging from one week (Anderson et al., 2018) up to 18 months (South et al., 2018). The remaining three studies presented follow-up periods from one month (Razani et al., 2018) up to six months (Hoag, Massey, Roberts, & Logan, 2013). All studies assessed psychological outcomes (e.g., mood states, rumination, anxiety, mental health). Ten (38,5%) also explored how nature-based experiences impact nature-interaction features as pro-environmental behavior and nature connection, and nine studies (34,6%) also assessed physiological measures (e.g., blood pressure, heart rate, salivary cortisol). The majority of instruments applied for psychological outcomes correspond to self-report measures (e.g., perceived stress scale, satisfaction with life scale), with exception to the studies that assessed executive functions, as attention and memory (e.g., Attention network test (ANT); Backwards digit-span task, Change detection task).

The Positive and Negative Affect Scale (PANAS; $n = 6$; 23.1%); Perceived Stress Scale (PSS; $n = 4$; 15.4%); Profile of Mood States (POM; $n = 3$; 11.5%); Rosenberg Self-Esteem Scale (RSES; ; $n = 3$; 11.5%); Rumination-Reflection Questionnaire (RRQ; $n = 2$; 7.7%); and the Outcome Questionnaire (OQ-45.2; $n = 2$; 7.7%), were self-report measures used in more than on study. To assess executive functions, the authors used the Backwards digit-span task ($n = 2$; 7.7%) and the Necker Cube Pattern Control Task (NCPCT; $n = 2$; 7.7%). To assess memory, the Operation span task (OSPAN) was used in one study (3.8%), while other study used the Change detection task (3.8%). Physiological outcomes were assessed using objective measures like heart rate ($n = 3$; 11.5%), blood pressure ($n = 3$; 11.5%), cortisol

levels ($n = 3$; 11.5%), and Neural activity (sgPFC; $n = 1$; 3.8%). Nature connection was assessed in two studies with Connectedness to Nature Scale (7.7%); and nature-based experiences and nature-interaction features were assessed with Engagement with Beauty Scale 2.0 in two studies (7.7%) and Love and Care for Nature in one study (3.8%). Some studies used single items to assess Positive emotions (Anderson et al., 2018), recovery experiences (De Bloom et al., 2017), subjective well-being (Mutz, Müller, & Göring, 2018), physical activity (Razani et al., 2018) and general health and happiness (Richardson et al., 2018).

Table 3. Evaluation procedures and statistically significant quantitative results.

Authors	Moments	Measures	Instruments*	Parameters*	Results*
Anderson et al. (2018)	Pre-/post- and follow-up evaluation	Psychological	1) Diary (single-item questions and short narratives); 2) Perceived Stress Scale (PSS); 3) Post-traumatic Stress Disorder Checklist (PCL); 4) Mental Health Checklist; Mental Health Continuum (MHC-SF); 5) Satisfaction with Life Scale (SWLS).	1) Positive emotions (awe, amusement, contentment, gratitude, joy, and pride); 2) Stress symptoms; 3) Post-traumatic stress disorder; 4) Mental health; 5) Satisfaction with life.	1) ↑ 2) ↓ 3) ↓ 4) = 5) ↑
Berman et al. (2008) (only experiment 1 was included)	Pre-/post- evaluation	Psychological	1) Positive and Negative Affect Schedule (PANAS); 2) Backwards digit-span task.	1) Mood (positive and negative affect); 2) Directed-attention performance.	1) = 2) ↑
Bratman et al. (2015)	Pre-/post- evaluation	Psychological Nature interaction	1) State-Trait Anxiety Inventory (STAI); 2) Rumination-Reflection Questionnaire (RRQ); 3) Positive and Negative Affect Schedule (PANAS); 4) Operation span task (OSPAN); 5) Change detection task; 6) Attention network test (ANT); Backwards digit-span task.	1) Anxiety; 2) Rumination; 3) Mood (positive and negative affect); 4) Working memory; 5) Visuospatial working memory; 6) Executive attention.	1) ↓ 2) ↓ 3) ↑ (positive affect); ↓ (negative affect) 4) ↑ 5) ↑ 6) ↑
Bratman et al. (2015)	Pre-/post- evaluation	Psychological Physiological	1) Rumination-Reflection Questionnaire (RRQ); 2) Arterial spin label (ASL; neuroimaging method).	1) Rumination; 2) Neural activity (sgPFC).	1) ↓ 2) ↓
de Bloom et al. (2017)	Pre-/post- and follow-up evaluation	Psychological	1) and 2) single-item questionnaires	1) Recovery experiences (relaxation, psychological detachment, enjoyment); 2) Well-being aspects (restoration, fatigue, job satisfaction).	1) = 2) =
Diessner et al. (2015)	Pre-/post- evaluation	Psychological Nature interaction	1) Engagement with Beauty Scale 2.0 (EBS); Engagement with Natural Beauty (ENB; subscale of the EBS); 2) Generalized Anxiety Disorder Scale (GAD); 3) The Center for Epidemiological Studies-Depression Scale (CES-D).	1) Cognitive and emotional engagement with natural beauty; 2) Anxiety; 3) Depression associated symptoms.	1) ↑ (EBS); = (ENB) 2) = 3) =
Gatersleben & Andrews (2013) (only study 2 was included)	Pre-/post- evaluation	Psychological Physiological	1) Self-rating Restoration Scale (SRRS); 2) Inventory of Personal Reactions (ZIPERS); 3) Necker Cube Pattern Control Task (NCPCT); 4) Heart rate.	1) Fear; 2) Affect; 3) Attention; 4) Physiological restoration.	1) ↓ (high prospect-low refuge); ↑ (low prospect-high refuge) 2) ↑ (positive affect) 3) ↑ (high prospect-low refuge); ↓ (low prospect-high refuge) 4) ↑

↑ increase; ↓ decrease; = no significant changes

* The numbering of parameters, instruments and results provides a direct correspondence among columns.
** Data evaluated only at one moment (e.g. baseline, post-intervention)

Table 3. (cont.)

Authors	Moments	Measures	Instruments*	Parameters*	Results*
Hamann & Ivztan (2016)	Pre-/post-evaluation	Psychological Nature interaction	1) Positive and Negative Affect Schedule (PANAS); 2) Warwick-Edinburgh Mental Well-Being Scale (WEMWBS); 3) Connectedness to Nature Scale (CNS); 4) Meaning in Life Questionnaire; Spiritual Transcendence Scale (STS); 5) Freiburg Mindfulness Inventory; 6) Understanding Society survey (adapted scale).	1) Mood (positive and negative affect); 2) Subjective-wellbeing; 3) Connectedness to nature; 4) Meaning and spirituality; 5) Mindfulness; 6) Environmental-friendly behaviour.	1) ↑ (positive affect); ↓ (negative affect) 2) ↑ 3) = 4) ↑ (meaning); = (spirituality) 5) ↑ 6) =
Hartig et al. (2003)	Pre-/post-evaluation	Psychological Physiological	1) Blood pressure; 2) Inventory of Personal Reactions (ZIPERS; Zuckerman, 1997); Overall Happiness Scale (OHS); 3) Necker Cube Pattern Control task (NCPCT); Search and memory test (adapted).	1) Physiology; 2) Emotion (positive affect, attentiveness, fear, anger/aggression); 3) Attention.	1) ↓ 2) ↑ (positive affect); ↓ (attentiveness); ↓ (fear, anger/aggression) 3) ↑
Hinds (2011)	Pre-/post- and follow-up evaluation	Psychological Nature interaction	1) International Personality Item Pool; 2) and 3) Children's Environmental Response; 4) Inventory Rosenberg's Self-Esteem scale; 5) Basic Need Satisfaction Scale; 6) Scale developed by Stejs and Biga (2003).	1) Sociability; 2) Attitudes towards the natural environment; 3) Attitudes towards the urban environment; 4) Self-esteem; 5) Competence; 6) Environmental identity.	1) = 2) ↑ 3) = 4) = 5) ↑ 6) ↑
Hoag et al. (2013)	Pre-/post- and follow-up evaluation	Psychological	1) Outcome Questionnaire-45.2 (OQ-45.2); 2) Life Effectiveness Questionnaire (LEQ); 3) Dysfunctional Attitudes Scale (DAS); 4) Helping Alliance Questionnaire (HAQ-II); 5) Client Motivation for Therapy Scale (CMOTS).	1) Psychological adjustment; 2) Life effectiveness; 3) Cognitive distortions; 4) Alliance between patient and therapist; 5) Motivation for therapy.	1) ↓ 2) ↑ 3) ↓ 4) ↑ 5) ↓ 6) ↑
Jeon et al. (2018)	Pre-/post-evaluation	Psychological Physiological	1) Heart rate variability (HRV); 2) Modified Semantic Differential (SD) method; 3) Profile of Mood States (POM).	1) Physiology (parasympathetic nerve activity); 2) Emotional impact; 3) Mood (tension and anxiety, depression, anger and hostility, vigour, fatigue, and confusion).	1) ↑ 2) Emotional impact (↑ pleasure; ↑ natural; = calm) 3) Mood (↓ tension and anxiety, ↓ depression, ↓ anger and hostility, ↓ vigour, fatigue, and ↓ confusion).

↑ increase; ↓ decrease; = no significant changes

* The numbering of parameters, instruments and results provides a direct correspondence among columns.

** Data evaluated only at one moment (e.g. baseline, post-intervention)

Table 3. (cont.)

Authors	Moments	Measures	Instruments*	Parameters*	Results*
Lee et al. (2009)	Pre-/post-, and follow-up evaluation	Psychological Physiological	1) Cortisol levels; blood pressure; pulse rate; 2) Self-report - closed questions.	1) Physiological; 2) Psychological response to the environment ("comfortable-uncomfortable", "soothing-awakening" and "refreshment").	1) ↓ cortisol; ↓ diastolic blood pressure; = systolic blood pressure; ↓ pulse rate; 2) ↑ comfortable-uncomfortable; ↑ soothing-awakening; ↑ "refreshment"; ↑ "soothing-awakening"; ↑ "refreshment"
Marselle et al. (2015)	Pre-/post-, and post-evaluation	Psychological Nature interaction	1) Positive and Negative Affect Schedule (PANAS); 2) Closed question (select on from a list of 10 categories); 3) Closed question (single item)**; 4) Closed questions (three items)**; 5) Perceived Restorativeness Scale (PRS)*.	1) Mood (positive and negative affect); 2) Environment type; 3) Perceived naturalness**; 4) Perceived biodiversity**; 5) Perceived restorativeness**.	1) Mood (↑ positive and ↓ negative affect; ↑ happiness)
Mutz et al. (2018)	Pre-/post-evaluation	Psychological	1) Perceived Stress Questionnaire (PSQ); 2) Single-item question; 3) Single-item question.	1) Perceived stress; 2) Life satisfaction (to assess subjective wellbeing); 3) Hedonic balance (to assess short-term wellbeing).	High media consumers 1) ↓ worry; ↓ tension; ↓ demand; ↑ joy; 2) ↑ 3) ↑ Low-to-moderate media consumers 1) ↓ worry; ↓ tension; ↓ demand; ↑ joy; 2) = 3) ↑
Pasanen et al. (2018)	Pre-/post-evaluation	Psychological	1) Restoration Outcome Scale (ROS); 2) Two-dimensional affect grid; 3) Random version of the Sustained Attention to Response Task (SART); 4) Perceived Stress Scale (PSS).	1) Restoration; 2) Mood; 3) Sustained attention; 4) Stress.	1) ↑ 2) = 3) ↑ 4) ↓

↑ increase, ↓ decrease, = no significant changes

* The numbering of parameters, instruments and results provides a direct correspondence among columns.

** Data evaluated only at one moment (e.g. baseline, post-intervention)

Table 3. (cont.)

Authors	Moments	Measures	Instruments*	Parameters*	Results*
Passmore & Holder (2016)	Pre-/post- evaluation	Psychological Nature interaction	1) Positive and Negative Affect Scale (PANAS); 2) Elevating Experiences Scale; 3) Sense of Meaning Scale; 4) Composite measure - Combination of four questionnaires: Self-construal Scale, Metapersonal Self-Scale Allo-Inclusive Identity Scale, and Connectedness to Nature Scale; 5) Composite measure - combination of two measures: Social Value Orientation Slider Measure, and the Aspiration Index; 6) Connectedness to Nature Scale (CNS); 7) Engagement with Beauty Scale (EBS).	1) Mood (positive and negative affect); 2) Elevation; 3) Meaning; 4) General sense of connectedness; 5) Prosocial orientation; 6) Connectedness with nature; 7) Engagement with natural beauty.	1) ↑ 2) ↓ 3) = 4) ↑ 5) ↑
Pretty et al. (2007)	Section 2 of the questionnaire: pre-/post- evaluation	Psychological Physiological	1) Rosenberg Self-Esteem Scale (RSES); 2) Profile of Mood States (POMS); 3) Calorie consumption.	1) Self-esteem; 2) Mood; 3) Physical health.	1) ↑ 2) ↓ Total mood disturbance; ↓ anger; ↓ confusion; ↓ depression; ↑ fatigue; ↓ Tension; = Vigour- activity 3) ↑
Razani et al. (2018)	Pre-/post-, and follow-up evaluation	Psychological Physiological Nature interaction	1) Perceived Stress Score (PSS10); 2) Modified UCLA Loneliness Score; 3) Single-item (self-report); 4) Cortisol levels; 5) Love and Care for Nature Scale (LCN); 6) Four validated items.	1) Stress; 2) Loneliness; 3) Physical activity; 4) Physiologic stress; 5) Nature affinity; 6) Neighbourhood social support.	1) ↓ 2) ↓ 3) ↑ 4) ↓ 5) ↑
Richardson et al. (2018)	Pre-/post-, and follow-up evaluation	Psychological Nature interaction	1) Inclusion of Nature in Self (INS); Nature Connection Index (NCI); 2) Single items; 3) Single items; 4) Bespoke four-item scale;	1) Nature connection; 2) General health; 3) General happiness; 4) Conservation behaviours.	1) ↑ 2) ↑ 3) ↑ 4) ↑
Ryan et al. (2010)	Pre-/post-, and follow-up (studies 4/5) evaluation	Psychological	1) Subjective Vitality Scale (SVS); 2) Diener & Emmon's (1984) 9-item hedonic valence scale**; 3) Single-item questions**.	1) Subjective vitality; 2) Emotions (positive and negative)**; 3) Satisfaction**.	1) ↑
Silva et al. (2018)	Pre-/post-, and follow-up evaluation	Psychological Nature interaction	1) World Health Organization Quality of Life (WHOQOL-BREF); 2) Outcome Questionnaire (OQ-45.2) 3) Rosenberg Self-Esteem Scale (RSES); 4) Nature Relatedness Scale (NRS).	1) Life quality; 2) Individual functioning; 3) Self-esteem; 4) Connection with nature;	1) ↑ 2) ↓ 3) ↑ 4) =

↑ increase; ↓ decrease; = no significant changes

* The numbering of parameters, instruments and results provides a direct correspondence among columns.

** Data evaluated only at one moment (e.g. baseline, post-intervention)

Table 3. (cont.)

Authors	Moments	Measures	Instruments*	Parameters*	Results*
South et al. (2018)	Pre-/post-, and follow-up evaluation	Psychological	1) Kessler-6 Psychological Distress Scale (K6)	1) Mental health	1) ↓ depression; ↓ feeling worthless;
Stigsdotter et al. (2017)	Pre-/post- evaluation	Psychological Physiological	1) Blood pressure; heart rate variability; 2) Profile of Mood States (POMS); 3) Perceived Restorativeness Scale (PRS); 4) Perceived Stress Scale (PSS)**; 5) EuroQol-visual analogue scales (EQ-VAS)**.	1) Physiology; 2) Mood; 3) Perceived restorativeness; 4) Perceived stress**; 5) Perceived health**.	1) = blood pressure; = heart rate; 2) ↓ total Mood disturbance; 3) ↑
van der Berg & Custers (2011)	Pre-/post-, and follow-up evaluation	Psychological Physiological	1) Cortisol levels; 2) Positive and Negative Affect Schedule (PANAS).	1) Physiologic stress; 2) Mood.	1) ↓ 2) ↑
Wolf & Housley (2017)	Pre-/post- evaluation	Psychological Nature interaction	1) Perceived Stress Scale (PSS); 2) 36-Item Short Form Survey from the RAND Medical Outcomes Study; 3) Review of Personal Effectiveness with Locus of Control (ROPELOC); 4) New Ecological Paradigm (NEP).	1) Perceived stress; 2) Perceived health; 3) Personal effectiveness/resiliency; 4) Pro-environmental orientation.	1) ↓ 2) ↑ 3) = 4) =

↑ increase; ↓ decrease; = no significant changes

* The numbering of parameters, instruments and results provides a direct correspondence among columns.

** Data evaluated only at one moment (e.g. baseline, post-intervention)

3.4 Quantitative outcomes.

3.4.1 Psychological outcomes.

Of the included studies, 11 (42%) presented quantitative outcomes related with mental health and 11 (42%) with mood (positive and negative emotions). The majority of the studies that assessed outcomes related to mental health ($n = 10$; 38,5%) concluded that nature experiences led to a significant increase of mental health positive outcomes (e.g., anxiety, depression, rumination, psychological disadjustment (e.g., Anderson et al., 2018; Bratman et al., 2015a; Bratmam et al., 2015b; Gatersleben & Andrews, 2013; Hoag et al., 2013; Jeon et al., 2018; Pretty et al., 2007; Razani et al., 2018; Silva et al., 2018; South et al., 2018)). Two studies concluded that nature had no significant effects on general mental health (Anderson et al., 2018), anxiety and depression associated symptoms, i.e., the walks did not lessen participants' levels of depressive and anxiety symptoms (Diessner, Woodward, Stacy, & Mobasher, 2015). The same pattern was verified with respect to mood states: nine studies (34,6%) concluded about the positive and significant effect of nature (Anderson et al., 2018; Bratman et al., 2018; Gatersleben & Andrews, 2013; Hamann & Ivtzan, 2016; Hartig et al., 2003; Marselle, Irvine, Lorenzo-Arribas, & Warber, 2015; van der Berg & Custers, 2011; Stigsdotter et al., 2017; Passmore & Holder, 2016), while two studies concluded that there was no change in mood (Pasanen et al., 2018) and in positive and negative affect (Berman et al., 2008). Another psychological outcome assessed before and after the contact with nature was perceived stress ($n = 5$), with main results showing positive reduction of stress (Anderson et al., 2018; Mutz et al., 2018; Pasanen et al., 2018; Pretty et al, 2007; Wolf & Housley, 2017). Participants' self-esteem improved significantly in two studies (Pretty et al., 2007; Silva et al., 2018), while in one study it remained unchanged after the intervention (Hinds, 2011). However, in this last study there was an increase in the sense of competence. Perception about general health, well-being and satisfaction with life showed positive changes after the intervention in eight studies (Anderson et al., 2018; Hamann & Ivtzan, 2016; Hoag et al., 2013; Mutz et al., 2018;

Richardson et al., 2018; Ryan et al., 2010; Silva et al., 2018; Wolf & Housley, 2017), while well-being aspects (restoration, fatigue, job satisfaction) remained unchanged after the nature experience, concluding that park walks and relaxation exercises during lunch breaks can enhance knowledge workers' recovery from work, but effects seem weak, short-lived and dependent on the season (De Bloom et al., 2017). Five studies assessed changes in attention levels and one in working memory, with all of these studies concluding that participants showed improved cognitive performance after the experimental condition (Berman et al., 2008; Bratman et al., 2015a; Gatersleben & Andrews, 2013; Hartig et al., 2003; Pasanem et al., 2018). Note, however, that in one study (Gatersleben & Andrews, 2013) the authors verified an improvement in attention in high prospect-low refuge condition and a decrease in low prospect-high refuge condition.

3.4.2 Physiological outcomes.

Exposure to natural environments seems to be beneficial in physiological response. Cortisol levels were assessed in three studies and all of them concluded the positive effect of nature in the diminution of this hormone (Lee et al, 2009; Razani et al., 2018; van der Berg & Custers, 2011); heart rate had a positive variation in two studies and remained unchanged in one study (Stigsdotter et al, 2017), as well as blood pressure (Stigsdotter et al, 2017). Another study concluded that blood pressure significantly decreased after the activity in nature (Hartig et al., 2003), and another study (Lee et al., 2009) concluded that nature had a positive effect only in diastolic blood pressure.

3.4.3 Nature interaction outcomes.

Behaviors, attitudes and feelings related to nature also improved in the majority of studies that assessed those traits: nature connection (Passmore & Holder, 2016; Richardson et al., 2010), perceived restorativeness (Pasanen et al., 2018; Stigsdotter et al., 2017), cognitive and emotional engagement with natural beauty (Diessner et al., 2015),

attitudes toward natural environment and environmental identity (Hinds, 2011), psychological response to environment (Lee et al., 2009), nature affinity (Razani et al., 2018) and conservation behaviors (e.g., Richardson et al., 2018). Contrarily, two studies concluded that, although nature connection was strengthened, the differences between pre and post-test were not significant (Hamann & Ivtzan, 2016; Silva et al., 2018), the same occurring with pro-environmental orientation (Wolf & Housley, 2017) and environmental-friendly behavior (Hamann & Ivtzan, 2016).

3.5 Qualitative outcomes.

Of the included studies, six (23%) presented qualitative data whose analysis allowed to conclude about the interventions' impact and characteristics (settings, performed activities, format, duration), and also infer on pathways through which contact with nature relates with human well-being.

3.5.1 Interventions' impact in overall well-being and components.

Different nature experiences (e.g., green exercise, outdoor adventure activities, conservation work, leisure, therapeutic) led to an increase of positive feelings as joy, gratitude, amusement, calm, awe, security, and feeling away from stress, as well as stress reduction (Anderson et al., 2018; Hinds, 2011; Richardson et al., 2018; Silva et al., 2018). For many participants, the lived nature experiences led to a strong sense of belonging and companionship, providing opportunities to a constructive group interaction and social support network strengthening (Hinds, 2011; Silva et al., 2018; Wolf & Housley, 2017). The acquisition of new working and social skills (e.g. capacity of interact with others, development of coping strategies) and knowledge about nature (e.g., species identification) and new places, was also pointed out by participants (Hinds, 2011; Silva et al., 2018; Wolf & Housley, 2017). Increased senses of self-efficacy (e.g., higher self-esteem, confidence and accomplishment) (Hinds, 2011; Silva et al., 2018; Wolf & Housley, 2017),

and of place (Richardson et al., 2018; Silva et al., 2018) were reported. Contact with nature also promoted the development of positive feelings towards the natural environment and environmental-friendly behaviors (e.g., animal rescuing, litter picking) (Hinds, 2011; Richardson et al., 2018; Silva et al., 2018). Three participants of the study by Richardson et al. (2018) also wrote that the lived nature experiences triggered childhood memories and associated feelings of wonder and fascination.

3.5.2 Nature-based interventions' characteristics.

Participants' highlighted several interventions' characteristics that were important to them. In the studies of Silva et al. (2018), and Wolf and Housley (2017) group format provided an opportunity to reinforce participants' social support network, to make new friends and develop interpersonal skills. The inclusion of activities that allowed for personal growth and learning opportunities was also relevant for several participants (Hinds, 2011; Silva et al., 2018; Wolf & Housley, 2017). Hamann and Ivtzan (2016) concluded that the amount of time spent in nature and type of natural settings had a significant effect in the impact of nature-based experiences. More than 30 minutes in nature *per* day led to significant positive changes and "wild" settings (authors use the term "wild" as opposite of "urban", thus meaning natural areas as forests, mountains, seaside or countryside, without including urban nature) to more benefits (Hamann & Ivtzan, 2016). Non-urban settings characterized by an appealing natural beauty, biodiversity (species of fauna and flora), and with water features appear to more indicated to promote overall well-being and/or have a positive impact in specific well-being features. Regarding the presence of children, studies didn't provide consistent conclusions. While in the study by Richardson et al. (2018), favorite moments tended not to mention children, with only four participants mentioning the pleasure of seeing children engage positively with nature, Silva et al. (2018) verified that the opportunity to participate in the activities with children was pointed out by several participants (mothers whose children were also integrated in the nature-based intervention) as a strong point.

3.5.3 Pathways.

In the study by Anderson et al. (2018), participants highlighted experiences of awe and of positive feelings, suggesting that positive emotions, like awe, contentment and gratitude, are mediators of the effect of nature in well-being. Individual experiencing of nature comprehended contemplation (e.g., watching the sunset, watching water flow, appreciating beauty), sensorial engagement (e.g. smelling plants, listening to birds, touching grass or water), and directed attention (e.g., noticing blooming flowers; paying attention to details, sounds and sights; noticing the surrounding nature).

3.6 Limitations and recommendations.

Authors pointed out important limitations that require results to be cautiously interpreted. The most commonly mentioned limitation was non-representative samples ($n = 15$; 57.7%), due to type of participants (Bratman et al., 2015a; De Bloom et al., 2017; Gatersleben & Andrews, 2013; Jeon et al., 2018; Lee et al., 2009; Mutz et al., 2018; Pasanen et al., 2018; Passmore & Holder, 2016; Pretty et al., 2007; Razani et al., 2018; Ryan et al., 2010; Silva et al., 2018; South et al., 2018; Stigsdotter et al., 2017) or small sample (Hamann & Ivtzan, 2016). Evaluation procedures – lack of follow-up evaluation (e.g., Bratman et al., 2015a; Gatersleben & Andrews, 2013; Mutz et al., 2018; Silva et al., 2018; South et al., 2018), instruments fragilities (e.g., Diessner et al., 2015; Hinds, 2011; Richardson et al., 2010; Silva et al., 2018; South et al., 2018; Stigsdotter et al., 2017), use of only one approach (quantitative; De Bloom et al., 2017), and prevalence of subjective outcomes through self-report instruments (e.g., Ryan et al., 2010; Silva et al., 2018) – was the second most mentioned limitation ($n = 11$; 42.3%). Settings also constituted an important limitation ($n = 6$; 23.1%) due to, for example, the presence of dominant urban features (e.g., Diessner et al., 2015), reduced number of tested environments (e.g., Lee et al., 2009) and insufficient attention to constituent elements (e.g., Ryan et al., 2010). Silva et al. (2018) referred as a

limitation the fact that previous life experiences were not evaluated, as well as the participants' access and use of natural areas on their daily lives. This could culminate in the overlooking of important mediating factors of the individuals' response to the natural settings. Pasanen et al. (2018), whose study feature a semi-structured intervention, mentioned that different routes lead to some difficulty in wayfinding that may have caused participants to have different experiences of the natural settings. Other limitations were i) intervention's short duration (e.g., De Bloom et al., 2017); ii) possible spillover between experimental and control group (e.g., De Bloom et al., 2017); iii) drop-out rates (e.g., Hoag et al., 2013; Richardson et al., 2018); iv) lack of control/comparison group (e.g., Mutz et al., 2018; Razani et al., 2018; Silva et al., 2018); v) data collected in only two seasons (e.g., Stigsdotter et al., 2017) and vi) no separation between effects of nature and of exercise (e.g., van der Berg & Custers, 2011).

Larger and more diversified, and thus more representative, sample populations were frequent recommendations (e.g., Gatersleben & Andrews, 2013; Hamann & Ivtzan, 2016; Hoag et al., 2013; Lee et al., 2009; Pasanen et al., 2018; Ryan et al., 2010; van der Berg & Custers, 2011). Future research with different vulnerable groups, besides domestic violence victims, was also suggested (e.g., Silva et al., 2018). Authors like Hinds (2011), Razani et al. (2018), and Silva et al. (2018) the inclusion of control groups in future research. Regarding the nature experiences, authors recommended that future research should assess the effect of different durations, especially of longer interventions (e.g., Bratman et al., 2015b; Gatersleben & Andrews, 2013; Hamann & Ivtzan, 2016; Pasanen et al., 2018; Passmore & Holder, 2016; Richardson et al., 2018). Studies assessing the benefits of different types of natural environments (e.g., Bratman et al., 2015a), the relevance of environments' key features (e.g., Bratman et al., 2015b; Gatersleben & Andrews, 2013) and its link to expected outcomes and specific target audiences (e.g., Silva et al., 2018) were also indicated as a need. Regarding settings, Stigsdotter et al. (2017) stressed out the importance of more research on how specific urban environments can be beneficial for human health. The use of more adequate and comprehensive measurement instruments, including behavioral and physiological (e.g., Gatersleben & Andrews, 2013; Hinds, 2011; Pasanen et al., 2018; Passmore & Holder, 2016); and continuous and follow-up evaluation

to assess long-term effects (e.g., Bratman et al., 2015a; Hamann & Ivtzan, 2016; Hoag et al., 2013; Passmore & Holder 2016; Razani et al., 2018; Silva et al., 2018; van der Berg & Custers, 2011) were also highly recommended. Pasanen et al. (2018) reinforce the need of integrate qualitative approaches and Passmore and Holder (2016) the relevance of experimental studies. Bratman et al. (2015a) and Marselle et al. (2015) also highlighted the need of carefully designed experiments that allow for the isolation of effects (e.g., in a green exercise intervention, differentiate the effects of exercise and of being in nature. The role of participants' characteristics (e.g., Bratman et al., 2015a), seasonal effect (e.g., De Bloom et al., 2016), variations in frequency and type of nature experience (e.g., Bratman et al., 2015b), sex disparity (e.g., Richardson et al., 2018), and causal mechanisms (e.g., Bratman et al., 2015a), were recommended as topics for future research. Mutz et al. (2018) stressed that outdoor experiences should have a stronger integration in school curricula, and be more available for adolescents of disadvantageous backgrounds.

4. Discussion

4.1 Main findings.

Our review focused on studies that directly assessed the impact of nature in human well-being. Overall, the evidence provided by these studies strongly suggest that outdoor nature has a significant beneficial impact in human well-being, leading, for example, to improved mental health (e.g., Anderson et al., 2018; Bratman et al., 2015a; Bratman et al., 2015b; Gatersleben & Andrews, 2013; Hoag et al., 2013; Jeon et al., 2018; Pretty et al., 2007; Razani et al., 2018; Silva et al., 2018; South et al., 2018) and positive mood states (e.g., Anderson et al., 2018; Bratman et al., 2018; Gatersleben & Andrews, 2013; Hamann & Ivtzan, 2016; Hartig et al., 2003; Marselle et al., 2015; van der Berg & Custers, 2011; Stigsdotter et al., 2017; Passmore & Holder, 2016); lower levels of stress (e.g., Anderson et al., 2018; Mutz et al., 2018; Pasanen et al., 2018; Pretty et al., 2007; + & Housley, 2017), and

cortisol (e.g., Lee et al, 2009; Razani et al., 2018; van der Berg & Custers, 2011). Spending time in nature also seems to be relevant for a stronger connection and engagement with the natural world (e.g., Diessner et al., 2015, Passmore & Holder, 2016; Richardson et al., 2010), promoting the development of pro-environmental behaviors (e.g., Hinds, 2011), and of a higher perceived restorativeness (Pasanen et al., 2018; Stigsdotter et al., 2017). Thus, nature-derived benefits go beyond a direct impact in human well-being components', assuming a holistic impact of extreme importance in the so needed development of healthier and sustainable societies. It is important to highlight the studies undertaken by Anderson et al. (2018), Hinds (2011), and Silva et al. (2018) that reinforced the advantages of nature for vulnerable social groups (e.g., domestic violence victims, marginalized youth), reinforcing the importance of including nature as a resource in community intervention projects aiming participants' empowerment capacity to face adverse situations. Several nature experiences (e.g., green exercise, leisure) appear to be beneficial, especially if performed in group format, with a duration superior to 30 minutes, and in natural areas with little or no urban features. Natural areas with an appealing natural beauty, high biodiversity, and water features seem to be more effective in promoting human well-being.

4.2 Methodological strengths and weaknesses.

All studies were longitudinal and provided a crossover design or comparison between groups. Evaluation was performed at, at least, two moments – before and after the trial – with some studies also undertaking continuous and follow-up evaluation. Those factors increase the internal validity of the studies, but several methodological fragilities were identified.

The majority of the studies assessed the effects of occasional activities. There is a very reduced amount of data regarding continuous interventions and long-term follow-up evaluation. Even when follow-up evaluation is performed, the time span is not always suitable to verify long-term effects. Continuous evaluation is not a prevailing trend, which contribute for missing relevant information regarding effects and mediators.

From the participants perception, structured activities appear to have more benefits, including the reinforcement of the social support network, personal growth, and acquisition of new skills. However, the majority of the studies referred only to semi-structured activities. These activities comprise a high degree of uncertainty as the researcher is not present throughout the majority of the nature-based experiences, increasing the probability of missing important information or of faux reports by the participants.

As in other reviews (e.g., Bowler et al., 2010; Britton et al., 2018), we also corroborated that the description of the settings tends to be rather scarce or even inexistent. Little attention is giving to characterize the environment's biodiversity, vegetation coverage, degree of human presence or urban influence, among other features. For example, the term "urban park" comprehends a wide variety of settings that may be completely different. Some may be quite large, having spaces were the urban influence is reduced, others may possess water features and/or recreation facilities, while others may not. Without a proper description, it is quite difficult to understand features that enhance or mitigate benefits, and that can be important mediators. The lack of this information also reflects that important key issues are being overlooked by researchers. Although in the majority of cases we were able to classify the settings, it took a great effort, including online research to learn more about specific projects referred in some of the articles and have access to photos of the settings. It is important to provide a good description of the intervention's settings in order to allow the comparison of results between studies and to understand which settings are more prone to positively impact human well-being and why. In studies where the participants choose the setting in which the nature experience will take place, it is not clear if the natural settings selected by the participants are due to their preferences, what could lead to more significant positive results, or, for example, due to easier access/proximity, which can result in a weaker positive impact. As Bowler (2010) argued, the randomized placement of participants in different environments also eliminates the possibility of choice, which can culminate in a decrease of positive associations.

Biased procedures and/or results were also present. We identified three major sources of possible bias, transversal to the majority of the studies, namely geographical location, sample population, and high frequency of self-report measures.

4.2.1 Geographical location.

A clear predominance of higher latitudes (North America, specially USA, and Europe, specially UK) was observed. The human-nature relationship is quite complex, comprehending a continuous interaction between cultural and biotic systems (Gual & Norgaard, 2010; Seymour, 2016). As highlighted by Seymour (2016), the human-centered dimensions are determinant in the development of the relationships between individuals and communities with nature. Thus, this relatively narrow geographical provenance of data doesn't allow for the necessary cross-cultural understanding of the impact of nature on human well-being, and of how human-nature interaction occurs. As Gual and Norgaard (2010, p. 708) stated, "*we urgently need to understand the coevolutionary character of culture and nature and incorporate it into our technology and social organization*". Besides limiting a better understanding of cultural effects, bias towards higher latitudes can also be responsible for masking the effect of different ecosystems. In tropical regions there is a stronger concern with venomous animals and disease vectors, a characteristic that may cause different responses to spending time in nature (Keniger et al., 2013).

4.2.2 Sample population.

Most participants were female, with ages comprehended between 18 and 30 years old, and more nature-oriented than general population. In many cases, participants were volunteers recruited from Facebook groups (e.g., members of nature or Psychology-related groups), universities (e.g., students from Psychology courses), or green exercise programs, which may have led to self-selection bias. Again, the sample population characteristics

reduces the possibility of extending the findings to the general population and creates a knowledge gap that needs to be urgently addressed.

4.2.3 Self-report measures.

Participants' prior self-beliefs, specially taking into account the type of the participants described above, may have led to biased answers based on prior beliefs and not on the actual nature experience. The variability of instruments used to measure parameters as, for example, mental health, and those related with nature interaction (e.g., pro-environmental behaviour, levels of connection), didn't allowed for the performance of a meta-analysis. A greater consistency in evaluation methods and instruments is required to provide a stronger and more extendable set of data.

Besides the three mentioned possible sources of bias, researchers must also be very careful when explaining the study to enrolled participants, avoiding directing or influencing their opinion. In the study by Razani et al. (2018), after enrollment, participants received information about nature and well-being, including a list of benefits of spending time in nature. This could have led to a strong conditioning of the participants opinions and perceptions, and, consequently, to biased results.

4.3 Recommendations.

Despite the recommendations made in several reviews, some of which performed over eight years ago (e.g., Bowler et al., 2010), there are methodological fragilities and research needs that have not been properly addressed by researchers, continuing to be present in recent studies and identified in this review. It is quite important that researchers study available reviews, identifying ways to strengthen their studies and resulting evidence. Studies' recommendations are mainly focused on research methods, neglecting the important responsibility of the Academia in providing sound information and advices to

policy makers. This responsibility gains an increased relevance taking into account our planet's severe environmental degradation and resulting negative impacts in human well-being.

Therefore, special attention must be paid to ensure larger and diversified sample populations, interventions with a longer duration, follow-up evaluation to assess long-term effects, mixed-methods approach, and evaluate different environments and features. Recommendations to policy makers and practitioners (of social, environmental, and health areas, among others) sustained in good practices, reflecting the existing evidence about nature and human well-being, must be a priority.

Multidisciplinarity should also be a goal to achieve when researching the human-nature relationship, as it comprehends biological/ecological and human-centered dimensions. Thus, cooperation between biology/ecology and social sciences is essential to better establish a holistic overview of this relationship, including pathways, mediators, and effects, and to generate evidence that will benefit not only human well-being but also the conservation of our planet's natural ecosystem. This resulting symbiotic cycle is determinant for the development of sustainable societies where human well-being is perceived as directly linked with the planet's well-being and actions are taken to ensure both.

5. Conclusion

Nature-based structured interventions can have significant costs. Frequently, researchers need to perform their research in the most economical way possible, that can culminate in a series of low budget studies that present several fragilities (e.g., biased populations, predominance of urban nature environments, reduced time of intervention). Thus, caution is needed in interpreting and extrapolating the data. Nevertheless, the available evidence clearly points out to a positive impact of nature in human well-being, leading to a decrease of psychopathological symptoms, improvement in mood states and positive impact at physiological level. These evidences support the integration of nature-

based interventions at both individual and community levels, enriching and increasing the efficacy of social, health and educational programs/actions. Although there is a growing body of evidence, studies about the impact of nature in human well-being must go beyond methodological facilities, which tend to culminate in bias and weak results, and invest in well-designed continuous interventions, incorporating non-biased groups of participants and a thorough description of the intervention's conditions (e.g., settings, seasons), longitudinal and mixed-methods evaluation, including long-term follow-up.

Though there are still several gaps to fill, the existent evidence is sound enough to validate the integration of nature-based interventions in health and social practices. This would be beneficial not only for these specific fields, but also for nature conservation and public environmental awareness, being essential for the development of sustainable societies.

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Chapter 3

Domestic violence: the impact of a nature-based holistic development program on victims' well-being

Silva, A., Antunes, J., Peixoto, J., Gonçalves, M., Alves, F., Silva, J., Garrido, M., Matos, M. (2018). Domestic violence: the impact of a nature-based holistic development program on victims' well-being. *Ecopsychology*, *10*(3), 158-172. doi:10.1089/eco.2018.0019

Domestic Violence: The Impact of a Nature-based Holistic Development Programme on Victims' Well-being

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Abstract

Several studies have highlighted the benefits of nature for human well-being. Nevertheless, the incorporation of nature as an operative resource in social support processes of vulnerable groups such as domestic violence victims is not a common practice. The complexity and prevalence of domestic violence result in a growing need for innovative intervention modalities that can contribute to providing more effective support for victims. *Project CarryOn – Ecosystem services and their role in domestic violence victims' support processes* was developed to address that need as a nature-based holistic programme that allowed participants to benefit from direct contact with natural environments. The effectiveness of this programme in promoting the participants' well-being was assessed. It included a mixed-methods approach, which included self-report quantitative measures (e.g., life quality, psychological adjustment and self-esteem) and qualitative measures (e.g., women's perception of their programme participation). The results showed positive changes in all dimensions, with statistically significant improvements between the pre- and post-intervention evaluations, including overall life quality and psychological adjustment. The qualitative results also reinforced other benefits derived from the nature-based programme. This study highlights the importance of including nature-based activities as a complementary practice to the existing, more traditional approaches, reinforcing the role of nature as an effective resource in promoting domestic violence victims' well-being.

Keywords: domestic violence; victims; ecosystem services; wellbeing; nature; holistic development.

1. Introduction

Nature and human well-being are strongly linked (Millennium Ecosystem Assessment [MA], 2005). Providing a broad range of promotional, restorative and therapeutic benefits to mental health and human well-being, nature is seen as a highly effective, low-cost public health resource (Kaplan & Kaplan, 1989; Kaplan, 1995; Kuo, 2015; Maller et al., 2006; MA, 2005; Townsend & Weerasuriya, 2010; Wells, 2000). Nature benefits are related to physical, psychological, social and economic dimensions (Keniger, L.; Gaston, K.; Irvine, K.; Fuller, R., 2013), including promotion of self-empowerment (Hine, Wood, Barton, & Pretty, 2011), social interaction and connectedness (Maas et al., 2009; Pretty et al., 2007), self-esteem, performance improvement, diminution of stress symptoms (Hartig, Cooper & Marcus, 2006) and enhancing of mental fatigue recovery (Hartig, Evans, Jamner, Davis & Gärling, 2003). The presence of water (e.g., lakes, rivers, creeks, waterfalls, sea), forests and fields with different degrees of openness, biodiversity (reflected by the presence of wildlife and different species of plants), coast line and relevant aesthetic values are important characteristics that potentiate the beneficial impact of nature in human well-being (Hartig et al., 2003; Herzog & Chernick, 2000; Korpela & Hartig, 1996); Laumann et al., 2001; Pretty, 2004). In urban areas, the presence of parks that provide green and tree views and water features that promote the occurrence of different species of flora and fauna, is also very relevant (Townsend & Weerasuriya, 2010; Tyrväinen, L.; Ojala, A.; Korpela, K.; Lanki, T.; Tsunetsugu, D.; Kagawa, T., 2014).

Due to the benefits of nature, many advocates state that fields related to health and medicine as well as social intervention and management should adopt an integrated perspective by collaborating with fields such as ecology and urban planning (Frumkin, 2001). In a world where life is rapidly becoming urbanized, with more than 54% of the population living in urban areas (World Health Organization [WHO], 2016), this integrated vision is an increasing necessity. With the expansion of urban areas and their habits, contact with natural environments has suffered a strong decrease (Maller et al., 2006), which is predicted to have severe outcomes for individuals, communities and cultures (Pretty, Griffin, Sellens, & Pretty, 2003). However, even for urban dwellers, a preference

for natural environments still appears to persist (Pretty et al., 2003), perhaps reflecting an intrinsic love of nature rooted in our innate and evolutionary past, also known as biophilia (Wilson, 1984). Biophilia is now seen as a condition triggered by contact with nature, resulting from experiential and learning processes (Joye & De Block, 2011; Simaika & Samways; 2010; Zhang et al., 2014). Hence, an integrative management and intervention approach, a direct contact with nature and the development of meaningful nature-based experiences are requirements that need to be met to potentiate the individuals' and communities' access to the benefits of nature.

Though beneficial to all, nature is an important resource for vulnerable groups' (e.g., psychiatric patients, emotionally disturbed children and adolescents, patients with post-traumatic distress) mental health and well-being (Frumkin, 2001). It was within this framework of knowledge that *Project CarryOn – Ecosystem services and their role in domestic violence victims' support processes* was developed. This project aimed to promote the well-being of domestic violence (DV) victims through the development and implementation of a nature-based holistic development programme. Matos, Machado, Santos, and Machado (2012) reinforced the need for innovative and effective intervention modalities for DV victims. Addressing this need, this project, through a multidisciplinary approach, was characterized by the operational cooperation of several disciplines, especially ecology and psychology, and aimed to contribute to overcoming this still-persistent need, providing new intervention options. The project's team was composed by psychologists, with previous experience in working with DV victims, and biologists, with experience in the field of environmental education.

DV includes any form of physical and/or psychological behaviour that is non-accidental, inappropriate, and repeated (or not), in the context of a relationship of physical, emotional and/or psychological dependency by the victim and of trust and power (arbitrarily exercised) by the abuser living in the same household and that has a family or intimate relationship with the victim (Machado & Gonçalves, 2003; Magalhães, 2010). It is a multifaceted phenomenon that includes several types and forms of violence (e.g., physical, psychological, economic, social and sexual), as well as complex abusive dynamics of power (e.g., intimidation, threat, control, isolation, children instrumentalization) that

tend to increase in terms of frequency, severity and harmfulness (Matos & Machado, 2011). Similar to the worldwide situation, most DV victims in Portugal are women, and intimate partner violence (IPV) is the most prevalent DV crime occurrence (Ministry of Internal Administration, 2015). This situation leads to the interchangeable use of both terms, DV and IPV, and their common use to report on situations of violence against women (Rutherford, 2007; WHO, 2012).

Violence against women is widely recognized as a public health problem and a severe human rights violation of global proportions, affecting all sectors of society and constituting an obstacle to the achievement of equality, development and peace (United Nations, 1995; WHO, 2005). The victimization impact is felt in all the dimensions of the victims' lives, provoking a significant decrease of life quality; physical, psychological and social well-being; and negative outcomes in several spheres of society (e.g., economy, health and social services, law and justice, education; Matos & Machado, 2011). Even the victims' parenting skills and the quality of the mother-child relationship can be jeopardized in cases of severe and continuous exposure to violence (Matos & Machado, 2011).

The severe and multidimensional impact of DV, the symptoms displayed by the victims, and the already mentioned need for new intervention modalities resulted in DV victims being selected as Project CarryOn's target audience. Despite the use of the broader term — domestic violence — the prevalence of IPV within DV was also reflected in the project's adult participants who were women victims of violence, perpetrated by a current or past intimate partner.

In addition to incorporating the added value of integrating ecology and psychology and using nature as the cornerstone of the intervention programme, this project also implemented the intervention through a group format because of its advantages, including allowing the development of a sense of legitimacy, validation, common purpose and cohesion; overcoming isolation and alienation; reduction of feelings of stigmatization and strengthening of the social support network, the sharing of common experiences and coping methods, the victim's empowerment and generation of a feeling of hope, and having a positive impact on the victim's self-esteem and sense of self-efficacy (Machado, Santos & Machado, 2012; Meichenbaum, 1994, as cited in McBride, 2001).

This study aimed to assess the effectiveness of the project's nature-based holistic development programme in promoting DV victims' well-being and thus verify whether nature can serve as an important resource to the social support and recovery processes of DV victims. Additionally, it also aimed to verify whether there was an association between participants' individual characteristics (e.g., age, education level, and employment status) and the observed differences between the pre- and post- intervention moments.

2. Methodology

2.1 Procedures

Victim support agencies were invited to identify and forward participants (women victims of DV and their children) to voluntarily take part in the project's holistic development programme. The adult participants were selected according to an intentional process of convenience sampling. To adjust the participants' experiences and needs to the programme goals, as well as to ensure the accuracy and methodological objectivity for effectiveness assessment purposes, a set of selection criteria (inclusion and exclusion) were defined (*Table 1*).

Table 1. *Criteria applied to the selection of adult participants.*

Inclusion criteria	<ul style="list-style-type: none"> (i) State of the violent intimate partner relationship: currently in the abusive relationship or having left it in a period not greater than 6 months, liable to be extended to 12 months in case of the persistence of victimization symptoms; (ii) Age: 18 – 65 years old (flexible criterion); (iii) Women with or without children; (iv) Current level of risk: low to moderate; (v) Receiving psychological and/or psychosocial support for at least two months.
Exclusion Criteria	<ul style="list-style-type: none"> (i) Evidence of severe psychopathological condition (e.g., psychotic disorders, major depression); (ii) Severe indication of suicidal ideation and behaviour; (iii) Problems associated with substance abuse; (iv) Severe physical health conditions (e.g., morbid obesity, severe diabetes, epilepsy, severe mobility limitations).

Face-to-face semi-structured interviews were performed individually, focusing on four topics: I) demographic and socioeconomic data; II) social and community functioning; III) individual functioning and adjustment; and IV) family and maternal functioning. Two psychological evaluation instruments were also applied: the *Brief Symptom Inventory* (BSI; Canavarro, 2007) to evaluate the victims' psychological adjustment and the *Inventory of Marital Violence* (Machado et al., 2008). The evaluation process was conducted by two female master psychologists on *Project CarryOn's* team who had prior experience with victims of DV and the application of self-report questionnaires and qualitative interviews.

Data collection occurred between April and November of 2015. The selected participants were integrated in a holistic development programme that comprised activities performed in natural (not constructed or deeply moulded by humans, such as wild forests) and naturalized areas (spaces with a strong anthropogenic influence, including urban parks and public gardens). Taking into account the project's global number of participants (101 – 52 women victims of DV and 49 children), four groups were created. Over a period of three months, each group had access to six full days of different activities based on different intervention strategies and implementations methods.

All days had the same general structure: welcoming the participants, briefing, relaxation time (*My 15 minutes* – breathing and stretching exercises), morning activities, lunch, afternoon activities, group dialogue (*Ark of emotions* – moment of reflection about the day), and debriefing. The participant's travels and meals were covered by the project as well as the required safety measures at the meeting points. *Table 2* provides an overview of each of the six days of the programme and the main objectives.

This research was approved by the University of Minho Life and Health Sciences Ethics Commission and by the Portuguese Data Protection Authority (CNPD).

Table 2. *Nature-based holistic development programme daily overview.*

Nature-based Holistic Development Programme Objectives
Day 1: Social dimension Establish the group as a space with rights and duties and as a safe, supportive space of sharing and learning; Reduce social isolation, promoting a sense of belonging and social cohesion; Increase the repertoire of personal, relational and social competences; Promote the development of healthy and egalitarian interpersonal relationships. <u>Settings:</u> Urban park <u>Activities:</u> The cobweb Narrative (icebreaker activity) Game of values Narrative, educational game Laughter Yoga Therapeutic
Day 2: Physical dimension Promote a sense of physical well-being and global satisfaction, envisioning Nature as a serene and relaxing setting; Reduce stress levels, relieve feelings of anxiety and restlessness; Encourage the adoption of sustainable and healthier life habits. <u>Settings:</u> Protected area – national park <u>Activities:</u> Sounds of Nature Educational game Animalia Educational game Zoo-gymkhana Educational game Body and mind – Zumba (dance-based workout) Therapeutic Body and mind – Pilates Therapeutic
Day 3: Affective and emotional dimensions Promote self-knowledge and self-perception as pillars for personal growth; Promote personal appreciation and self-esteem, mobilizing the voices of competence and enhancing the qualities of the self; Strengthen the mother-child bond, promoting playful and affective mother/child interactions. <u>Settings:</u> Natural area (with a lake and a river beach, waterfall, forest, trails and a recovered rural village) <u>Activities:</u> Photo-moments Narrative Discovering the treasures of Nature: Seed Odyssey and Tree Wisdom Narrative and experimental Discovering the treasures of Nature: Sources of Light Narrative and experimental Body and mind – Ki-move and Do-in Therapeutic

Table 2. (cont.)

Nature-based Holistic Development Programme Objectives
<p>Day 4: Spiritual dimension</p> <p>Reinforce introspection and self-reflection capacities; Promote inner peace; Strengthen bond with Nature.</p> <p><u>Settings:</u> Beach</p> <p><u>Activities:</u> Lenses of future Narrative Exploring the intertidal zone Experimental The strength of the ocean Narrative Learning more: visits to a Centre for Environmental Monitoring and Interpretation and an <i>Acqua Museum</i> Body and mind – Ki-move and Do-in Therapeutic</p>
<p>Day 5: Cognitive dimension</p> <p>Improve attention/concentration and memory capacities; Enhance individual communication and language skills; Reinforce problem-solving and decision-making skills; Increase knowledge regarding natural ecosystems;</p> <p><u>Settings:</u> Protected area – national park</p> <p><u>Activities:</u> Eco scavenger hunt Experimental Self-care moments with Nature (natural cosmetic; medicinal plants) Experimental and therapeutic Body and mind – Zumba (dance-based workout) Therapeutic</p>
<p>Day 6: Cultural dimension</p> <p>Encourage the adoption of recreation and leisure habits that contribute to individual and social well-being; Strengthen the sense of sociocultural identity; Promote the inclusion of cultural expressions in daily living.</p> <p><u>Settings:</u> Monastery of S. Martinho de Tibães (including the exterior grounds: gardens, farmlands and woods)</p> <p><u>Activities:</u> Monastery of S. Martinho de Tibães – a special tour Experimental A garden of flavors (aromatic and medicinal plants) Experimental Nature Diary Artistic Body and mind – Zumba (dance-based workout) Therapeutic Memories Corner Narrative</p>

2.2 Instruments

Considering that a mixed-methods approach allows access to information that the application of only one of the methods would not provide (Sells, Smith, & Sprenkle, 1995), quantitative and qualitative instruments were applied to collect the required data.

For the participants' screening, a set of instruments was used, namely:

The *Risk Checklist* assesses the level of risk to which participants were exposed. It was adapted by the Project CarryOn technical team from the *Victims Domestic Abuse, Stalking and Harassment and Honor Based Violence (V-DASH, 2010) Risk Identification Checklist* (Richards, 2010) and from the *Spousal Assault Risk Assessment (SARA: PV; Kropp, Hart, Webster & Eaves, 1995; Almeida & Soeiro, 2010)*;

The *Inventory of Marital Violence* (Machado, Matos, & Gonçalves, 2008) provides typifies the forms of violence (practised and received) in intimate relationships and their frequency (never, once and more than once). It consists of 21 items (abusive behaviours) and has two subscales that correspond to the dimensions of physical and emotional abuse. This instrument was developed for the Portuguese population and its analysis is made based on the frequency of abusive behaviours;

The *Brief Symptom Inventory* (BSI; Canavarro, 2007) evaluates the victims' psychological adjustment, in nine dimensions of symptomatology concerning emotional disturbance, representing different aspects of psychopathology. BSI is a self-report inventory consisting of 53 items, in which the individual classifies the degree to which each problem or symptom affected him during the last week using a Likert scale with 5 points (ranging from 0 – “not at all” – to 4 – “extremely”).

To perform the quantitative assessment of the program's effectiveness (pre- and post-intervention) in the participants' well-being, the following self-report quantitative instruments, validated for the Portuguese population, were used:

The *World Health Organization Quality of Life* (WHOQOL-BREF; Portuguese version by Canavarro et al., 2007) assesses an adult's life quality in its different domains (physical and psychological health, social relationships and environment). Overall life quality is also assessed through two questions: one regarding the overall life quality – “*How would you rate your quality of life?*” – and other on overall health perception or satisfaction with health – “*How are you satisfied with your health?*”. WHOQOL-BREF has 26 items which are formulated to four scales of answers, in a five-point Likert-type scale;

The *Outcome Questionnaire* ([OQ-45.2]; Lambert & Burlingame, 1996; Portuguese version by Machado & Fassnacht, 2014) measures three subscales of individual functioning:

1) symptom distress (depression and anxiety); 2) interpersonal relationships (loneliness, conflict with others and marriage and family difficulties); and 3) social role (difficulties in the workplace, school and home duties), assessing general wellness or psychological discomfort. It has 45 items that can be answered through a five-point Likert-type scale (never, rarely, sometimes, often, and always). The total score can range from 0 to 180. Any individual whose total score lies between 0 and 62 reveals no relevant clinical symptomatology. A clinically significant change from OQ-45 is achieved when there is a difference higher than 15 points between two assessments;

The *Rosenberg Self-Esteem Scale* (RSES; Rosenberg, 1965; Portuguese version by Santos, 2008) measures overall self-worth through the evaluation of positive and negative feelings about the self. It's a 10 item Likert-type scale that presents a four-point scale (strongly disagree, disagree, agree, strongly agree). Total scores range from 10 to 40, with higher results showing higher levels of self-esteem;

The *Nature Relatedness Scale* (NRS; Nisbet et al., 2009, translated by the project's CarryOn team, 2015): assesses the individual's connection with nature, regarding the cognitive, affective, and experiential aspects. It encompasses three dimensions: NR-Self, that represents the internalized identification with nature, the NR-Perspective, that assesses the external nature-related worldview, and the NR-Experience, that reports to the physical familiarity established with the natural world. It's a 21 items Lykert-type scale, presenting a five-point scale (disagree strongly, disagree a little, neither agree or disagree, agree a little, agree strongly). Higher scores indicate a stronger connectedness with nature.

Due to the importance of the participants' points of view and perception regarding the lived experience, a qualitative instrument was also applied on the last day of the holistic development programme. This instrument, *Memories Corner*, was introduced as an individual moment, giving participants the opportunity to characterize what they have experienced in their own terms and through their own voices (Coyle, 2007). It consisted of a semi-structured individual interview that focused on three key points: i) what they liked the most about the project, ii) identifying the most memorable day or moment, and iii) a word that, for them, represented the meaning of the experience. The interviewer had ensured all the participants addressed the key points. The interviews were conducted by one of the project's (female) psychologists.

2.3 Data analysis

Quantitative evaluation of the impact of the programme was performed through a quasi-experimental and intrasubject design, in two moments: pre- and post-intervention. All the assumptions of the statistical tests were verified and, when they were not fulfilled, namely relatedly to the normality distribution, we applied the Fife-Schaw (2006) recommendation: when non-parametric and parametric tests provide similar results, the latter should be selected. So, the paired t-test results were used to analyse the differences between the pre- and post-intervention moments regarding all evaluated dimensions.

The Pearson, Spearman and point-biserial correlation coefficients were calculated to verify possible association between some participants' characteristics and all quantitative measures. IBM® SPSS® Statistics (Statistical Package for Social Sciences, 22.0) was used to perform the required statistical analyses.

The qualitative analysis of the information obtained through the *Memories Corner* followed an inductive approach through the thematic content analysis method, which is based on the grounded theory, i.e., when analysing the interview transcripts, the identified themes and categories arose from the data itself and not a predetermined framework, as it occurs in deductive approaches (Anderson, 2010; Burnard, Gill, Stewart, Treasure & Chadwick, 2008; Clarke & Braun, 2007, Chapter 6; Coyle, 2007, Chapter 2; Payne, 2007, Chapter 8). The first stage of the data analysis corresponded to the transcript (*verbatim*) of the interviews. Second, the transcripts were carefully read, and an open coding process occurred, allowing the identification of summary statements and key words for each element present in the transcripts. After the elimination of duplicates, a list of categories was established. Next, the information was again analysed to allow the grouping of overlapping categories, leading to the compilation of the final list to which the information in the transcripts was allocated. This process was independently performed by two researchers to minimize individual researcher bias, to help ensure reliability and to provide wider insights into the categories' development (Anderson, 2010; Burnard et al., 2008). When completed, the two analyses were compared, and special attention was given to divergent cases (different or unique categorization cases). Those cases led to a new analysis

of the transcripts and improvement of the categories list (Anderson, 2010; Burnard et al., 2008).

2.4 Participants

In total, 76 women were recommended and, after screening by the project's technical team, 52 were accepted as participants. Of these, 32 fulfilled all the evaluation requirements and were integrated in the effectiveness evaluation study. Those participants, who were between 21 and 66 years old ($M = 43.47$; $SD = 10.93$), are described in *Table 3*.

Table 3. Sociodemographic and forms of violence experienced by the participants. These data were collected through the application of the following instruments: face-to-face, semi-structured interviews ⁽¹⁾, Risk Checklist ⁽²⁾ and Inventory of Marital Violence ⁽³⁾.

	<i>n</i>	%
Education level¹		
Elementary school (1 st – 4 th grades)	10	31.3
Middle school (5 th – 9 th grades)	18	56.3
Secondary school (10 th – 12 th grades)	4	12.5
Employment status¹		
Employed	14	43.8
Unemployed	11	34.4
Retired	7	21.9
Socio-economic level¹		
Lower middle	3	9.38
Low	29	90.6
Marital status (at the time of the offenses)¹		
Single	1	3.10
Married (including common-law relationships)	31	96.9
Marital status (at the time of data collection)¹		
Single	4	12.5
Married (including common-law relationships)	7	21.9
Divorced or separated	21	65.6

* These categories are not mutually exclusive.

Table 3. (cont.)

	<i>n</i>	%
Abusive intimate relationship status^{1*}		
Currently in the relationship	10	31.3
No longer in the relationship	22	68.8
Current level of violence risk²		
Moderate	14	43.8
Low	18	56.3
Forms of violence experienced (last 12 months)^{3*}		
Physical	24	75
Psychological	27	85

* These categories are not mutually exclusive.

Relative to emotional well-being and with the exception of three dimensions — obsessive-compulsive, hostility, phobic anxiety — and the positive symptom total index, when compared to the general population, our sample presented significantly higher values in the BSI dimensions and levels of distress. The data presented in *Table 4* indicate that this sample suffered from emotional distress, presenting clinical symptoms of psychological disturbance since the PSDI value was superior to 1.7 (cutoff point indicated by Canavarro, 2007).

Table 4. Psychopathological symptoms displayed by the sample population, in comparison with the reference values for the general population.

	General population (Canavarro, 2007)		Sample (<i>n</i> = 32)		<i>t</i>	95%CI [LL,UL]
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
BSI dimensions						
Somatization	0.57	0.92	1.05	0.784	3.43**	[.19,.76]
Obsessive-compulsive	1.29	0.88	1.25	0.780	-.29	[-.32,.24]
Interpersonal sensitivity	0.96	0.73	1.32	0.896	2.27*	[.04,.68]
Depression	0.89	0.72	1.46	0.871	3.69**	[.25,.88]
Anxiety	0.94	0.77	1.33	0.881	2.53*	[.08,.71]
Hostility	0.89	0.78	0.84	0.560	-.53	[-.25,.15]
Phobic anxiety	0.42	0.66	0.63	0.733	1.63	[.05,.48]
Paranoid ideation	1.06	0.79	1.61	0.769	4.07***	[.28,.83]
Psychoticism	0.67	0.61	1.04	0.934	2.22*	[.03,.71]
BSI Indices of Distress						
GSI	0.84	0.48	1.17	0.633	2.96*	[.11,.56]
PSTI	27.0	11.7	28.9	11.3	.97	[-2.13,6.01]
PSDI	1.56	0.39	2.07	0.524	5.54***	[.32,.71]

Notes. BSI – Brief Symptom Inventory; GSI – Global severity index; PST – Positive symptoms total index; PSDI – Positive symptom distress index; CI – Confidence Interval; LL – lower limit; UL – Upper limit

p* < .05; ** *p* < .01; **p* < .001

3. Results

3.1 Quantitative Results

Through the analyses of the results presented in *Table 5*, it is possible to verify that several positive changes, many of them statistically significant, were verified between the pre- and post-intervention period. A general tendency of improvement was verified in all the assessed domains for overall life quality (WHOQOL-BREF), psychological adjustment (OQ-45.2) and individual self-esteem (RSES). The participant's connection with nature (NRS) was also strengthened in its various dimensions. After the programme, a statistically significant increase in the participants' overall life quality was verified ($t(31) = -3.098$, $p = .004$, $d = .62$). In fact, all the domains assessed in the WHOQOL showed a tendency toward improvement.

There was a statistically significant decrease in the OQ-45.2 total score after the conclusion of the programme, ($t(31) = 3.749$, $p = .001$, $d = -.42$). In post intervention moment, participants scored above the cut-off point in total score and in the three subscales of the instrument – symptom distress, interpersonal relationships and social role.

The participants' perception of their self-worth also showed significant improvement ($t(31) = -2.853$, $p = .008$, $d = .337$), with the RSES showing a total score that is higher in the post-intervention moment.

Improvements on the overall score of NRS and in all the assessed domains also occurred, being the improvements verified in the NR-self domain, reflecting the sense of connectedness and feelings of oneness with nature (statistically significant ($t(31) = -2.229$, $p = .033$, $d = .423$).

In pre- and post-intervention only age and employment status presented significant correlations with quantitative measures. Age presented a negative significant correlation with the verified improvements on overall self-worth ($r = -.401$, $p = .023$), meaning that younger participants presented a higher increase in the perception of their self-worth when compared to older participants. A negative significant correlation also occurred between employment status and overall life quality improvements ($r_{pb} = -.357$, $p = .045$). These

correlations indicate that when compared to employed and retired participants, unemployed participants presented higher improvements in overall life quality.

Table 5. Comparison of the results obtained for the applied quantitative self-report instruments regarding both temporal moments in the analysis: pre- and post-intervention.

	Pre-Intervention			Post-Intervention			t(31)	Cohen's d
	M	SD	α	M	SD	α		
WHOQOL-BREF								
Physical health	62.6	18.9	.76	70.8	15.3	.72	-3.44**	.48
Psychological health	59.8	17.6	.77	69.8	14.9	.84	-4.02***	.61
Social relationships	54.7	26.3	.81	60.4	19.1	.48	3.98	.25
Environment	55.4	11.9	.58	63.0	11.6	.68	-3.50**	.65
Overall quality of life	66.5	22.1	.88	78.1	14.9	.86	-3.10**	.62
OQ-45.2								
Symptom distress	37.6	15.8	.91	31.8	17.4	.93	3.79**	-.35
Interpersonal relationships	15.3	6.57	.66	13.1	4.61	.47	2.02*	-.39
Social role	11.5	4.92	.56	9.50	5.56	.76	3.64**	-.38
Total score	64.4	23.2	.91	54.3	25.1	.93	3.75**	-.49
RSES								
Positive items	15.3	2.54	.81	15.7	2.58	.31	-1.05	.16
Negative items	13.3	3.92	.87	14.8	4.16	.89	-1.92	.37
Total score	28.6	5.70	.88	30.5	5.59	.76	-2.85**	.34
NRS								
NR-self	4.08	.583	.593	4.31	.504	.606	-2.23*	.423
NR-perspective	3.56	.733	.491	3.67	.595	.448	-.702	.165
NR-experience	3.87	.758	.111	3.98	.680	.082	-.731	.153
Total score	3.84	.488	.636	3.99	.394	.696	-1.33	.338

Note: WHOQOL-BREF – World Health Organization Quality of Life; [OQ-45.2] – Outcome Questionnaire; RSES – Rosenberg Self-Esteem Scale; NRS – Nature Relatedness Scale.

* $p < .05$; ** $p < .01$; *** $p < .001$

3.2 Qualitative Results

The interviews provided relevant information regarding perceptions about participation in Project CarryOn's programme. The data analysis allowed the establishment of nine categories which are generally congruent with the above quantitative results concerning the dimensions of overall life quality: positive feelings, social support network, discovery and learning, personal development, liberation, mother-child interaction, body and mind activities, settings and, finally, freedom and security.

Positive feelings

All the participants were pleased with the experience and pointed out several positive aspects (cf. Table 6):

"Zumba, the games we played and the environment itself" (Participant 7);

"The interaction with my colleagues and the peace I have found"
(Participant 2);

"I've enjoyed being with my children and seeing new places" (Participant 5);

"I've loved all the details, all the places that were carefully chosen"
(Participant 10);

"The union and the conviviality with all of you." (Participant 27)

Social support network

Most women reported that participation in the activities was a source of happiness and a sense of general well-being, pointing out that group cohesion and posture, including participants and technicians, were the most important factors, generating a strong sense of companionship and a stronger social support network:

"(...) the friendship and care, the fact that I'm not alone, that I have good people in whom I can trust (...)" (Participant 19)

Discovery and learning

Discovering new places and learning about nature new ways of interpreting and processing life situations were also listed by many participants as strong points:

“I’ve learned to cope with some situations in a different way. I’ve learned to breathe first and then answer. Each day I learned something new.”

(Participant 15)

Personal development

Several personal development aspects were also mentioned by participants, including not only a renewed strength and improved self-esteem but also physical and psychological improvements. One participant gave an extensive testimony that portrays the impact of the intervention in her life, with a strong focus on personal development:

“I’ve been through this (domestic violence) experience twice, and this is the first time I’m in a project like this, and all I’ve learned here will stay (...) things were more internalized because they were experienced in a different way. I even had my son with me, which meant a lot to me because the problem I had with his father affected him (...) and this project helped him a lot. And to me, even much more! (...) What I will remember are all the little moments, which were kept inside, and I learned so much and today, at the end of all these sessions, I can manage my life in a different way. (...) I feel like another person, another woman, totally different. For example, something I could not do until now was driving. I did not drive for nearly 15 years and, after my stroke, I completely stopped driving. After all of this, I do not know where I gathered the strength, but I did, from you, from all the people that helped me, from all the activities... today I drove and got into my car without fear. (...) This project gave me this: the strength to be a new woman.” (Participant 10)

Liberation

The sense of liberation and letting go of negative feelings was also clear in many of the testimonies:

“I forgot all the bad things I had experienced and remembered the good things” (Participant 2)

Mother-child interaction

Many of the participants, whose children also participated, stated that there was an extremely relevant and positive aspect:

“Getting closer to my daughter...that was good! I think it was the best outcome: the bonding between me and my daughter. I think that was lacking in our lives.” (Participant 11)

Body and mind activities

The performed activities, many of which specifically mentioned by several participants as their favourite moment, were also important and strongly enhanced the empowerment-leading processes:

“The activity I liked the most was, without a doubt, Zumba. A person cheers you up and gives us that strength to not stop... exceptional (...)” (Participant 16)

Settings

The settings where the activities occurred were also a relevant differential factor, with many participants pointing out the aesthetic and spiritual characteristics as aspects of great significance:

“I liked where we are today because it gives us a lot of peace (...)” (Participant 15)

Freedom and security

The sense of freedom and security was also mentioned as an important feature of the intervention:

“I’m always a little bit concerned (...) but now I’m not (...) the three of us are free.” (Participant 8)

Table 6. *Categories of the participants’ individual interviews analysis.*

Categories	Illustrative quotes
1) Positive feelings (<i>n</i> = 22) Joy and happiness, liveliness, sense of belonging; general sense of well-being.	“(...) I feel such as a child. I feel well.” (participant 1); “We feel happy and, at the same time, young! It is wonderful!” (Participant 26)
2) Social support network (<i>n</i> = 19) Companionship, familiarity, conviviality, friendship, care and support, trust, union.	“... the friendship and care, the fact that I’m not alone, that I have good people in whom I can trust (...)” (participant 19); “I like all (...) and now they are all my friends and I’m happy.” (participant 21); “The union among all. We felt like a family.” (Participant 28)
3) Discovery and learning (<i>n</i> = 11) Learning about nature, animal and plant species; discovering new places; learning new activities (e.g., games, physical activities); learning new ways of coping and perceiving life situations.	“I’ve learned to cope with some situations in a different way. I’ve learned to breathe first and then answer. Each day I learned something new.” (participant 15); “Now I find myself thinking about many things we’ve learned (...) You’ve taught us to think differently.” (participant 18); “I’ve enjoyed the ocean (...) discovering all those animals (...)” (Participant 20)
4) Personal development (<i>n</i> = 11) Physical and psychological health improvements. Empowerment; improved self-efficacy, self-esteem and coping skills; renewed personal strength.	“(...) in this project, I felt a more consistent strength. I feel like another person, another completely different woman! (...) This project gave me the strength to be a new woman!” (Participant 10); “I was really low... But now I feel a different self-esteem (...) Much, much different. I feel better, without a doubt.” (participant 16); “(the project) was really good for me. I’ve stopped taking my medication (...) I’m much better at everything, health, psychologically, everything. I never thought I would overcome this.” (Participant 17)

Note. Below each category is a brief list of the main items that take into account the participants’ answers.

Table 6. (cont.)

Categories	Illustrative quotes
<p>5) Liberation (<i>n</i> = 9) Letting go of negative and/or repressed feelings and past painful situations; sense of relief; overcoming some insecurities and fears; feeling liberated.</p>	<p>“I forgot all the bad things I had experienced and remembered the good things” (Participant 2); “The spiritual day was important to me because there were many things I wanted to leave behind that were kept inside. Additionally, for me, that liberation was a big help (...) I never thought it would make me feel like I did.” (Participant 10); “The day at the beach. I liked being there, throwing that stone (...) I felt an immense joy, a sense of liberation... I have not felt like that in a long time.” (Participant 29)</p>
<p>6) Mother-child interaction (<i>n</i> = 9) Sharing the experience with their children; relationship improvements; benefits to their children.</p>	<p>“Getting closer to my daughter, that was good; I think it was the best outcome: the bonding between me and my daughter. I think that was lacking in our lives.” (Participant 11); “My son is a child that, in school, does not interact much (...) but in CarryOn, he was always ready to go (...) (in CarryOn) is a boy who interacts, plays, talks, and he also has good and bad moments, but regarding socialization, this project was good for him.” (Participant 12)</p>
<p>7) Body and mind activities (<i>n</i> = 8) Zumba, dancing, relaxation exercises, laughter yoga, walking in nature, team games.</p>	<p>“(I liked) Zumba, the games we played and the environment itself.” (participant 7); “The activity I liked the most was, without a doubt, Zumba. A person cheers you up and gives us that strength to not stop... exceptional (...)” (Participant 16); “I really liked to walk outdoors (...) of nature... everything was part of me.” (Participant 18)</p>

Note. Below each category is a brief list of the main items that take into account the participants' answers.

Table 6. (cont.)

Categories	Illustrative quotes
8) Settings (<i>n</i> = 8) Aesthetic aspects; peacefulness; natural features	"I liked the company, the project was wonderful, the places I will never forget." (participant 1); "I liked where we are today because it gives us a lot of peace (...)" (Participant 15)
9) Freedom and security (<i>n</i> = 7) Freedom to be themselves without fear of judgement; safe refuge (the group and natural settings); no concerns with their safety as they feel completely secure (when participating in the activities).	"I'm always a little bit concerned (...) but now I'm not (...) the three of us are free." (Participant 8); "Zumba made me feel joy, liberation, a freedom of being able to act without anyone judging whether I was doing it correctly." (Participant 12)

Note. Below each category is a brief list of the main items that take into account the participants' answers.

4. Discussion

There is already broad knowledge regarding the benefits of nature for mental health and general well-being (Kaplan & Kaplan, 1989; Kaplan, 1995; Kuo, 2015; MA, 2005; Maller et al., 2006; Townsend & Weerasuriya, 2010; Wells, 2000). Despite this knowledge, the incorporation of nature as an important promotional, therapeutic and restorative resource is still scarce (Maller et al., 2006; Silva et al., 2016).

Social support, health and medical care institutions, taking into account the needs of their users, are among those to whom nature could be a valuable resource. Regarding many social issues such as DV, there is still a lack of innovative and effective answers (Matos et al., 2012). CarryOn was a pioneer project that integrated the existing knowledge regarding the role of nature in human well-being and the multidisciplinary benefits of associating ecology with psychology to structure and implement a holistic development programme strongly grounded on ecosystem services, especially cultural ecosystem services. Hence, the main goal of this study was to ascertain the effectiveness of a nature-based holistic development programme in promoting DV victims' well-being.

Due to the possibility of the occurrence of life events that could have a strong impact on the participants' well-being, continuous and close contact with the participant's

social support technicians was maintained. Together with the information provided by the participants themselves, this close contact allowed timely verification of whether such events occurred. Regarding our sample, during the holistic development programme implementation time, no long-term and emotional significant situations aside from the programme itself were reported. In addition to the programme, none of the participants experienced other changes in their social support process. Therefore, during the time of the program's implementation, the only major difference and innovative factor in the victims' support process was Project CarryOn.

Overall, the results reveal several positive changes in the participants between the pre- and post-intervention moments. Significant improvements were found regarding overall life quality, psychological adjustment and self-esteem. The verified improvements on overall dimensions and specific domains show that after the intervention, the participants presented higher levels of psychological, physical and social well-being. It is important to note that before the intervention, regarding psychological adjustment, our sample presented total scores above the cut-off value (62, as indicated by Machado & Fassnacht, 2014), presenting a clinically relevant psychological condition. After the intervention, this condition no longer occurred and the OQ 45.2 total scores lowered to values below the cut-off. Thus, after the intervention, the sample psychological adjustment values corresponded to those of the general population, as indicated by Machado and Fassnacht (2014).

The participants also highlighted key features that should be present in these types of programmes, including:

- Group format: the establishment of a cohesive and trustworthy group was one of the most important factors that allowed participants to feel supported, to develop a sense of belonging, not to be concerned with judgement and to enjoy participation in the project. As noted by Maller et al. (2008), the realization of nature-based activities in a group format also proved to be an effective way to promote the participant's social capital, increasing their social network, a sense of trust and security, and the development of some pro-environmental norms within the group.

- The integration of educational activities, including gaining new knowledge — everyday practical issues, recreational activities and games, scientific knowledge, new ways of perceiving and interacting with the surrounding environment — acquiring new skills and having the opportunity to recognize that each individual can give important contributions to the group (and to society) by sharing personal experiences and knowledge were essential to promoting key features of well-being such as self-esteem and sound social integration.
- The activities and the discovery of new places proved to be quite important for strengthening the participants' voice and their will to socially express themselves, providing interesting experiences to share with their friends, families and acquaintances. The sense of achievement provided by successful completion of the activities also triggered positive feelings, contributing to the participants' self-esteem and providing an excellent opportunity to strengthen group cohesion and supportive interaction.
- The opportunity to participate with their children: the inclusion of the children constituted, in many cases, a determining factor for the mothers' participation and well-being;
- The integration of body and mind activities strongly contributed to physical and mental health. For most participants, those activities were also a new and positive experience that they were willing to repeat;
- Appealing natural settings, i.e., the performance of the activities in natural settings, conveyed a sense of peacefulness and contentment and provided spiritual and aesthetic benefits, which was one of the main foundations of this nature-based programme.

The results strengthened the restorative potential of nature and reinforce the added value of the association between ecology and psychology, as stressed by Roszak et al. (1995) and Clinebell (1996), who emphasize the relevance of ecopsychology and ecotherapy, respectively. The benefits derived from participating in the nature-based

holistic development programme are in line with the already existing body of scientific knowledge. Thus, the importance of nature highlighted by previous studies (e.g., Hartig et al., 2003; Hartig et al., 2006; Hine, Wood, Barton, & Pretty, 2011; Kaplan & Kaplan, 1989; Kuo, 2015; Maas et al., 2009; Maller et al., 2006; Pretty et al., 2007; Townsend & Weerasuriya, 2010; Wells, 2000) regarding different settings and target audiences is also clear for DV victims' integral well-being. As an integral part of DV victims' social support process, nature can be seen as a catalyst in their recovery, allowing them to fully explore their lives and to overcome the focus on victimization.

The qualitative data also allowed concluding that the inclusion of physical activities in the nature-based holistic development programme was very important. Those results support the findings of several studies that report the beneficial effects of physical activity on mental health, including better general and health-related quality of life, better functional capacity and better mood states (Penedo & Dahan, 2005; Rimmele et al., 2009). As Pretty et al. (2005) suggested, exercising in pleasant environments (e.g., green, natural areas) may have greater benefits than to do it in less attractive settings. Activities such as zumba are able to engage and motivate people, leading to health benefits that reflect in overall physical and psychological well-being (Delextrat, Warner, Graham, & Neupert, 2016; Vendramin et al., 2016).

Due to the fact that a high nature relatedness is typically associated with greater happiness and environmental concern and that a growing distancing from nature can have negative consequences for both human and environmental health (Nisbet & Zelenski, 2013), the participants' nature relatedness was also assessed. Though there is no validated instrument to assess individuals' connection with nature for the Portuguese population, we believed it was important to verify if participating in a nature-based program would contribute to its increase. The Nature Relatedness Scale (NRS) was the instrument selected to make this assessment. Nature relatedness is a broad concept that comprises several facets of human-nature relationship, including emotional and experiential aspects, and the understanding of the existing connection between humans and all other living things (Nisbet & Zelenski, 2013). The verified improvement in the nature relatedness of our

participants is in accordance with the previously mentioned positive changes in well-being dimensions.

A higher increase in self-esteem was observed in younger participants, while unemployed participants revealed greater improvements in their overall life quality. Nevertheless, and despite the fact that these results may be important to help adapt the activities to participants' specific characteristics, it is important to note that the correlation between characteristics and changes requires more research. The fact that the assessment of possible correlations between changes and participants' characteristics in this study was not a main goal led to evaluation limitations, including the fact that there was no verification of the meaning of the characteristics in the participants' lives and well-being (e.g., does being unemployed have an impact in participant A's self-esteem? What type of impact does it have?). Not knowing the specific meaning (or impact) of each analysed characteristic in the participants' lives and well-being may misdirect the interpretation of the results. Therefore, the results derived from the correlation tests should be used as exploratory data to direct further research regarding individual characteristics that may have a significant role in the participants' changes through time and relevance in the intervention's planning.

4.1 Strengths and Limitations

The results of this study must be analysed taking into account some limitations, including the use of self-report measures, a cross-sectional design of data collection (performed in two sets: pre- and post-intervention) and the lack of a control group. As highlighted by other researchers (e.g., Hansen, Eriksen, & Elklit, 2014), assigning DV victims to a control group where they would have to go through all the evaluation steps without benefiting from the intervention itself poses a serious ethical question. In fact, none of the professionals responsible for the participants' social support process and participating psychologists chose to subject the victims to evaluation procedures without allowing them access to the intervention programme.

It is also important to note that all instruments, with the exception of the NRS, in both pre- and post-intervention moments presented an overall Cronbach's alpha (α) superior to .7, showing good internal consistency. NRS Cronbach's alpha, though below .7, was still above .6 and, hence, still between the limits of acceptability (Hair, Black, Babin & Anderson, 2014). Although the overall values of Cronbach's alpha reflect good or acceptable internal consistency, some of the different assessed domains presented values below the levels of acceptance. Taking into account that Cronbach's alpha may present low values even for valid tests (Zaiontz, 2013), these low values do not invalidate the instruments and, specifically, the results regarding those domains but prescribes caution when interpreting the results. NRS was also the only instrument not validated for the Portuguese population, which increases the need of caution when interpreting its results.

Possible impact differences between natural or naturalized areas were not evaluated, nor were past and present events in participant's lives that could be relevant to interpreting the results (e.g., previous nature-based individual experiences and meanings). In the initial meetings, the participants did state that they had never participated in a similar programme. However, information regarding specific personal and meaningful interactions with nature was not assessed. The participant's individual opportunities for accessing natural (e.g., living close to forest or beach) or naturalized (e.g., urban park, home garden) areas where they could continue to implement what they learned during the activities was also not verified. This information could be important for interpreting and understanding the impact differences of the holistic development programme and establishing some practical implementation guidelines.

Despite the mentioned limitations, this study provides relevant and valid information regarding the effectiveness of a nature-based programme in promoting DV victims' well-being, as well as key features that should be present in this type of intervention. It clearly shows that nature constitutes a useful and important resource in the support process of DV victims and has a significant impact on several dimensions of the participants' lives. The mixed-method approach and the application of several data collection instruments allowed a comprehensive overview of the programs' impact, as well as the collection of practical information that may be used as implementation guidelines.

The fact that the sample socio-demographic characterization was diverse also constitutes a strong point of this study, whose results are not restricted to a specific age group or education level, for example, but represent the impact in a sample population that, as a group, presented a socio-characterization similar to most DV victims in Portugal.

4.2 Future Recommendations and Practical Implications

This study reflects the effectiveness evaluation of a pioneer project in Portugal that was very important to introduce nature as a resource that can provide relevant contributes to DV victims' well-being. After this initial study, future efficacy studies are recommended to provide additional information that would allow the continuous improvement of nature-based holistic development programs. Further studies with other vulnerable groups, besides DV victims, are also required, in order to verify if they could also benefit of the advantages of this kind of program and preferential implementation practical guidelines. A follow-up evaluation is also necessary to verify the long-term impact of the nature-based holistic development programme and the prevalence of the acquired knowledge and skills. We believe that a stronger body of research regarding the impact of nature-based development programs could be an important wakening call for policy makers, leading to an effective integration of nature as a therapeutic and restorative resource in health and social support processes.

The validation for the Portuguese population of an instrument that would allow verifying the individuals' connection with nature is of extreme importance, being NRS one of the possibilities.

This study also presents some information regarding specific features that should be present in natural settings, in order to potentiate a positive impact in human well-being, including the presence of water features and of aesthetic values. More research should be made in order to identify specific set of features and to associate them with expected outcomes and target audiences.

5. Conclusion

The results suggest that nature is an important resource to promote DV victims' well-being, leading to improvements in dimensions such as overall quality of life, psychological adjustment and self-esteem. The wide array of tested benefits provided by ecosystem services strongly reinforced by the victims' own testimonies, highlight the importance of nature in DV victim support processes. Despite the mentioned limitations, this study provides important information regarding an innovative intervention modality with DV victims, which should be taken into account by policy makers, institutions and professionals operating in the field of DV. The association between nature-based activities, preferentially in the form of a structured nature-based holistic development programme that promotes the direct contact with natural ecosystems, and more traditional approaches should be implemented in DV victim support processes.

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Disclosure statement

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6. References

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Chapter 4

Nature relatedness scale: validation for the Portuguese population

Silva, A., Gonçalves, M., & Matos, M. (submitted). Nature relatedness scale: validation for the Portuguese population. *Environmental Education Research*.

Nature relatedness scale: validation for the Portuguese population

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Abstract

The beneficial role of nature in the promotion of human well-being has been a topic of growing interest, with several studies highlighting its multiple benefits. Nature connectedness appears to be an essential trait to ensure access to nature-provided benefits, as well as to promote pro-environmental behaviors. To our knowledge, there is no available instrument validated for the Portuguese population to assess nature connectedness. This study aims to fill this gap, by validating the short and full versions of the Nature Relatedness Scale for the Portuguese population. The translation and adaptation of the questionnaire complies with international guidelines in this field and validation was conducted with 204 Portuguese participants with a mean age of 36.75 ($SD = 11.05$, age range = 18-77) years, mostly female ($n = 136$; 67%). Confirmatory factor analysis indicated that the original three-factor latent structure of the full Nature Relatedness Scale, after the removal of two items, and the short version of the instrument with six items obtained an adequate fit. These two versions of the instrument showed adequate validity to be used with the Portuguese population.

Keywords: nature relatedness, connection with nature, validation, Portuguese population

1. Introduction

With the majority of the world's population living in urban areas (UN, 2018), engulfed in a world of concrete and technology, direct contact with nature is becoming more and more scarcer (Beery, Jönsson, & Elmberg, 2015). The impacts of this estrangement and of environmental degradation are being felt in all of dimensions of our life, including health (MA, 2005; Nisbet & Zelenski, 2013). The World Health Organization (WHO) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 2006). In this context, health gains a multidimensional character and a subjective dimension, reinforcing the need for multidisciplinary and multilevel answers (Hartig, Mitchell, de Vries, & Frumkin, 2014). Thus, a variety of actors have important roles in assuring the development and implementation of diversified and effective actions (Frumkin, 2001; Hartig et al., 2014). Nature - comprehending natural areas not constructed or deeply molded by man, like wild forests, and naturalized spaces with strong anthropogenic influence, as urban parks or gardens - is increasingly seen as one of those important actors that should be directly integrated in preventive and/or therapeutic processes (Frumkin, 2001; Hartig et al., 2014; Silva et al., 2018). In fact, currently existing data, supported by the work of several researchers, emphasize several benefits for human well-being provided by natural ecosystems services, including: lower risk of mental illness (e.g., Bratman, Hamilton, Hahn, Daly, & Gross, 2015a; South, Hohl, Kondo, MacDonald, & Branas, 2018); decreased levels of anxiety, rumination and negative affect (e.g., Bratman, Daily, Levy & Gross, 2015a; Bratman et al., 2015b; Pretty, Peacock, Sellens, & Griffin, 2005); lower stress levels (e.g., Anderson, Monroy, & Keltner, 2018; Mutz, Müller, & Göring, 2018; Pasanen, Johnson, Lee, & Korpela, 2018); increased life satisfaction and happiness (e.g., Anderson et al., 2018; MacKerron & Mourato, 2013; Richardson, McEwan & Garip, 2018; Silva et al., 2018); social skills improvement and strengthening of interpersonal relationships (e.g., Hoag, Massey, Roberts, & Logan, 2013; Kingsley & Townsend, 2006); amplified positive affect (e.g., Hamann, & Ivtzan, 2016; Hartig, Evans, Jamner, Davis, & Garling, 2003); enhanced overall well-being (e.g., Hinds, 2011; Marselle, Irvine, Lorenzo-Arribas, & Warber, 2015; Silva et al.,

2018). Nevertheless, humanity's impact in environmental ecosystems is still causing dramatic changes and environmental concern is continuously surpassed by economic development (Ekins, 1993). In this worrying scenario, researchers are making efforts to better understand the human-nature relationship and how it affects pro-environmental behavior and our life as a whole (Nisbet & Zelenski, 2013). As highlighted by Schultz (2002), the relationship established with nature is determinant for our survival.

Drawing from humanity's evolutionary path, researchers as Wilson, Orians, Appleton and Sampson have established theories aiming to explain our connection with nature (CWN) and preferences regarding natural environments. In Edward Wilson's biophilia hypothesis, the author defines biophilia as an "innate tendency to focus on life and lifelike processes (Wilson, 1984, pp.1), or an "innately emotional affiliation of human beings to other living organisms", comprehending "several emotional spectra: from attraction to aversion, from awe to indifference, from peacefulness to fear-driven anxiety", which persists from generation to generation (Wilson, 1993). Thus, our tendency to affiliate with nature, as well as our cognitive and emotional processes, reflects our species biocultural evolution (Gullone, 2000; Wilson, 1984; Wilson 1993).

Gordon Orians based his theory - the savanna hypothesis - on the fact that human evolution, as evidence suggest, occurred in the African savanna, in the Pleistocene (Moura, Júnior, Silva, & Albuquerque, 2017; Orians, 1980; Orians & Heerwagen, 1992). This hypothesis stated that due to its evolutionary past, human species prefer open savanna-like landscapes (Moura et al., 2017; Orians, 1980; Orians & Heerwagen, 1992).

Similarly to Orians, Jay Appleton (1975) also presented a theory based on habitat suitability, highlighting the importance of prospect and refuge values in landscapes' preferences. This idea was more recently explored by Gatlersleben & Andrews (2013), whose findings show that exposure to natural environments with high levels of prospect and low levels of refuge has a higher restorative potential than exposure to environments without clear lines of vision (low prospect) and many hiding places (high refuge).

The concept of topophilia reflects the emotional bonds established between people and place (Tuan, 1974). Based on this notion, Sampson (2012), proposed the topophilia hypothesis, stating that "humans possess an innate bias to bond with local place, including

both living and nonliving components” and that topophilia corresponds to an evolutionary adaptation that facilitated the human species wide dispersion. Closely linked with culture-based learning, these emotional bonds have a trans-generational character, beginning to be formed in early childhood (Sampson, 2012). It is an evolutionary hypothesis that provides a multidisciplinary consideration of how biological selection and cultural learning interacted throughout human evolution, leading to specific mechanisms of human-nature affiliation via place attachment (Beery et al., 2015; Sampson, 2012). This hypothesis widens the scope of Wilson’s biophilia hypothesis and overcomes some of its limitations by including non-living aspects of nature and providing an explanation of the evolutionary importance of place attachment (Sampson, 2012).

Despite the relevance of our species evolutionary history, much of the information we need to function is acquired through life experiences that occur in specific sociocultural and environmental contexts, having an important influence in individuals’ responses to environments (Kaplan & Kaplan, 1989; Korpela, Klemettilä, & Hietanen., 2002). As Schultz & Tabanico (2007) verified, not everyone shows a positive affiliation with nature, leading to the conclusion that while there is an innate biological tendency to affiliate with natural environments, life experiences may cause relevant changes. Consequently, and though common preferences can be identified, the way we perceive natural environments is quite subjective, leading to a significant variability in the ways people relate to nature (Nisbet, Zelenski, & Murphy, 2009; Moura et al., 2017). The benefits derived from natural ecosystems are also not the same for every person (Craig, 2016). As Schultz (2002) emphasized, despite the different approaches and terminology of various fields of knowledge, at the core of human-nature relations is the individual. This subjective character makes it important to understand CWN at an individual level.

Researchers have been introducing several constructs and meanings to address environmental connectedness, many of which, if not similar, are interrelated, presenting overlaps (Beery, 2011; Schultz, 2002). Schultz (2002) defined connectedness as “the extent to which an individual includes nature within his/her cognitive representation of self”, highlighting that the core of this connection is cognitive. While this notion of connectedness offers a limited perspective (Beery, 2011), focusing only in the cognitive

dimension, Schultz (2002) incorporated it within the concept of inclusion with nature. This concept comprehends three core components – connectedness, caring, and commitment – encompassing the cognitive, emotional, and behavioral dimensions (Schultz, 2002). Despite the multidimensional character of inclusion with nature, the Inclusion of Nature in Self (INS) proposed by Schultz (2001), a graphical measure of the perceived relationship between self and nature, focus on the cognitive dimension. The fact that INS is a single-item scale, not allowing for an internal reliability assessment, and that it requires participants to perceive their relationship with nature at an abstract level constitute fragilities of this instrument (Mayer & Franz, 2004; Schultz, Shriver, Tabanico, & Khazian, 2004). Schultz et al. (2004) also stated that due to being a self-report measure, INS could not be the best way to test nature connectedness. The authors came to the conclusion that many people never thought about their relationship with nature, not having a conscious belief to express. This obstacle was overcome by Schultz et al. (2004) through the use of a modified version of an implicit association test (IAT), which doesn't require conscious awareness of the situation in analysis and doesn't rely on self-report (Mayer & Franz, 2004; Schultz et al., 2004). It is important to highlight that concerns have been raised about what IAT actually measures. Karpinski & Hilton (2001) have suggested that instead of measuring the extent to which people believed in the associations they were performing, IAT scores reflected associations to which people have been exposed in their environment. Additionally, and when compared to paper and pencil measures, IAT has logistic requirements that make its administration more difficult (Mayer & Franz, 2004). More recently, Martin & Czellar (2016) have proposed a four-item scale that corresponds to an extended version of the INS (Schultz, 2001): The Inclusion of Nature in Self (EINS). Though overcoming the problems of the INS due to its single-item character, the EINS also only focus the cognitive dimension of nature connectedness.

Also drawing, and complementing, on Schultz's work, Mayer & Franz (2004) underlined the affective aspect of CWN, developing a measure to assess the emotional dimension of connectedness: connectedness to nature scale (CNS). However, Perrin and Benassi (2009) concluded that the CNS measures cognitive beliefs and not emotional aspects. To overcome this tendency to focus on only on the cognitive aspects of nature

connectedness, Perkins (2010) proposed the construct of love and care for nature, defining it as a “deep love and caring for nature which includes a clear recognition of nature’s intrinsic value as well as a personal sense of responsibility to protect it from harm”. To measure this construct, Perkins (2010) developed a 15-item measure: The Love and Care for Nature scale (LCN). Addressing only the emotional dimension of the human-nature relationship, the LCN may constitute an important complement to measures that lack this dimension (Perkins, 2010).

Clayton (2003) proposed the term environmental identity, defending that the natural environment can be a source of self-relevant beliefs. This construct reflects a sense of connection with the non-human natural environment, resulting from the interactions between an internal (the individual’s needs, abilities, emotions, and interests) and external environment (characteristics of the natural environments, and social mediators of the environment’s meaning; Chawla, 1998; Clayton, 2003). Influencing the way in which we perceive and act toward the natural environment, environmental identity is a multidimensional construct, comprehending cognitive, behavioral and emotional aspects (Clayton, 2003). Clayton (2003) developed a 24-item scale to measure environmental identity. Although multidimensional, this scale is deeply focused on the self, i.e., individual identification with natural environments (Nisbet et al., 2009). Arguing that the existing measures of environmental identity failed to acknowledge the role of differentiation in identity development and presented methodological frailties, for example in the item selection process, Walton & Jones (2017) have developed the Ecological Identity Scale (EIS). It aims to be a more comprehensive measure, assessing self-environment relations and taking into account different bases of identity (personal, role, and group). According to the authors, this scale evaluates the *sameness*, *difference*, and *centrality* of environmental concepts within a socioecological context (Walton & Jones, 2017). Though quite useful to evaluate self-identification, identity-based measures don’t seem to be so adequate to assess experiences and emotions related to nature (Nisbet et al., 2009).

Relying on previous theories, including Wilson’s biophilia hypothesis, and available environmental measures, Nisbet et al. (2009) proposed a comprehensive construct: nature relatedness (NR) - “individual levels of connectedness with the natural world”, integrating

one's perception regarding all aspects of nature, including less appealing ones (Nisbet et al., 2009, pp. 718). Being positively associated with happiness and overall well-being (Gerofsky, 2016; Zelenski & Nisbet, 2014), NR also appears to predict sustainable attitudes and behavior, as well as environmental concern (Zelenski & Nisbet, 2014). To measure NR, Nisbet et al. (2009) developed the Nature Relatedness Scale (NRS), a comprehensive 21-item self-report questionnaire that assesses three dimensions of the individual's CWN: NR-Self, that represents the internalized identification with nature, i.e., how strongly people identify with the natural environment, reflecting feelings and thoughts; the NR-Perspective, that assesses the external nature-related worldview, indicating how individuals' relationship with the natural environment is expressed through attitude and behavior; and the NR-Experience, that refers to the attraction and physical familiarity established with the natural world (Nisbet et al., 2009). As interest in the NRS grew, it became clear that for some research contexts a 21-items scale was too burdensome (Nisbet & Zelenski, 2013). Thus, Nisbet & Zelenski (2013) proposed a short version of the NRS with 6 items (NR-6), especially useful in situations of limited space and/or time. Although some reliability was lost regarding well-being correlations, similarly to the full scale, the NR-6 also predicted happiness, pro-environmental behavior and attitudes, as well as environmental concern (Nisbet & Zelenski, 2013). Despite the benefits of the NR-6, due to its reduced length, and its apparent reliability, the authors stress that the full version of the scale is more adequate for a high-quality assessment of nature relatedness (Nisbet & Zelenski, 2013).

Due to the high number of available instruments that assess the human-nature relationship and the existing similarities among many of them, the task of selecting which one to use can be a rather confusing one (Tam, 2013). Tam (2013) compared several instruments that assess CWN, verifying that multidimensional instruments, as NRS or EID, appeared to be more strongly correlated with the variables in analysis. This notion is consistent with hypothesis such as the topophilia hypothesis that reflects the importance of affective bonds developed through learning and experience in specific sociocultural contexts. If no time or space limitations are present, multidimensional instruments appear to be more suitable to assess CWN. While the majority of available instruments tends to

focus on one or two dimensions (e.g., LCN – emotional dimension; INS – cognitive dimension), NRS/NR-6, EIS and EID consider a multidisciplinary approach (Nisbet, Zelenski, & Murphy, 2009; Nisbet, Zelenski, & Murphy, 2013; Tam, 2013; Walton & Jones, 2017). As previously mentioned, EID and EIS have a strong focus on the self-perspective, whereas NRS (and NR-6) is a broader instrument that explores the emotional, cognitive and physical relationship with nature (Nisbet et al., 2009).

Providing a more comprehensive understanding of CWN, both NRS and NR-6 reveal a strong potential for research and intervention in the fields of human well-being and nature conservation (Craig, 2016). Several studies have already reported the good internal consistency of the NRS and NR-6 (e.g., Beery, 2011; Dornhoff, Sothmann, Fiebelkorn & Menzel, 2019; Howell, Dopko, Passmore & Buro, 2011; Tam, 2013). In 2018, Silva et al. applied a translated (not validated) version of the NRS in a study assessing the effectiveness of nature-based experiences in promoting the overall well-being of Portuguese domestic violence victims. The scale's internal consistency was acceptable and the results showed that there was an increase in the overall score, reflecting an improvement in the participants' nature relatedness (Silva et al., 2018). Considering that the participant's overall well-being also improved (Silva et al., 2018), this study also reinforces the connection between nature relatedness and human well-being. The authors stressed the fact that the NRS was not validated for the Portuguese population and, consequently, the necessity of having a validated instrument to verify individual CWN (Silva et al., 2018). This necessity as also arisen in many other contexts, leading to validation studies of different instruments for different cultural contexts (e.g, Clayton, Irkhin, & Nartova-Bochaver, 2019; Gim, Lee, & Kim, 2019; Navarro, Olivos, & Fleury-Bahli, 2017; Pessoa, Gouveia, Soares, & Vilar, 2016).

Comprehending the importance of the human-nature relationship to the development of pro-environmental behaviors and human well-being, as well as the necessity of having validated instruments to assess this trait, this study corresponds to the validation of both NRS and NR-6 for the Portuguese population. Our three main goals were: i) to translate and adapt the original scale for the Portuguese language; ii) to perform the factorial structure

analysis of the scales' Portuguese version; and iii) to assess the psychometric properties of the obtained factorial structure.

2. Methodology

2.1 Participants

A community convenience sample of 204 participants agreed to participate in this study. The mean age of the participants was 36.75 ($SD = 11.05$, age range = 18-77 years), subdivided into females ($n = 136$; 67%) and males ($n = 68$, 33%). The participants had mostly higher education ($n = 159$; 78%), followed by high school ($n = 40$; 19%) and elementary school ($n = 5$; 3%). No differences were found between males ($M = 36.25$, $SD = 10.99$) and females ($M = 37.01$, $SD = 11.11$) regarding age, $t(202) = -0.46$, $p = .65$. Regarding professional status, 82% ($n = 168$) were active, 10% ($n = 20$) students, 3.4% ($n = 7$) unemployed, 1.5% ($n = 3$) retired, and 2.9% ($n = 6$) didn't provide information. Most participants ($n = 159$; 78%) had a higher education level, with 22% ($n = 45$) having a secondary level (junior and high school degrees).

From the 204 participants, almost all ($n = 201$; 98.5%) considered important to spend time in direct contact with nature; 67% ($n = 137$) reported to frequently or always spend time in places that allowed them to be in direct contact with nature.

2.2 Materials

The Nature Relatedness Scale (NRS; Nisbet, Zelenski, & Murphy, 2009) assesses the individual's connection with nature, regarding the cognitive, affective, and experiential aspects. It encompasses three dimensions: NR-Self which represents the internalized identification with nature; NR-Perspective, which assesses the external nature-related worldview; and NR-Experience, which refers to the physical familiarity established with the natural world. It is a 21-item Likert-type scale, presenting a 5-point scale (disagree strongly,

disagree a little, neither agree or disagree, agree a little, agree strongly). Higher scores indicate a stronger connectedness with nature.

After the development and validation of the NRS, Nisbet and Zelenski (2013) developed the NR-6: a new brief measure of nature relatedness. The short-form version of the nature relatedness scale (NR-6) comprised 6 items from the “self” and “experience” dimensions (My ideal vacation spot would be a remote, wilderness area; I always think about how my actions affect the environment; My connection to nature and the environment is a part of my spirituality; I take notice of wildlife wherever I am; My relationship to nature is an important part of who I am; and I feel very connected to all living things and the earth). The authors tested the new scale's predictive ability across multiple samples and with longitudinal data in students, community members, and businesspeople. The NR-6 scale demonstrated good internal consistency, temporal stability, and predicted happiness, environmental concern, and nature contact.

Additionally, the following question was also asked: “How often do you spend time in places where you can be in direct contact with nature?”.

2.2.1 Questionnaire Selection and Translation.

After the selection of NRS, authorization was requested from the original authors of the instrument to translate, adapt and validate it to the Portuguese community. The translation and cross-cultural adaptation of the questionnaire followed the guidelines of the International Test Commission Guidelines for Translating and Adapting Tests (International Test Commission, 2005). The translation was performed by two independent investigators, followed by retroversion by an English-speaking native and compared with the original version. The retroversion was also sent to the author of the original scale, who validated it. The final version was submitted to a pilot test with six participants, allowing to adapt and optimize the final version of the questionnaire.

2.3 Procedures

The questionnaire was built online in the Survey Creator program and disseminated online in *Facebook* and via snowball sampling, through the contacts of the authors of the study. The link to the questionnaire was accompanied by a note with the framework and objectives of the study, also clarifying the ethical issues in completing the questionnaire (e.g., anonymity, freedom to leave the questionnaire at any time, confidentiality of the data), which was only possible after validation and the participant's agreement (informed consent). The data collection took place between May and June 2019.

2.4 Data Analysis

SPSS Statistics v25 and AMOS (IBM SPSS, 2017) were used to analyze the data. Confirmatory factor analyses (CFAs) were conducted using Maximum Likelihood (ML) robust methods and covariance matrix. The following goodness of fit indices were used to evaluate the models: a) the chi-square value, which determines the adjustment in case of a result without statistical significance, although this value is almost always significant, especially in large samples. To circumvent this, it is used the value of χ^2 / gl , which divides the value obtained by this statistic by the number of degrees of freedom (gl), being acceptable values equal to or less than 3.0 (Brown & Moore, 2012); (b) the square root of the root mean squared error (hereinafter referred to as RMSEA). This measure is considered adequate for values below 0.07 (Marôco, 2010; Schmitt, 2011). P-close was also considered as a complement to this adjustment measure, considering more adjusted models for $p > .05$; c) the Goodness of Fit Index (GFI), whose criterion for adequate adjustment is $GFI > 0.90$ (Hu & Bentler, 1995; Marôco, 2010; Schmitt, 2011); d) The Tucker-Lewis Index (TLI), also referred to as Non Normed Fit Index (NNIFI), whose criterion for proper adjustment is $TLI / NNIFI > 0.90$ (Brown & Moore, 2012; Marôco, 2010; Schmitt, 2011); e) Adjusted Goodness of Fit Index (AGFI) whose criterion for adequate adjustment is $AGFI > 0.90$ (Brown & Moore, 2012; Marôco, 2010; Schmitt, 2011); f) the Comparative Fit

Index (CFI), where values higher than 0.90 were considered adequate (Brown & Moore, 2012; Marôco, 2010; Schmitt, 2011); g) Akaike Information Criteria (AIC), which indicates perfect fit when the value is null (Albright & Park, 2009; Brown & Moore, 2012; Schmitt, 2011). This criterion is useful for comparing different confirmatory models that have the same number of observed variables and equal sample size (Mesquita, 2013). Modification indexes (MI) were checked and used to improve model fit if necessary. CFA was performed for both NRS and NR-6. To assess reliability, we used the Cronbach’s alpha (considered adequate if above .70) and corrected item-total correlation (considered adequate if above .20; Finch, Immekus, & French, 2016).

To analyse differences between sociodemographic and behavioural variables and nature relatedness, we used t-tests (sex and education level), Pearson correlation (age) and Spearman correlation (time spent in nature).

3. Results

Initially, we analyzed the psychometric properties of the NRS by examining its latent factor structure. Some of the adjustment values of this model were below the reasonable expected (GFI 0.86; TLI 0.84; AGFI 0.84; CFI 0.86). Since two of the items (Item 3 and Item 20) showed loading factors below the reasonable values (.30), we decided to exclude them and test the CFA without these items. The CFA model for NRS and NRS-6 presented a good fit, after the elimination of these items (Table 1).

Table 1. Goodness of fit indexes for NRS and NR-6

	S- B χ^2 /df	GFI	TLI	CFI	AGFI	RMSEA (90% CI), p close	AIC
NRS	1.27	.92	.95	.96	.95	.04(.02-.05), pclose = .93	273.171
NR-6	1.61	.98	.98	.99	.95	.05(.00-.10), pclose = .39	38.48

Note. NRS = Nature relatedness scale; S-B χ^2 = Satorra-Bentler chi-square; df = degrees of freedom; GFI = Goodness of Fit Index; CFI = Comparative Fit Index; RMSEA (90% CI) = Root Mean Square Error of Approximation (90% Confidence Interval); MI: modification indexes.

Table 2 and Table 3 display the item loadings for the NRS model and for NR-6, respectively. All items had loadings above .30 value.

Table 2. Loadings for the confirmatory structure of NRS with modification index.

Items	Loading
NR-Self	
It5. I always think about how my actions affect the environment	0.58
It7. My connection to nature and the environment is a part of my spirituality.	0.80
It8. I am very aware of environmental issues.	0.49
It12. I am not separate from nature, but a part of nature.	0.39
It14. My feelings about nature do not affect how I live my life.	0.32
It16. Even in the middle of the city, I notice nature around me.	0.62
It17. My relationship to nature is an important part of who I am.	0.87
It21. I feel very connected to all living things and the earth.	0.72
NR-Perspective	
It2. Some species are just meant to die out or become extinct.	0.40
It11. Nothing I do will change problems in other places on the planet.	0.49
It15. Animals, birds and plants should have fewer rights than humans.	0.35
It18. Conservation is unnecessary because nature is strong enough to recover from any human impact.	0.34
It19. The state of non-human species is an indicator of the future for humans.	0.37
NR-Experience	
It1. I enjoy being outdoors, even in unpleasant weather.	0.49
It4. My ideal vacation spot would be a remote, wilderness area.	0.35
It6. I enjoy digging in the earth and getting dirt on my hands.	0.64
It9. I take notice of wildlife wherever I am.	0.65
It10. I don't often go out in nature.	0.38
It13. The thought of being deep in the woods, away from civilization, is frightening.	0.39

Table 3. Loadings for the confirmatory structure of NR-6.

Items	Loading
It4. My ideal vacation spot would be a remote, wilderness area.	0.35
It5. I always think about how my actions affect the environment	0.55
It7. My connection to nature and the environment is a part of my spirituality.	0.81
It9. I take notice of wildlife wherever I am.	0.64
It17. My relationship to nature is an important part of who I am.	0.85
It21. I feel very connected to all living things and the earth.	0.72

3.1 Internal consistency and Item-Total Statistic

The Cronbach alpha for the total NRS was .81. The alpha Cronbach for NRS subscales was .79 for NRS-Self; .69 for NRS-Perspective; and .71 for NRS-Experience. Thus, the correlations between the NRS and its three factors were moderate positive to strong and statistically significant (see Table 4).

Table 4 shows the corrected item-total correlation and Cronbach’s alpha if item deleted for the NRS’s subscales. Although the items of NRS-Perspective are the lowest, when compared to the other two sub-scales, these are within the values considered adequate (above .20), indicating good relationship of items with the construct.

Table 4. Item-Total Statistics for NRS sub-scales

	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
NR-Self		
It5. I always think about how my actions affect the environment	0.56	0.76
It7. My connection to nature and the environment is a part of my spirituality.	0.64	0.75
It8. I am very aware of environmental issues.	0.48	0.78
It12. I am not separate from nature, but a part of nature.	0.24	0.80
It14. My feelings about nature do not affect how I live my life.	0.31	0.82

Table 4. (cont.)

	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
NR-Self		
It16. Even in the middle of the city, I notice nature around me.	0.52	0.77
It17. My relationship to nature is an important part of who I am.	0.77	0.73
It21. I feel very connected to all living things and the earth.	0.64	0.75
NR-Perspective		
It2. Some species are just meant to die out or become extinct.	0.29	0.58
It11. Nothing I do will change problems in other places on the planet.	0.25	0.63
It15. Animals, birds and plants should have fewer rights than humans.	0.22	0.68
It18. Conservation is unnecessary because nature is strong enough to recover from any human impact.	0.24	0.67
It19. The state of non-human species is an indicator of the future for humans.	0.20	0.67
NR-Experience		
It1. I enjoy being outdoors, even in unpleasant weather.	0.44	0.71
It4. My ideal vacation spot would be a remote, wilderness area.	0.42	0.72
It6. I enjoy digging in the earth and getting dirt on my hands.	0.44	0.71
It9. I take notice of wildlife wherever I am.	0.44	0.73
It10. I don't often go out in nature.	0.25	0.77
It13. The thought of being deep in the woods, away from civilization, is frightening.	0.43	0.72

The Cronbach alpha for the total NR-6 was .79. The corrected item-total correlation and Cronbach’s alpha if item deleted for NR-6 is presented in Table 5.

Table 5. *Item-Total Statistics for NR-6*

NR-6	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
It4. My ideal vacation spot would be a remote, wilderness area.	0.33	0.84
It5. I always think about how my actions affect the environment	0.49	0.78
It7. My connection to nature and the environment is a part of my spirituality.	0.69	0.73
It9. I take notice of wildlife wherever I am.	0.60	0.76
It17. My relationship to nature is an important part of who I am.	0.73	0.74
It21. I feel very connected to all living things and the earth.	0.64	0.75

The correlations between the NRS and its three factors were positive moderate to strong and statistically significant (see Table 6).

Table 6. *Pearson correlation matrix*

	NRS-Total	NR-Self	NR-Perspective
NRS-Total	1		
NR-Self	.89**	1	
NR-Perspective	.49**	.28*	1
NR-Experience	.85**	.68*	.27*

* $p < .05$; ** $p < .01$; *** $p < .001$

3.2 Sociodemographic and behavioral variables

Significant correlations were only found regarding sex and education level. Table 7 shows the mean differences in total NRS and sub-scales, as well as in NR-6, for these two variables. In general, female participants showed higher significant relatedness with nature than male participants, except for NRS-Experience, which presented no significant differences. Participants with higher education showed significantly higher means in NRS total and NRS perspective.

Table 7. *Relatedness with nature by sex and education level*

	Sex					Education level				
	Male (n = 68)		Female (n = 136)		t	Secondary (n = 45)		Higher education (n = 158)		t
	M	SD	M	SD		M	SD	M	SD	
NRS Total	74.94	10.32	79.88	7.80	-3.82***	75.73	8.53	78.87	9.02	-2.08*
NRS -Self	32.18	5.19	34.82	4.03	-4.01***	32.96	4.40	34.20	4.65	-1.60
NRS-										
Perspective	20.68	3.09	21.94	2.66	-3.03**	20.27	2.93	21.87	2.76	-3.40**
NRS-Experience	22.09	4.51	23.12	3.89	-1.69	22.51	3.83	22.80	4.19	-0.42
NR-6	22.93	4.75	24.85	3.60	-3.23**	23.71	4.07	24.33	4.13	-0.89

Frequency of time spent in contact with nature was positively correlated with NRS-total, $r_{sp} = .45, p < .01$, NRS-self, $r_{sp} = .47, p < .01$; NRS-Experience, $r_{sp} = .50, p < .01$; and NR-6, $r_{sp} = .48, p < .01$.

4. Discussion

Several studies have concluded about the benefits provided by nature for the general, mental and physical well-being (e.g., Bowler, Buyung-Ali, Knight & Pullin, 2010;

Cleary et al., 2017; Hartig et al., 2014; Keniger, Gaston, Irvine, & Fuller, 2013). Connecting with nature appears to be essential for people to have access to those benefits, but also for the development of pro-environmental behaviors (Howell, Dopko, Passmore, & Buro, 2011; Mayer & Franz, 2004; Nisbet, Zelenski, & Murphy, 2010). Thus, assessing levels of nature connectedness is important not only for interventions aiming to promote human well-being, but also for those that aim the development of environmentally-aware citizens and sustainable societies. In this context, nature connectedness becomes a trait transversal to several fields of knowledge, bringing them together and offering a space for collaborative work (Mayer & Franz, 2004).

Comprehending the relevance of nature connectedness and the need to have an instrument that would allow its assessment for the Portuguese population, this study's objective was to adapt and validate a generalist instrument that assessed one's relationship with nature in a comprehensive way. Taking into consideration the best adequacy of multidimensional instruments to assess CWN (Tam, 2013), the broader scope of the Nature Relatedness Scale, and its previous use in a Portuguese context, we choose to validate both full and short forms of this scale. As far as we know, this is the first study of validation of both NRS and NR-6 in Portugal.

The results of the procedures undertaken for the scale's translation indicated that the items were easily perceived by respondents, ensuring that there were no semantic or content problems. Both versions, translated and original, were considered equivalent.

In relation to the initial model of the NRS, the adjustment values were below the expected. The items 3 ("Humans have the right to use natural resources any way we want.") and 20 ("I think a lot about the suffering of animals") had lower loading weight and were deleted. The choice to delete items showing loading factors below reasonable values was also performed by researchers as Navarro et al. (2017), that defended it to be an advantage in obtaining the best version for specific cultural contexts. The version of NRS obtained after these items' elimination had better psychometric qualities, proving to be a more adequate model for the Portuguese population. Both NRS and NR-6 revealed to follow the factorial structure of the original instrument for this sample, with very good adjustment indices, proving to be an adequate model to measure the relationship with nature in the

Portuguese population. The NR-6, while not including items of all the dimensions assessed in the original scale, may be an important asset, especially in investigations with longer protocols, as it implies a shorter response time while maintaining statistical robustness.

The Pearson correlation matrix between the NRS total and its three factors showed mostly high positive significant associations. The exception was the correlations between the Proactive-Relational and the Reactive-Relational factor, and between the NR-Perspective with NR-Self and NR-Experience, that were lower.

Current available research doesn't provide consistent results regarding the correlation between CWN and sociodemographic variables. Nevertheless, there's a tendency for being older and female to be associated with higher levels of nature connectedness (Beery, 2011; Capaldi, Dopko & Zelenski, 2014). Our results regarding gender and educational level are consistent with those obtained in previous studies regarding aspects of the human-nature relationship (e.g. de Bell, 2017; Beery, 2011; Dean et al., 2018; Wyles et al., 2017). Some studies have found age to be a significant factor (e.g. Beery, 2011; Dean et al., 2018; Lumber, Richardson, & Sheffield, 2017), but, in our study, no significant correlations were found. Similar results were obtained by, for example, Dutcher, Finley, & Luloff, 2007, which found no correlations between age and CWN. According to Capaldi et al. (2014), people who present higher levels of nature connectedness are more likely to spend time in nature. Based on their results, Nisbet & Zelenski (2009) also concluded that people more nature-related spend more time in natural environments. Our results are in line with this reasoning as participants that reported spending more time in direct contact with nature presented higher levels of nature relatedness, as well.

It is not easy to concentrate in a single instrument all aspects of the human-nature relationship, including evolutionary path, socio-cultural aspects, individual perspectives and life experiences. Furthermore, many authors have also highlighted the importance of the environmental settings' characteristics to enhance the positive outcomes of the human-nature relationships and levels of nature connectedness (Hartig et al., 2014; Pretty, 2004; Silva et al., 2018; Wyles et al., 2017). The fact that high-quality natural environments are perceived as more restorative and appear to foster a stronger connection is consistent

with evolution-based theories as biophilia and topophilia (Wyles et al., 2017). Such environments could present better conditions to support our species survival, constituting and innate preference (Wyles et al., 2017) and leading to affiliation via place attachment. In this context, and despite the added- value of the NRS and NR-6 for the assessment of nature relatedness, we recommend it's use as part of a set of complementary instruments and not singly. This recommendation is in line with the work of several researchers as Zelenski & Nisbet (2014) which combined different measures to assess several domains of CWN. Among others, the authors included measures to assess in-group identifications, which is a domain not addressed by the NRS but essential to fully understand CWN (Walton & Jones, 2017).

Although the results are consistent with the findings of the authors of the original scale, this study presents some limitations, as the non-representativeness of the sample for Portuguese population. In comparison with the general population, our sample had an over-representation of higher education level and professionally active participants. This fact is probably due to the methodologic decision to collect data online. There was also an overrepresentation of female participants, which tends to occur in studies that address human-nature relationships (e.g., Lumber et al., 2017; Pasanen et al., 2018; Perrin & Benassi, 2009).

Data that allowed to calculate convergent and divergent validity of the instrument was not collected. So, in future investigations, it would be important to invest in studies aimed at testing the validity (convergent, divergent), the temporal stability of the scores in this instrument, as well as the invariance of the measurement with different populations.

In agreement with Beery & Wolf-Watz, 2014, we also defend that future research would benefit of associating the notions of nature relatedness and place attachment, not merely focusing its inquiries in undefined environments but incorporating the participants' lived experience. It would also be interesting to gather further information regarding the type of contact, length and frequency, and associate them with other cultural and sociodemographic variables. As Gatersleben & Andrews (2013) verified, not all natural environments have restorative effects. Thus, a special attention should also be given to the natural environments' characteristics, in order to identify those that may lead to positive

benefits and to increase CWN, and those that can have negative effects. NRS and NR-6 are indeed relevant instruments but, whenever possible, we recommend its use as part of a structured evaluation plan that addresses the participants' sociocultural contexts, life experiences, and natural environments' specificities.

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Chapter 5

Final considerations

1. Discussion

Environmental education's task was never an easy one. The goals were ambitious but crucial for the achievement of sustainability. What should have been decades of a common commitment to ensure an environmentally healthy planet, has turned into a worrisome scenario of fast-pacing global changes and environmental degradation. This is not saying that much has not been achieved. It has. But it is simply not enough. Lost among recommendations, ambiguous interpretations, and "easy way" practices, EE is in desperate need of refocusing on its core principles, of practices that strengthen its immersion in society as a whole, and of potentiating the already available resources.

It must be seen as more than a science class, focusing on ecology and biology. Developing pro-environmental values and behaviors it's not merely a cognitive process, having a determinant emotional dimension. Though knowledge is important, loving and caring for nature in its broad sense is of paramount importance. Provide EE actions that encompass a socio-ecological approach, reinforcing social interactions and nature connectedness is essential, as well as to operate at both individual and community levels. During the previous chapters, two traits appear as essential to increase emotional engagement and promote the adoption of environment-friendly behaviors: the perception of direct and unconditional benefits, especially those related with human health, and nature connectedness.

Though, in many cases, results must be cautiously interpreted, there is already a vast body of research that validate nature as determinant for overall human well-being. Several benefits have been identified, ranging from psychological, to physiological and social. The restorative and therapeutic potential of nature makes it an important resource for social and health interventions. In this context, EE can play an important and determinant role, allowing for the development of well-informed nature-based collaborative practices between professionals of several fields on knowledge and intervention. The added-value of EE for social intervention was highlighted by Project CarryOn (see Chapter 3), whose results showed how a nature-based multidisciplinary intervention can benefit a socially vulnerable group.

Following the findings and recommendations of several researchers (Burls, 2007; Frumkin, 2001; Maller et al., 2006; Maller et al. 2008; Pedretti-Burls, 2007; Pretty, 2003; Pretty et al, 2007), Project CarryOn adopted a socio-ecological approach, integrating environment, society and health, to provide an innovative and effective intervention modality with domestic violence victims. Comprehending a nature-based activities' program implemented in group format, this project allowed its participants to engage in direct contact with nature. This project aimed to be an example of how environmental education can raise awareness to the importance of nature, while giving a significant contribute to mitigate the negative impacts of a severe social scourge: domestic violence.

The results presented on Chapter 3, besides validating how a holistic development nature-based methodology can contribute to the wellbeing of domestic violence victims, also highlight a new path for environmental education. By strengthening its multidisciplinary, cooperative and holistic character, it was possible to integrate EE as an important component of the social support process of a vulnerable group and raise awareness to the importance of natural ecosystems to human wellbeing.

When it comes to nature and wellbeing, there are still relevant gaps regarding available information and public awareness (Cleary et al., 2017; Hartig et al. 2014; Maller et al., 2006). So, there is a need to direct efforts to fill in knowledge gaps through research, and to promote public engagement and awareness through different levels of intervention. Answering to this need, Project CarryOn incorporated, alongside with the direct intervention with DV victims, several awareness actions (e.g., activities in schools, training sessions, presence in the media and in scientific events, participation and development of communication and information public events). These actions aimed to raise awareness about DV itself, helping in its prevention and public engagement, but also about the importance of nature and how much it contributes to human wellbeing.

Thus, Project CarryOn's contributes were given regarding three main needs:

1. provision of effective ways for EE to reach society as a whole, and to strengthen the link between individuals and nature;
2. development of new social intervention modalities and report of effectiveness data;

3. raise awareness to the essential role of nature to human development and overall wellbeing, promoting healthier life styles and pro-environmental behaviors.

The evidence that links health to ecological and environmental factors has been highlighted by research since 1986 (Butler & Friel, 2006). The Ottawa Charter for Health Promotion, an outcome of the first International Conference on Health Promotion held in 1986, already clearly stated that “The protection of the natural and built environments and the conservation of natural resources must be addressed in any health promotion strategy” and that humanity had “to address the overall ecological issue of our ways of living” (WHO, 1986, pp. 3-4). Unexpectedly, and despite the growing body of knowledge, nature has not yet gained its rightful place in public health and social intervention (Butler and Friel, 2006; Frumkin, 2001), being often not taken seriously by planners or public health agencies (Barton et al., 2009). Maller et al. (2006) said that this was probably due to the still prevailing misunderstanding and underestimation of the role of ecosystem services to human health and general wellbeing. Throughout the project, in the interactions established with victims, professionals, institutions and the public, we also verified that the association between nature and wellbeing was highly unknown and/or applied. In fact, none of the social support technicians involved had used nature as a resource and none of the victims had participated in similar projects or activities. So, Project CarryOn constituted their first experience in using nature as a central resource within social support and recovery processes. The fact that the project expressed a methodology that was, to them, new and quite unknown, led to initial doubts about accepting to participate and if it would work. The positive development and results cleared all the existing doubts and both technicians and victims validated the importance of nature.

Hence, addressing the information gap regarding nature and its role in human wellbeing is essential to assure that nature and the required multidisciplinary approaches will not be left out of decision-making and policy formulation processes, in areas as public health and urban planning (Maller et al., 2006). Governments, social institutions, enterprises and communities must be aware of the significant contributes that nature can provide to mitigate or solve current social problems, having a positive impact not only in

individuals but in society as a whole, including in the economic dimension. More than just something beautiful to look at, nature must be perceived as an indispensable social, educational and health resource. According to Maller et al. (2008), contact with nature can facilitate a more optimistic or positive attitude, enhance social support, reduce stress and tension and provide opportunities for physical exercise. Project CarryOn's participants also reported similar impacts (Chapter 3, Table 7), emphasizing the role of nature as a promoter of positive feelings and the development of a stronger social network. Physical exercise, a powerful wellbeing promoter on its own, was also an important part of the program activities. This integration made it possible to amplify the effects that nature and physical exercise individually have in wellbeing (Maller et al., 2008; Pretty, 2003; Pretty et al., 2005). Although both wild nature (e.g., wild forests, national parks) and urban nature (e.g., urban parks, gardens) are quite relevant and provide access to ecosystem services, the latter constitutes a daily setting more easily accessed by the majority of the population. Hence, Maller et al. (2008) were quite right when stating that "parks are one of our most vital health resources" (p. 10). It is important for urban planning to take into account that nature should be accessible to all and that natural urban areas need to be a growing reality (Maller et al., 2006; Maller et al., 2008; Rohde & Kendle, 1997, Chapter 9).

Nevertheless, not all can enjoy and experience nearby outdoor urban nature safely. Domestic violence victims are an example of a social group in which some people may require help to ensure access to rights that they should never be deprived of. Taken into account the risk posed by the aggressor, the victim's sense of insecurity and psychological needs, the only way for many DV victims to effectively access the benefits of nature may be through social support actions. Thus, as important as increasing the quantity and quality of natural spaces in urban realities, is the inclusion of nature-based activities in social interventions, especially in those directed to vulnerable social groups. This has a highlighted relevance when we analyze the negative impacts that many social scourges have in individuals and society. We all require nature in our lives but to victims of scourges as violence or social exclusion, nature can truly be determinant in their lives. Reading the testimonies of Project CarryOn's participants is still quite an emotive moment as it is amazing to see what a six-day nature-based program, implemented during three

consecutive months, brought to their lives. This was not a long time and when we think in the emotional distress and clinical symptoms presented by these women, it becomes and even shorter amount of time. Nevertheless, in a relatively short amount of time significant improvements were achieved, sustaining the claim that a nature-based program can indeed be a promising modality in social intervention.

In this context, to enhance the added value of nature in promoting human health and wellbeing, besides increasing the presence of natural urban areas, it is also important to include nature-based activities and programs in the social support process of vulnerable social groups. Taking into account the already mentioned importance of long-term experiences, this inclusion should not be based in sporadic activities but in long-term continuous programs.

Building up on the idea expressed by Lee et al. (2005), it is not enough to build parks (or other urban green areas) to ensure its intended uses and the full access to nature's benefits. Continuous maintenance and improvements are needed, as well as to motivate and promote the exploration of the full potential of urban green areas. Natural areas, especially urban natural areas, are still mainly seen as venues for leisure and sport (Maller et. all, 2008; Rohde & Kendle, 1997, Chapter 9), being considered optional amenities (Kaplan & Kaplan, 1989). Governments (local, regional and national), together with associations and other institutions, must promote the development of a new way of perceiving these areas, by including, in a specific and direct way, the use of nature as a resource in areas such as health and education (more outdoor activities and direct contact with nature should be occurring).

As well as EE has been highly hindered by non-binding agreements and diffuse and indirect references, so is the full integration of nature as a health, educational and social resource. Direct references in legislation and financial support (to nature-based programs) are some of the required measures.

As observed by Rohde and Kendle (1997, Chapter 9), policy-makers and deciders need to receive sound information on the benefits of nature, including urban landscapes, in order to justify the allocation of funds to green areas' enhancement and construction, to the development of nature-based programs, and other measures. Academia has an

incredibly important role, a responsibility, in providing relevant information and influencing management decisions, as well as to raise public awareness.

Maller et al. (2006) stated that “To seek human health and wellbeing without considering the importance of environmental sustainability is to invite potentially devastating consequences for the health and wellbeing of whole populations” (p. 49). Sandifer, Sutton-Grier, and Ward (2005) concluded that

“the contributions of biological complexity to human health and wellbeing are important and could be used as a strong and potentially persuasive argument for protecting and restoring ecosystems and biodiversity. Enlisting the public health community to support biodiversity conservation might be an excellent way to gain broader public interest and acceptance of expanded conservation actions that also would enhance public health” (p. 11).

Pretty et al. (2005) and Maller et al. (2008) also suggested that a greater awareness of the importance of nature to human well-being and of the benefits provided by ecosystems could lead to changes in attitudes towards nature, leading to a wider support for pro-sustainability policies and nature conservation. Together, these statements establish a clear link between environmental education/nature conservation and human wellbeing promotion (including the use of nature as a health resource). This linkage allows participants to have access to unconditional and direct benefits that, as referred on Chapter 1, seem to play a decisive role in the adoption of mitigation actions (Amelung et al., 2019). Barton et al. (2009), in their study about the effects of walking in nature, concluded that “the majority of participants did not recognize this (walking in nature in the fresh air and enjoying green scenes) as a health service that the site was providing” (p. 274). Contrarily, Project CarryOn’s participants highlighted the importance of nature and of its spiritual and healing characteristics, identifying several benefits of developing activities in natural spaces. Most likely, this difference occurred due to the inclusion of structured EE activities. More than just developing activities in nature, CarryOn’s participants had access to a fully

structured holistic development methodology that embraced their lives' dimensions. Activities were developed within a framework based on their life experiences, emotional and psychological needs and the characteristics of the surrounding nature. This allowed the development of a strong emotional connection with the natural settings that gained and enhanced meaning. The inclusion of structured activities of different typologies (e.g., physical activities, social interactions), and of an active interaction with nature are in line with Dean et al. (2019) findings (see Chapter 1). Besides strengthening the positive impact of nature in the participants' wellbeing, these factors appear to be decisive to elicit a stronger pro-environmental response.

Project CarryOn constitutes an example of how environmental education can be a key component in the social support process of vulnerable social groups and reinforce awareness regarding the importance of nature to humanity. Working within, for and with the community, this project was able to give a significant contribute to the integration of EE in society, highlight the importance of nature, increase nature connection (in participants) and reinforce the role of EE as a key component in social intervention. It presents limitations and room for improvement, but it is a good example of how EE is much more than a science class and how it can address a multiplicity of environmental problems (e.g., ecological, social, cultural, health), by adopting a socio-ecological approach. As Maller et al. (2006) stated, public health and environmental management/conservation are strongly interconnected fields that can optimize each other through a socio-ecological approach in which nature acts as an ideal setting for the integration of environment, society and health. So, as Maller et al., we must hope that

“perhaps ecological inequality, or a lack of opportunity to experience contact with nature may come to be recognized as a third powerful determinant of health and wellbeing in populations. In such a case, along with access to primary health care, accessibility to nature would be seen as a social justice issue” (Maller et al., 2006, p. 50).

Besides accessibility, and as mentioned before, assuring a strong connection with nature is quite important. Thus, nature connectedness assessment should be a relevant part of nature-based interventions' evaluation. Though there are several instruments to measure this trait (see Chapter 4), there was no availability of one validated for the Portuguese population. To overcome this gap, the validation of both full and short forms of the NRS (NRS and NR-6, respectively) was performed. The results provided on Chapter 4 showed that the translated versions (Appendix A) constituted adequate instruments to measure the relationship of the Portuguese population with nature. The existence of a validated instrument now allows researchers and practitioners to incorporate the assessment of this relationship, also potentiating further research in how it can be strengthened. As stated in Chapter 1 (pp. 48), the relationship with the environment is culturally and context specific (Sauvé, 2002), which emphasizes the importance of having a validated instrument that allows to better understand the Portuguese context.

1.1 Drawing from experience

After more than a decade of experience in EE, a lot has been learned, done, seen and discovered. Loureiro (2004, Chapter 1) stated that environmental education is not restricted to the levels of ideas and information transmission, but it also acts at the existence level, taking into account our lives' experiences and sociocultural evolution. The same author emphasizes that to educate is to emancipate and that emancipation is allowing individuals to build paths based in their knowledge and perception of the world (Loureiro, 2004, Chapter 1). Hence, this chapter aims to discuss information and results presented in the previous chapters, but also to integrate some practical knowledge and ideas gathered during my professional path.

It is important to stress out that the presented personal points of view, in which I believe in, are the result of my specific professional experience and personal learning process, both occurring in specific sociocultural contexts. Thus, they may not constitute a representative truth of other realities. The audiences we work with, as well as the

sociocultural context, have a strong influence in the entire process, including in the educator's personal evolution. So, different audiences and contexts can lead to distinct learning processes and conclusions and, as Loureiro (2004, Chapter 1) said, to "different paths of salvation" (p. 37). This is not necessarily a bad thing, as it may lead to a different set of intervention modalities, adapted to several existing realities.

Though general guidelines and principles are very important, I believe that EE should not lie in one view, one idea or one solution, but it should be enriched by a multiplicity of possibilities, evaluated and proven to be effective, that reflect our world's diversity and the several realities in which educators are operating. As defended by Layrargues (2004), diversity is a key feature of EE.

Besides different realities and environmental problems, the educators' personality will also have a tremendous influence in the choice of interaction and intervention methods, as well as in personal perception. Our personality, previous life experiences, personal preferences and interests will determine who we are as educators, and who we are is far from being out of the learning process equation. Instead, it is quite an important and determinant part.

As Bedran (2012) and Cury (2003), I'm also a defender that stories are a wonderful and effective way to transmit information, showing how we are "reading" the world, stimulating emotions and, hence, long term memory. Bedran (2012, Chapter 1) stated that stories are a way to awake the curiosity and creative imagination, providing an excellent opportunity to dialogue with the surrounding culture and to exercise one's citizenship. Thus, previously, formality of speech was quite respected but, in this that is a very personal reflection based on a long personal journey, I have chosen to adopt a more conversational style. In this way, I hope to contribute to a moderate incorporation of an emotional character, making it an open invitation to the sharing of personal experiences and debate.

1.1.1 Has environmental education lost focus of its priorities?

Despite the fact that sustainability and environmental goals are far from being reached, it is likely that without EE the current environmental scenario would be much

worse (Saylan & Blumstein, 2011). In fact, many improvements resulted from undertaken efforts, including i) a more holistic view of EE, integrating all the dimensions of human life as well as the ecological dimension, ii) an increase in environmental awareness (Ballantyne, Fien, & Packer, 2001); iii) the recognition, at policy level, that education is essential to achieve a sustainable development (UNESCO, 2014); iv) a stronger presence of EE programs in schools (Ballantyne et al., 2001); v) a stronger presence of environmental issues in national and international policies, reporting a growing concern with sustainability at governmental level (UNESCO, 2014); vi) significant involvement of NGOs and community-based institutions in the environmental cause (UNESCO, 2014); and vii) greater number of institutions, including higher education institutions, concerned with the search of sustainable solutions (UNESCO, 2014). Nevertheless, 40 years should have been enough to achieve more effective changes in the three pillars of sustainable development: environment, society and economy (Gough & Gough, 2010).

Since its early definitions, EE was always conceptualized as continuous education for both adults and youth, not being restricted to students but directed to all citizens (e.g., Declaration of the United Nations Conference on Human Development, 1973; the Belgrade Charter, 1975; the Tbilisi Declaration, 1977). The holistic and multidisciplinary character of EE was also always defended: “science-centered multidisciplinary subject where most – if not all school subjects – could and should be incorporated” (IUCN & UNESCO, 1970, pp. 11, 14); “1. Environmental education should consider the environment in its totality – natural and man-made [*sic*], ecological, political, economic, technological, social, legislative, cultural and esthetic” (UNESCO & UNEP, 1975, pp. 4). In fact, from 1970 to 1987 the foundations (e.g., objectives, guidelines, principles, needs) to what should be a worldwide effective effort in overcoming environmental problems and to develop a sustainable way of life were laid out. The outcomes of further meetings (e.g., summits, conferences, workshops) mainly reinforced or reiterated past commitments and findings, updating them with references to new technologies, recent scientific data and events, or defined new terminologies to already established guidelines or key issues. Most meetings held after 1987 verified that the previous meetings’ goals were not fully achieved and that the environmental situation had worsened (e.g., International Conference on Environment and

Society: Education and Public Awareness for Sustainability, 1997; World Summit on Sustainable Development, 2002). Nevertheless, every meeting was seen as a possibility to promote changes in the non-sustainable course of humanity, a new hope to life on Earth. As decades gone by, no new chapter was actually written in human history but increasing amounts of resources were spent in meetings that were supposed to finally lead humanity to sustainability. Palmer (1998) questioned if we were continuously reinventing the wheel, adding that “Worthy as the outcomes of their [*dedicated groups of people spending a great deal of valuable time devising aims, objectives and guidelines for environmental education*] strenuous efforts may be, they often do little more than replicate the products of previous workshops, conferences and publications” (Part I, p. 3). As stated by Thomas Friedman (2009, Chapter 9), it appears that a green hallucination is currently being lived, not a green revolution.

Herman Daly (as cited in Saylan & Blumstein, 2011, p. 20) said, “If you jump out of an airplane you need a crude parachute more than an accurate altimeter. And if you also take an altimeter with you, don’t become so bemused in tracking your descent that you forget to pull the ripcord”. In fact, we do seem to be lost in a quest for more and more information and knowledge, forgetting to put to good use the important information that we already possess. Documents such as the Declaration of Tbilisi and the Belgrade Charter gave us strong directions and important practical information that are not yet fully implemented and explored. There is no need of a continuous reiteration of what has already been said or of attempts to come up with apparently more erudite ways of stating the same; only the need of effectively applying what we already know.

More than a field of research, EE is a field of intervention. It requires research, of course, and updated information but must not lose itself in the ever-growing intricacies of research possibilities, thus forgetting its goals and main focus. I do agree with Loureiro’s (2004, Chapter 1) idea that without a consistent theoretical frame in the basis of their development, practical interventions may be weakened and wrongfully implemented. However, I also believe that there is already enough information available to sustain effective and good practices. We must be careful and ponder deeply about information gaps that address practical and priority needs and, on the other hand, information that is

not going to add significant value to EE interventions. The first, and only the first, should be immediately addressed.

Augusto Cury says that an educator is a storyteller and that educating is telling stories (Cury, 2003, Part 5). Incorporating that concept, *Figure 1* brings the story of Thomas and his twenty apples as a metaphor to what I believe is happening in EE regarding information needs.

A trip to the orchard

Thomas had to carry twenty beautiful apples from the orchard to his home. For him not to drop any of the apples, a basket was needed. So, he went to his shed and picked a big enough basket. When he was leaving the shed, he noticed that the weather was a little bit chilly. He thought that maybe he should put on a jacket. Suddenly, he also noticed that a dark cloud seemed to be approaching. So, he ran home and dressed a rainproof jacket. After that, he went back to the shed to pick the basket for the twenty apples. When picking up the basket, Thomas realized that it was a little bit rough to his hands. "A pair of gloves is what I need", said Thomas. He chose a comfortable pair of gloves and felt quite ready to, finally, complete his task. Soon enough, he was on his way to the orchard. "There is a dark cloud in the sky but the sun is yet quite strong", thought Thomas, while deciding that what he now needed was a hat. Back to the shed he went. A basket, a jacket, a rainproof jacket, a pair of gloves and a hat later, the apples were still not picked. Now, Thomas seemed more interested in finding out what else he could add to improve his trip to the orchard than in picking the twenty apples, which was the original task. When night came, Thomas was still running between his house and the shed, picking up lots and lots of things that would make his trip to the orchard more comfortable and effective. After a few more hours, Thomas had spent all his energy and couldn't think in anything else besides how tired he was feeling. So, the twenty beautiful apples, which required only a basket to be brought home, were left in the orchard.

Figure 1. Story "A trip to the orchard", a metaphor to alert that EE must not lose focus of its mains goals and guidelines.

Environmental educators must stop acting like Thomas and face that *a basket is enough to bring the apples home*. A vast array of teaching materials and useful theoretical information, including how to evaluate interventions efficacy, is already available. Nevertheless, much is put aside and forgotten.

Environmental education has been seen as a “panacea for almost all social and bio-social ills” (Lucas, 1978, p. 10). So, in face of the severity of environmental problems, the responsibility that lies in EE is a heavy one. EE alone won’t save the world but a significant contribute is still expected.

While there is a consensus about EE’s goals, objectives, guiding lines and principles, there are disputes and doubts regarding not only how to properly implement EE within formal and non-formal education, but also about theoretical assumptions (e.g., the implications for education of the holistic nature of environmental problems) (Gough & Gough, 2010). There are so many theories (arising from the fields of education, psychology and biology) which can be incorporated in EE to explain learning processes, how motivation works, social functioning, etc., that finding a global consensus is almost impossible. Although a greater knowledge regarding behavioral theories and learning processes can be advantageous for the educator, resulting in more effective programs and actions, we must not forget one of the key aspects: knowing your audience, community, and participants. Theories may help the educator but they also may fail in successfully adequate to our group of learners or participants. More important than a vast theoretical knowledge is a practical knowledge of the reality where the educator is going to operate. It is essential for environmental educators to know the community and the audience they are going to work with. We cannot forget that EE has a holistic character, comprehending all of life dimensions and that an environmental educator must be able to go beyond the transmission of scientific information. Educators must keep in mind that providing scientific information without a channel of dialog and community participation may have devastating consequences (Loureiro, 2004, Chapter 1). The richness and meaning of knowledge lie within the interaction between the individuals and their surrounding environment (Medina & Santos, 1999). Information transmission requires an appropriate framework to result in an effective learning. People must be involved in actions where they can see that their contributions have made a difference and where they don’t feel overwhelmed by a great amount of scientific information. Personal and community benefits of the intervention should be emphasized by promoters (e.g., NGO’s, governmental institutions, community associations, etc.) (O’Connel, 2011). Positive results of interventions should also be

publicized, helping to establish direct links between the performed pro-environmental actions and overall benefits, as well as to help participants to see their efforts recognized by their community (Riley, 2008). This will also promote the development of a healthy sense of pride and personal responsibility (O’Connel, 2011). Educators must also be careful in not allowing participants to feel overwhelmed by the environmental problem(s) they are addressing, which may lead to the development of feelings of helplessness and to a resigned, no-action position (Rogers, 2005 in O’Connel, 2011). This may be achieved by transmitting encouraging messages that appeal to positive emotions (O’Connel, 2011) and clearly explain how individual and group actions will have a positive environmental, and community, impact. As Klöckner (2003) stated, “people require information about what to do and how to do it” (p. 1036) and EE practitioners must be concerned with creating a feeling of self-efficacy among the participants. The perception that individual contributions to environmental problems are too small to be of consequence is one of the major obstacles to behavioral changes (Babcock, 2009). On the other side, perceiving individual actions as being of no consequence also leads to people feeling that they are not responsible for environmental degradation (Babcock, 2009). So, educators must be really careful in showing people that what is asked of them will make a difference and, at the same time, that every citizen is responsible for environmental degradation and for their own legacy. As Zaval, Markowitz and Weber (2015, pp. 235) defended

“legacy motives matter deeply for proenvironmental action (...) Prompts that encourage people to think about how they would want to be remembered (or perhaps what they don’t want to be remembered for) may effectively promote environmental behavior by framing decisions as “win-win” for both present and future generations.”

Although more research is required to understand some aspects of normative conduct (Bicchieri, 2010; Cialdini, Reno, & Kallgren, 1990), the influence of norms on behavior should also be taken into account in EE. Research shows that both descriptive (describes what is typical or normal, thus referring to what most people do) and injunctive

(rules or beliefs as to what constitutes morally approved and disapproved conduct) social norms have behavioral impacts (Cialdini et al., 1990; Doren & Larsen, 2016). Personal norms, which are associated to the self-concept and experienced as feelings of moral obligation to perform certain behaviors (Schwartz, 1973; Schwartz, 1977 in Doren & Larsen, 2016), also have an impact on behavior (Doren & Larsen, 2016). Bamberg and Möser (2007) considered pro-environmental behavior to be a mixture of self-interest and pro-social motives, highlighting the mediating role of intention and identifying perceived behavioral control, attitudes and moral norms as significant predictors of intention. The same authors stressed that knowledge is necessary but not a sufficient precondition for the development of pro-environmental behavior, moral norms and attitudes. In fact, the activation of moral norms depends on cognitive, social and emotional factors, including social norms, awareness, feelings of guilt and internal attribution (Bamberg & Möser, 2007).

Cialdini et al. (1990), performed several studies to assess the impact of social norms in a specific human behavior, concluding that:

“Our view is that what is normative (i.e. most often done or approved or both) in a society, in a setting, and within a person will, in each case, have demonstrable impact on action, but that the impact will be differential depending on whether the actor is focused on norms of the culture, the situation, or the self” (p. 1025).

Doran & Larsen (2016) presented similar conclusions, emphasizing the role of personal norms that presented “the strongest association with behavioral intentions”, mediating “the link between injunctive social norms and behavioral intentions” (p. 165). The relevance of norms, especially personal norms, was also highlighted by Stern and Dietz that proposed a value-belief-norm (VBN) theory (Stern, 2000; Stern & Dietz, 1994) that establishes a causal chain of variables leading to behavior, including personal values, beliefs and personal norms for pro-environmental action (Stern, 2000; Stern & Dietz, 1994). According to this theory,

“altruistic (including pro-environmental) behavior occurs in response to personal moral norms that are activated in individuals who believe that particular conditions pose threats to others (awareness of adverse consequences, or AC) and that actions they could initiate could avert those consequences (ascription of responsibility to self, or AR)” (Stern, 2000, p. 412).

Though personal norms are extremely important, the impact of any individual’s personal behavior is only environmentally significant in the aggregate, i.e., when many people independently perform the same behavior (Stern, 2000). Each person doing its part is important but only when associated to a collective movement (Guimarães, 2014). Thus, it is important to implement EE activities that will contribute to the development of both personal and social norms associated with pro-environmental behaviors. This is not new, as it has always been defended that EE should aim at producing a citizenry that is environmentally and socially knowledgeable and caring. It is also possible to find several examples of EE actions, especially in waste management/recycling campaigns and programs, which aim the promotion of social and personal norms in order to contribute to the adoption of the desired behaviors (O’Connel, 2011). Nevertheless, with most of EE efforts focusing on students and schools, there seems to be a tendency in not considering committed interventions in community a priority. Community-focused, long-term interventions, aiming to develop social norms that would favor the adoption of pro-environmental behaviors by the community members, must become a priority in EE. In their study, Ardoin, Clark & Kelsey (2012) concluded that a shift of focus from individuals to communities is already occurring in EE arguing that, instead of being a new path, this is a return to the roots of EE as envisioned in the Tbilisi Declaration.

For EE educators to be able to establish programs with an effective impact in the development of personal and social norms, they have to be operating within a community for a long period of time. Sporadic and short-term activities will not grant the educator a position of trust within the community and will not lead to the desired level of commitment.

EE actions must also promote connectedness to nature, as connection to nature is a key component of fostering ecological behavior (Ernst & Theimer, 2011; Mayer & Frantz, 2004). Time and frequency are strong predictors of affinity to nature (Kals, Schumacher, & Montada, 1999; Schultz & Tabanico, 2007), leading to more meaningful experiences. Hence, extended EE programs are more likely to lead to change (Rickinson, 2001; Zelezny, 1999).

A responsible management of resources, including human and financial resources, should reflect these findings by directing efforts to programs that offer a long-term experience, rather than to sporadic activities. Strengthening the continuous character of EE is of the essence to achieve the needed individual and social changes.

1.1.2 Are funding programs a bias factor in EE development?

Environmental education is not exclusively meant for school population and youth, but for all population and all social actors, occurring in a wide range of settings – formal, non-formal and informal (Fien, 2012 in UNESCO, 2014). All should receive an equal amount of effort and if we have to choose specific audiences to direct the majority of efforts, we should select those who are already in decision-making and decision-influencing positions. The Tbilisi Declaration highlighted the following target audiences, not distinguishing students as a main priority (UNESCO & UNEP, 1978):

“Environmental education should cater to all ages and socio-professional groups in the population. It should be addressed to (a) the general non-specialist public of young people and adults whose daily conduct has a decisive influence on the preservation and improvements of the environment; (b) to particular social groups whose professional activities affect the quality of the environment; and (c) to scientists and technicians whose specialized research and work will lay the foundations of knowledge on which education,

training and efficient management of the environment should be based” (Recommendation nº 1, principle 9)

It is essential to redirect efforts to bring back the focus on intervention and to equally include all the EE target audiences. Intervention has to integrate some general, but indispensable steps: assess the community and getting to know it, identify environmental problems, select those to act upon, identify social actors/stakeholders, structure two plans – implementation (that will probably suffer alterations, evolving over time) and evaluation –, and start their implementation. These steps should be integrated in a similar process as the one translated by the Plan, Do, Study, and Act (PDSA) Cycle (*Figure 2*). The PDSA cycle values evaluation and learning in order to continuously improve a process or product (<https://www.deming.org/theman/theories/pdsacycle>). Planning is encouraged to be based on theory and improved through the data provided by its practical implementation.

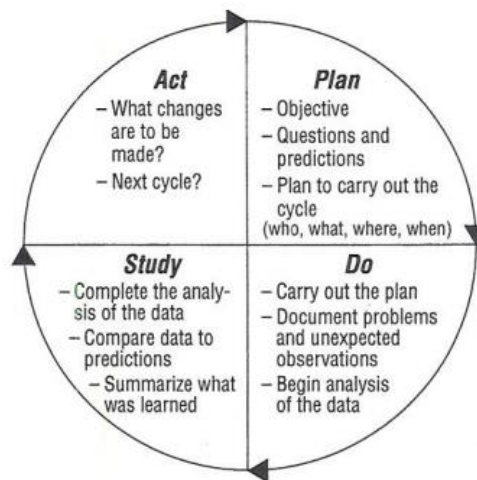


Figure 2. PDSA Cycle, composed of four interconnected steps: plan, do, study and act (Moen & Norman, 2009).

In this process we need to keep in mind that we don’t always have to do actions that will amaze everyone. If a simple action is what is required to solve the identified environmental problem, then a simple action should be implemented. Of course, it is quite easy to say this but the pressure for producing spectacular events that will capture media

attention and for proposing innovative approaches in order to get funded is quite strong. More than demanding innovative proposals, funding programs should demand for effective ones. If it is simple, not requiring a large amount of resources, but it solves the problem and allows to achieve the proposed goals, it should be our choice. The way in which the majority of funding programs is structured is, in my opinion, becoming one of the main reasons why EE is being implemented focusing only few of the aspects it should. Most funding programs still present school population as a priority, forcing organizations to present projects that direct EE efforts towards this specific audience. Although quite present in nature protection and conservation funding programs (Wagner, Fagot, Verré, Doler, & Vogrin, 2011), EE is not yet seen as a powerful social intervention tool (or field). In many major European funding programs, EE still appears as an indirect goal and possibility, linked to the preservation and protection of natural ecosystems and/or species. As it happens in the European Regional Development Fund (ERDF), which aim to strengthen economic and social cohesion in EU, for example, EE is seen as a tool to help raise environmental awareness that will contribute to nature preservation and conservation, leading to the long-term maintenance of the ecosystem services from which economic growth is dependent on. Thus, and even in programs that aim sustainable development, the focus is on economic growth. Despite recognizing that EE is clearly an objective of ERDF regulations and one of the most frequently funded measures, Wagner et al. (2011) also report issues that reflect a secondary role for EE in this fund:

“All of these nature investments need to be accompanied by communication measures, which leaves room for environmental education activities. However, the regional project allocations of these funding opportunities varies enormously across Europe. Unfortunately, only a small share of this money was invested in environmental education activities and environment education measures are often not well targeted and the results not easy to measure”

Throughout the years, the Life Program, the EU's funding instrument for the environment and climate action, has included EE in its array of actions to be funded (European Parliament & EU Council, 2013; European Commission [EC], 2016). The fourth phase of the LIFE program implementation (2007 – 2013) comprehended three components, being one of them (LIFE + Information and Communication) specific to communication and awareness-raising campaigns (EC, 2016). Nevertheless, the funds allocated to the components where EE was integrated corresponded to a small percentage of the global budget (EC, 2016). As it happened in previous phases, the regulation for the fifth phase of LIFE's implementation (2014 – 2020) doesn't directly mention environmental education. It refers communication, information and awareness campaigns and activities, which may encompass EE activities but also others that do not fully integrate EE's guidelines. Within the main European funding programs, EE tends to be focused on awareness campaigns and information dissemination, being present in association with the promotion of a more eco-friendly tourism, environmental restoration projects, specific issues (e.g., included in the European Fisheries Fund if relevant to fisheries management) and still extensively linked to schools and youth (WWF, 2005). Students are offered more structured EE programs than other audiences, to which the actions are more focused on impersonal campaigns that include leaflets and brochures distribution, TV spots, websites, among other media-prone activities (WWF, 2005). The fact that in these major funding programs EE is mainly implied but not directly addressed, and specific orientations to promote its efficacy are not provided, contributes to a very diffuse and ineffective implementation of EE. Adding to this the fact that many require as evaluation data only i) the number of participants, ii) performed actions and iii) produced materials, it is quite difficult to assess if projects are indeed being effective or not.

Funding programs that directly address education, allowing the development of structured and directed EE programs, normally are focused in schools and science education and allow a very limited duration for projects. It is quite frequent to encounter programs that finance projects with a maximum duration under or equal to two years (e.g., projects funded by *Ciência Viva* through programs like *Escolher Ciência*). As mentioned before, the reduced duration is quite counter-productive.

Funding programs can constitute a great way to help EE to reconnect with its intervention priorities and necessities, but they need to be more directed and specific. EE must be given the rightful relevance in programs that aim sustainability (ecological, social and economic). EE specific funding programs that require structured, and not only highly impersonal actions, for several social actors, demanding for a dominant intervention character and proper evaluation are very much needed.

Since they need to receive funds, educators will follow funding programs recommendations. Thus, the EU and national governments have the responsibility to develop funding programs that will give a significant contribute to the proper implementation of EE according to the already established guidelines, goals and principles. In a generic way, indirectly or sporadically mentioning EE does not cover that responsibility and contributes to the prevalence of bad practices and to misapplication of resources. EE projects should also be periodically evaluated and those proven to be more effective should receive further funding to continue to make a difference. Throughout time, this would reinforce good practices and reduce waste of productive work.

Funding programs must reflect the nations' commitment with EE, already stated in so many international and national meetings. They must be responsibly structured and elaborated taking into account current needs. Corresponding to the accepted commitment is not only to make money available, but to make sure that EE is being fully and correctly implemented, and resources well spent.

1.1.3 Environmental education's integration in the school system: a success or a goal not yet fully achieved?

Although EE in school context is not the focus of this thesis, it represents a dominant reality of the field. Thus, a critical overview of EE could not be performed without including it.

At the end of the UNESCO Decade for Sustainable Development (2005 – 2014), it was concluded that “a full integration of education for sustainable development³ into the education systems has yet to take place in most countries” (UNESCO, 2014, pp. 10). Rauch and Steiner (2006) also concluded that despite the fact that EE can constitute a strong trigger for the introduction of beneficial innovations in the educational system, EE wasn’t still fully and properly implemented in schools. In 1990, Hungerford and Volk already alerted to this situation, stating that “there appear to be few concerned nationally focused efforts that prepare future citizens (...). As a result, only a fraction of our young learners is being exposed to logically developed, well-articulated EE programs” (p. 266).

Despite all the recommendations that EE should be a continuous and integral part of all stages of formal (and non-formal) education (e.g., The Belgrade Charter, 1975, and Tbilisi Declaration, 1977), short or medium-term projects, as well as sporadic activities, appear to be prevalent ways of implementing EE in schools. These actions are frequently implemented by external entities and made available by specific funding programs. After the funding is over, there is no assurance that another one will be secured. This is a situation that also happens in cases of EE actions directed to other audiences. Thus, and in general, EE implementation has a highly precarious character.

I’ve already participated in the implementation of several EE projects and, after a great effort to be trusted by students, teachers and parents, and to captivate participants’ interest, we saw the projects end exactly when they would start to produce more effective results. Trust, motivation and high levels of active participation and interest take time to develop. Getting an entire school community to trust us, to value our work and to be willing to participate at increasing rates is not easy and takes time. It is quite sad when a student that, initially, had no interest, comes to us and says “I would like to talk to you because I have some ideas for the project’s development in the next year” and we have to tell him that there will be no project next year. To the following questions, “Then what are we going

³ In this discussion, due to the similarities and developmental connections, education for sustainable development and environmental education will be used as synonyms. As stressed out by McKenzie (2008) “The point is not what we call what we do, but how we understand and practice it, where it maps onto other approaches and where it does not, where we might usefully extend our palette of pedagogical “arts” or “places,” and how we too, as educators and researchers concerned with the social and the ecological, can coalition build at a range of scales” (p. 369).

to do next year? Will someone else come to work with us? Are you going to come back with another project?”, all we can answer is “We don’t know.”. We then have to stand there and see students lose all of their motivation because, after all, “it doesn’t make any difference”. Then we try to make them understand that their ideas are important and that teachers will remain with them, paying attention to what they have to say and helping throughout their path of environmental discovery. But, in reality, all we are seeing is that our efforts and achievements will fade and that when someone else comes to implement EE actions (if it happens), they will have to start all over again. This is an incredible waste of time and resources.

Unpublished results of an inquiry applied to teachers during the development of EE projects’ in school context showed that all of them believed that external entities should be responsible for the development of EE actions for the school population. Only two teachers defended that the school should also be responsible. The most frequent justifications for this choice were: i) the extension of the curricular programs; ii) schools’ lack of resources; iii) professors’ lack of specific training; iv) the belief that external entities and professionals are better qualified, regarding technical human resources and training materials; and v) the belief that external entities and professionals will capture the students’ attention in a more effective way.

Regarding schools, it is now my opinion that EE actions should not be mainly implemented by external entities. When it comes to formal education, the Minister of Education and educational establishments should be responsible for the full integration of EE in the learning process. Fully trained environmental educators should already be a reality in formal education. The integration of EE as a subject in school curricula would allow the elimination of this harmful precarious character of EE actions. This is an idea that I’ve already defended in my master’s thesis, as well as the indication that EE as a subject could not follow the template of the already existent formal subjects, requiring a specific and adequate functioning mode (Silva, 2008). Besides helping to overcome precarity, this would also allow to overcome other obstacles to the integration of EE in schools, including the lack of time and of specialized professionals (Silva, 2008). Regarding human resources management, this would also, in my opinion, be advantageous. We cannot afford to have

the majority of human resources allocated to students. Students already have access to several teachers and other professionals, as well as to a high diversity of teaching materials, during their formal education path. If, besides that, we still direct the majority of environmental educators and researchers from several organizations, including NGO's and universities, to develop work with schools and students, there will not be enough educators to work with the community at the needed levels. These professionals should be focusing on others audiences that don't have a direct and daily access to teachers and teaching materials. Even teachers and schools should make additional efforts to reach out to the community, including students' family and close community, to increase the students' encouragement in adopting pro-environmental behaviors (Chawla & Cushing, 2007). So, if future teachers would receive training in EE, acquiring the knowledge and skills to be environmental educators, and if EE was a mandatory subject in school curricula, environmental educators outside the school system could be more focused in working with other audiences. Resource management is essential to make sure that all the priorities are receiving the required attention. Throughout the years I've heard many professionals defending that EE should focus on schools because "it's an easier audience to work with", "students are more receptive to participate, having more time available", "adults are not receptive because they believe EE is for children in schools". These claims, that are direct quotations, really concerned me because they reflect a search for easy paths and the perpetuation of an extremely wrong concept – EE is only for children and restricted to school's population, not being of interest to anyone else. If this is an idea that is present within the population and if educators enable it by choosing the easiest path, EE's success is forfeit. The possibility of integrating EE as a subject in the school curricula has been debated for a long time, and many are those that are against it. In 1985, UNESCO and UNEP, in an environmental education module, stated the following:

Environmental dimensions may be incorporated in the school curriculum in different ways. Environmental studies may be introduced as a special subject, which may be taught by specially trained teachers. But this may be overburdening the students with one

additional subject and they may be averse to it from the beginning. Alternatively, the content of environment education may be broken into units. These may be merged with different subject areas like, biology, geography, history, etc. spreading over the whole secondary-school term. It would still be better if instead of units, the concepts were integrated into different subject areas. But incompetent teachers in both cases may make the teaching of these units on concepts just incidental without making environmental issues relevant to the students' life. For tackling this problem, a national advisory committee on environmental education may be constituted at the national level who would help in designing the proposed courses (Stapp, 1971). Teachers may be trained accordingly" (p.14).

Kymario (2011), in a study regarding EE integration in primary schools in Tanzania, focused some interesting points that I believe to be also relevant in other realities, including the Portuguese one, namely: EE is not integrated on equal footing in all subjects, and teachers focus the aspect of knowledge acquisition. In this study, teachers also reported difficulties in transversally integrating EE in the school curricula and that the way to do it was not shown clearly (Kymario, 2011). According to them, the way to ensure that EE is taught properly in schools would be to include it in the curriculum as an independent subject or, at least, through specific topics (Kymario, 2011). When addressing the possibility of EE as an independent subject, Kymario (2011) states that EE would have to be taught like the other subjects, which I don't agree with. As I said before, EE as a subject would have to have specific characteristics in order to maintain its holistic and interventional character. The Tbilisi Declaration already alerted to the fact that EE cannot be treated as simply one more subject to add to the school curriculum, requiring the adoption of new concepts, methods and techniques (UNESCO & UNEP, 1978, p.20):

"Environmental education should not be just one more subject to add to existing programmes but should be incorporated into programmes

intended for all learners, whatever their age. A new joint pattern of work must be drawn up, involving home, community and school, to introduce young people to environmental issues.”

“(the success of environmental education) requires the application of new concepts, new methods and new techniques as a part of an overall effort stressing the social role of educational institutions (...)”

Saying that EE can't be “just one more” subject doesn't mean it can't be one; it means it can't be like the already existing ones, reflecting the also mentioned necessity of applying new educational modalities.

Presenting different recommendations for different educational levels, the Tbilisi Declaration also recommended that “Secondary schooling should take the pupil on to a more ecologically, socially, politically and economically based application of ideas about the environment” (UNESCO & UNEP, 1978). So, more than a theoretical subject, EE would have to be a practical one, challenging students to act in the community, while discovering how to interpret the surrounding environment. The teacher (environmental educator) would be a facilitator, motivator and advisor, but not the only producer of information, that should be mainly gathered through practical experience, peer-to-peer instruction and by a motivated individual search. The teacher should provide opportunities for the student to learn independently and to acquire skills to do so effectively (Michael, 2006). By sharing the responsibility in decision-making and by not providing all the answers, the teacher would be preparing students to participate in a democratic society (Mogensen, 1997). We must be prepared for change and for an initial difficulty in integrating it in our lives. However, we must accept that without profound changes we will have to face the hardest of them all, without choice.

In my opinion, EE should be integrated not as weekly subject but following the general guidelines presented on *Figure 3*. I would like to point out that devising an implementation method for the integration of EE in the school curricula as a distinct subject was not the aim of this thesis and, hence, *Figure 3* reports only the general idea that I defend.

Environmental Education as a subject in formal education – general guidelines for implementation

- 1) EE as a subject should not be structured as the already existent formal subjects;
- 2) EE subject's curriculum should incorporate main goals, guidelines and key themes but it shouldn't be extensively specific, allowing for students and teachers to complete the curriculum taking into account their communities' reality;
- 3) The goal should be for each group of students to develop and implement a pre-determined number of community-directed projects that would address specific environmental issues identified and selected by the students with the help of EE teachers';
- 4) After this selection, a work plan should be established for each group of students. Within the work plan, a chronogram, detailing timelines for each necessary action, should be elaborated. Students would have full responsibility in meet the proposed schedule;
- 5) Instead of a formal schedule for the subject, the teacher would be available to clarify doubts, help and monitor the development of the groups' work, to participate in activities, to perform meetings with the students and with other social actors that would be part of the students' projects. In order to engage students' participation and to explain the subject's functioning, initial meetings where the teacher would have a predominant role would have to occur;
- 6) Students should have an active role, preparing group projects and moments of peer-to-peer instruction, as well as taking several important decisions. The time allocated to each project would be of their responsibility;
- 7) The school and teachers involved should be responsible for publicizing the students' projects and respective results, within the community and to the media;
- 8) A budget should be allocated to the subject (for the development of the students' projects) but, especially in the cases of more expensive projects, teachers and students should actively search for other sources of funding;
- 9) The required number of EE teachers should be calculated for each school taking into account the number of students.

Figure 3. Proposal of general guidelines for integrating EE as a distinct subject in school curricula.

More than addressing environmental topics in several subjects, I believe, as other researchers (e.g., Ayres, 1999; Haigh, 2006; Rickinson, 2001; Robson, 2002), that it is necessary to involve students in field work that will put them in direct contact with reality and help strengthening their connection with the surrounding environment. Allowing

students to go beyond the school gates will also contribute to stop students from thinking they can forget what they have learned as soon as the class or course ends (Haigh, 2006). The proposed guidelines also emphasize the interventionist perspective, as defended by Mogensen (1997), thus promoting a pro-active behavior in the resolution of environmental problems. Fien (1997) defended that EE should foster the development of caring for others and nature, highlighting that we forgot what it was to be cared and care for. He also pointed out that educational approaches “fail to consciously and deliberately teach young people to care for each other, other creatures and for the natural world” (p. 438). According to Noddings (1984 as cited by Fien, 1997),

“Schools give some attention to environmental problems, but they are not giving enough to the development of caring human beings.... Students in today's schools do learn about ecosystems and food chains, and about extinction and habitat preservation. But the problems they tackle are often focused on faraway places... They do not learn to work through sophisticated political processes to make the measurable improvements— sometimes small ones. If they knew how to do this, they might be able to plan for a continuous series of small changes that would make a significant difference” (p. 438).

Besides emphasizing the interventionist perspective, the proposed guidelines also aimed to reinforce the promotion of the ethical dimension that, when compared with knowledge and behavioral components, has received less attention (Nazir, 2014). As defended by Fien (1997) and Martin (2007), I also believe that a care-based thinking can contribute to more environmentally and socially concerned citizens, prone to act in favor of human and non-human wellbeing and in defense of nature. Living experiences that provide a direct contact with nature, the community, and an active role in addressing environmental problems that are part of the students' reality can contribute to enhance the development of a caring ethic, an idea also patent in the research work performed by Nazir (2014).

This model would also approach school and community, establishing an open subsystem where school and the community would be in a constant interaction and beneficial exchange of knowledge (Medina & Santos, 1999, Chapter 1). The involvement of the community's own youth (the students) would contribute to a higher acceptance of the environmental message and higher level of participation in the activities (Grodzińska-Jurczak, Tomal, Tarabula-Fiortak, Nieszporek, & Read, 2006). This would also allow for a meaningful learning to occur, by emphasizing the affective dimension, essential to the construction and evolution of knowledge, and by allowing what the students and the community already know to be a part of the process (Medina & Santos, 1999, Chapters 2 and 3). In a review about climate change and energy education, Jorgenson, Stephens, & White (2019), defined key aspects of EE implementation in schools:

- EE educators and researchers appear to be more focused on individual behavior, strengthening a private and individualized sphere of action and causing a disconnection from collective actions;
- Need to provide students options for active participation within the public sphere, and include a broader social network composed of several different actors (e.g., policy makers, researchers, families, among others);
- Proposed actions should aim to include local, tangible, and actionable aspects;
- Actions should ensure long-term engagement and offer a broader knowledge framework, encompassing multidisciplinary points of view.

These key aspects, fundamental to ensure the participatory character of EE and for the development of active citizens, are consistent with the proposed general guidelines (Figure 3). Responsibility is given to the students, as well as a way for a positive and active intervention in their communities, allowing for a multi-actor collaboration in the development and implementation of well-informed practices. Environmental education, in formal, non-formal or informal contexts, must be guided by the idea that “theory without practice is an abstract rational exercise without a real effect, practice without theory is activism that doesn’t work in processes aiming for change” (Loureiro, 2004, p. 101). Thus,

the acquisition of information is not neglected but provided through several individual and collective paths (e.g., individual research, peer-to-peer instruction, dialogue with researchers), and with a view to practical application.

Reflecting about the first 10 years of the journal *Environmental Education Research*, Reid and Scott (2006), verified that the majority of the presented research was focused on schools. In fact, EE efforts are still mainly focused on schools, the majority of which directed to pre-school and elementary levels (Schmidt et al., 2012), and strongly focused in natural sciences. According to Jorgenson et al. (2019), these choices are many times justified with the future: children and youth will be the most affected generation and, when in their adult lives, also the responsible for future decisions. The need to assure that EE is an integral component of children's formative process is not to place the responsibility of saving the environment on children, what would be completely selfish and unethical. What is expected from those children is that they will have the knowledge, skills and will to continue to preserve the environment and to promote a sustainable way of life after we, in the present, have achieved those very goals. But, continuously, the final verdict is left to a distant future. Regarding the environmental crisis, we are time-bounded and cannot lay our hopes in some distant future, under penalty that there won't be one. Children are indeed the future, but it is up to us, *the grownups*, to make sure that they will have one to protect and preserve.

2. Conclusion

As Butler & Friel (2006) defended, sustainability was to be honored by promise rather than action. Many important concepts and methodological categories have become so common and recurrent in projects' theoretical fundamentals that they have become empty of meaning (Loureiro, 2004, Chapter 1). Lost between non-binding agreements and commitments, choices based in misconceptions and hidden agendas, EE was left adrift, becoming more a label than a reality. But leaving one of humanity's most important hopes adrift is not wise and has already caused severe negative impacts. Sustainability is still a

faraway reality (or dream) and EE is falling short when compared to what was expected. It is imperative that EE regains focus in intervention, long-term programs, and in reaching society as a whole instead of selecting some easier audiences to work with. Addressing real problems within communities and facilitate a path by which individuals can perceive their value and the direct effects of their actions in problem-solving is also crucial.

Environmental education can be an important key not only to achieve ecological sustainability, but also in the direct promotion of human wellbeing, leading to a healthier environment and healthier people. As Barton (2009) stated “Lifestyles are becoming increasingly characterized by sedentary behaviors, obese statures, stressed states, mental ill-health and a growing disconnection from nature” (p. 261). Environmental education can reconnect people with nature, providing access to ecosystem services and enhancing their role in human wellbeing. Additionally, a greater awareness of nature benefits to human wellbeing can foster pro-environmental attitudes and greater support for nature conservation and sustainable policies. Thus, EE educators must seek to establish this mutual beneficial relationship between the ecological and social dimensions, adopting a socio-ecological approach where EE and environmental sciences work in cooperation with landscape management, urban planning and public health. Indeed, regarding many aspects of this socio-ecological approach, more research is still needed. However, saying that more research is needed does not mean that nothing can be done until we know everything there is to know and to find out about an issue. We know more than enough about EE and nature’s role in human wellbeing to act in effective ways. More research is needed to allow continuous improvement but this need should not be used as an excuse to postpone action. As Maller et al. (2006) stated, regarding nature as a health resource,

“Whilst the extent to which contact with nature can contribute to human health and wellbeing is in need of further investigation, the strength of this evidence alone is sufficient to warrant inclusion of ‘contact with nature’ within population health strategies, and for parks to be considered a fundamental health resource in disease prevention for urban populations worldwide” (p. 49).

Redirecting efforts towards community-focused projects, following a socio-ecological approach and assuming a strong interventional character, will also contribute to renew public trust and support. Evaluation must be a permanent partner of EE, providing data to help policy makers and deciders to make the best possible decisions, and to promote the continuous improvement of EE. As millions are spent annually in EE and conservation, accountability is a necessity and evidence of effectiveness must be provided (Keene, 2010). A culture of evaluation must be a norm within EE programs and educators, as it is essential for the selection and development of effective EE strategies (Keene, 2010).

Environmental education can indeed be a determinant key for a sustainable future but for this to happen, significant and hard changes will have to be made. The responsibility to alert population and to help society press governments to make the right and needed decisions primarily falls to the academia. We must stop building up knowledge without actually applying it. Academic controversy, mixed messages and political posturing are frustrating the public (Lowe et al., 2006). As Keene (2010) said, the fact that so many controversies still occur within EE community, leading to endless debates, is quite troubling because there is no time to waste.

Many have given wonderful and important contributes to guide EE and the world towards the path of sustainability. It is time to put them to good use.

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Appendix A

Nature relatedness scale: translated versions

Escala de vínculo com a natureza (NRS)

Instruções de preenchimento: Classifique o seu grau de concordância com cada uma das afirmações seguintes, usando a escala de 1 a 5, como indicado em baixo. Por favor, responda de acordo com o que realmente sente e não como acha que a maioria das pessoas se deverá sentir.

1 Discordo Fortemente	2 Discordo um pouco	3 Não concordo nem discordo	4 Concordo um pouco	5 Concordo Fortemente
-----------------------------	---------------------------	-----------------------------------	---------------------------	-----------------------------

- | | |
|---|--|
| <p>1. Gosto de estar no exterior, mesmo com mau tempo. _____</p> <p>2. Algumas espécies estão simplesmente destinadas a morrer ou extinguirem-se. _____</p> <p>3. Os humanos têm o direito de usar os recursos naturais como quiserem. _____</p> <p>4. O meu local ideal para férias seria numa zona remota e selvagem. _____</p> <p>5. Penso sempre no modo como as minhas ações afetam o ambiente. _____</p> <p>6. Gosto de cavar na terra e ficar com as mãos sujas. _____</p> <p>7. A minha ligação com a natureza e o ambiente faz parte da minha espiritualidade. _____</p> <p>8. Estou muito consciente das questões ambientais. _____</p> <p>9. Reparo na vida selvagem onde quer que eu esteja. _____</p> <p>10. Não costumo sair para a natureza. _____</p> <p>11. Nada do que eu faça terá impacto nos problemas existentes noutros locais do planeta. _____</p> | <p>12. Eu não existo de forma separada da natureza, mas sim como parte integrante da natureza. _____</p> <p>13. A ideia de estar embrenhado(a) na floresta, longe da civilização, é assustador. _____</p> <p>14. Os meus sentimentos acerca da natureza não afetam a forma como eu vivo a minha vida. _____</p> <p>15. Animais, aves e plantas devem ter menos direitos do que os humanos. _____</p> <p>16. Mesmo no meio da cidade, reparo na natureza à minha volta. _____</p> <p>17. A minha relação com a natureza é uma parte importante de quem eu sou. _____</p> <p>18. A conservação da natureza é desnecessária, porque a natureza é forte o suficiente para recuperar de qualquer impacto humano. _____</p> <p>19. O estado das espécies não-humanas é um indicador do futuro para os humanos. _____</p> <p>20. Penso bastante acerca do sofrimento dos animais. _____</p> <p>21. Sinto-me bastante ligado(a) a todas as coisas vivas e à terra. _____</p> |
|---|--|

Escala de vínculo com a natureza (NR-6)

Instruções de preenchimento: Classifique o seu grau de concordância com cada uma das afirmações seguintes, usando a escala de 1 a 5, como indicado em baixo. Por favor, responda de acordo com o que realmente sente e não como acha que a maioria das pessoas se deverá sentir.

1 Discordo Fortemente	2 Discordo um pouco	3 Não concordo nem discordo	4 Concordo um pouco	5 Concordo Fortemente
--	--	--	--	--

1. O meu local ideal para férias seria numa zona remota e selvagem. _____
2. Penso sempre no modo como as minhas ações afetam o ambiente. _____
3. A minha ligação com a natureza e o ambiente faz parte da minha espiritualidade. _____
4. Reparo na vida selvagem onde quer que eu esteja. _____
5. A minha relação com a natureza é uma parte importante de quem eu sou. _____
6. Sinto-me bastante ligado(a) a todas as coisas vivas e à terra. _____