UNIVERSITY OF PADOVA

Department of General Psychology

Bachelor's Degree Course in Psychological Science

Final dissertation

The relationship between Wayfinding inclinations, Connectedness to Nature and Pro-environmental Attitudes and Behaviours

Supervisor: Veronica Muffato

Candidate: **Chiara Cattozzo**

Student ID number: **1223577**

Anno accademico 2022/2023

Table of Contents

1. Introduction

Nowadays, we are actually overwhelmed by the environmental crisis: the shortage of natural resources, endangered species, polluting emissions, climate crisis, and so on. Time ago scientists raised the alarm in a desperate call for consciousness, but society has not completely faced the issue yet. Fact is that in this consumeristic and exploiter of nature world, who loses out is not only nature, but everything that lives on earth, humans too. The carelessness of society flanks people's pressure to do something to "save" themselves from the world going to ruin. Not surprisingly, we have always talked about what each one of us could do in our small to limit this self-destruction and to give back space to nature. For the note, literature dug into pro-environmental attitudes and behaviours of people also to understand the extent to which individuals actually act in such view; it investigated in which way individuals feel part of and connected to nature; it searched for possible relations that could enlighten those individual characteristic variables that feature a respectful and caring approach to nature. Various studies could light up certain routes to follow, bringing some significant results. This is still not sufficient though and more research in the field is needed. In fact, this research wants to bring to light further information about possible connections among pro-environmental attitudes and behaviours, connection to nature and wayfinding inclinations in the environment. Connectedness to nature and wayfinding inclinations have been considered as individual characteristics related to the environment that may show a link with pro-environmental attitudes and behaviours. People that enjoy nature and are able to orient within the environment may indeed act responsibly for the environment. Participants consisted of Italians aged 18-58 years old, for a total of 182 people (I have personally tested 135 of them). Individuals answered anonymously the questionnaire comprising 8 different questionnaires, presented in random order. Questionnaires were: Introductory Questionnaire (adapted from De Beni et al., 2008); Pro-environmental attitudes questionnaire (New Ecological Paradigm, NEP, Dunlap et al., 2000); Pro-Environmental Behaviours Scale (PEBS, adapted from Markle, 2013 and from Menardo et al., 2020); Connectedness to Nature Scale (CNS, Mayer & Frantz 2004); Questionnaire of Attitude towards Orientation Tasks (AtOT, De Beni et al., 2014) and Spatial Orientation Short Questionnaire (SOSQ; De Beni et al., 2014; Pazzaglia & Meneghetti, 2017). I have personally analysed the aforementioned questionnaires, but participants have also filled out the Spatial Anxiety Questionnaire (SA; De Beni et al., 2014) and the BIG-5 inventory, Italian version (translated from Ubbiali et al., 2013) which have not been analysed in this paper.

The procedure took place online, through a video call, during which the participant fulfilled the questionnaire autonomously.

In chapter 1 is illustrated the literature that dealt with pro-environmental attitudes and behaviours, connection with nature and wayfinding inclinations. Chapter 2 explains the present research and corresponding results, while in Chapter 3 is found the discussion of results in the light of the starting hypothesis.

CHAPTER 1.

2.1. Individual differences in pro-environment attitudes and behaviours

Conservation psychology is the scientific study of the reciprocal relationships between humans and the rest of nature, with the goal of encouraging conservation of the natural world. This new field of psychology is oriented towards the conservation of ecosystems and resources, and quality of life of humans and other species. Such a wide interest digs into both the attitudes of people towards the natural environment, and the actual behaviours that are performed in such a pro-environmental view. Actual pro-environmental behaviours, or environmentally significant behaviours, are defined as behaviours that harm the (natural) environment as little as possible or that contribute to its protection (Menardo et al., 2020). As the Value-belief-norm theory (Stern et al. 1995, 1999; Stern, 2000) asserts, the performance of pro-environmental behaviour is conditioned by different factors: personal values and norms, environmental orientation, beliefs about environmental conditions, and individual agency. By taking this into consideration, the most reliable, valid and used instrument to measure pro-environmental behaviours was developed: PEBS (Markle et al., 2013). To complete the sphere of conservation psychology, among the reviewed literature, pro-environmental attitudes are addressed typically through questionnaires. Indeed, for attitudes, the most recognized instrument is the New Ecological Paradigm (Dunlap et al., 2000). The NEP scale is considered a measure of environmental worldview or a paradigm (framework of thought), able to measure pro-environmental attitudes. With the new-ecological paradigm is intended a worldview that endorses pro-ecological attitudes, compared to a dominant social paradigm that reflects a weaker concern for environmental matters. A growing body of research has used the NEP and the PEBS scales. Previous studies addressed the correlation between pro-environmental behaviours and pro-environmental attitudes. For instance, Prati and colleagues (2017) administered a questionnaire that measured environmental attitudes, pro-environmental behaviour, social identity, and pro-environmental institutional climate, in 2 different time-periods of 2 months of distance. The sample used was university students, mainly females. Contrary to what was expected by the value-belief-norm theory of Stern, attitudes and social identity didn't impact pro-environmental behaviours, and at the first assessment point, pro-environmental behaviour did not predict later environmental attitudes. These findings suggested that attitudes, identity, and perception are not sufficient to influence conservation behaviours. Among the studies that used NEP and PEBS scales, some specified gender

differences, a variable of individual differences. Such papers are reported below in the next paragraph.

2.2. Gender differences in pro-environmental attitudes and behaviours

In 1994, Stern and Dietz tested empirically a theory that links values, beliefs, attitudes, and behaviour within a framework that activates personal environmental norms. They noticed that behavioural intentions were affected directly and indirectly by gender. More precisely, behavioural intentions were stronger in females who saw more negative consequences of environmental degradation for themselves, other human beings, and the biosphere. Shifting the focus on behaviours, a paper of Menardo et al. (2020), analysed the Italian version of PEBS. They found that metric and scalar invariance suggest that items are perceived in the same way independently of gender, educational level, and geographical provenience, and the same meaning is attributed to the measured behaviour independently of the same mentioned factors. Similarly, the bidirectional relationship between social well-being and energy conservation behaviour as a form of pro-environmental behaviour did not differ between men and women in the study of Prati et al. (2017). In addition, with the same data, Prati et al. (2015) among the variables used in the longitudinal study, cross-lagged relationships did not seem to differ across gender. Among the most studied factors in individual differences besides gender, is personality traits. For instance, (Soutter & Mottus, 2020) Openness was consistently and highly correlated with pro-environmental attitudes and behaviours, and facets of Agreeableness were generally associated with pro-environmental attitudes and behaviours in a positive direction. Self-Discipline was only positively associated with pro-environmental behaviours, while for Extraversion, only the facets of Activity Level and Cheerfulness were significantly associated with pro-environmental behaviours. Lastly, for Neuroticism the only significant result was Immoderation being negatively associated with pro-environmental behaviours. Moreover, further studies explored other personal aspects such as the individual connectedness to nature. Indeed, previous studies found that environmental concerns are malleable across situations and depend on the degree to which individuals view themselves as interconnected with nature (Shultz, 2000). Connection to nature and pro-environmental attitudes and behaviours are presented in the next paragraph.

2.3. Connectedness to Nature, pro-environmental attitudes and behaviours

Feeling connected to nature means perceiving ourselves conjoined with and belonging to the rest of the wider natural world. Such a relation would reasonably lead to thinking of a link with a respectful approach towards the natural environment, considering both attitudes and behaviours that can articulate this connection. Just like a relationship with a person we like and feel connected with, we would mostly respect it. Leopold's (1949) concept states that environmentally responsible behaviours are the results of individuals that see themselves as indeed members of the natural world, and not as the owners of it. This is the concept at the basis of the Connectedness to Nature Scale (CNS), the mostly used tool that measures to what degree people feel part of and feel emotionally connected to nature (Mayer & McPherson Frantz, 2004). Indeed, previous research investigated the link between CNS and NEP (pro-environmental attitudes). For instance, two studies aimed at comparing connectedness to nature as a predictor of behaviour with the New Ecological Paradigm (Mayer et al., 2013). In the first study of Trostle (2008), participants completed a survey including demographic information, the NEP, and the CNS. All participants completed the original Connectedness to Nature Scale (CNS), the New Ecological Paradigm (NEP), and a measure of attitudes toward electricity use. Their results showed that electricity-specific attitudes and the NEP were non-significant, indeed, NEP failed to predict actual electricity use in their field studies. On the other hand, what might be more intuitive to be linked with connectedness to nature are pro-environmental behaviours, in the hope for promising future adults. Literature showed to include both CNS and PEBS, particularly using children as data. Some of them are summarised as follows. The study of Solano-Pinto et al. (2020) aimed at identifying the predictors of connectedness to nature in children using PEBS and other variables. They found that conservation behaviours, such as turning off lights, limiting air conditioning use, or conserving water in daily activities, were influenced positively and significantly by their connection to nature. However, scores on abusive and consumptive outdoor activities performed insignificant influences on connection to nature independently, but this doesn't provide a causal relationship. In addition, out of the three categories of outdoor activities (consumptive, abusive and appreciative), only appreciative outdoor activities, such as nature photography and backpacking, were related to the respondents' connection to nature positively and importantly. Moreover, they unveiled that neither age nor gender were predictors of connectedness to nature. Likewise, in Katherine Street Hoover research (2021), a connection to nature was found to significantly predict conservation behaviours, such as turning off lights or electronic devices, limiting heat and air conditioning

use, and conserving water in daily activities; furthermore she showed that high school students who participated in more consumptive outdoor activities, like hunting and fishing, during childhood were slightly less likely to maintain a favourable environmental attitude. Similar results were found by Collado et al. (2018) in their survey of college students, where contact with nature as a child was associated with contact with nature as an adult, which positively related to connection to nature and pro-environmental behaviours. Yet, as specified by Wells and Lekies (2006), the strength of such relationships may vary based on the type of outdoor experiences that dominate childhood. Among these results though there's room for uncertainty: not all results provide a direct and clear explanation for connectedness with nature and pro-environmental attitudes and behaviours, suggesting the existence of other background factors that can influence this relationship. Alternative assumption can be the way an individual approaches the environment. This aspect has been studied within the spatial cognition domain, which considers how people navigate, explore and orient, although it has never been related to pro-environmental attitudes and behaviours. The so-called wayfindings are described in the next paragraph.

2.4. Self-reported way to approach an environment: the wayfinding inclinations

Wayfinding inclinations can be described as inclinations or attitudes of self-navigation through the environment. According to Montello (2005), the wayfinding component entails an efficient goal-directed and planned movement through an environment. Given that these inclinations are generally assessed through questionnaires, they have been referred to as visuospatial self-assessments (Meneghetti et al., 2014, 2020). Such questionnaires measure wayfinding attitudes and preferences, perceived sense of direction (Hegarty et al., 2002), preferred environment representation mode (Lawton, 1994; Pazzaglia & Meneghetti, 2017), pleasure in exploring places (Meneghetti et al., 2014), and spatial anxiety (Lawton, 1994). Studies have shown that wayfinding inclinations are related among each other (De Beni et al., 2014), and can be divided into positive inclinations (such as perceived strong sense of direction and pleasure in exploring new places) and negative inclinations (less functional attitudes like spatial anxiety and preference for moving in known places). A study (Meneghetti et al. 2021) that aimed to examine the relationship between individual differences in visuospatial thinking and accuracy in recalling a path learned in navigation-like (desktop-based) condition, found that visuospatial abilities and wayfinding inclinations are two distinct variables that contribute to navigation-like learning accuracy. A study found that wayfinding inclinations were related to personality traits: positive inclinations correlated positively, and negative inclinations inversely correlated with

traits of Extraversion, Agreeableness, and Openness. Instead, negative inclinations were only associated with poor Emotional stability (Meneghetti et al., 2019). Therefore wayfinding inclinations can be considered individual characteristics that reflect how people approach the environment. However, none of these studies have ever linked these aspects of way-finding inclinations with pro-environmental attitudes and behaviours, which actually is a question of interest in the present paper.

CHAPTER 2. The research

3.1. Aims

The present study has three aims. The first aim is to analyse gender differences among pro-environmental attitudes and pro-environmental behaviours.

The second aim is to confirm the relationship among pro-environmental attitudes, pro-environmental behaviours and connectedness with nature.

The third aim is to investigate the relationship among pro-environmental attitudes, pro-environmental behaviours, connectedness with nature and positive wayfinding inclinations (sense of direction and pleasure in exploring), to see whether the modality with which an individual positively approaches to orientation tasks delineates also an individual connected to nature and prone towards pro-environmental attitudes and behaviours.

3.1.1. Hypothesis

Regarding the first aim, in line with previous literature of Stern and Dietz (1994), Menardo et al. (2020) and Prati et al. (2015, 2017) we expect to find stronger pro-environmental attitude values among females than in males, and no substantial gender differences concerning pro-environmental behaviours. Concerning the second aim, based on previous literature of Trostle (2008), we expect to find no statistically significant correlation between CNS and NEP scales. While moderate positive correlation between CNS and PEBS are expected given the previous studies (Collado et al., 2019; Hoover, 2021; Solano-Pinto et al., 2020). Lastly, for the third aim, given that no previous literature investigated the link between wayfinding inclinations and pro-environmental attitudes and behaviours, no hypothesis can be laid down. Hence, this paper will provide a first attempt to reveal possible correlations.

3.2. Method

3.2.1 Participants

182 people participated in the research (of which 97 females) between 18 and 58 years old (males mean age $M = 26.9$, standard deviation $SD = 6.57$; females $M = 25.7$, $SD = 9.95$). Data was collected through students of an Italian course at the University of Padua (Laurea triennale in Scienze e tecniche psicologiche) in exchange for course credits, and through word of mouth. Among them, I personally collected 135 participants.

3.2.2. Materials

Questionnaire not analysed in the present thesis work

Introductory Questionnaire (adapted from De Beni et al., 2008)

This Introductive Anagraphical Questionnaire asks for information about age, gender, level of schooling (level reached until now; branch, for those who have attended or are currently attending university; and any other master's degrees or specialisation schools attended or being attended), professional position and any extracurricular/extra-occupational activities, sports or physical activities. The Introductory Questionnaire also asks about any physical and/or mental disorders and the use of medication.

Pro-Environmental Behaviours Scale (PEBS, adapted from Markle, 2013 and from Menardo et al., 2020)

This questionnaire consists of 21 items (see Appendix A) investigating pro-environmental behaviour, in the areas of transport (How often do you use public transport to get around?), conservation (How often do you limit your time in the shower to save water?), environmental citizenship (How frequently do you watch tv programmes, movies or internet videos on environmental issues?), food consumption (How often do you consume pork?), and waste (How often do you separate plastic and paper?). The first 8 items are from Pro-Environmental Behaviours Scale (PEBS Markle 2013; Italian version by Menardo et al., 2020), items from 9 to 15 are adapted from Markle 2013 and Menardo et al. (2020), items from 16 to 21 are newly inserted. The response options to 18 items (question) are 5: “never”, “rarely”, “sometimes”, “often”, “always”, while 2 items have the option “yes” / ”no”, and 1 item the options for specific quantities. The score is the sum of the total scale (min score 21, max score 107); Cronbach’s alpha current sample = 0.78).

Pro-environmental attitudes questionnaire (New Ecological Paradigm, NEP, Dunlap et al., 2000)

The questionnaire consists of 15 items investigating pro-environmental attitudes (see Appendix B). Specifically, the NEP scale measures broad beliefs about the biosphere and the effects of human action on it, so basically it focuses on an individual’s perception of the relationship between humans and the natural environment. The response options to each item (question) are 5: from “totally disagree” to “totally agree”. Among the 15 items, 7 come from the Dominant Social Paradigm (DSP) which reflect the prevailing worldview of the population, and the remaining 8 items are meant to endorse the new paradigm (NEP) reflecting a greater

environmental concern. The negative items of the DSP are reversed in order to be summed up to the others, obtaining therefore the total score of the scale (min score 43, max score 47); Cronbach's alpha current sample = 0.58).

Connectedness to Nature Scale (CNS, , Mayer & Frantz 2004)

This questionnaire consists of 14 items investigating the connection with nature, i.e. an individual's affective, experiential connection to nature. The response options to each item (question) are 5: from "not at all true" to "absolutely true". The total score is the sum of the items (items 4, 12 and 14 are reversed for the calculation of the score; min score 26, max score 58); Cronbach's alpha current sample = 0.69).

Questionnaire of Attitude towards Orientation Tasks (AtOT, De Beni et al., 2014)

The AtOT is a questionnaire consisting of 10 items aimed at assessing a person's attitude to navigating in familiar or unfamiliar places. The instrument allows for the detection of two different attitudes to exploring the environment: pleasure in taking familiar places (e.g. "I enjoy finding new ways (streets) to reach familiar places") and fear of exploring unfamiliar or new places (e.g. "When I go to a new city, I am afraid of getting lost"). The response options to each item (question) are 6: from "very false" to "completely true". The sum is calculated for the total score (min. 10, max. 60), after the five negative items are reversed (Cronbach's alpha current sample = 0.86).

**Spatial Anxiety Questionnaire (SAQ; De Beni et al., 2014)*

The Spatial Anxiety Questionnaire assesses the degree of anxiety, or the predisposition to feel anxiety, in environmental tasks. Questionnaire consisting of 8 items that investigates the degree of anxiety experienced in environmental tasks. The response options to each item (question) are 6: from "none" to "very much". An example of an item is: "Please indicate the degree of anxiety in locating your car in a large car park". The score is the sum of each item rating (max score 48, min score 8; Cronbach's alpha current sample = 0.91).

Spatial Orientation Short Questionnaire (SOSQ; De Beni et al., 2014; Pazzaglia & Meneghetti, 2017)

The Sense of Direction and Spatial Representation Questionnaire (SDSR), aims to detect the level of perceived sense of orientation and spatial orientation strategies. A 13-item questionnaire that investigates the sense of orientation and spatial representation. The tool allows for the detection of 3 factors: sense of direction, knowledge and use of cardinal points and visuo-spatial representations. The response options to each item (question) are 5: from “not at all” to “very much”. An example of an item is: "Do you consider yourself a person who has a good sense of orientation?". The score is the sum of the item ratings comprising each factor (max score 65, min score 13; Cronbach’s alpha = 0.87).

**BIG-5 inventory, Italian version (translated from Ubbiali et al., 2013).*

Questionnaire consisting of 44 items investigating five personality traits: extroversion (I see myself as a person who is…extroverted, sociable), neuroticism (I see myself as a person who…can be moody), open-mindedness (I see myself as a person who…enjoys artistic and aesthetic experiences), conscientiousness (I see myself as a person who...persevere until the task is completed), amiability (I see myself as a person who is…thoughtful and kind to almost everyone). The response options to each item (question) are 5: from “strongly disagree” to “Strongly agree”. The calculation of the score by single factor was obtained by reversing negative values into positive ones and then by summing them (current sample Cronbach’s alpha α for conscientiousness = 0.52, openness α = 0.41, neuroticism α = 0.50, extraversion α = 0.46, agreeableness α = 0.26).

3.2.3. Procedure

Experimenters met participants in a single session lasting about 20 minutes. The appointment consisted of a video call on zoom meeting, at the beginning of which the experimenter shared the link to the questionnaire so that the participant opened it autonomously. The first page of the survey consisted of a description of the various questionnaires that characterised it, the informed consent, plus the treatment of data. After obtaining the consent form, the participants completed the introductory questionnaire (asking them for personal data). From there on, the participant continued the survey independently, while remaining on video call with cams on. In case the participant had doubts or questions, the experimenter was there for any help. Participants filled out the Questionnaire on Pro-Environmental Behaviours (PEBS, adapted from Markle, 2013 and from Menardo et al., 2020), Pro-environmental attitudes questionnaire (New Ecological Paradigm, NEP, Dunlap et al., 2000), Connectedness to Nature Questionnaire (Connectedness to Nature Scale, Mayer & Frantz, 2004), Questionnaire of attitude towards

orientation tasks (AtOT, De Beni et al., 2014), Spatial Anxiety Questionnaire (SAQ; De Beni et al., 2014), Sense of Direction and Spatial Representation Questionnaire (SDSR; De Beni et al., 2014; Pazzaglia & Meneghetti, 2017), BIG-5 inventory, Italian version (translated from Ubbiali et al., 2013) in random order. When the participant reached the end of the questionnaire, the answers were automatically saved, and the experiment ended thanking the participant.

3.4 Results

In the first place, mean and standard deviation values (*M* and *SD*) of all variables of interest have been calculated as descriptive, divided into gender (males and females) and total (see Table 1).

Table 1. *Mean and Standard Deviation of all variables of interest*

	Males		Females		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*
SDSR Sense of Direction and Spatial Representation	37.2	8.41	33.9	7.37	35.55	7.89
AtOT Attitude towards Orientation Tasks	34.9	6.96	32.1	7.64	67	7.3
CNS Connectedness to Nature Scale	55.6	8.49	56.9	7.53	56.25	8.01
NEP New Ecological paradigm	55.8	6.42	56.3	5.82	56.05	6.12
PEBS Pro Environmental Behaviour Scale	60.5	10.1	64.9	8.58	62.7	9.34

2.4.1 Aims

Aim 1: Gender differences in Pro-Environmental Attitudes and Pro-Environmental Behaviours

First of all, *t*-tests were conducted to analyse any differences between males and females for pro-environmental attitudes (Pro-Environmental Attitudes questionnaire: New ecological paradigm scale, NEP) and pro-environmental behaviours (Questionnaire on Pro-Environmental Behaviours, PEBS). See *M* and *SD* in Table 1. With regard to attitudes, there were no significant differences in scores between males and females, t(171.02) = 0.59, $p = 0.56$, Cohen's d = 0.08. See Figure 1. With regard to behaviours, there were significant differences in scores between males and females, t(171.02) = 3.11, $p = 0.002$, Cohen's d = 0.47. See Figure 2.

Figure 1_Pro-environmental Attitudes (New Ecological Paradigm Scale) in males and females

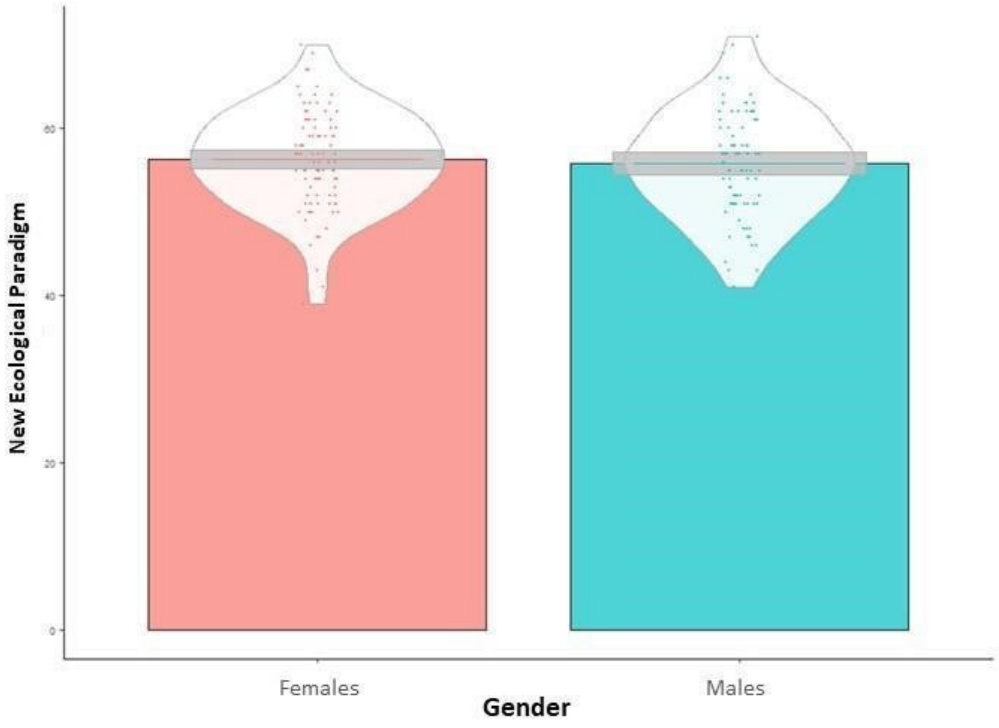

Figure 2_Pro-environmental Behaviours (PEBS) in males and females

2.4.2 AIM 2 and 3: Relationship between Pro-Environmental Attitudes, Pro-Environmental Behaviour, Connectedness to Nature, Sense of Orientation and Attitude towards Orientation.

Correlations were made between pro-environmental attitudes, pro-environmental behaviour and the variables of interest for this paper (*Connectedness to Nature, Sense of Direction and Attitude towards Orientation*) within females (see Table 2) and within males (see Table 3). Regarding the Age factor it can be noted a significant positive correlation (0.24) with attitudes towards orientation among females, i.e. the increasing age correlates to a more pleasurable exploration of places, while there exists no correlation of such factors among males. A similar non statistically significant correlation between males and females is seen for age and CNS (0.14 and 0.16). Concerning sense of direction and spatial representation (SDSR): with NEP there is a negative not significant correlation in both genders. Instead, a very good correlation is found with PEBS among females (r=0.38) and a bit lower among males (0.29). Concerning attitudes Towards Orientation Tasks (aTOT): no significant correlation is seen with NEP in both genders, while with PEBS a high correlation is found among females (r= 0.43), and a little,

but statistically insignificant, one among males (0.11). Concerning Connectedness to Nature (CNS): with NEP a good correlation is found in both genders (males r=0.26, females r=0.22); similarly, with PEBS among males and females respectively (0.30 and 0.27). Concerning the two dependent variables (NEP and PEBS) a notable correlational difference in gender is seen: a good correlation in females (r=0.31) but a non-existent one in males (0.06).

Table 2. *Correlations between variables of interest in females*

	1. Age	2. SDSR	3. AtOT	4. CNS	5. NEP
1. Sense of Direction and Spatial Representation (SDSR)	0.11				
2. Attitude towards Orientation Task (AtOT)	0.24	0.62			
3. Connectedness to Nature Scale (CNS)	0.16	-0.01	0.04		
4. New Ecological Paradigm (NEP)	-0.03	-0.06	0.04	0.22	
5. Pro-Environmental Behaviours (PEBS)	0.22	0.38	0.43	0.27	0.31

Note. $r > |0.23|$, $p < 0.05$

Table 3. *Correlations between variables of interest in males*

	1. Age	2. SDSR	3. AtOT	4. CNS	5. NEP
1. Sense of Direction and Spatial Representation (SDSR)	0.14				
2. Attitude towards Orientation Task (AtOT)	-0.02	0.57			
3. Connectedness to Nature Scale (CNS)	0.14	0.16	0.11		
4. New Ecological Paradigm (NEP)	0.21	-0.02	-0.01	0.26	
5. Pro-Environmental Behaviours (PEBS)	0.08	0.29	0.11	0.30	0.06

Note. $r > |0.23|$, $p < 0.05$

CHAPTER 3

Discussion

The research had the aim of finding gender differences between pro-environmental attitudes and behaviours, of confirming the connection among pro-environmental attitudes and behaviours and connection with nature, and of finding a link among the above mentioned with wayfinding inclinations (sense of orientation and Attitude towards Orientation). Participants, of which majority were students of psychology university, have contributed to the research answering the online questionnaire. From the results obtained, regarding the first aim of this study, it appears that within pro-environmental attitudes there aren't gender differences, while within pro-environmental behaviours females report stronger correlations than men. From the existing literature (Stern e Dietz, 1994), though uncertain, we would have expected to find stronger pro-environmental attitudes among females compared to males, but this was not the case. We could pin this discrepancy to the dissimilar data used: our respondents were mainly students, while those of Stern et al. were taken from the general population. In addition, we could even blame the different historical periods of the two researches (1994 and 2022) that could hide distinct trends and mentalities. Regarding pro-environmental behaviours, from

prevailing literature we expected not to find gender differences (Menardo et al., 2020; Prati et al., 2017), as opposed to our results. This may be due to the unbalanced gender (females more than males) number in our sample. However, this issue merits further investigation in future research. Further, our results showed a significant positive correlation between NEP and PEBS among females, but not in males. In other words, we found a good positive correlation in both genders, reflecting those of other studies (Solano-Pinto et al., 2020; Katherine Street Hoover, 2021; Collado et al., 2018).Instead, considering both genders, Trostle (2008) provided no correlation between NEP and PEBS. The correlation among the two measures of attitude and behaviours found in this research, present only for women, would merit further investigation.

As concerns the aim of confirming the link among pro-environmental attitudes (NEP), pro-environmental behaviours (PEBS) and connection with nature (CNS). This indicates that people with stronger connections with nature are also people that report having more pro-environmental behaviours. CNS and NEP results show a significant correlation in both genders, indicating that people who feel connected to nature also have a pro-environmental attitude. This latter result is opposed to the study of Trostle (2008) who instead found no correlation.

Concerning the third aim (investigate the relationship among pro-environmental attitudes, pro-environmental behaviours, connectedness with nature and positive wayfinding inclinations), our results showed good positive correlations between wayfinding inclinations (both sense of direction and attitudes towards orientation) and pro-environmental behaviours without substantial gender differences. This is an interesting outcome because it seems to suggest that those individuals that have a good orientation and movement throughout the environment report more pro-environmental actions. This is the first time such a result has been analysed and for this it is worthy of insight.

Conclusion

Climate crisis is the daily topic, on everyone's lips, of economy and politics too. To make decisions at the world level requires time that we no longer have. Citizens of the earth have disfigured the planet wearing it down to the point of no return, over which it's not possible to get back to the initial state. What led to such self-destruction has been wondered by many researchers who searched for factors that influence people to act in a consumistic or, on the contrary, protective way towards the planet. This article follows such a research line, investigating which individual characteristics link pro-environmental attitudes and behaviours

with other factors, some of which already deepened, and other new ones such as wayfinding inclinations within the environment. In fact, the present research has three aims. We tried to uncover i) gender differences between pro-environmental attitudes and behaviours and ii) those links among them and connection with nature and iii) wayfinding inclinations. 182 participants (university students and some of the general population) answered an online questionnaire, that lasted about 15minutes, through a video call with the experimenter. The tool comprised 8 different questionnaires. Among those analysed in this paper there are: personal information, pro-environmental attitudes, pro-environmental behaviours, connection with nature, attitudes towards orientation and sense of direction. The remaining not analysed here are spatial anxiety and personality traits questionnaires. Main results interestingly highlighted a good positive correlation found between pro-environmental attitudes and pro-environmental behaviours only among females. Concerning way-finding inclinations, good correlations are displayed with pro-environmental behaviours, with a preference for females (stronger correlation). Precisely, an attitude towards orientation tasks is associated with more pro-environmental behaviours (more among females). Generally, the outcomes favour females, providing statistically more significant correlations, with a little stress on attitudes in general. It's becoming clear that there are links among the above variables, some of them already confirmed by other studies, but many factors influence these relationships. A direct contact with nature seems to favour a more respectful approach towards the natural environment. Altogether, our outcomes suggest we keep on focusing on environmental matters and individual factors to find what triggers behaviours that preserve nature and hopefully restore it.

Bibliography

Borella, E., Carretti, B., & De Beni, R. (2008). Working memory and inhibition across the adult life-span. *Acta psychologica*, *128*(1), 33-44. https://doi.org/10.1016/j.actpsy.2007.09.008

*Collado, S., & Evans, G. W. (2019). Outcome expectancy: A key factor to understanding childhood exposure to nature and children's pro-environmental behavior. *Journal of Environmental Psychology*, *61*, 30-36. https://doi.org/10.1016/j.jenvp.2018.12.001

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New trends in measuring environmental attitudes: measuring endorsement of the new ecological

paradigm: a revised NEP scale. *Journal of social issues*, *56*(3), 425-442. https://doi.org/10.1111/0022-4537.00176

Frantz, C. M., & Mayer, F. S. (2014). The importance of connection to nature in assessing environmental education programs. *Studies in Educational Evaluation*, *41*, 85-89. https://doi.org/10.1016/j.stueduc.2013.10.001

*Hegarty, M., Richardson, A. E., Montello, D. R., Lovelace, K., & Subbiah, I. (2002). Development of a self-report measure of environmental spatial ability. *Intelligence*, *30*(5), 425-447. https://doi.org/10.1016/S0160-2896(02)00116-2

Hoover, K. S. (2021). Children in nature: exploring the relationship between childhood outdoor experience and environmental stewardship. *Environmental Education Research*, *27*(6), 894-910. https://doi.org/10.1080/13504622.2020.1856790

Lawton, C. A. (1994). Gender differences in way-finding strategies: Relationship to spatial ability and spatial anxiety. *Sex roles*, *30*(11), 765-779. https://doi.org/10.1007/BF01544230

Leopold, A. (1949). *A Sand County almanac, and sketches here and there*. Oxford University Press, USA..

Markle, G. L. (2013). Pro-environmental behavior: Does it matter how it's measured? Development and validation of the pro-environmental behavior scale (PEBS). *Human ecology*, *41*(6), 905-914. https://doi.org/10.1007/s10745-013-9614-8

Menardo, E., Brondino, M., & Pasini, M. (2020). Adaptation and psychometric properties of the Italian version of the Pro-Environmental Behaviours Scale (PEBS). *Environment, Development and Sustainability*, *22*(7), 6907-6930. https://doi.org/10.1007/s10668-019-00520-3

*Meneghetti, C., Borella, E., Pastore, M., & De Beni, R. (2014). The role of spatial abilities and self-assessments in cardinal point orientation across the lifespan. *Learning and Individual Differences*, *35*, 113-121. https://doi.org/10.1016/j.lindif.2014.07. 006

Meneghetti, C., Labate, E., Toffalini, E., & Pazzaglia, F. (2021). Successful navigation: The influence of task goals and working memory. *Psychological Research*, *85*(2), 634-648. https://doi.org/10.1007/s00426-019-01270-7

Muffato, V., Meneghetti, C., & De Beni, R. (2019). Spatial mental representations: The influence of age on route learning from maps and navigation. *Psychological Research*, *83*(8), 1836-1850. https://doi.org/10.1007/s00426-018-1033-4

*Pazzaglia, F., & Meneghetti, C. (2017). Acquiring spatial knowledge from different sources and perspectives: Abilities, strategies and representations. In *Representations in mind and world* (pp. 120-134). Routledge. https://doi.org/10.4324/9781315169781

Prati, G., Albanesi, C., & Pietrantoni, L. (2017). Social well-being and pro-environmental behavior: A cross-lagged panel design. *Human Ecology Review*, *23*(1), 123-139. doi: 10.3316/informit.293860608339524

Prati, G., Albanesi, C., & Pietrantoni, L. (2017). The interplay among environmental attitudes, pro-environmental behavior, social identity, and pro-environmental institutional climate. A longitudinal study. *Environmental Education Research*, *23*(2), 176-191. doi: 10.1080/13504622.2015.1118752

Rosa, C. D., Profice, C. C., & Collado, S. (2018). Nature experiences and adults' self-reported pro-environmental behaviors: The role of connectedness to nature and childhood nature experiences. *Frontiers in psychology*, *9*, 1055. https://doi.org/10.3389/fpsyg.2018.01055

Schultz, P. W. (2000). New environmental theories: Empathising with nature: The effects ofPerspective taking on concern for environmental issues. *Journal of social issues*, *56*(3), 391-406. http://dx.doi.org/10.1111/0022-4537.00174

Shah, P., & Miyake, A. (Eds.). (2005). *The Cambridge handbook of visuospatial thinking*. Cambridge University Press. https://doi.org/10.1017/CBO9780511610448

Solano-Pinto, N., Garrido, D., Gértrudix-Barrio, F., & Fernández-Cézar, R. (2020). Is knowledge of circular economy, pro-environmental behavior, satisfaction with life, and beliefs a predictor of connectedness to nature in rural children and adolescents? A pilot study. *Sustainability*, *12*(23), 9951. doi:10.3390/su12239951

Soutter, A. R. B., & Mõttus, R. (2021). Big five facets' associations with pro-environmental attitudes and behaviors. *Journal of Personality*, *89*(2), 203-215. doi: 10.1111/jopy.12576

Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of social issues*, *50*(3), 65-84. https://doi.org/10.1111/j.1540-4560.1994.tb02420.x

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human ecology review*, 81-97. https://www.jstor.org/stable/24707060

*Trostle, J. (2008). *Connectedness to nature and electricity consumption: An interdisciplinary study of behavior and emotional response to nature in the Union Street housing complex* (Doctoral dissertation, Oberlin College). http://rave.ohiolink.edu/etdc/view?acc_num=oberlin1212356060

Ubbiali, A., Chiorri, C., & Hampton, P. (2013). Italian big five inventory. Psychometric properties of the Italian adaptation of the big five inventory (BFI). *BPA-Applied Psychology Bulletin (Bollettino di Psicologia Applicata)*, *59*(266). https://www.researchgate.net/publication/250662562

*Wells, N. M., & Lekies, K. S. (2006). Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children Youth and Environments*, *16*(1), 1-24. https://www.jstor.org/stable/10.7721/chilyoutenvi.16.1.0001

*=articles not consulted directly

APPENDIX A: *Pro-Environmental Behaviours Scale (PEBS, adapted from Markle, 2013 and from Menardo et al., 2020), with 6 added items. Italian version.*

1. Quanto spesso spegni le modalità standby di elettrodomestici o dispositivi elettronici?

Mai Raramente A volte Spesso Sempre

2. Quanto spesso riduci il riscaldamento o l'aria condizionata per limitare il consumo di energia?

Mai Raramente A volte Spesso Sempre

3. Quanto spesso limiti il tuo tempo sotto la doccia per risparmiare acqua?

Mai Raramente A volte Spesso Sempre

4.Quanto spesso aspetti di avere un carico completo per usare la lavatrice o la lavastoviglie?

Mai Raramente A volte Spesso Sempre

5. Sei attualmente membro di un gruppo ambientale, di conservazione o di protezione della fauna selvatica?

SI NO

6. Durante l'ultimo anno hai contribuito con del denaro a gruppi di tutela ambientale, di conservazione o protezione della fauna selvatica?

SI NO

7. Con quale frequenza guardi programmi televisivi, film o video su Internet sui problemi ambientali?

Mai Raramente A volte Spesso Sempre

8. Quanto spesso parli con gli altri dei loro comportamenti pro-ambientali?

Mai Raramente A volte Spesso Sempre

9. Quanto spesso consumi frutta e verdura coltivata a basso impatto ambientale (ad es. km 0, biologica)?

Mai Raramente A volte Spesso Sempre

10. Rispondi alla seguente domanda in base al veicolo a motore che usi più spesso: approssimativamente quanti chilometri al litro fa il veicolo?

Non lo so 10 o meno 11-12 13-14 15-16 17 o più Non mi sposto con veicoli a motore

11. Quanto spesso consumi carne di manzo?

Non mangio manzo Raramente A volte Spesso Molto spesso

12. Quanto spesso consumi carne di maiale?

Non mangio maiale Raramente A volte Spesso Molto spesso

13. Quanto spesso consumi pollame?

Non mangio pollame Raramente A volte Spesso Molto spesso

14. Quanto spesso utilizzi i mezzi pubblici per spostarti?

Mai Raramente A volte Spesso Sempre

15. Quanto spesso cammini o pedali invece di utilizzare automobile o motorino?

Mai Raramente A volte Spesso Sempre

16. Quanto spesso applichi la raccolta differenziata plastica e carta?

Mai Raramente A volte Spesso Sempre

17. Con quale frequenza presti attenzione nell'acquisto di prodotti con pochi imballaggi?

Mai Raramente A volte Spesso Sempre

18. Con quale frequenza presti attenzione alla provenienza dei prodotti che acquisti?

Mai Raramente A volte Spesso Sempre

19. Quanto spesso partecipi ad iniziative promosse a sostegno dell'ambiente?

Mai Raramente A volte Spesso Sempre

20. Quanto spesso preferisci acquistare capi di abbigliamento di seconda mano rispetto che nuovi?

Mai Raramente A volte Spesso Sempre

21. Quanto spesso preferisci riparare oggetti usati rispetto al sostituirli con oggetti nuovi?

Mai Raramente A volte Spesso Sempre

APPENDIX B: *Pro-environmental attitudes questionnaire (New Ecological Paradigm, NEP, Dunlap et al., 2000). Italian version.*

1. Ci stiamo avvicinando al limite del numero di persone che la Terra può sostenere
2. Gli umani hanno il diritto di modificare l'ambiente naturale per soddisfare i propri bisogni
3. Quando gli umani interferiscono con la natura, questo spesso causa conseguenze disastrose
4. L'ingegnosità dell'uomo garantirà che la Terra non venga resa invivibile
5. Gli umani stanno abusando seriamente dell'ambiente
6. Il pianeta Terra è ricco di risorse se solo imparassimo a svilupparle
7. Le piante e gli animali hanno lo stesso diritto di esistere degli umani
8. L'equilibrio della natura è abbastanza resistente da fronteggiare gli impatti delle moderne nazioni industriali

9. Nonostante le nostre abilità speciali, gli umani sono ancora soggetti alle leggi della natura
10. La cosiddetta “crisi ecologica”, che sta affrontando l’umanità, è stata molto esagerata
11. La Terra è come un'astronave con spazi e risorse molto limitati
12. Gli esseri umani avrebbero dovuto governare il resto della natura
13. L'equilibrio della natura è molto delicato e facilmente alterabile
14. Gli esseri umani col tempo impareranno abbastanza riguardo a come la natura opera da essere in grado di controllarla
15. Se le cose continuano nel loro corso attuale, presto sperimenteremo una grande catastrofe ecologica