

EXPLORING THE VALUES FOR NATURE, NATURE CONNECTEDNESS,
PRO-ENVIRONMENTAL BEHAVIOUR, AND WELL-BEING: A CASE STUDY
ON URBAN PARK VISITORS IN ISTANBUL

by

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ABSTRACT

EXPLORING THE VALUES FOR NATURE, NATURE CONNECTEDNESS, PRO-ENVIRONMENTAL BEHAVIOUR, AND WELL- BEING: A CASE STUDY ON URBAN PARK VISITORS IN ISTANBUL

Urban greenspaces play an important role not only for biodiversity conservation, but also for the well-being of urban residents. Recent empirical studies focused therefore on the interplay between nature connectedness, individual well-being and pro-environmental behavior. Yet, most studies so far have used student samples from high-income countries, where conservation and environmental policies are relatively well-established. The present study aims to test the impacts of plural values for nature (intrinsic, instrumental, relational), nature connectedness, ecological knowledge, eco-anxiety, environmental concern, on pro-environmental behavior (PEB) and subjective well-being in a relatively understudied middle-income developing country context with participants from a policy-relevant urban greenspace field setting. To do this, face-to-face surveys with 112 participants were conducted in two popular urban greenspaces of Istanbul, Emirgan Grove and Hacıosman Atatürk Urban Forest. Findings suggest that relational values constitute an empirically distinct category of values highly significant for urban park visitors, and mediated by nature connectedness, they can predict PEB and subjective well-being significantly. Moreover, ecosystem-based ecological knowledge (recognition of local plant and animal species) was found to be a positive correlate of PEB, while environmental concern emerged as a potential predictor of subjective well-being. Overall, the study suggests relational values and connectedness to nature as two important leverage points for enhancing sustainable behavior and human well-being in urban contexts that could be targeted by biodiversity policy, education and urban design for reinforcing cycles of increased care and responsibility for nature and improved life satisfaction.

ÖZET

DOĞAYA ATFEDİLEN DEĞERLER, DOĞAYLA BAĞ, ÇEVRE DOSTU DAVRANIŞ VE ESENLİK: İSTANBUL'DAKİ KENT PARKLARI ZİYARETÇİLERİ ÜZERİNE BİR VAKA ÇALIŞMASI

Kentsel yeşil alanlar yalnızca biyolojik çeşitliliğin korunması için değil, aynı zamanda kent sakinlerinin esenliği için de önemli bir rol oynamaktadır. Bu nedenle, son dönemdeki pek çok ampirik çalışma doğayla olan bağ, bireysel esenlik ve çevre dostu davranış arasındaki etkileşime odaklanmaktadır. Ancak şimdiye kadarki çalışmaların çoğu, doğa koruma ve çevre politikalarının görece kurumsallaşmış olduğu yüksek gelirli ülkelerdeki öğrenci örneklemeleri üzerine yoğunlaşmıştır. Bu çalışma ise görece az incelenmiş, orta gelirli gelişmekte olan bir ülke bağlamında, doğaya atfedilen çoğul değerleri (içsel, araçsal, ilişkisel), doğayla bağ, ekolojik bilgi, eko-anksiyete, çevre problemlerine ilişkin endişe, çevre dostu davranış ve bireysel esenlik arasındaki ilişkileri, kentsel politikalar açısından önemli bir kentsel yeşil alanda test etmeyi amaçlamaktadır. Bu doğrultuda, İstanbul'un popüler iki kentsel yeşil alanı olan Emirgan Korusu ve Hacıosman Atatürk Kent Ormanı'nda 112 katılımcıyla yüz yüze anketler gerçekleştirilmiştir. Bulgular, ilişkisel değerlerin kent parklarındaki ziyaretçiler için ampirik olarak ayırt edilebilir ve istatistiki olarak anlamlı bir değer kategorisi oluşturduğunu, doğayla kurulan bağ aracı değişken olarak modellendiğinde, ilişkisel değerlerin çevre dostu davranış ve bireysel esenlik üzerinde pozitif etkisi olduğunu göstermektedir. Ayrıca, ekosistem temelli ekolojik bilginin (yerel bitki ve hayvan türlerinin tanınması) çevre dostu davranış üzerinde pozitif etkisi olduğu ve çevresel kaygının bireysel esenliğin potansiyel bir belirleyicisi olarak ortaya çıktığı bulunmuştur. Bu nedenle çalışma, kentsel bağlamlarda sürdürülebilir davranış ve bireysel esenliği güçlendirmek için ilişkisel değerler ile doğayla bağı iki önemli kaldıraç noktası olarak öne sürmektedir. Doğaya gösterilen özen ve sorumluluk ile hayattan memnuniyetin artması arasında pekiştirici döngüler oluşturmak amacıyla bu unsurlar biyoçeşitlilik, eğitim ve kentsel politikalarda hedeflenebilir.

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
CNS	Connectedness to Nature Scale
INT	Intrinsic Value
INS	Instrumental Value
NCP	Nature's Contributions to People
N4C	Nature for Community
PEB	Pro-Environmental Behaviour
REL	Relational Value
VBN	Value-Belief-Norm

1. INTRODUCTION

Rapid urbanization and loss and fragmentation of habitats pose big challenges for both biodiversity conservation and human well-being in urban contexts. While urban areas have more than doubled in size since 1992 (IPBES, 2019), biodiversity has experienced a substantial decline, amounting to a 73% reduction when compared to 1970 (WWF, 2024). Indeed, recent estimates indicate that by 2050, approximately 68% of the global population will reside in urban regions (United Nations, 2019), with potentially severe consequences for the well-being of urban residents.

Several recent studies confirm that urban parks and greenspaces are becoming niche areas where individuals can contact nature and experience biodiversity in cities, improving urban residents' well-being, including their physical and mental health and making individual pro-environmental action more likely (Richardson et al., 2020; Zhou, Lu, Zhou, Zheng, & Wei, 2025). In this regard, a central question emerges: What drives individuals' pro-environmental behavior in urban contexts? Is it primarily rooted in their underlying values for nature, their psychological connectedness to nature, or is there an indirect relationship between these constructs?

Individuals may assign varying degrees of importance to biodiversity and the natural world. In addition, the values they attribute to the natural environment may also differ. While these values were commonly classified as instrumental (focusing on the tangible and non-tangible benefits to humans) versus intrinsic values (emphasizing the values of nature independent of human uses) in the past literature (Dietz, Fitzgerald & Shwom, 2005; Stålhammar & Thorén, 2019), recently, a third category has been put forth, namely, relational values that underline the responsibility towards and co-existence with nature (Arias-Arévalo, Martín-López, & Gómez-Baggethun, 2017; Chan, Gould, & Pascual, 2018; Himes & Muraca, 2018; Klain et al, 2017; IPBES, 2022). “Relational value emphasizes the interactions between humans and the environment as a relationship or responsibility, as well as the fundamentals of a good life” (Chan et al., 2018; IPBES 2016, as cited in O'Connor & Kenter, 2019, pp. 1247-1248), hence, broadening our comprehension of the complex connections between people and nature and shedding further light on human choices concerning biodiversity. However, this newly emerging category of relational values has also received considerable criticism from philosophers and other scholars, who argued that this category is not justified as an ethical concept (Baard, 2025; Luque-Lora, R., 2023). Moreover, there are only a limited number of empirical studies attempting to test whether the concept of relational values is a distinct category to be

considered as a psychological determinant of pro-environmental behavior (Uehara, Sakurai, & Hidaka, 2022). Indeed, recent studies suggest that instrumental values may have limited potential for predicting pro-environmental behavior and conservation of biodiversity (De Groot & Steg, 2010; Wiegleb, 2002). In contrast, intrinsic and relational values may trigger more ethical responses and may improve pro-environmental behavior (Pereira & Forster, 2015; Winkler-Schor, van Riper, Landon, & Keller, 2020).

Moreover, varying degrees of nature contact and nature connectedness have been found to play a significant role in terms of pro-environmental behavior and the well-being of individuals (Pritchard, Richardson, Sheffield, & McEwan, 2020; Whitburn, Linklater, & Abrahamse, 2020). Indeed, a meta-analysis on nature connectedness showed that nature connectedness consistently predicts pro-environmental behaviour and subjective well-being (Barragan-Jason et al. 2022). Yet, studies also suggest that there is a considerable degree of overlap between the constructs of nature connectedness and relational value (Kleespies and Dierkes, 2020a). However, there is a very limited number of studies actually testing these relationships in policy-relevant contexts such as urban greenspaces. Other potential predictors of pro-environmental behavior suggested in the empirical literature is eco-anxiety (Lutz, Zelenski, & Newman, 2023; Pavani, Nicolas, & Bonetto, 2023) and ecological knowledge (Amoah & Addoah, 2021; Geiger, Geiger, & Wilhelm, 2019; Liobikienė & Poškus, 2019). Yet, recent studies have mostly focused on these factors in high-income, developed countries where per-person urban greenspace and average conservation policy expenditures are relatively high.

Given this context, the present study aims to investigate the following research questions:

- Do relational values represent a distinct category of values in urban greenspace contexts, in addition to intrinsic and instrumental values?
- Do relational values and nature connectedness reinforce each other in terms of pro-environmental action and subjective well-being?
- Which other factors predict pro-environmental behavior and subjective well-being of the visitors of urban green spaces in Istanbul?

The present study aims to answer these questions based on face-to-face surveys carried out with 112 urban park visitors in the two popular urban green spaces of Istanbul, namely, Emirgan Grove and Haciosman Atatürk Urban Forests. The findings confirmed the central role of nature connectedness for pro-environmental behavior and subjective well-being in the literature, and they also indicated that relational values play a distinct role for both pro-environmental behavior, and

subjective well-being of urban park visitors, by acting as predecessors of nature connectedness, and not vice versa. Moreover, ecological knowledge and eco-anxiety were other significant predictors of pro-environmental behavior and subjective well-being of the park visitors, respectively.



2. LITERATURE REVIEW

The present study seeks to integrate several domains of environmental social sciences literature, namely, plural values of nature, connectedness to nature, pro-environmental behaviour, and subjective well-being, within the context of a face-to-face survey conducted in urban greenspaces in Istanbul. In this section, an overview of these key concepts is provided, with specific attention to their theoretical foundations and empirical evidence from previous studies. Additional constructs such as ecological knowledge, eco-anxiety, and environmental concern are also introduced, as they contribute with further explanatory power to the understanding of human–nature relationships. The section concludes with a synthesis of these perspectives and the identification of research gaps that form the basis for the hypotheses of the present study. A detailed summary table for the findings of the recent literature relevant for the present study is provided in Appendix H.

2.1. Biodiversity and Plural Values of Nature

The causes of the global biodiversity crisis and the opportunities to address these problems are closely linked to how nature is valued in political and economic decision-making (IPBES, 2022). People comprehend, contact, and interact with nature in various ways, implying that the values of nature are highly diverse and complex. However, policy-making processes often overlook this diversity and instead prioritize a narrow set of values, especially, economic values (IPBES, 2022). However, inclusion of a pluralistic value perspective in decision-making is much needed to address the currently pressing environmental crises of today (Pascual et al., 2017). The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) emphasizes this need for diversity as follows: “*A comprehensive typology of the diverse values of nature can help guide decisions that affect nature and its contributions to people in diverse contexts, including economic (e.g., investment, production, consumption), political (e.g., recognition of individual and collective rights and duties) or sociocultural (e.g., forming, maintaining or changing peoples’ sociocultural identities) decisions*” (IPBES, 2022, p. 11).

This recognition of plural values as put forth by IPBES has not emerged in isolation, but builds on a longer trajectory of nature valuation frameworks. The concept of values has long been a central topic in the social sciences, particularly within the fields of psychology and philosophy. From an environmental perspective, however, values have also been examined as a key framework for

understanding pro-environmental attitudes and behaviours, most notably through the perspective of the Value-Belief-Norm (VBN) theory. Studies on the applicability and validity of the VBN theory in the context of environmentalism examined and extended its relevance beyond the social sciences into the environmental sciences (Stern, Dietz, Abel, Guagnano, & Kalof, 1999).

Initially, when the concept of values of nature was examined in the context of environmentalism, a rather simplified dichotomy was dominant. Values were largely framed through the perspective of biospheric/eco-centric versus egoistic orientations (Joireman, Lasane, Bennett, Richards, & Solaimani, 2001; Martin & Czellar, 2017; Pereira & Forster, 2015). Subsequently, this dichotomy evolved into the distinction between instrumental and intrinsic values, appreciating nature either as it contributes to humans or as appreciation of nature just for its own sake (Batavia & Nelson, 2017; Pearson, 2016; Spash & Aslaksen, 2015). However, it became increasingly evident that this binary framework was insufficient to capture the diversity and complexity of how people value nature. Later, this dichotomy evolved to encompass the need for more pluralistic and multi-dimensional approaches to value assessment, recognizing the coexistence of multiple value domains in environmental sciences (van Riper et al., 2019; de Groot & Steg, 2009; Winter, 2007), by further considering the role of altruistic and eudamonic values (Gkargkavouzi, Paraskevopoulos, & Matsiori, 2021; Masson & Otto, 2021; van den Born et al., 2018). Accordingly, altruistic values emphasize concern for the well-being of other people, whether this refers to family members, friends, local communities, or humanity at large (Stern & Dietz, 1994; Slimak and Dietz, 2006), and eudemonic values are related with the expression of a meaningful life (van Den Born et al. 2018) Yet, altruistic values were considered to be mainly people-centered, reflecting the worries about consequences for humans rather than recognizing nature itself as part of the community (Lengieza et al., 2023).

Earlier approaches such as the Ecosystem Services framework introduced by the Millennium Ecosystem Assessment (2005) emphasized the material and non-material benefits of ecosystems to people, but these also remained primarily anthropocentric and instrumental in orientation (Gómez-Baggethun & Ruiz-Pérez, 2011). The recent framework proposed by IPBES attempted to change this solely anthropocentric approach by highlighting Nature's Contributions to People (NCP) and relational values as a conceptual bridge. While NCP broadened the evaluative space by recognizing cultural and identity-based contributions of nature (Díaz et al., 2018), relational values further articulated the meaningful responsibilities, principles, and identities people hold in relation to nature and each other (Chan et al., 2016). Accordingly, relational values represent a paradigmatic shift that not only complements but also transcends the instrumental–intrinsic dichotomy by embedding human–nature connections within broader socio-cultural contexts (Chan et al., 2018; Arias-Arévalo

et al., 2017; Klain, Olmsted, Chan, & Satterfield, 2017). Yet, one has to note that critics have questioned relational values as an ethical concept and considered this category as redundant (Baard, 2025; Luque-Lora, R., 2023). Currently, the number of empirical studies testing and measuring the presence and extent of relational values is rather limited as the concept is relatively novel, and the existing studies are mostly carried out with university students without a specific reference to a policy-relevant context or habitat (Feucht et al. 2023; Kleespies and Dierkes, 2020a), except for a few recent studies carried out in field settings (Arias-Arévalo et al. 2017; Kachler, Felipe-Lucia, Isaac, Bonn, & Martín-López, 2024).

Below, I provide a short overview of the three main categories of values present in the literature (i.e., intrinsic, instrumental and relational values). Next, I discuss the findings of recent empirical studies specifically focusing on relational values carried out with university students as well as with ordinary citizens in field settings.

2.1.1. The Specific Content of Intrinsic, Instrumental and Relational Values

Instrumental Values

From an anthropocentric and utilitarian perspective, instrumental values are attributed to nature primarily because of the specific benefits it provides to humans (Himes et al., 2024; Kageyama, Saito, Tajima, & Hashimoto, 2024; Klain et al., 2017). These benefits are often associated with economic approaches and are frequently measured in monetary terms (Arias-Arévalo et al., 2017; Chan et al., 2018; Kageyama et al., 2024). Instrumental values are commonly linked to the concept of ecosystem services (IPBES, 2022; Chan et al., 2016; Van Den Born et al., 2018), and nature is often considered worthy of conservation because of these benefits to humans (Feucht et al., 2023). Such benefits can include meeting needs, achieving goals, or satisfying desires (Himes et al., 2024; Van Den Born et al., 2018), and they are typically regarded as substitutable (Himes & Muraca, 2018; O'Connor & Kenter, 2019). Consequently, in economic and political decision-making, market-based instrumental values tend to be prioritized (IPBES, 2019). However, this has been criticized by several scholars who drew attention to a larger diverse set of values (Pascual et al., 2017).

Intrinsic Values

Intrinsic values are broadly defined as the inherent value of nature, ecosystems, or life itself, independent of human use, perception, or evaluation. They emphasize that nature has worth itself, not merely as a means to human ends (Arias-Arévalo et al., 2017; Chan et al., 2016, 2018; Kachler et al., 2024; Kageyama et al., 2024). This perspective highlights that non-human beings and the more-than-human world possess significance and rights of existence regardless of human interests, often framed as moral or biocentric claims (Feucht et al., 2023; Himes & Muraca, 2018; Klain et al., 2017; Van Den Born et al., 2018). The IPBES framework explicitly defines intrinsic values as the worth that exists beyond human experience or judgment, viewing them as an internal property of organisms or ecosystems rather than something assigned externally (IPBES, 2019, 2022; Pascual et al., 2017). Recent research further stresses that intrinsic values can be articulated as both objective and subjective, linking biocentric, eco-centric, and eudemonic worldviews, and serving as a category that allows human and non-human interests to be expressed together (Himes et al., 2024; O'Connor & Kenter, 2019).

Relational Values

Going beyond the dichotomy between instrumental and intrinsic values, IPBES defined relational values as the “*meaningfulness of people–nature interactions, and interactions among people (including across generations) through nature (e.g., sense of place, spirituality, care, reciprocity)*” (IPBES, 2022, p. 20). Relational values also encompass eudemonic values, or values related to a good quality of life, embracing the affinity between humans and nature (Chan et al., 2016, 2018; O'Connor & Kenter, 2019). Accordingly, distinctly different from instrumental or intrinsic values, they derive their meaning from the interactions and responsibilities between humans and nature, and the more-than-human world (Arias-Arévalo et al., 2017; Kachler et al., 2024; Klain et al., 2017). Pascual et al. (2017) also emphasize that relational values do not originate directly from nature itself but rather emerge from the relationships and responsibilities individuals hold toward it.

Relational values are strongly associated with eudemonic dimensions, such as spirituality, aesthetic appreciation, and cultural embeddedness, and unlike instrumental values, they are non-substitutable, where the relationship itself is more important than the attainment of an external goal (Himes & Muraca, 2018; Lengieza et al., 2023). Moreover, several studies interpret relational values as reflecting a community-oriented perspective, where the shared bonds between humans and nature strengthen collective well-being (Arias-Arévalo et al., 2017; Lengieza et al., 2023). Taken together,

relational values represent a pluralistic category that integrates ethics, identity, and socio-ecological well-being, thereby offering a crucial lens for inclusive and transformative environmental governance.

Nevertheless, some scholars have questioned the added value of relational values as a distinct category. Baard (2025), for instance, argues that relational values are neither theoretically necessary nor sufficiently justified, suggesting that they may complicate rather than clarify valuation frameworks. Similarly, Luque-Lora (2023) criticizes the concept as counterproductive, contending that all values are inherently relational and that introducing a separate category risk obscuring the relational aspects already embedded in instrumental and intrinsic values.

Nonetheless, recent studies on relational values show that consideration of multiple values are necessary for effective environmental management to address and mitigate socio-environmental conflicts (Arias-Arévalo, 2017; Himes et al., 2024). In this regard, relational values offer a measurable and context-based alternative to a solely economic valuation-based approach by integrating diverse perspectives from the social sciences and humanities, thereby advancing justice and sustainability (Chan et al., 2018). In addition, it is argued that relational values resonate more widely than instrumental and intrinsic values, especially in the presence of traditional and/or indigenous practices that guide individuals' and communities' interactions with nature (Kachler et al., 2024). Their inclusion in pluralistic valuation methods enhances therefore epistemic justice, makes visible existing power asymmetries, and provides a framework for articulating human-nature relationships that challenge the dominant Western dichotomic model of values relying on intrinsic versus instrumental values only (Himes & Muraca, 2018). In the following section, I briefly discuss the recent empirical findings on relational values.

2.1.2. Recent Empirical Studies on Relational Values

Recent empirical evidence shows that relational values not only resonate with participants of these studies, but also offer a critical lens for pluralistic valuation and inclusive governance of social–ecological systems (Chan et al., 2016; Arias-Arévalo et al., 2017; Klain et al., 2017; Himes & Muraca, 2018; Feucht et al., 2023; Helseth, Vedeld, Vatn, & Gómez-Baggethun, 2023; Himes et al., 2024). In an early study addressing relational values Arias-Arévalo et al. (2017) conducted surveys with 589 individuals in the urban and rural regions of the Otun River watershed in Columbia and found that relational values were the most frequently stated value category by the participants, co-existing with intrinsic and instrumental values. The study carried out by Klain et al. (2017) was one of the first

attempts to formally create and test a specific empirical survey module for relational values with participants in the United States and Costa Rica. The findings showed that instrumental values were widely acknowledged by the participants, based on the statement “it is important to protect nature in order to have clean air and water” receiving the highest level of agreement among participants. However, relational values also exhibited high internal consistency and were similarly recognized across different populations, emerging as a strong indicator of human-nature connections. The findings of the study therefore suggested that relational values represent an empirically distinct category of values for nature.

Other empirical studies specifically targeted university students using the same construct. For instance, Kleespies and Dierkes (2020a) used the relational value scale created by Klain et al (2017) and showed that relational values can be considered a separate value category. Accordingly, even though they partially overlap with nature connectedness, relational values were shown to be broader, including social dimensions like care and community. Similarly, Feucht et al. (2023), using the same scale by Klain et al. (2017), found that relational values resonated with university students in Germany, where students with a major in environmental sciences held stronger relational values than other students.

Complementing these findings, Uehara et al. (2022) conducted one of the first large-scale quantitative tests of relational values across three Japanese social-ecological systems (SESs). Their findings revealed that relational values significantly predicted people’s support for and involvement in SES management, even when overlapping conceptually with other value types. Despite partial covariance with instrumental and intrinsic dimensions, relational values independently contributed to explaining pro-SES behavior. The study therefore provided evidence that cultivating relational values can strengthen community engagement and stewardship in local ecosystem management.

Another recent study conducted by Kachler et al. (2024) with visitors across three protected areas in Germany explored the plural values for nature and underlying preferences for NCP (Nature’s Contributions to People). Using semi-structured interviews and qualitative content analysis, the study found that visitors prioritized regulating (e.g., carbon storage, pollination) and non-material NCPs (e.g., recreation, landscape beauty) over material ones. However, the most frequently expressed values were relational ones, especially therapeutic (well-being, relaxation) and care/stewardship, which were followed by intrinsic and instrumental values. Overall, the study underscored that relational and therapeutic dimensions are central for connecting nature and human well-being and should be more strongly integrated into environmental policy and decision-making. Similarly, in a

protected area field setting in Ecuador, Asanza-Reyes et al. (2024) found that the presence of relational values played the biggest role for the strength of nature connectedness among the 400 participants they surveyed face-to-face.

Together, these empirical studies demonstrate that relational values are not only conceptually distinct but behaviourally consequential. Across diverse cultural and ecological contexts, these studies confirmed that relational values consistently emerge as strong correlates of environmental stewardship, moral responsibility, and human-nature connectedness. Moreover, they highlighted that relational dimension of valuing nature can serve as critical leverage points for fostering sustainable behavior and achieving socially supported environmental management.

2.2. Nature Connectedness

In addition to plural values, recent studies highlight the significance of nature connectedness in shaping individuals' relationships with biodiversity, their pro-environmental behavior and subjective well-being (Barragan-Jason et al., 2022). Connectedness to nature refers to the extent to which individuals perceive themselves as part of the natural world, and it has recently become an important variable in explaining outcomes such as subjective well-being and pro-environmental behaviour. Unlike mere nature contact (spending time in natural environments), nature connectedness implies a deeper and more intimate relationship with nature and biodiversity. Connectivity with nature is a wide-ranging concept and implies more than just a relationship between humans and nature, as it entails different emotional, cognitive, cultural, and spiritual dimensions (Dutcher et al., 2007). Nature connectedness has also been conceptualized as oneness with nature or self-inclusion in nature implying that all the living and non-living organisms are parts of the same environment (Gkargkavouzi et al., 2021).

Both field-based and online studies have employed various scales to measure nature connectedness, and numerous scales have been developed to measure it, including the Connectedness to Nature Scale (CNS) (Mayer & Frantz, 2004), the Nature Relatedness Scale (Nisbet, Zelenski, & Murphy, 2009), the Nature Connection Index (Hunt et al., 2017), Human Nature Connectedness (Meis-Harris, Borg & Jorgensen, 2021), and the Inclusion of Nature in Self scale (Schultz, 2002). The 14-item Connectedness to Nature Scale (CNS) by Mayer and Frantz (2004) is one of the most widely applied scales across different cultural and linguistic contexts. There exists also a 7-factor reduced version of this scale (Kleespies & Dierkes, 2020a, 2020b), and the 14-item scale was validated

in cross-national studies, in multiple countries and languages (Capaldi, Dopko, & Zelenski, 2014; Pasca, Aragonés, & Coello, 2017; Swami et al., 2024).

One recurring discussion in the literature concerns the distinction between nature connectedness and relational values. According to Kleespies and Dierkes (2020a), some of the items measuring nature connectedness and relational values tend to overlap, whereas Lengieza et al. (2023) demonstrated that connectedness to nature and N4C (“Nature for Community”, mostly overlapping with relational values) emerge as distinct constructs, as CNS alone is insufficient to explain the role of nature in the community building and cohesion. More recently, Lengieza and Aviste (2025) further confirmed that CNS and relational values can be conceptualized as empirically distinct constructs. Similarly, in another empirical study on nature connectedness and relational values, the findings indicated that relational values were more pronounced in traditional agricultural landscapes, whereas the highest proportion of individuals reported a strong sense of connectedness to nature in terms of intermittent streams and greenhouses in their environment (El Ghafroui, Quintas-Soriano, Pacheco-Romero, Murillo-López, & Castro, 2023). This suggests that while nature connectedness and relational values are related, they capture distinct dimensions that may vary according to contextual factors. Hence, investigating these two constructs in different contexts and habitats including urban biodiversity is important for gathering further insights on the relationship between nature connectedness and relational values.

To date, only a limited number of studies investigated whether environmental values are a predecessor of nature connectedness, or vice versa, while considering their impacts on pro-environmental behavior and subjective well-being. One recent empirical study suggested that relational values can be considered as a predictor of nature connectedness (Asanza-Reyes et al., 2024), and another one provided evidence for the opposite, showing that nature connectedness precedes biospheric values (Martin & Czellar, 2017), however, further studies are needed to investigate the direction of this relationship.

2.3. Subjective Well-Being and Nature

The concept of subjective well-being does not have a universally agreed definition in the literature. Instead, it is expressed in multiple ways, such as life satisfaction, a general sense of feeling good, or the belief that the things one has in life are valuable and meaningful. This multidimensionality reflects the complexity of subjective well-being, which is influenced by diverse determinants including health status, living environment, and economic conditions, among others. Building on these diverse perspectives, the IPBES conceptual framework positions well-being as *a good quality of life* as the ultimate outcome of human–nature relationships. Within this framework, *Nature’s Contributions to People (NCP)* are directly linked to human well-being, emphasizing that ecosystems provide both material and non-material benefits that are indispensable for fulfilling lives (IPBES, 2022). Moreover, IPBES recognizes that different societies articulate well-being via more holistic visions such as “living in harmony with nature” or “living well in balance and harmony with Mother Earth” (2022). This highlights that subjective well-being is not only shaped by individual or social determinants but is also deeply embedded in ecological conditions and cultural relationships with nature, thereby reinforcing the centrality of well-being in pluralistic approaches to sustainability.

Consequently, researchers have employed a variety of scales to measure subjective well-being. Prominent examples include the Satisfaction with Life Scale (Diener, Emmons, Larsen & Griffin, 1985), the Environmental Quality of Life Scale (Bauman, Erpelding, Régat, Collin, & Briançon, 2010), or simpler single-item measures such as asking participants “How happy are you with your life overall?” (Ma, Dong, Chen, & Zhang, 2018; Martin et al., 2020). In addition to single-item approaches, several studies have used multiple items in combination to capture the multidimensional nature of well-being (Cervinka, Röderer, & Hefler, 2012). Other studies have taken a more affective perspective, focusing on the measurement of positive and negative emotions to understand subjective well-being (Samus, Freeman, van Heezik, Krumme, & Dickinson, 2022). Such diversity in methodology reflects the inherent complexity of measuring the construct, as well as the effort to account for its cognitive, emotional, and evaluative dimensions.

Research linking well-being and nature provides robust empirical support for the role of connectedness to nature or time spent in natural environments for well-being of individuals. Across these studies, a consistent finding is that individuals with higher levels of connectedness to nature tend to report greater subjective well-being (Howell, Dopko, Passmore, & Buro, 2011; Barragan-Jason et al., 2022). This suggests that nature not only contributes to psychological health through

recreational and aesthetic experiences, but also fosters deeper feelings of meaning, belonging, and fulfilment, positioning well-being as a central outcome in human–nature relationship research.

2.4. Pro-Environmental Behaviour (PEB) and Its Potential Predictors

Within the literature on conservation and environmental degradation, pro-environmental behavior (PEB) is consistently identified as a critical driver of transformative change (De Leeuw, Valois, Ajzen, & Schmidt, 2015; Markle, 2013; Perkins, 2010). However, pro-environmental behaviour is described and measured in various forms in the literature; for instance, as actions that minimize harm to the environment, actions that contribute positively to the environment (Lutz et al., 2023 & Gkargkavouzi et al., 2021), or behaviours that reduce the impact of the human footprint on the natural environment (Gkargkavouzi et al., 2021).

Different approaches have been employed for measuring pro-environmental behaviour: while some studies rely on diary-keeping methods (Lutz et al., 2023), the more common approach involves assessing the individual state of PEB through participants' level of agreement with a set of given statements in a survey (De Leeuw et al., 2015; Markle, 2013; Martin et al., 2020; Perkins, 2010; van Riper et al., 2019). Another methodology adopted is direct observation/measurement of actual pro-environmental behaviour, however, due to operational difficulties this method is not applied widely (Batavia & Nelson, 2017). The setting also differs across studies: whereas some PEB studies were conducted online or through indirect approaches, others were implemented as field research in diverse green environments (van Riper et al., 2019; Winkler-Schor, 2022).

PEB was commonly studied alongside different variables in order to identify those that trigger pro-environmental actions. Fundamentally, the VBN (Value-Belief-Norm) theory was widely applied to explain which factors are decisive in fostering behavioural change (Stern et al., 1999). Nature connectedness was found to be one of the most common determinants with a positive effect on PEB (Martin et al., 2020; Rosa, Collado, Profice, & Pires, 2022). Another driver found to be important was eco-anxiety which can trigger pro-environmental behaviour in both positive and negative directions (Pavani et al, 2023; Türkarslan, Kozak, & Yıldırım, 2023). That is, while the level of eco-anxiety can activate the individual for positive change, it can also paralyze the individual and withdraw them from action (Lutz et al., 2023). Studies on PEB also consider the impact of different value categories on PEB. For instance, one study on PEB focused on the empirical construct of 'consideration of future consequences.' This was categorized into biospheric, egoistic, and social consequences. The study found that participants who expressed higher levels of biospheric

consequences also reported higher levels of PEB (Joireman et al., 2001). Similarly, several recent studies addressed the direct impacts of having intrinsic, instrumental, or relational values on self-reported PEB. Accordingly, instrumental values were found to be a negative correlate of pro-environmental behaviour (Lengizea et al., 2023; Aviste & Niemiec, 2023). On the other hand, other recent research showed that relational values have a directly positive relation with PEB (Kleespies, 2021; Lengieza et al., 2023; Uehara et al., 2022). Another study found that ecocentric values have a positive correlation with pro-environmental behaviour (Aviste & Niemiec, 2023).

Another concept that has frequently been addressed in conservation studies in relation to PEB is ecological knowledge. Ecological knowledge is broadly defined as awareness and understanding of environmental problems and potential solutions, and it also encompasses the ability to recognize and interpret environmental symbols, concepts, and behavioural patterns associated with conservation (Amoah & Addoah, 2021). In this sense, ecological knowledge represents both a cognitive foundation for environmental concern and a potential predictor of sustainable practices. However, self-reported ecological knowledge often produced inconsistent results, limiting its explanatory power for PEB (Geiger et al., 2019), as individuals may overestimate or underestimate their own actual level of knowledge, creating a gap between perceived and factual understanding. Hence, it has been suggested that assessing ecological knowledge via fact-based knowledge questions may perform better. Ecological knowledge has therefore also been assessed through people's ability to recognize and express specific (local or scientific) species names. Findings showed that ecological knowledge is often stronger where traditional practices of interacting with nature (such as through semi-subsistence farming systems or fisheries) persist, but it declines or becomes fragmented when such practices fade (Biró, Babai, Bódis, & Molnár, 2014; Löki et al., 2021).

Eco-anxiety is another potential predictor of PEB. It is commonly described as the emotional distress and concern associated with local and global environmental crises including climate change, biodiversity loss, local pollution and other environmental disasters. Various negative emotions are observed as the result of eco-anxiety in different parts of the world (Europe, America, Asia, etc.), the rate of this experience is particularly high in the young population (Sampaio et al., 2023). Consequences of this feeling can bring different physical and spiritual consequences; recent studies indicate that eco-anxiety correlates with various forms of distress, including depression (Clayton & Karazsia, 2020; Lutz et al., 2023). Previous studies examining the relationship between pro-environmental behaviour and eco-anxiety have shown that pro-environmental behaviour is not the outcome of eco-anxiety; rather, it is considered a strategy to control and treat these emotional concerns (Bamberg et al., 2015 as cited in Hogg et al., 2021). However, eco-anxiety may have a

significant impact on subjective well-being given the accelerating climate and biodiversity crises of today (Lutz et al. 2023)

Environmental concern may also play a role on PEB and subjective well-being (Rhead, Elliot & Upham, 2015; Binder & Blankenberg, 2016). Lengieza et al. (2023) emphasizes that environmental concern is not only related with just personal motivations but rather it should be framed through a broader societal perspective. In this respect, it can capture aspects that overlap with relational values like responsibility toward nature. However, there are again various scales trying to measure environmental concern (Cruz and Manata, 2020). Schulz (2001) is one of the early attempts widely used in the literature to operationalize environmental concern in surveys. Yet, Cruz and Manata (2020) suggested that there is a need for the development of new and updated frameworks that can better capture the multifaceted nature of environmental concern in future research.

2.5. Hypotheses of the Present Study

As discussed in previous sections, a wide range of empirical studies have been conducted to investigate plural values of nature, connectedness to nature, pro-environmental behaviour, and subjective well-being, employing diverse methodologies. In sum, these studies consistently indicated that higher levels of intrinsic values are associated with stronger engagement in PEB (Aviste & Niemiec, 2023; Pereira & Forster, 2015; van Riper et al., 2019; Winkler-Schor et al., 2020). In addition, relational values have been shown to exhibit a positive relationship with PEB (Lengieza et al., 2023; Pereira & Forster, 2015; Uehara et al., 2022; Winkler-Schor et al., 2020). When examining the link between nature connectedness and values of nature, relational values emerge as a distinct factor, demonstrating a positive association with nature connectedness (Asanza-Reyes et al., 2024; Kleespies & Dierkes 2020b). Moreover, individuals with greater ecological knowledge tend to display stronger pro-environmental behaviours (Amoah & Addoah, 2021; Geiger et al., 2019; Liobikienė & Poškus, 2019). In addition, empirical evidence suggests that nature connectedness is positively related to both PEB (Lahoti, Dhyani, Sahle, Kumar, & Saito, 2024; Martin & Czellar, 2017; Mayer & Frantz, 2004; Pereira & Forster, 2015; Perkins, 2010; Rosa et al., 2022; Whitburn et al., 2020; Zhang, Cai, Bai, Yang, & Zhang, 2023) and subjective well-being (Cervinka et al., 2012; Howell et al., 2011; Martin et al., 2020; Pritchard et al., 2020; Samus et al., 2022). Based on these previous findings in the literature, the following hypotheses have been developed for the present study in the context of urban greenspaces in Istanbul:

Hypothesis 1 (H1): Intrinsic values will be positively related with higher pro-environmental behaviour.

Hypothesis 2 (H2): Relational values will be positively related with higher pro-environmental behavior.

Hypothesis 3 (H3): Relational values will be positively related with connectedness to nature.

Hypothesis 4 (H4): Connectedness to nature will be positively related with higher subjective well-being.

Hypothesis 5 (H5): Connectedness to nature will be positively related with higher pro-environmental behaviour.

Hypothesis 6 (H6): Higher ecological knowledge will be positively related with higher pro-environmental behaviour.

3. METHODOLOGY

3.1. Online Pilot Study

Prior to the main research, a preliminary online survey was prepared and conducted to test the compatibility and comprehensibility of the questionnaire items in Turkish, specifically focusing on the variables i) values for nature (intrinsic, instrumental and relational), and ii) nature connectedness (via the CNS scale by Mayer and Frantz, 2004)). These two variables were prioritized because they constitute key constructs measured in the main study, and their conceptual nuances are often rooted in culturally specific interpretations. Given the risk of difficulty in preserving the original meaning during translation, a double translation method first from English to Turkish, then back to English was employed to make sure that the original meaning is preserved. Only the Turkish versions of selected questions were used in the pilot survey, and this process aimed to ensure that the items retained conceptual clarity and cultural relevance when applied to the local context.

Validated scales exist for both variables such as the 14-item Connectedness to Nature Scale (CNS) by Mayer and Frantz (2004), and various values of nature scales were proposed by Klain et al. (2017), Feucht et al. (2023), and Lengieza et al. (2023). However, these instruments were originally developed in English and predominantly applied in geographical and cultural contexts that differ significantly from Türkiye. To address potential linguistic and cultural misalignments, Turkish versions of these scales were tested separately via online surveys.

For the values for nature variable, a total of 31 statements were selected and translated from four widely-cited main empirical studies in the literature (i., e. Klain et al., 2017; Winter, 2007; Feucht et al., 2023; Lengieza et al., 2023), and the scale was tested on a sample of 159 individuals in the online pilot study. For the connectedness to nature, the original 14-item CNS scale by Mayer and Frantz (2004) was used to test for the participants from Türkiye. Although a 7-item shorter version was proposed and tested by Rosa et al. (2022) for CNS for different national contexts, I preferred to test the original 14-item version in the online pilot study. This decision was made to preserve the depth of the construct and to better assess the influence of local cultural and linguistic factors. The Turkish version of this scale was tested on a sample of 109 individuals in a separate online survey.

These pilot studies offered valuable insights into how participants interpreted and responded to the adapted scales. To further evaluate the measurement quality of the two scales, statistical analyses were conducted focusing on their internal consistency and underlying factor structures. Assuming a normal distribution of the sample, exploratory factor analysis (EFA) was employed to identify the latent constructs within each scale (Feucht et al., 2023; Klain et al., 2017; Costello & Osborne, 2005).¹ This way, the number of questionnaire items could be reduced without disturbing the conceptual integrity of the original scales, and the presence of factors (subcategories) in each scale could be tested (Brace, 2018; Galesic & Bosnjak, 2009). This balance was essential to maximize participant engagement and response quality without compromising the robustness of the measurement tools.

As a result of the EFA, CNS scale could be meaningfully reduced to 6 items and the value scale could be reduced to asset of 12 items by prioritizing only the items that loaded with highest factor loadings for each identified factor (subcategory in each scale). (see Table C.2: Values of Nature Factor Analysis and Table C.4: CNS Factor Analysis). This reduction process preserved the core conceptual structure of each scale while enhancing their clarity, efficiency, and measurement accuracy.

3.2. Data collection via Face-to-face Surveys

After the number of items and their translations were tested in the online pilot study, a structured face-to-face survey was carried out with urban greenspace visitors in Istanbul as participants. The survey was designed to measure six main variables across ten modules. The survey methodology and question form were reviewed and approved by Boğaziçi University Social and Human Sciences Human Research Ethics Committee (2023-21T).

To facilitate data collection, an electronic survey interface was used during face-to-face interactions, enhancing participant convenience and thereby potentially increasing response rates: Participants could either complete the survey on their own mobile devices or on the researcher's mobile device. Participants also had the option to read the questions themselves or have them read aloud by the researcher. This hybrid approach enabled me to observe and document participants'

¹ For both the connectedness to nature and values of nature variables, the Maximum Likelihood extraction method was applied, with the extraction criterion set as eigenvalues greater than 1. Oblique (Direct Oblimin) rotation was used to account for potential correlations between factors, and a minimum factor loading threshold of 0.40 was adopted (Costello & Osborne, 2005).

verbal responses and thought processes as well, which would not have been possible through a standard online survey.

Fieldwork was conducted in two urban greenspaces in Istanbul with significant tree coverage compared to their surroundings: Emirgan Grove and Atatürk Urban Forest in Hacıosman (İstanbul Büyükşehir Belediyesi Park, Bahçe ve Yeşil Alanlar Dairesi Başkanlığı, 2024). These urban parks were selected due to their differences in the level of biodiversity (Hacıosman Atatürk Urban Forest with potentially higher biodiversity than Emirgan Grove), spatial characteristics (Emirgan Grove closer to urban centers with more structured landscape planning) and surrounding neighbourhood's demographics. The target sample consisted of Istanbul residents aged 18 and older who visit these urban parks during the survey period. Data collection was carried out in both of these urban greenspaces, maintaining a balanced number of participants (N (Hacıosman Atatürk Urban Forest) = 60, N (Emirgan Grove) = 52). Data were collected in 6 days on both weekdays and weekends throughout July and August 2024 and, on average, each survey took around 12 minutes.

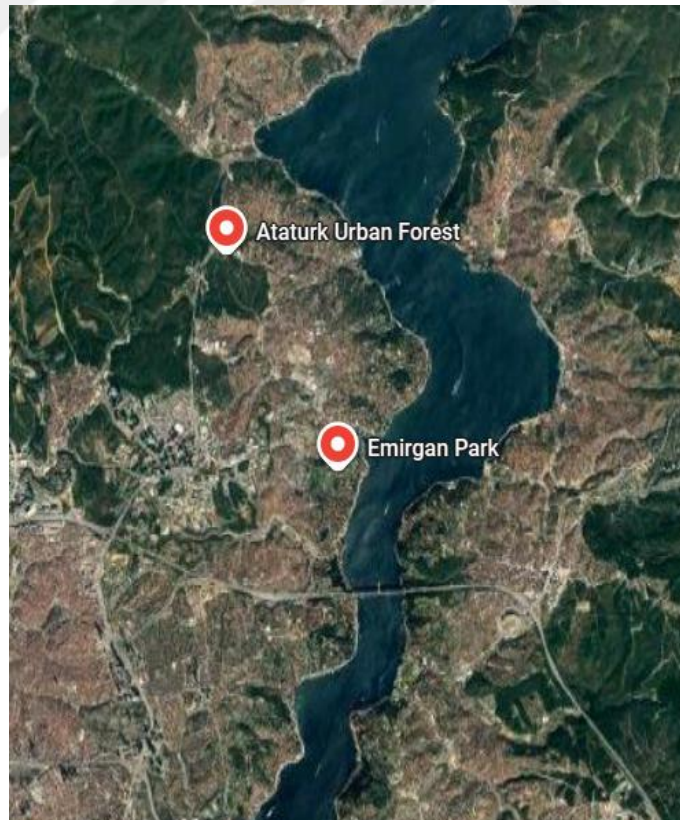


Figure 3.1. Locations for data collection in İstanbul

Participants were approached in the most frequented areas of the urban parks between 12 am and 6 pm and given a brief verbal introduction about the study. Although participation rates varied by location and day, approximately one in ten approached individuals declined to participate. The most common reason for refusing to participate in the survey was saying “I don’t have time” or “I don’t want to allocate time for this right now.”. Two individuals expressed distrust regarding participation in a university survey that offered monetary compensation at the end of the study. After the verbal introduction, every participant was informed that the survey would be conducted anonymously and no personal information would be asked. In addition to this, the purpose, scope, and withdrawal conditions of the study were verbally explained and reiterated in detail from the consent form presented at the beginning of the survey.

Most participants accessed the survey via a QR code on their mobile devices. Those experiencing technical difficulties or who preferred not to use their own devices completed the survey on the researcher’s device (mobile phone or tablet). The majority of participants using the researcher’s device opted to have the questions and answer options read aloud. To ensure data integrity, only individuals physically present in the park at the time of the survey were allowed to participate, and the QR code/survey link was not shared outside the field setting. On each data collection day, the collector ID information was monitored to prevent unauthorized participation.

3.3. Survey Modules

The survey consists of 10 modules in total, one specific module for each variable. It started with a general introduction and ended with the dictator game to assess the donation behavior (or the actual individual PEB), as described below and briefly shown in Table 3.1.

The first module was a general introduction, examining participants' park visit habits through two multiple-choice questions regarding the park in which they were physically present at the time of the survey. The first question assesses the frequency of park visits, while the second explores the reasons for visiting; participants were allowed to select multiple answers for this second question.

The second module focuses on measuring the nature connectedness variable. In this section, six items from the 14-item CNS scale (Mayer and Frantz, 2004) were used in line with the findings from the online pilot study. Responses are collected using a 5-point Likert scale (1–5), where 1 =

Completely disagree, 5 = Completely agree, and 3 = Neither agree nor disagree, and the questions are displayed in the same order for all participants.

The third module, similar to the second module, includes 12 value-related questions derived from the EFA analysis of the online pilot study. These questions are categorized into three groups with four instrumental, four intrinsic, and four relational value items. These questions are presented using a 5-point Likert scale (1–5), where 1 = Completely disagree, 5 = Completely agree, and 3 = Neither agree nor disagree. In this section, the questions are randomized for each participant to minimize order bias.

The fourth module includes a multiple-choice question in which participants are asked to identify the three most important problems in Türkiye from a list of nine options. The primary purpose of this question in the survey is to examine participants' environmental concern. These nine options represent various prominent societal problems and development areas currently discussed in Türkiye, including, but not limited to, political and economic challenges, animal rights, and environmental issues. Those who have indicated environmental issues among the top three most important problems of Türkiye were coded as having relatively high environmental concern (1 = if environmental problems among the top three problems, 0 = otherwise).

The fifth module assesses participants' ecological knowledge. Participants are shown images of three local bird species and three local plant/tree species, and they are asked whether they know the name of each species. Those who indicate that they know the species are provided with an open-ended text box, where they are asked to write down the species name that comes to their mind. The species selected for this task are those with a high likelihood of being observed in both urban parks chosen for the study.

In the sixth module, participants' eco-anxiety levels are measured by asking them to select the option that best describes their feelings over the past two weeks when thinking about climate change and other environmental problems. Participants are given five options (1) Worrying too much, 2) Feeling scared, 3) Feeling anxious about the global impact of your personal actions, 4) Unable to stop thinking about the losses in nature, 5) none) to choose from. Although eco-anxiety is not the main variable of interest in the study, it is considered important to explore its relationship with other variables, based on the existing literature. Hence, the questions and response options have been shortened and adapted, instead of directly using the existing substantially longer version Hogg's HEAS-13 scale (Hogg et al., 2021).

In the **seventh module**, the subjective well-being question was presented as a single-item scale, a shortened version of the one found in the literature (Ma, Dong, Chen & Zhang, 2018). In this section, participants are asked to rate their overall happiness on a 5-point scale, reflecting their general life satisfaction.

In the eighth module, participants stated pro-environmental behaviours are measured. The question in this module is designed by reviewing commonly used question formats in the literature, to ensure that the responses are distinguishable from one another (De Leeuw et al., 2015; Lengieza et al., 2023; Markle, 2013; Martin et al., 2020; Perkins, 2010; van Riper et al., 2019). Participants are presented with five options from which they could select one or more answers : (1) Tried to reduce my use of plastic bags, 2) chose buses or trains with lower carbon emissions instead of flying on long-distance trips, 3) Read at least one book, magazine, or article on nature, ecology, or the climate crisis, 4) Volunteered for an organization or public institution working on environmental issues, 5) Provided support (financial or other) to an organization or public institution working on environmental issues, 6) None of these apply to me, and they are asked to indicate which of the behaviours they have engaged in at least once over the past five years. Those who have not performed any of the listed behaviours select the sixth option, which is "None of the above."

In the ninth module, participants are asked to provide their demographic information, namely, age, gender, education, and income status.

The last module collected data on “actual” pro-environmental behavior via a dictator game. In this section, building on the methodology of a previous study in which PEB was measured through the donation method (Batavia & Nelson, 2017), participants were given either 100 TL or 200 TL and were informed that they can donate some portion of this total reward to a local conservation organisation dedicated to the protection of local endangered birds and mammals (Kuzey Doğa Derneği). Participants were asked to specify the amount they would like to donate, and if they choose to keep the money instead, the cash equivalent was directly provided to them in cash. Initially, the reward was set at 100 TL, but after observing that most participants decided to donate the total amount to the conservation organisation, the amount was raised to 200 TL in further surveys in order to test whether this behavior emerged as a result of the relatively low amount of the reward provided to the participants. Yet, as discussed in the next sections, doubling this reward did not change the donation behavior substantially.

Table 3.1. Brief Explanation of the Variables used in the Study

Module	Variable	Explanation
1	Independent	Park visit frequency and reason of visiting the park: two multiple-choice questions
2	Independent	Connectedness to Nature (CNS): 6 items in 5-point Likert Scale
3	Independent	Values For Nature: 12 items in 5-point Likert Scale (four items for each category of values)
4	Independent	Environmental Concern: a multiple-choice question asking about the top three most important problems of Türkiye
5	Independent	Ecological Knowledge: recognition of 3 local plant & 3 local bird species
6	Independent	Eco-anxiety: a multiple-choice question asking about participants' feelings over the past two weeks when thinking about climate change and other environmental problems
7	Dependent	Subjective well-being: overall level of individual happiness on a 5-point scale
8	Dependent	Stated Pro-Environmental Behavior (PEB): multiple response question asking which of the behaviours participants have engaged in at least once over the past five years
9	Independent	Demographic information: four multiple-choice questions (age, gender, education, and income status)
10	Dependent	Dictator Game- Actual PEB: the amount of donation to Kuzey Doğa Derneği [0,200] TL

3.4. Data Analysis

The data analysis was carried out in the IBM SPSS Statistics (Version 29.0.0.0) programme and IBM SPSS Amos (29 Graphics) for path analysis. Initially, descriptive analyses were conducted for all variables across the ten modules. Subsequently, reliability (Cronbach's alpha) and Exploratory Factor Analyses (EFA) were performed for the variables related to connectedness to nature, values, and pro-environmental behaviour. Given that the values of nature variable were developed using different references based on preliminary research, reliability analyses were also carried out separately for each of its three dimensions (ie., instrumental, intrinsic, and relational values) to assess their internal consistency and the underlying factor structures. Following these analyses, composite scores were calculated for all variables except those in module 9 (demographics). Using these scores, a Spearman correlation matrix was constructed to provide an initial overview of the relationships among the variables.

After completing the correlation analysis, regression analyses were undertaken to identify the key predictors of subjective well-being and stated pro-environmental behaviour. These analyses aimed to reveal which variables significantly influenced these two dependent variables, thereby offering deeper insights into their determinants. Due to the strong influence of the connectedness to nature variable, regression models were run both including and excluding this variable to examine the effects of other predictors in greater detail. Finally, a path analysis was performed to explore the possibility of any mediating variables between the independent and dependent variables, more

specifically, I tested whether values are a predecessor of nature connectedness, or vice versa, when considering their impacts on the pro-environmental behavior, and then, on subjective well-being. This model was informed by previous studies that examined connectedness to nature and PEB variables with path models (Pereira & Forster, 2015; Shin, van Riper, Stedman & Suski, 2022) and similar studies investigating the relationship between environmental values and nature connectedness (Asanza-Reyes et al., 2024; El Ghafroui et al., 2023; Kleespies & Dierkes 2020b).



4. RESULTS

120 individuals participated in the face-to-face surveys; however, 8 questionnaires were excluded as these 8 participants did not complete the entire questionnaire, hence, the final sample consisted of 112 individuals. Every 1/10 individuals refused to participate and the response rate was about 90% for the study. All modules of the survey were mandatory for all participants, and participants completed the survey in 12 minutes, on average.

4.1. Descriptive Results of the Survey

4.1.1. Module One: General Introduction

This introductory module was crucial for understanding participants' park visit habits by examining visit frequency and reasons. The findings indicate no significant difference between Hacıosman Atatürk Urban Forest and Emirgan Grove regarding respondents' visit frequency. Overall, only 27% of participants indicated that they visit the parks more than once or twice a month, making them the smallest group. In contrast, the majority stated to visit the park less than once a month (45%), suggesting that regular park visits are not a common habit among the sample.

The second question in this module aims to identify the key drivers behind participants' park visits. This multiple-choice question, designed with a checkbox option, allowed respondents to select multiple reasons for their visits. While there are only minor differences between the two parks, the most common reasons overall are spending time with family or friends and connecting with nature. At Emirgan Grove, the primary motivation was socializing, with 67% of visitors citing spending time with family or friends as their main reason. In contrast, at Hacıosman Atatürk Urban Forest, the most common reasons were connecting with nature and walking or exercising, both with 55%.

Table 4.1. Park Visit Frequency Descriptive Statistics. “How often do you visit this park?”

N=112		Haciosman Atatürk Urban Forest	Emirgan Grove	Total Group
Everyday	n	4	1	5
	%	7%	2%	4%
2-3 times a week	n	14	12	26
	%	23%	23%	23%
Once or twice a month	n	16	15	31
	%	27%	29%	28%
Less than once a month	n	26	24	50
	%	43%	46%	45%
Total	n	60	52	112
	%	100%	100%	100%

Table 4.2. Park Visit Reason Descriptive Statistics. “Please check the reasons for visiting this park (you can select more than one option).”

N=112		Haciosman Atatürk Urban Forest	Emirgan Grove	Total Group
Walking my baby	n	1	4	5
	%	2%	8%	4%
Having my child play in the park's playground	n	7	18	25
	%	12%	35%	22%
Walking my pet	n	3	1	4
	%	5%	2%	4%
Walking or exercising	n	33	16	49
	%	55%	31%	44%
Spending time with friends or family	n	25	35	60
	%	42%	67%	54%
Connecting with nature, spending time outdoors	n	33	28	61
	%	55%	54%	54%
Nature activities (birdwatching, mushroom picking, etc.)	n	10	3	13
	%	17%	6%	12%
Using it as a passageway	n	4	1	5
	%	7%	2%	4%
Organizational activities of civil society organizations	n	1	0	1
	%	2%	0%	1%
Relaxing and clearing the mind	n	1	0	1
	%	2%	0%	1%
Total	n	60	52	112
	%	%100	%100	%100

4.1.2. Module Two: Nature Connectedness (CNS)

The results of the Connectedness to Nature Scale suggest that participants generally perceive themselves as closely connected to nature, with a strong sense of belonging and community. Looking at Table 4.3, it can be seen that the average agreement level for most statements is above 3, indicating a general tendency toward positive nature connectedness among participants. In line with this, CNS4 ("I often feel disconnected from nature") and CNS12 ("I see myself at the top of nature's hierarchy") indicated lower levels of agreement, on average. During the surveys, these two statements were the ones participants most frequently asked to be re-read, suggesting potential difficulties in comprehension. While further analysis will provide deeper insights into response patterns, an initial interpretation is that, despite being adapted to Turkish and the local context following a structured best-practice approach of translation and back-translation, some survey items may still require improvements for enhanced clarity. This highlights the need for continuous refinement of translated scales to enhance their accessibility and interpretability for respondents.

Secondly, statements like "Nature feels like a community of which I am a part" (CNS 2) and "I feel like I am part of nature like a tree is part of a forest" (CNS 11) received higher agreement levels, on average, indicating that most respondents feel integrated within the natural world. Conversely, fewer participants feel disconnected from nature, as reflected in the lower mean score of 2.85 for the statement "I often feel disconnected from nature" (CNS4). The responses also show a balanced view of their place within nature's hierarchy, with several participants recognizing themselves as part of the natural world rather than above it (41% of participants agreed with CNS 12 ("I see myself at the top of nature's hierarchy"), while 87% and 77% agreed with CNS 2 ("Nature feels like a community of which I am a part"), and CNS 11 ("I feel like I am part of nature like a tree is part of a forest") respectively).

Lastly, an important insight from the survey came from participants at Emirgan Grove. For the statement "When I consider my place in the world, I see myself as at the top of nature's hierarchy (CNS12)," two of the participants who selected responses 1 (Strongly Disagree) or 2 (Disagree) explained their perspective by saying, "Nature and other living beings are very valuable, but humans are the most important and superior beings created by God." This suggests that religious beliefs can influence one's connection to nature. Overall, the data reflects a predominantly positive relationship with nature among the participants.

Table 4.3. Connectedness to Nature Descriptive Statistics. CNS: “To what extent do you agree with the following statements? Please use the scale: 1 = Strongly Disagree, 5 = Strongly Agree”

<i>N=112</i>		1: Strongly Disagree	2: Disagree	3: Neither agree nor disagree	4: Agree	5: Strongly Agree	Means	SD
CNS1: I often feel connected to the nature around me.	n	6	6	17	45	38	3,92	1,092
	%	5%	5%	15%	40%	34%		
CNS2: Nature feels like a community of which I am a part.	n	2	4	8	52	46	4,21	0,864
	%	2%	4%	7%	46%	41%		
CNS4: I often feel disconnected from nature.	n	19	32	24	21	16	2,85	1,310
	%	17%	29%	21%	19%	14%		
CNS11: I feel like I am part of nature like a tree is part of a forest.	n	2	9	15	51	35	3,96	0,967
	%	2%	8%	13%	46%	31%		
CNS12: When I consider my place in the world, I see myself as at the top of nature's hierarchy.	n	20	18	28	31	15	3,03	1,305
	%	18%	16%	25%	28%	13%		
CNS13: I often feel like I am just a small part of the natural world and not more important than the grass on the ground or the birds in the trees.	n	8	16	26	32	30	3,54	1,230
	%	7%	14%	23%	29%	27%		

4.1.3. Module Three: Values of Nature

Firstly, as Table 4.4. shows instrumental value statements (such as INS5, INS7, INS9, and INS10) received a high level of agreement, indicating that participants perceive nature as valuable primarily due to its instrumental benefits for them. Specifically, the highest agreement is seen for INS10 ("Nature is important because it gives us various resources"), with an average score of 4.46.

However, the intrinsic value statements (like INT7, and INT11) also show a substantial level of agreement. The statement INT7 ("Nature has value in and of itself, independent of human attribution") has an average score of 4.44, and INT11 ("Nature is valuable in its own right") has an even higher score of 4.65, which shows that participants also acknowledge nature's inherent value.

Interestingly, while the instrumental values exhibited a relatively high level of agreement, the intrinsic values such as INT2 ("Humans have the right to use nature however they please") and INT6 ("Parts of nature that don't appeal to the eye have no meaning") were also widely disagreed with, with

means of 2.03 and 1.97 respectively, indicating that participants tend to reject the idea that nature should be exploited without limitation or that its value is only based on its aesthetic appeal.

Lastly, the relational value exhibits a high agreement level as well. Especially REL2 (“My or my family's health is connected to nature in some way.”) is significantly one of the highest agreement levels upon all values questions with an average of 4.47. This also suggests that participants perceive themselves, their families, and the community as interconnected with nature, viewing nature as valuable due to this collective bond. They seem to recognize the significance of nature not only for individual well-being but also in the context of broader societal and familial connections.

These preliminary findings suggest that participants have a complex relationship with nature, where they recognize both its practical benefits, intrinsic value, and relational value. Contrary to expectations, the initial descriptive statistics of the survey do not show a sharp distinction among participants based on different value categories (instrumental, intrinsic, and relational). The reason for this difference could be attributed to the structure of the sample, or it could also be influenced by the way the questions were formulated.

Table 4.4. Values of Nature Descriptive Statistics. “To what extent do you agree with the following statements? Please use the scale: 1 = Strongly Disagree, 5 = Strongly Agree”

<i>N=112</i>		1: Strongly Disagree	2: Disagree	3: Neither agree nor disagree	4: Agree	5: Strongly Agree	Means	SD
INS5: Nature is important because it benefits people.	n	5	6	9	28	64	4,25	1,103
	%	4%	5%	8%	25%	57%		
INS7: Nature is valuable because it ensures human welfare.	n	2	6	10	32	62	4,3	0,966
	%	2%	5%	9%	29%	55%		
INS9: Nature is valuable because it provides us with clean air and water.	n	2	7	5	34	64	4,35	0,956
	%	2%	6%	4%	30%	57%		
INS10: Nature is important because it gives us various resources.	n	1	4	8	29	70	4,46	0,848
	%	1%	4%	7%	26%	63%		
INT2: Humans have the right to use nature however they please.	n	48	33	18	6	7	2,03	1,174
	%	43%	29%	16%	5%	6%		
INT6: Parts of nature that don't appeal to the eye have no meaning.	n	55	32	8	7	10	1,97	1,277
	%	49%	29%	7%	6%	9%		
INT7: Nature has value in and of itself, independent of human attribution.	n	0	2	4	49	57	4,44	0,655
	%	0%	2%	4%	44%	51%		
INT11: Nature is valuable in its own right.	n	1	0	3	29	79	4,65	0,625
	%	1%	0%	3%	26%	71%		
REL1: There are landscapes in nature that reflect who we are as a community and as a people.	n	2	0	11	39	60	4,38	0,808
	%	2%	0%	10%	35%	54%		
REL2: My or my family's health is connected to nature in some way.	n	2	1	7	34	68	4,47	0,805
	%	2%	1%	6%	30%	61%		
REL3: I have strong feelings about all the plants, animals, soil, etc., in nature. These are part of who I am and how I live my life.	n	4	3	17	49	39	4,04	0,967
	%	4%	3%	15%	44%	35%		
REL6: Some natural areas that I care about and try to protect often come to mind, even though I may never see them with my own eyes.	n	2	0	14	51	45	4,22	0,802
	%	2%	0%	13%	46%	40%		

4.1.4. Module Four: Three Most Important Problems in Türkiye (Environmental Concern)

In this module, most participants strongly emphasized that all the listed problems are significant when considering Türkiye's current situation. The two most prominent concerns were "Negative developments in the national economy" (75%) and the "Increase in the number of immigrants." (68%). On the other hand, the combined percentage of responses related to environmental concerns (environmental pollution and loss of biodiversity and natural resources) amounted together to 47 percent, indicating that economic and vital problems stand out more.

Table 4.5. Environmental Concern Descriptive Statistics. “Which problems do you think are the most important ones for Türkiye? (Please select exactly 3 options).”

<i>N=112</i>		1: Yes
Negative developments in the national economy	n	84
	%	75%
Unemployment	n	28
	%	25%
Inequality in education	n	48
	%	43%
Access to healthcare services	n	9
	%	8%
Increase in the number of immigrants	n	76
	%	68%
Natural disasters (earthquake, storm, flood, etc.)	n	30
	%	27%
Stray animals	n	9
	%	8%
Environmental pollution	n	32
	%	29%
Loss of biodiversity and natural resources	n	20
	%	18%

4.1.5. Module Five: Ecological Knowledge

In this part of the survey for evaluating ecological knowledge, the participants were shown the photos of the three most common local plant/tree species and three wide-spread local bird species, and were asked whether they know the species names in Turkish as open-ended questions, with images embedded in the survey.

For the analysis of open-ended responses, answers were grouped, and even if participants did not provide the exact species name, similar responses were categorized together as 1 = ecological knowledge present. For example, responses containing the word "parakeet" were considered correct for the species Green Parakeet. The most recognized bird species was the Green Parakeet (75%), while the most well-known plant was French Lavender (52%). Additionally, when participants read these questions, some specifically mentioned that they had seen species like the European Robin and the Turkish Pine in the park but were unsure or unaware of their exact scientific or local names.

Table 4.6. Ecological Knowledge Descriptive Statistics. "Do you know the name of the bird/plant species shown in the example picture? (repeated for the six pictures given below)"

<i>N=112</i>		Proportion of correct answers
B4.1 European Robin (<i>Kızılgerdan</i>)	n	3
	%	3%
B4.2 Eurasian Magpie (<i>Saksağan</i>)	n	16
	%	14%
B4.3 Green Parakeet (<i>Yeşil Papağan</i>)	n	84
	%	75%
B4.4 Sessile Oak (<i>Sapsız Meşe</i>)	n	24
	%	21%
B4.5 Red Pine (<i>Kızılçam</i>)	n	25
	%	22%
B4.6 Lavender (<i>Karabaşotu/Yabani Lavanta</i>)	n	58
	%	52%

4.1.6. Module Six: Eco-Anxiety

In module six, the participant's eco-anxiety level was examined with one multiple-choice question, and the majority of respondents selected "worrying too much" (30.4%), while the second most common response was "none of the above" (21.4%). In general, excluding those who selected "none," the proportion of participants who experienced eco-anxiety is 78.57%. This suggests that a significant majority of respondents feel some level of eco-anxiety regarding environmental issues.

Table 4.7. Eco-Anxiety Descriptive Statistics. “Over the past two weeks, when you thought about climate change and other environmental problems (e.g., ecological degradation, overuse of natural resources), which of the following feelings best describes your emotions?”

<i>N=112</i>		Worrying too much	Feeling scared	Feeling anxious about the global impact of your personal actions	Unable to stop thinking about the losses in nature	None	Total
	n	34	12	20	22	24	112
	%	30,4%	10,7%	17,9%	19,6%	21,4%	100%

4.1.7. Module Seven: Subjective Well-being

In this module for investigating the well-being variable, the Life Satisfaction Scale (Diener et al., 1985) was used as a reference; however, it was measured with a single item on a 5-point Likert-type scale to keep the survey concise. Participants were asked how happy they are with their lives when considering their overall living standards. As a result, most of the group remained neutral, with 45.5% responding "neither happy nor unhappy." However, the group's positive score (“happy” and “very happy”) was also almost 48%. The three participants needed clarification for this question, asking, "Are you asking about my current situation in the park or my life in general?" and they indicated that while they would rate their happiness as a 5 while in the park despite their overall happiness in life would be a 3 or 2. This distinction, therefore, provided a valuable insight into the positive impact of time spent in greenspaces on urban residents on well-being.

Table 4.8. Subjective Well-being Descriptive Statistics. “On a scale of 1-5, how happy do you feel in general terms about your life?”

<i>N=112</i>		Very Unhappy	Unhappy	Neither Happy nor Unhappy	Happy	Very Happy	Total
	scale	1	2	3	4	5	
	n	2	5	51	35	19	112
	%	1,8%	4,5%	45,5%	31,3%	17,0%	100%

4.1.8. Module Eight: Stated Pro-Environmental Behaviour

The stated pro-environmental behavior questions provided the following findings: 73% of the respondents stated trying to reduce their use of plastic bags. While only 15% of the participants have voluntarily worked for an organization or public institution working on environmental issues, 41% stated to have financially supported them. Although 22% of the participants stated that they prefer buses or

trains instead of planes, however, the reason behind their answer was likely not ecological concerns, but rather their weak economic conditions, as confirmed by some of the respondents after the survey. Lastly, 47% of the participants indicated that they have read at least one book, magazine, or article on nature, ecology, or the climate crisis. This result is surprisingly higher than expected, as the the national average for reading books stands at 31% (TURKSTAT, 2022). On the other hand, 12% of the participants said that none of these statements apply to them.

Table 4.9. Stated Pro-Environmental Behaviour Descriptive Statistics. “Which of the following actions have you taken at least once in the past five years? (You can select more than one option)”

<i>N</i> = 112		1: Yes
Tried to reduce my use of plastic bags	n	82
	%	73%
Chose buses or trains with lower carbon emissions instead of flying on long-distance trips	n	25
	%	22%
Read at least one book, magazine, or article on nature, ecology, or the climate crisis	n	53
	%	47%
Volunteered for an organization or public institution working on environmental issues	n	17
	%	15%
Provided support (financial or other) to an organization or public institution working on environmental issues	n	46
	%	41%
None of these apply to me	n	13
	%	12%

4.1.9. Module Nine: Demographics

In Module 9, demographic questions were asked. The participants’ ages were distributed between 18 and 60. Out of these, 60 participants were surveyed in Hacıosman Atatürk Urban Forest, and 52 in Emirgan Grove. The majority of participants were female (70% female and 30% male), with an average age of 35. In terms of education, most had either a high school (41%) or a bachelor’s degree (47%). Additionally, 55% of the sample reported an income level ranging from 11,500 to 40,000 TL. Therefore, based on TURKSTAT 2024 data, the sample at hand includes relatively more women and fewer men compared to the national average (50.02% men, 49.98% women), and while the national median age in Türkiye is 34.4, the sample median is 29.5, indicating the sample represents a slightly younger population than the national average of Türkiye (TURKSTAT, 2024).

Comparing the averages in two parks with respect to gender and age provided quite similar results. However, there was a difference in terms of income distribution and education level. The proportion of

participants with an income of 40,000 TL and above was 33.3% in Hacıosman Atatürk Urban Forest, while it was 17.3% in Emirgan Grove. Regarding education level, 70% of participants in Hacıosman Atatürk Urban Forest were university graduates and above, whereas only 30.8% of the Emirgan Grove sample were university graduates. This difference in education and income levels was expected, given the socio-economic characteristics of the settlements surrounding the parks.

Table 4.10. Demographics Descriptive Statistics. “Please indicate your age group, gender, income level, and highest level of education completed.”

<i>Demographic Questions</i>		# of Respondents			% of Respondents		
			Hacıosman Atatürk Urban Forest	Emirgan Grove		Hacıosman Atatürk Urban Forest	Emirgan Grove
		Total			Total		
		112	60	52	100,0%	53,6%	46,4%
Gender	Female	78	39	39	69,6%	65,0%	75,0%
	Male	33	20	13	29,5%	33,3%	25,0%
	Did not want to mention	1	1	0	0,9%	1,7%	0,0%
Age	Weighted Average of Age = 35, Median = 29.5						
	18 or under	1	0	1	0,9%	0,0%	1,9%
	18-24	28	14	14	25,0%	23,3%	26,9%
	25-34	31	18	13	27,7%	30,0%	25,0%
	35-44	31	17	14	27,7%	28,3%	26,9%
	45-60	16	8	8	14,3%	13,3%	15,4%
	Over 60	5	3	2	4,5%	5,0%	3,8%
Income Level	Weighted Average Income Per Person = 31,991 TL, Median = 25,750 TL						
	11,500 TL or less	21	15	6	18,8%	25,0%	11,5%
	11,500 – 40,000 TL	62	25	37	55,4%	41,7%	71,2%
	40,000 – 70,000 TL	19	11	8	17,0%	18,3%	15,4%
	70,000 TL or more	10	9	1	8,9%	15,0%	1,9%
Education Level	Middle School or less	8	1	7	7,1%	1,7%	13,5%
	High School (general or vocational)	46	17	29	41,1%	28,3%	55,8%
	University (including open education and 2-year programs)	53	37	16	47,3%	61,7%	30,8%
	Master’s degree or higher	5	5	0	4,5%	8,3%	0,0%

4.1.10. Module Ten: Dictator Game (Actual Pro-Environmental Behaviour)

The final part of the survey corresponds to the dictator game, which was used as a measure of actual pro-environmental behaviour. The main objective of this module was to assess whether participants' self-reported PEB align with their real-life PEB. In this question, participants were told at the end of the survey that they would receive 100 TL (or 200 TL) in cash as a result of their participation and that they had the option to donate any amount they would like to Kuzey Doğa Derneği, a local conservation organisation dedicated to the protection of birds and mammals in the North East Türkiye. Participants were informed that the researcher actually would donate this amount on their behalf to this organisation. Their donation decision was then noted by the researcher.

The survey initially started by providing participants 100 TL (N=59), but due to the very high donation rates observed in both parks and considering the changing economic conditions (high inflation) in Türkiye, the amount was later increased to 200 TL for the remaining participants (N=53). After increasing the amount to 200 TL, the donation distribution in Haciosman Atatürk Urban Forest remained relatively stable. However, in Emirgan Grove, there was a slight increase in the proportion of participants who kept the entire amount for themselves and who donated half of it to the conservation organisation.

Beyond analysing the participants' responses and distribution patterns in this module, the verbal insights shared during the face-to-face surveys were also crucial for interpreting the findings. These qualitative remarks provide context and depth to the numerical data, helping to better understand participants' motivations and thought processes. For example, some participants requested to see the website and Instagram accounts of Kuzey Doğa Derneği to verify the legitimacy of the organisation. This conservation organisation was chosen on purpose by the researcher as it is relatively politically “neutral” in the sense that the organisation is careful about making political statements regarding everyday politics in social media and is mainly devoted to technical work for conservation of local endangered species in the North East of Türkiye. However, for some participants, the fact that the researcher was offering a (small) financial reward during the survey seemed unusual. To address this, the researcher clarified that the reward was provided by a project carried out at Boğaziçi University and was linked to the research project's grant. Lastly, at Emirgan Grove, two women expressed distrust of this explanation and decided to withdraw from the survey. These feedbacks show us that this kind of behavioural experiment could be difficult to implement because of cultural or political concerns.

Additionally, one participant at Emirgan Grove questioned whether the money was “halal” and suggested that donations could be made to another organization. She argued that humans, being the most

valuable beings created by God, also have needs. In response, the researcher informed her that they could not redirect her donation to another charity and that they were unable to support any organization other than the one mentioned in the survey. However, the researcher offered that she could take all the money and donate it to any organization she preferred, or she could withdraw from the survey if she would like to. Ultimately, this respondent decided to donate half of the amount and, in front of her friends, introduced someone as "our needy young girl," saying, "Please see this, I'm donating to this girl in need. May your heart be at ease, use it well." This action was meant to ensure that I witnessed her donation. These incidents highlight the important role of face-to-face interactions in psychological and behavioural research, as they provide valuable preliminary insights into participants' decision-making processes and motivations.

Table 4.11. Actual Pro-Environmental Behaviour (100 TL) Descriptive Statistics. "Thank you for your participation! Lastly, we will give you 100 TL. You can either keep this amount entirely for yourself or, if you wish, donate a portion of it to Kuzey Doğa Derneği, an organization focused on protecting bird and mammal species. Would you like to donate a portion? If yes, please specify the amount you wish to donate."

<i>N=59</i> <i>Dictator Game with 100 TL</i>		Total		Haciosman Atatürk Urban Forest		Emirgan Grove	
		n	%	n	%	n	%
100TL	Total	59	100%	45	100%	14	100%
	100 TL donation	53	90%	41	91%	12	86%
	50 TL donation	1	2%	1	2%	0	0%
	0 TL donation	5	8%	3	7%	2	14%

Table 4.12. Actual Pro-Environmental Behaviour (200 TL) Descriptive Statistics. "Thank you for your participation! Lastly, we will give you 200 TL. You can either keep this amount entirely for yourself or, if you wish, donate a portion of it to Kuzey Doğa Derneği, an organization focused on protecting bird and mammal species. Would you like to donate a portion? If yes, please specify the amount you wish to donate."

<i>N=53</i> <i>Dictator Game with 200 TL</i>		Total		Haciosman Atatürk Urban Forest		Emirgan Grove	
		n	%	n	%	n	%
200TL	Total	53	100%	15	100%	38	100%
	200 TL donation	33	62%	13	87%	20	53%
	100 TL donation	9	17%	0	0%	9	24%
	0 TL donation	11	21%	2	13%	9	24%

4.2. Reliability and Factor Analyses for Individual Scales

The reliability analysis for connectedness to nature, values for nature, ecological knowledge, and stated pro-environmental behaviour were conducted by calculating Cronbach's Alpha for each scale. Following reliability assessments, exploratory factor analysis (EFA) was performed for the connectedness to nature (CNS) variable and for values for nature scale.

Initially, the connectedness to nature scale (6 items) yielded a Cronbach's Alpha of 0.450, indicating relatively lower reliability. Examination of the inter-item correlation matrix revealed that CNS4 ("I often feel disconnected from nature") exhibited a reversed pattern compared to other items and some of the respondents had difficulties for understanding this question, as already mentioned. After removing CNS4, the Cronbach's Alpha improved to 0.611, a level acceptable for social and behavioural research carried out in field settings (Van Griethuijsen et al., 2015).

A similar analysis was carried out for the values of nature scale, with reliability tested separately for its subdimensions (instrumental, intrinsic, and relational). INT2 and INT6 were reverse-coded in line with previous studies (Klain et al., 2017; Winter, 2007; Feucht et al., 2023). For intrinsic value, reliability was higher when INT2 and INT6 were reverse-coded in the reliability analysis ($0.509 > 0.4$), leading to the decision to proceed with the reverse-coded versions in further statistical analysis. Additionally, the Cronbach's Alpha of instrumental value was 0.851 and 0.675 for relational value. The overall Cronbach's Alpha for the values of nature scale was 0.731.

For ecological knowledge and self-reported pro-environmental behaviour, Cronbach's Alpha values were 0.565 and 0.493, respectively. Due to concerns about the clarity of items B7.2 ("For long-distance travel, I prefer low-carbon transportation options such as buses or trains instead of airplanes.") and B7.3 ("I have read at least one book, magazine, or article on topics such as nature, ecology, or the climate crisis."), reliability analysis was repeated by first removing B7.2, and then both B7.2 and B7.3. However, as these modifications did not significantly impact Cronbach's Alpha, all items were retained in further statistical analyses.

Exploratory Factor Analysis (EFA) showed that for values for nature and CNS, explained variance amounted to 47.6% and 48.7%, respectively. EFA provided a three-factor structure for values for nature, the first factor clearly representing the instrumental value, while the third factor captured relational value as a distinct dimension. In contrast, intrinsic value showed a more complex pattern: INT2 ("Humans have the right to use nature however they please") and INT6 ("Parts of nature that do not appeal to the

eye have no meaning”) loaded onto the second factor, whereas INT7 (“Nature has value in and of itself, independent of human attribution”) and INT11 (“Nature is valuable in its own right”) loaded together with the relational value items on the third factor. This suggests a certain degree of conceptual overlap between intrinsic and relational values. Yet, instrumental value items distinctly loaded on the first factor only. Considering the difference in the wording of INT2/INT6 versus INT7/INT11, the EFA suggests that the use of INT7 and INT11 may perform better to assess intrinsic values as it involves the direct definition of intrinsic values in the literature. This finding may serve as a future reference point for further studies in similar contexts in Türkiye. In sum, the data provided evidence confirming the three-factor structure for values for nature, where relational value emerged as a distinct category of values relevant for the participants of the study.

The EFA for the Connectedness to Nature Scale suggested a two-factor structure, with three items loading on both of the factors (CNS1: I often feel connected to the nature around me; CNS2: Nature feels like a community of which I am a part; CNS11: I feel like I am part of nature like a tree is part of a forest). However, since the factor loadings did not clearly separate the items and multiple items cross-loaded, the scale was treated as unidimensional in the subsequent analyses in line with previous literature. The emergence of two factors and the overlap of many items may nonetheless suggest that CNS captures both cognitive and affective aspects of nature connectedness in different samples. All results on reliability and factors analyses are available in Appendix D.

4.3. Correlation Analyses

Following the reliability analyses, Spearman’s correlations were calculated to explore the strength and direction of associations between different variables. The correlations that were found to be significant are provided in Table 4.14. For multi-item constructs such as values for nature or connectedness to nature, scores were calculated by averaging the responses to the items for each participant. The full correlation matrix including all significant and non-significant correlations are provided in Appendix F.

As part of data preparation for this analysis, certain variables were transformed into binary (categorical) variables to enable consistent interpretation. The two study sites were assigned numeric identifiers, with “1” representing Haciosman Atatürk Urban Forest and “2” representing Emirgan Grove. For the Park Visit Reason variable, participants who selected at least one nature-oriented reason such as “Connecting with nature, spending time outdoors” or “Nature activities” (e.g., birdwatching, mushroom picking) were coded as “1”, while all others were coded as “0”. Similarly, in the Environmental Concern

variable, respondents who identified at least one nature-related issue (Environmental pollution, or Loss of biodiversity and natural resources) were coded as “1”, and the remainder as “0”. For the Eco-anxiety variable, participants indicating no anxiety were coded as “0”, whereas any expression of anxiety was coded as “1”. Demographic variables were also included in the dataset, with each response assigned a corresponding categorical value (which corresponded to an ordinal scale for age, education, and income). Together, these coded variables and computed scores formed the dataset used for the correlation analysis, the key findings of which are outlined below.

The correlation analysis revealed several preliminary associations among the study variables. When examining the associations among the values of nature dimensions (instrumental, intrinsic, and relational values), intrinsic value was not significantly correlated with instrumental ($p = 0.257$) value. However, there was a positive correlation between intrinsic and relational value ($r = .248, p < 0.01$) and between instrumental and relational value ($r = .476, p < 0.01$).

Intrinsic value also exhibited positive correlations with ecological knowledge ($r = .218, p < 0.05$), and stated pro-environmental behaviour ($r = .234, p < 0.05$). Notably, within the values of nature dimensions, only intrinsic values demonstrated a direct positive correlation with PEB, which was in line with previous research (Aviste & Niemiec, 2023; Pereira & Forster, 2015; Shin, van Riper, Stedman, & Suski, 2022), whereas instrumental and relational values did not significantly correlate with PEB ($p = 0.967, p = 0.065$). Interestingly, prior research has yielded mixed results for egoistic values (which mainly overlap with instrumental value in the present study) and PEB, whereas some studies identified a positive relationship (Shin et al., 2022; van Riper et al., 2019), others, in line with the present findings, did not deliver a significant association (Pereira & Forster, 2015). Additionally, relational value was also positively associated with ecological knowledge ($r = .239, p < 0.05$) and was more prominent among participants whose primary visit reason was nature-related ($r = .257, p < 0.01$).

Connectedness to nature (CNS) showed moderate to strong positive correlations with instrumental ($r = .310, p < 0.01$) and relational values ($r = .510, p < 0.01$), however, CNS was not significantly correlated with intrinsic value ($p = 0.758$) in this dataset. Asanza-Reyes et al. (2024) likewise had similar findings in their study conducted within a protected area in Ecuador. Another recent study (Kleespies & Dierkes, 2020a, 2020b) also found some overlaps between CNS and relational value, yet, the reserachers still concluded that these two constructs were sufficiently distinct from each other as the correlation coefficient was below 0.80 for CNS and relational value and relational values were mainly broader than CNS via the emphasis of the former on care and community. (Brown, 2006). CNS also exhibited significant positive correlation with subjective well-being ($r = .206, p < 0.05$) and stated pro-

environmental behavior ($r = .359, p < 0.01$). These relationships suggest that individuals who ascribe greater practical or relationship-based values to nature tend to feel more connected to it, which in turn may be associated with enhanced life satisfaction and stronger self-reported pro-environmental action tendencies.

Ecological knowledge emerged as an important variable, displaying significant positive correlations with subjective well-being ($r = .194, p < 0.05$) and stated pro-environmental behavior ($r = .339, p < 0.01$). This indicates that environmental knowledge may contribute to both subjective well-being and has a strong tendency to contribute to individual-level environmental protection.

It is also important to note that the actual pro-environmental behavior measure derived from the dictator game based on participants' willingness to donate did not show any statistically significant correlation with other variables. This suggests that, within this sample, stated pro-environmental tendencies and actual behavior in a dictator game context may be driven by different underlying factors. Due to the absence of significant associations, actual PEB variable was excluded from the regression models.

Table 4.13. Significant Correlations

Relationship	p-value	Correlation coefficient
CNS – Instrumental Value	< 0.001	0.31
CNS – Relational Value	< 0.001	0.51
CNS – Subjective Well-being	< 0.05	0.206
CNS – Stated PEB	< 0.001	0.359
Instrumental Value – Relational Value	< 0.001	0.476
Intrinsic Value – Relational Value	< 0.001	0.248
Intrinsic Value – Stated PEB	< 0.05	0.234
Eco-Knowledge – Stated PEB	< 0.001	0.339
Eco-Knowledge – Subjective Well-being	< 0.05	0.194
Environmental Concern – Subjective Well-being	< 0.05	0.229

4.4. Regression Analyses

Following the preliminary analysis of correlations among variables, multiple regression analyses were conducted to investigate the predictors of stated pro-environmental behaviour (PEB) and subjective well-being. The primary aim was to determine which independent variables significantly contribute to explaining the variance in these two dependent variables. Therefore, three separate linear regression models were run as summarized in Table 4.15.

4.4.1. Regression Analysis for Stated Pro-Environmental Behaviour

In the first regression model, the dependent variable was (stated) PEB and the independent variables included park visit frequency, park visit reason, connectedness to nature, instrumental value, intrinsic value, relational value, environmental concern, ecological knowledge, eco-anxiety, age, gender, income and education level. The results showed that the model had an R value of 0.583, indicating a moderate positive relationship between the dependent variable and the set of independent variables. The R^2 value was 0.340, meaning that the model explained 34% of the variance in stated PEB. Findings from ANOVA confirmed that the overall model was statistically significant and that the independent variables jointly predicted stated PEB ($F(15, 96) = 3.884, p < 0.001$).

The strongest predictor in the model was CNS ($\beta = 0.334, p = 0.003$), followed by ecological knowledge ($\beta = 0.217, p = 0.028$) and age ($\beta = 0.277, p = 0.004$), all of which had significantly positive effects on stated PEB. Consequently, these three variables emerged as the key predictors, whereas the other independent variables did not reach statistical significance. Furthermore, the VIF values ranged from 1.17 to 1.88, which is well below the critical value of 10, thereby indicating that multicollinearity was not an issue, confirming that the model's estimates were reliable.

Given CNS's dominant explanatory power in the results, it was removed from the model in the second step to assess the independent contributions of the remaining predictors. In this adjusted model, the R^2 value decreased; however, the purpose of this model was not to increase explanatory power but rather to gain a clearer understanding of the strength of the other independent variables in the absence of CNS. As a result, the effect of age increased both in magnitude ($\beta = 0.318, p = 0.002$) and in significance (previously $\beta \approx 0.297$), and visit frequency ($\beta = 0.198, p = 0.048$) became statistically significant, whereas it had not been in the initial model ($p \approx 0.353$). Conversely, the effect of ecological knowledge weakened ($\beta = 0.194, p = 0.062$); while previously significant at $p = 0.038$, it fell short of

significance. Relational values remained non-significant, but its coefficient shifted notably from $\beta = -0.104$ in the first model to $\beta = 0.055$ in the second. This can be explained by the positive correlation between relational value and CNS ($r = 0.510$, $p < 0.001$). When CNS was included in the model, the shared variance between the two variables was attributed to CNS, reversing the direction of the relational value coefficient. Once CNS was removed, relational value's own positive association with stated PEB became visible.

As a result, for the analyses did not provide any support for H1; neither intrinsic value nor relational value emerged as significant predictors of (stated) PEB, which was contrary to the initial expectations. In contrast, there was evidence supporting H3; both CNS and ecological knowledge were found to significantly predict (stated) PEB, with CNS exhibiting particularly strong explanatory power.

4.4.2. Regression Analysis for Subjective Well-Being

Similar analyses were carried out taking the subjective well-being as the dependent variable. Independent variables included park visit frequency, park visit reason, connectedness to nature, instrumental value, intrinsic value, relational value, environmental concern, ecological knowledge, eco-anxiety, age, gender, income level and education level as in the previous model.

The strongest predictor of subjective well-being was Environmental Concern ($\beta = 0.257$, $p = 0.006$), followed by park visit frequency ($\beta = 0.216$, $p = 0.034$) and age ($\beta = 0.209$, $p = 0.038$), all of which exhibited positive effects on the dependent variable. Interestingly, the positive coefficient for environmental concern was rather unexpected, as higher levels of concern about environmental issues might typically be assumed to be associated with lower well-being due to increased worry or distress. However, one may speculate that those participants who think that environmental issues are one of the most significant challenges for Türkiye, may be somewhat more inclined to spend time in nature and hence this may be increasing their subjective well-being. Yet, there was no statistically significant correlation between environmental concern and nature connectedness in the dataset. Further studies may address this relationship by explicitly checking the underlying reason behind this association. In contrast, eco-anxiety ($\beta = -0.213$, $p = 0.028$) showed a significant negative association with well-being, as expected. Moreover, the VIF values ranged from 1.12 to 1.83, which is well below the critical value of 10, thereby indicating that multicollinearity was not a concern and confirming that the model's estimates were reliable.

Table 4.14. Regression Results

Independent Variables	Model 1 (PEB with CNS)	Model 2 (PEB without CNS)	Model 3 (Subjective Well-being)
Park Visit Frequency Score	0.084 (p=0.383)	0.188 (p=0.045)	0.216 (p=0.034)
Park Visit Reason Score	0.072 (p=0.415)	0.113 (p=0.219)	0.066 (p=0.482)
CNS Score	0.334 (p=0.003)	-	0.172 (p=0.145)
Instrumental Value Score	-0.114 (p=0.226)	-0.094 (p=0.336)	-0.055 (p=0.579)
Intrinsic Value Score	0.121 (p=0.178)	0.103 (p=0.267)	0.051 (p=0.586)
Relational Value Score	-0.117 (p=0.297)	0.039 (p=0.705)	0.062 (p=0.599)
Environmental Concern	-0.008 (p=0.931)	0.023 (p=0.798)	0.257 (p=0.006)
Ecological Knowledge Score	0.217 (p=0.028)	0.202 (p=0.048)	0.006 (p=0.955)
Eco-anxiety Score	0.002 (p=0.985)	-0.022 (p=0.817)	-0.213 (p=0.028)
Age	0.277 (p= 0.004)	0.305 (p=0.002)	0.209 (p=0.038)
Gender	-0.028 (p=0.744)	-0.018 (p=0.847)	0.049 (p=0.591)
Income Level	-0.052 (p=0.591)	-0.117 (p=0.237)	-0.002 (p=0.983)
Education Level	0.163 (p=0.102)	0.145 (p=0.159)	0.024 (p=0.819)

Green cells indicate statistical significance at the 5 percent level ($p < 0.05$). Coefficients are standardized β values, with p-values reported in parentheses.

4.5. Path Analyses

The complex relationship between environmental values (especially relational value) and nature connectedness as documented in the literature (El Ghafroui et al., 2023; Kleespies & Dierkes, 2020a; Lengieza et al., 2023) led to a need for a more comprehensive method of hypothesis testing. More specifically, the presence of a mediating variable (either values or nature connectedness) has been suggested and tested in the literature assessing the determinants of pro-environmental behavior. Studies tested more specifically environmental values (environmental values in general, or biospheric values in particular) and nature connectedness as two different mediating variables (Martin & Czellar, 2017; Pereira & Forster, 2015).

Two alternatives to test the existence of mediating variables in the literature were structural equation modelling (SEM) and path analysis (Batavia et al., 2017; Cervinka et al., 2012; Lahoti et al., 2024; Martin et al., 2020; Masson & Otto, 2021). Earlier studies in the literature have shown that while SEM provides advantages by accounting for measurement error, incorporating latent variables, and offering robust fit indices (Grapentine, 2000; Mitchell, 1992), path analysis with composite scores is especially advantageous for estimating direct relationships between observed variables in a parsimonious manner. More recent meta-analytical evidence highlights that path analysis with weighted composites not only yields more practical and straightforward interpretations but also demonstrates higher statistical power than SEM (Deng & Yuan, 2023).

Taken together, these insights combined with the preliminary evidence from correlation analyses and supported by the fact that path analysis has been frequently employed in studies involving variables such as environmental values, connectedness to nature (CNS), and pro-environmental behaviour (PEB) provided a strong rationale for conducting a path analysis as the final step in hypothesis testing (Aviste & Niemiec, 2023; Lengieza et al., 2023).

Five different path models were run for the two dependent variables separately (three models for PEB and two models for subjective well-being). The first model included three categories of environmental values and ecological knowledge as independent variables, and CNS as a mediating variable between these independent variables and PEB. The second model included environmental values as one independent variable rather than three distinct categories, and the third model was run for CNS as an independent variable, and relational values as a mediating variable for PEB. For the remaining two models, the dependent variable was subjective well-being. In one of these models, CNS was modelled as the mediating variable between three categories of values and ecological knowledge and

subjective well-being. In the last model, I also added environmental concern and eco-anxiety as further independent variables as these emerged as significant correlates of subjective well-being in the previous regression models.

The findings of the first model provided evidence that relational values ($\beta = 0.30$, $p < 0.001$) significantly predicted connectedness to nature, which mediated significantly between relational values and pro-environmental behaviour ($\beta = 0.42$, $p < 0.001$). In addition, ecological knowledge was found to significantly predict pro-environmental behaviour independently of connectedness to nature ($\beta = 0.30$, $p < 0.001$). However, instrumental and intrinsic values did not predict PEB within this model. This model shown below in Figure 4.1.

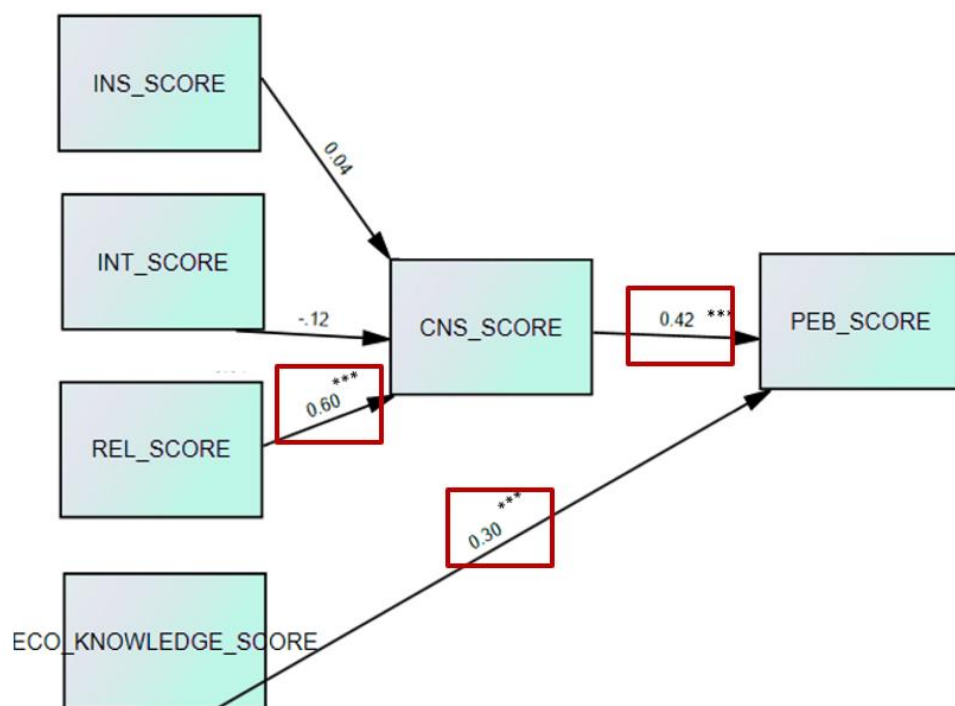


Figure 4.1. Path Analysis Model for Stated PEB with CNS as a Mediator

Standardized path coefficients (β) are shown on the arrows. Significance at 10 percent, 5 percent, and 1 percent are denoted by *, ** and ***, respectively.

In the second model, the entire value scale was used as a mediating variable between CNS and PEB. In this model, CNS significantly predicted environmental values ($\beta = 0.25$, $p < 0.001$). However, environmental values did not exhibit a significant predictive effect on pro-environmental behavior in this model. In addition, ecological knowledge again significantly predicted PEB independently of environmental value ($\beta = 0.31$, $p < 0.001$).

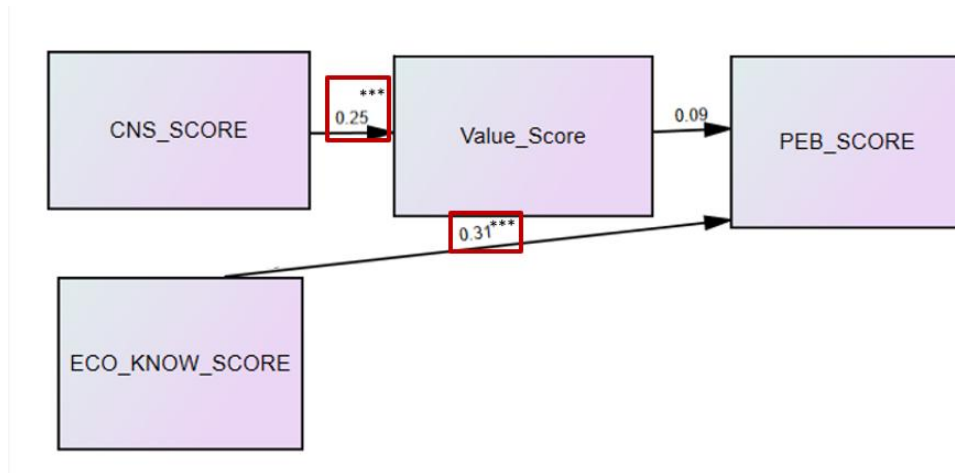


Figure 4.2. Path Analysis Model for Stated PEB with Values as a Mediator

Standardized path coefficients (β) are shown on the arrows. Significance at 10 percent, 5 percent, and 1 percent are denoted by *, ** and ***, respectively.

In the third model run for PEB, the impact of relational values as a mediating variable between CNS and PEB was tested. This model was similar to the study by Martin & Czellar (2017), which used (only) biospheric values as a mediating variable between CNS and PEB and found that biospheric values were a significant mediator. In contrast, the present study did not provide evidence for the relational values as a mediator.

While connectedness to nature significantly predicted relational value ($\beta = 0.45$, $p < 0.001$), relational values did not show a significant predictive role on pro-environmental behavior in the present model. In addition, ecological knowledge again significantly predicted PEB independently of relational values ($\beta = 0.30$, $p < 0.001$).

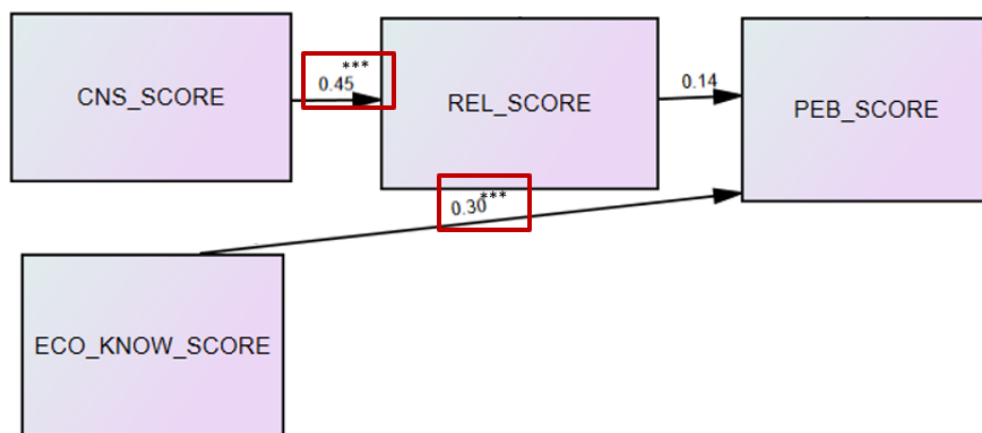


Figure 4.3. Path Analysis Model for Stated PEB with Relational Value as a Mediator

Standardized path coefficients (β) are shown on the arrows. Significance at 10 percent, 5 percent, and 1 percent are denoted by *, ** and ***, respectively

In the fourth model where subjective well-being was the dependent variable, relational value ($\beta = 0.60, p < 0.001$) again emerged as a significant predictor of connectedness to nature, which in turn significantly predicted subjective well-being ($\beta = 0.38, p < 0.001$). In this model, unlike the PEB model, ecological knowledge did not exhibit a significant effect on subjective well-being.

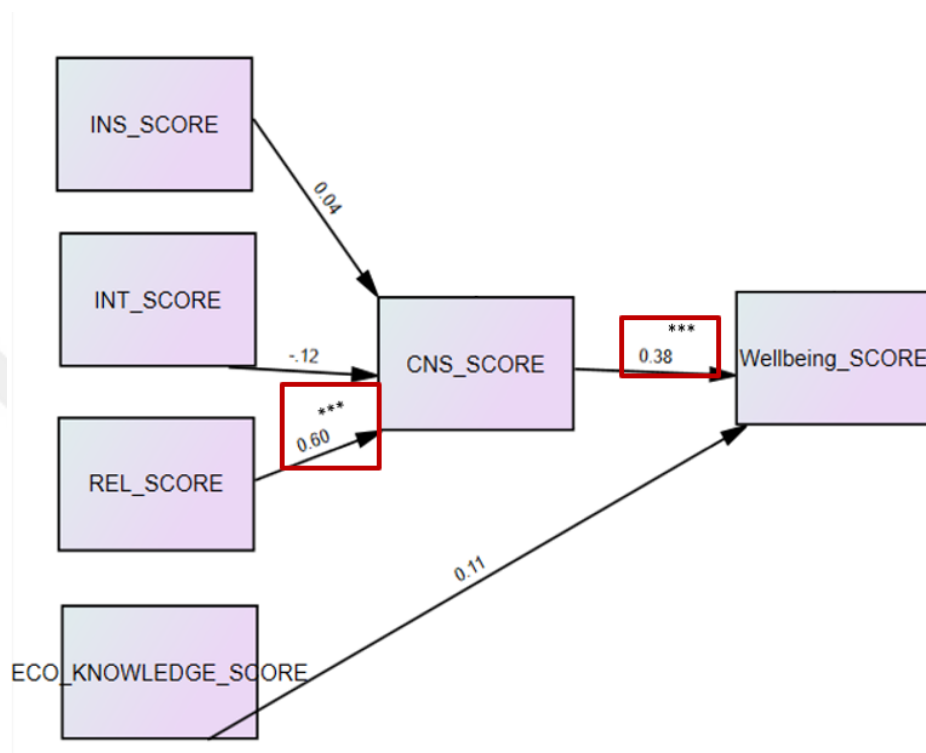


Figure 4.4. Path Analysis Model for Subjective Well-being with CNS as a Mediator

Standardized path coefficients (β) are shown on the arrows. Significance at 10 percent, 5 percent, and 1 percent are denoted by *, ** and ***, respectively

In the final model of subjective well-being, considering the correlations observed and the regression analysis results indicating that environmental concern and eco-anxiety significantly predicted subjective well-being, these two variables were further added to the model.

As can be seen in Figure 4.5, relational values ($\beta = 0.60, p < 0.001$) again emerged as a significant predictor of connectedness to nature, which in turn significantly predicted subjective well-being ($\beta = 0.41, p < 0.001$). In addition, environmental concern significantly predicted subjective well-being independently of CNS ($\beta = 0.08, p = 0.006$), however, eco-anxiety was not a significant correlate of subjective well-being in this model.

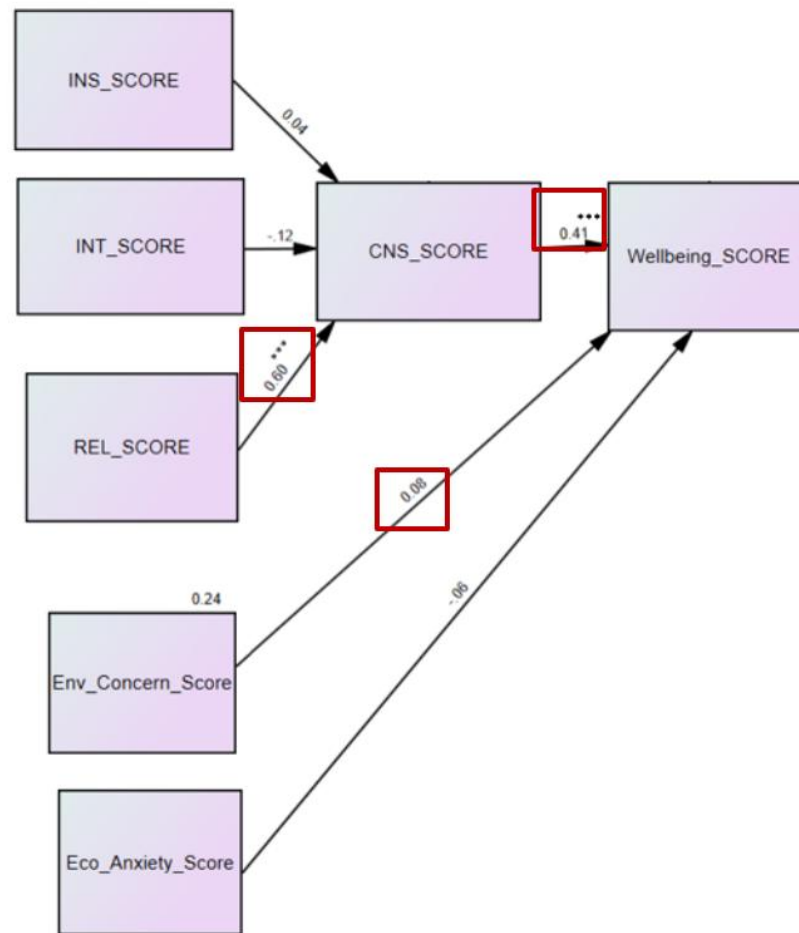


Figure 4.5. Path Analysis Model for Subjective Well-being with CNS as a Mediator in addition to Environmental Concern and Eco-anxiety as Independent Variables

Standardized path coefficients (β) are shown on the arrows. Significance at 10 percent, 5 percent, and 1 percent are denoted by *, ** and ***, respectively

5. DISCUSSION

The present study aimed to investigate the role of plural values for nature, connectedness to nature, and ecological knowledge in predicting two separate dependent variables, namely, pro-environmental behavior and subjective well-being. The findings provided novel insights by investigating these relationships for park visitors in an urban greenspace context in İstanbul, offering a comparison to the majority of studies conducted in high-income developed countries with student samples. While the study specifically also aimed to address actual PEB along with stated PEB, the donation behavior of the participants in the urban greenspaces did not significantly differ from each other (most donating the full reward to the conservation organisation), hence, I limited the analysis to the predictors of stated PEB only.

The study confirmed the well-established finding in the literature with respect to the role of nature connectedness for pro-environmental behavior and subjective well-being (Barragan-Jason et al. 2022). In addition, however, the study confirmed previous empirical studies suggesting that relational values can be conceptualized as a distinct category of values, sufficiently different from instrumental and intrinsic values. Indeed, in the present study, relational values were perceived and evaluated differently by the participants, and relational values exhibited sufficient internal consistency, as shown by the three-factor structure delivered by the EFA and reliability analyses. Moreover, relational values (but not instrumental or intrinsic values) played a significant role as a positive correlate of nature connectedness, the latter in turn predicted both PEB and subjective well-being as a mediating variable. This finding was mainly in line with empirical studies carried out with university students on relational values (Klain et al. 2017; Kleespies et al. 2020a, Feucht et al 2023), while the theoretical discussions on relational values suggested that relational values as a category are redundant (Baard, 2025; Luque-Lora, R., 2023). While previous studies have mostly emphasized intrinsic and biospheric values as predictors of PEB (Pereira & Forster, 2015; Van Riper et al., 2019; Avits & Niemiec, 2023; Winkler-Schor et al., 2020), the findings of the present study highlight that relational values, which are closely associated with the community, responsibilities, care, and meaningful bonds with nature, positively predict both PEB and subjective well-being. This also resonates with recent work confirming “nature for community” (N4C) as a distinct dimension of human–nature relationships (Lengieza et al., 2023). By providing empirical support to this relationship in an urban greenspace setting, the study confirms that relational values indeed play an important role for behavioral and well-being-related dimensions of urban biodiversity, by pointing out community- and responsibility-based orientations of our participants.

Another major contribution of the present study lies in providing evidence for the mediating role of connectedness to nature (CNS) with its positive impacts on subjective well-being and PEB (Cervinka et al., 2012; Howell et al., 2011; Lahoti et al., 2024; Mayer & Frantz, 2004; Perkin, 2010; Pritchard et al., 2020; Samus et al., 2022). The findings showed that while relational values and CNS seemed to reinforce each other in a reciprocal manner, CNS functioned as a mediator between values and PEB (and subjective well-being), and not vice versa. In other words, one can argue that it is primarily through heightened connectedness to nature that values translate into pro-environmental behavior and increased subjective well-being. In other words, holding a certain degree of relational values is necessary but not sufficient for ensuring a higher level of pro-environmental behavior and subjective well-being, but relational values need to be strengthened by the presence of nature connectedness. This highlights the pivotal role of CNS as a psychological construct: interventions that strengthen either relational values or connectedness to nature are likely to reinforce each other, but behavioral outcomes depend especially on the cultivation of a stronger sense of connectedness to nature, which is important from a city-planning and urban biodiversity perspective.

This finding is particularly relevant when compared to previous path-modeling approaches in the literature. Studies examining values for nature, CNS, and PEB have often treated environmental values in the model as a single variable without distinguishing between instrumental, intrinsic, and relational dimensions, and modelled them as mediators between CNS and PEB (Pereira & Forster, 2015). A prominent example is Martin & Czellar (2017), who demonstrated for the US and European samples that biospheric values (which largely overlap with intrinsic values in the present study) acted as mediators between CNS and PEB. Additionally, they highlighted the direct impact of CNS on PEB, and results showed that both the mediating role of biospheric values and the direct predictor role of CNS were significant for PEB. However, in their study, the explanatory power of CNS as a direct predictor was stronger than that of biospheric values as a mediator, possibly suggesting that connectedness to nature provides a more robust pathway to pro-environmental behavior.

The findings of the present study also underline the role of ecological knowledge for our participants, which positively predicted PEB. Previous empirical research also supports its predictive role on PEB (Amoah & Addoah, 2021; Liobikienė & Poškus, 2019). Past studies emphasized that action-related knowledge (e.g., “Does buying organic food help conserve biodiversity?” or “Traveling by train is less polluting than by plane”) significantly and positively predicted PEB (Liobikienė & Poškus, 2019). However, other studies noted that broader, specific ecosystem-based ecological knowledge also significantly predicts PEB (Geiger et al., 2019). The present study confirmed the latter finding by using individual ecological knowledge about local plant and bird species.

Another noteworthy finding pertains to the environmental concern variable, which significantly predicted subjective well-being, but not PEB in the final path model. This pattern may suggest that perceiving environmental issues as pressing societal problems may influence individuals' broader evaluations of life satisfaction, yet does not necessarily translate into personal pro-environmental actions. A possible explanation lies in the measurement approach adopted in the present study: participants were asked to identify the most important problems facing Türkiye, an item that reflects perceived importance at the societal level rather than individual attitudes or behavioral intentions. Consequently, the variable may have captured a cognitive awareness of environmental threats without activating the motivational pathways required for concrete pro-environmental behavior. Future research could refine this construct by distinguishing between macro-level problem recognition and micro-level personal concern, which may exert different impacts on well-being and behavior.

The present study was subject to some limitations. First, the reliance on translated scales from the literature may have introduced conceptual ambiguities, as certain constructs (e.g., relational versus intrinsic values) may not resonate identically across cultural contexts. Nevertheless, the study combined several items from recent studies to address this difficulty. However, one needs to note that there are considerably more empirical scales in the literature to measure connectedness to nature, plural values, and subjective well-being, and particularly a universally accepted and standardized scale for PEB is lacking in contrast to connectedness to nature. It may therefore be more appropriate to develop context-specific measurements of PEB that reflect the cultural characteristics and lived experiences of people in each studied region and habitat. Furthermore, using mixed-method approaches incorporating in-depth interviews based on a less structured approach in addition to structured surveys could enhance the validity of stated PEB measures in future studies.

Secondly, unlike many prior studies conducted in high-income developed countries with student samples, this research was carried out in an urban forest and grove with non-random opportunistic sampling of park visitors, which may limit generalizability of the findings but adds ecological validity to the study. Conducting the study in a middle-income developing country and in a relevant field setting such as urban greenspaces posed additional challenges. For example, particularly in a metropolitan city like Istanbul with a considerably high rate of working population who would most likely not be able to visit the urban greenspaces at the day time when the study was carried out posed challenges with respect to reaching the working population. To compensate for this, the surveys were also carried out at the weekends, yet, the distribution with respect to gender was still biased towards female respondents. Yet, measuring complex constructs such as values, connectedness to nature, or behavior with participants

recruited from a directly policy-relevant field setting and habitat contributed to the literature in terms of diversifying the sample and ecosystem under study.

Third, the dictator-game measure of actual PEB was implemented during a period of high inflation in Türkiye, with a relatively limited project budget, which may have undermined the effectiveness of the fixed monetary amounts offered to participants. The incentive provided in return for participation could have been better calibrated to reflect the economic realities of the context if a higher budget would be available. Moreover, rather than framing the task as a monetary donation to an NGO, future studies might consider alternative formats that resonate more directly with participants such as contributions to activities or systemic changes through which individuals can visibly perceive their impact. Such approaches could provide a more meaningful and motivating context for measuring actual pro-environmental behavior.



6. CONCLUSION

This study explored how plural values for nature, connectedness to nature, ecological knowledge, environmental concern, and eco-anxiety interact in shaping pro-environmental behavior (PEB) and subjective well-being among urban park visitors in Istanbul. By conducting field-based surveys in urban greenspaces in a middle-income developing country, the study broadens the empirical scope of the literature, which has been dominated mostly by student samples from high-income country contexts of the Global North.

The findings underscore three main contributions. First, the results highlight the distinct impact of relational values, mediated by connectedness to nature, on PEB and subjective well-being. This confirms the need to explicitly integrate relational values into future theoretical and empirical studies, as they capture community-, care- and responsibility-based orientations that are empirically relevant for the participants, mostly lacking in scales assessing instrumental or intrinsic values. Second, the study shows that CNS and relational values mutually reinforce each other, with CNS assuming a mediator role linking values to both PEB and subjective well-being. This is in contrast to earlier studies that modelled environmental values as mediators between CNS and PEB (e.g., Martin & Czellar, 2017) and suggests that different causal pathways may apply across socio-cultural settings. Third, the analysis confirms the role of ecological knowledge and environmental concern as additional predictors of PEB and subjective well-being. While ecological knowledge directly predicted PEB, environmental concern was linked only to subjective well-being, reflecting the methodological distinction between recognizing environmental problems at the societal level and translating such awareness into personal action.

Beyond these contributions, the study also illustrates the importance of specific context of the study. The findings reveal how cultural narratives, access and contact to nature, and economic realities shape the ways people value nature and act for the environment. Hence, this research provides evidence that urban greenspaces can play a critical role not only in biodiversity conservation but also in fostering sustainable behavior and enhancing psychological well-being.

Further studies across cultural and socio-economic contexts are needed in the future in order to gain more detailed insights regarding how to promote well-being and pro-environmental behavior in different urban settings.

In conclusion, the study demonstrated relational values and connectedness to nature as forming the two important leverage points of both sustainable behavior and human well-being in urban contexts. Strengthening these dimensions through policy, education, and urban design may create reinforcing cycles of care for nature and improved life satisfaction. For policymakers, this underscores the potential of urban greenspaces to act not merely as recreational areas but as catalysts for fostering meaningful human–nature relationships that benefit both humans and the environment.



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APPENDIX A: SURVEY



DOĞA İLE İLİŞKİ ve DEĞERLER ANKETİ

Sayın Katılımcı,

Bu bilimsel araştırma, Boğaziçi Üniversitesi araştırmacıları tarafından yapılmakta ve bireylerin insan- doğa ilişkisi hakkında tutum ve davranışlarını incelemeyi amaçlamaktadır. Araştırmamıza katılmayı kabul ettiğiniz takdirde, sizden yaklaşık 15 dakikalık bir ankete katılım göstermeniz beklenecektir. Ankette sizden isim talep edilmeyecek, tüm bilgileriniz isimsiz bir şekilde yalnızca bilimsel çalışmalarda kullanılacak ve yanıtlarınız herhangi bir kişi ya da kurum ile paylaşılmayacaktır. Anketin sonunda size bir katılım ödülü verilecektir, isterseniz, bunun dilediğiniz bir miktarını bir doğa koruma örgütüne bağışlayabilirsiniz.

Çalışmaya katılımınız tamamen isteğe bağlıdır. İsteddiğiniz zaman çalışmadan çekilme hakkına sahipsiniz. Bu durumda yanıtlarınız çalışma dışında tutulacak ve kayıtları silinerek imha edilecektir. Anketimiz ileri bir tarihte başka bir çalışma için kullanılmayacak, başka bir çalışma ile birleştirilmeyecektir. Araştırma çıktıları kamu ya da özel herhangi bir kurum veya kuruluş ile paylaşılmayacak, herhangi bir karar alım sürecinde kullanılmayacaktır. Araştırma kapsamında verdiğiniz cevaplar Türkiye'deki genel eğilimleri ortaya çıkarmak için toplu bir şekilde analiz edilecek, bireysel cevaplarınız kullanılmayacaktır. Araştırma sonuçlarına ilişkin dilerseniz daha sonra **buse.tinic@boun.edu.tr** e-posta adresinden bilgi talep edebilirsiniz. Araştırmayla ilgili haklarınız konusunda Boğaziçi Üniversitesi Sosyal ve Beşeri Bilimler İnsan Araştırmaları Etik Kurulu'na (sbinarek@boun.edu.tr) da danışabilirsiniz.

Ankete katılımınız için teşekkür ederiz.

☐ Bana anlatılanları ve yukarıda yazılanları anladım. Çalışmaya katılmayı kabul ediyorum.

Online Anket:

ANKET

BÖLÜM 1

1. Bu parkı hangi sıklıkla ziyaret ediyorsunuz?

- Her gün
- Haftada 2-3gün
- Ayda 1 veya birkaç kez
- Ayda bir kereden daha seyrek

2. Bu parkı ziyaret etme sebebin/sebeplerinizi işaretleyiniz. (Birden fazla seçenek işaretleyebilirsiniz.)

- Bebeğimi gezdirmek
- Çocuğumun parktaki oyun alanında oynaması
- Evcil hayvanımı gezdirmek
- Yürüyüş veya spor yapma
- Arkadaş veya aile ile vakit geçirme
- Doğaya temas etmek, doğada vakit geçirmek
- Doğa etkinlikleri (kuş gözlemi, mantar toplama vb.)
- Geçiş yolu olarak kullanmak
- Diğer (lütfen belirtin)

BÖLÜM 2

Ekranda yer alan ifadelere ne derece katıldığınızı “1 Kesinlikle katılmıyorum”, “5 Kesinlikle katılıyorum” anlamına gelen cetveli kullanarak belirtir misiniz?

SORULAR	Kesinlikle katılmıyorum	Katılmıyorum	Ne katılıyorum ne katılmıyorum	Katılıyorum	Kesinlikle katılıyorum
1 Kendimi çoğu zaman çevremdeki doğa ile birlik içinde hissedirim.	1	2	3	4	5
2 Doğa, parçası olduğum bir topluluk gibidir.	1	2	3	4	5
3 Kendimi pek çok zaman doğadan kopmuş hissediyorum.	1	2	3	4	5
4 Bir ağacın bir ormanın parçası olması gibi, ben de kendimi doğanın bir parçası olarak hissediyorum.	1	2	3	4	5
5 Dünya’daki yerimi düşündüğümde, kendimi doğadaki hiyerarşinin en üstteki üyesi olarak görürüm.	1	2	3	4	5
6 Çoğu zaman çevremdeki doğal dünyanın yalnızca küçük bir parçası olduğumu ve yerdeki çimenden ya da ağaçlardaki kuşlardan daha önemli olmadığımı hissedirim.	1	2	3	4	5

BÖLÜM 3

Ekranda yer alan ifadelere ne derece katıldığınızı “1 Kesinlikle katılmıyorum”, “5 Kesinlikle katılıyorum” anlamına gelen cetveli kullanarak belirtir misiniz?

SORULAR		Kesinlikle katılmıyorum	Katılmıyorum	Ne katılıyorum ne katılmıyorum	Katılıyorum	Kesinlikle katılıyorum
1	Doğa insanlara fayda sağladığı için önemlidir.	1	2	3	4	5
2	Doğa, insan refahını sağladığı için önemlidir.	1	2	3	4	5
3	Doğa, insanlara temiz hava ve su sağladığı için değerlidir.	1	2	3	4	5
4	Doğa bize çeşitli kaynaklar sağladığı için önemlidir.	1	2	3	4	5
5	İnsanların doğayı dilediği gibi kullanma hakkı vardır.	1	2	3	4	5
6	Doğanın göze hitap etmeyen bölümlerinin hiçbir anlamı yoktur.	1	2	3	4	5
7	İnsanın doğaya atfettiği değerden bağımsız olarak doğanın kendi anlamı vardır.	1	2	3	4	5
8	Doğa, kendi başına değerlidir.	1	2	3	4	5
9	Doğada öyle manzaralar bulunur ki, bize topluluk ve halk olarak kim olduğumuzu söyler.	1	2	3	4	5
10	Benim veya ailemin sağlığı o ya da bu şekilde doğa ile ilişkilidir.	1	2	3	4	5
11	Doğadaki tüm bitkiler, hayvanlar, toprak vb. hakkında güçlü hislere sahibim. Bunlar benim kim olduğumun ve hayatımı nasıl yaşadığımın bir parçası.	1	2	3	4	5
12	Geleceğini önemseydiğim ve korumaya çalıştığım bazı doğal alanlar, ben bu alanları kendi gözlerimle hiç göremeyecek olsam bile sık sık aklıma gelir.	1	2	3	4	5

BÖLÜM 4

Sizce Türkiye için en önemli 3 sorun hangileridir? (Lütfen tam olarak 3 seçenek işaretleyiniz.)

- *Ülke ekonomisindeki olumsuz gelişmeler*
- *İşsizlik*
- *Eğitim eşitsizliği*
- *Sağlık hizmetlerine erişim*
- *Göçmen sayısındaki artış*
- *Doğal afet (deprem, fırtına, sel vb.)*
- *Sokaktaki başı boş hayvanlar*
- *Çevre kirliliği*
- *Azalan biyoçeşitlilik ve doğal kaynaklar*



BÖLÜM 5

Resimde örneği gösterilen kuş/bitki türünün ismini biliyor musunuz?

SORULAR		Biliyorum	Bilmiyorum	Biliyorum (lütfen belirtiniz)
1	Kızılgırdan			
2	Saksağan			
3	Yeşil Papağan			
4	Sapsız Meşe			
5	Kızılcım			
6	Yabani Lavanta			

1



2



3



4



5



6



BÖLÜM 6

Geçtiğimiz 2 hafta boyunca, iklim değişikliği ve diğer çevre problemlerini (örneğin; ekolojik bozulma, doğal kaynakların aşırı kullanılması) düşündüğünüzde hissettiğiniz duyguyu aşağıdaki seçeneklerden hangisi en iyi anlatıyor?

- Çok fazla endişelenmek
- Çok fazla korkmak
- Bireysel davranışlarının Dünya'daki etkisi hakkında endişeli hissetmek
- Doğanın kayıplarını düşünmeyi durduramamak
- Hiçbiri

BÖLÜM 7

Mutluluğu 5 kademeli düşünürseniz, genel hayat şartları bakımından kendinizi ne kadar mutlu hissediyorsunuz?

- Çok mutsuz
- Mutsuz
- Ne mutlu ne mutsuz
- Mutlu
- Çok mutlu

BÖLÜM 8

Son 5 yılı düşündüğünüzde aşağıdakilerden hangisini ya da hangilerini en az 1 kez yapmışsınızdır? (Birden fazla seçeneği işaretleyebilirsiniz.):

- Plastik poşet kullanımımı azaltmaya çalıştım
- Uzun mesafeli seyahatlerimde uçak yerine daha az karbon salımı yapan otobüs, tren gibi araçları tercih ederim
- Doğa, ekoloji, iklim krizi gibi konularda en az bir kitap, dergi veya makale okudum
- Çevre problemleri için çalışan dernek ya da kamu kurumunda gönüllü olarak görev aldım
- Çevre problemleri için çalışan dernek ya da kamu kurumuna destek oldum (maddi vb.)
- Hiçbiri benim için geçerli değil

BÖLÜM 9

Yaşınızın bulunduğu aralığı işaretleyiniz:	☐ 18 -24	☐ 25-34	☐ 35-44	☐ 45-60	☐ 60 yaş üstü
Cinsiyetinizi işaretleyiniz:	☐ Kadın	☐ Erkek	☐ Belirtmek istemiyorum		
Gelir durumunuzu işaretleyiniz:	☐ 11,500 TL veya daha az	☐ 11,500 - 40,000 TL	☐ 40,000 - 70,000 TL	☐ 70,000 TL veya daha fazla	
Son bitirdiğiniz eğitim seviyesi hangisidir?	☐ Ortaokul Mezunu veya altı	☐ Lise	☐ Üniversite	☐ Yüksek Lisans Mezunu veya üstü	

BÖLÜM 10

*a. Katılımınız için teşekkür ederiz, son olarak, size şu anda **100 TL** vereceğiz, bu 100 TL'nin tamamını kendinize alabilirsiniz ya da isterseniz bir kısmını kuş ve memeli türlerini korumaya odaklanan bir doğa koruma örgütü olan Kuzey Doğa Derneği'ne bağışlayabilirsiniz.*

Bir kısmını bağışlamak ister misiniz? Cevabınız evetse, bağışlamak istediğiniz miktarı belirtiniz:

*b. Katılımınız için teşekkür ederiz, son olarak, size şu anda **200 TL** vereceğiz, bu 200 TL'nin tamamını kendinize alabilirsiniz ya da isterseniz bir kısmını kuş ve memeli türlerini korumaya odaklanan bir doğa koruma örgütü olan Kuzey Doğa Derneği'ne bağışlayabilirsiniz.*

Bir kısmını bağışlamak ister misiniz? Cevabınız evetse, bağışlamak istediğiniz miktarı belirtiniz:

APPENDIX B: PRELIMINARY RESEARCH SURVEY

Lütfen aşağıdaki ifadelere katılım düzeyinizi 1-5 ölçeğinde belirtin.

(1 = Kesinlikle katılmıyorum, 2 = Katılmıyorum, 3 = Ne katılıyorum ne katılmıyorum, 4 = Katılıyorum, 5 = Kesinlikle katılıyorum).

Doğaya Bağlılık (CNS) Soruları

CNS 1	Kendimi çoğu zaman çevremdeki doğa ile birlik içinde hissedirim.
CNS 2	Doğa, parçası olduğum bir topluluk gibidir.
CNS 3	Diğer canlıların sahip oldukları zekanın farkındayım ve takdir ediyorum.
CNS 4	Kendimi pek çok zaman doğadan kopmuş hissediyorum.
CNS 5	Hayatımı düşündüğümde kendimi daha büyük, döngüsel bir yaşam sürecinin parçası olarak görürüm.
CNS 6	Kendimi sıklıkla hayvan ve bitkilerle akrabaymış gibi hissediyorum.
CNS 7	Dünya bana ait olduğu kadar, ben de Dünya'ya aitim.
CNS 8	Doğayı nasıl etkilediğimi derinlemesine anlıyorum.
CNS 9	Kendimi sıklıkla dünyadaki yaşam ağının bir parçası gibi hissediyorum.
CNS 10	Dünya'nın tüm sakinlerinin, insan olsun olmasın, ortak bir 'yaşam gücünü' paylaştığını düşünüyorum.
CNS 11	Bir ağacın bir ormanın parçası olması gibi, ben de kendimi doğanın bir parçası olarak hissediyorum.
CNS 12	Dünya'daki yerimi düşündüğümde, kendimi doğadaki hiyerarşinin en üstteki üyesi olarak görürüm.
CNS 13	Çoğu zaman çevremdeki doğal dünyanın yalnızca küçük bir parçası olduğumu ve yerdeki çimenden ya da ağaçlardaki kuşlardan daha önemli olmadığımı hissedirim.
CNS 14	Benim kişisel refahım, doğanın refahından bağımsızdır.

Doğaya Bağlılık (CNS) Soruları

INT 1	Doğada bırakılan olumsuz etkinin geçmesi 10 yıl veya daha uzun sürse bile, insanların kendi ihtiyaçlarını karşılamak için doğayı kullanma hakkı olmalıdır.
INT 2	İnsanların doğayı dilediği gibi kullanma hakkı vardır.
INT 3	Doğanın insanlar tarafından kullanılmayan kısımları bile anlamlıdır.
INT 5	Doğa, insanlar ondan herhangi bir fayda elde etmese bile değerlidir.
INT 6	Doğanın göze hitap etmeyen bölümlerinin hiçbir anlamı yoktur.
INT 7	İnsanın doğaya atfettiği değerden bağımsız olarak doğanın kendi anlamı vardır.
INT 4	Doğanın insanlar tarafından kullanılamayan kısımlarının korunması gerekmez.
INT 8	Doğa, sadece varlığıyla bile değerlidir.
INT 9	Doğanın değeri parasal bir değer ile ifade edilebilir.
INT 10	Doğa sağlıklı olmayı hak eder.
INT 11	Doğa, kendi başına değerlidir.
INT 12	Ormanlar bitki ve hayvanlara yaşam alanı sağladıkları için önemlidir.
INT 13	Doğaya yasal haklar vermek aşırıdır.
INS 1	Doğal kaynakların kullanılması ülkelerin gelişimi için şarttır.
INS 2	Doğayı korumamız, temiz hava ve suya sahip olabilmek için önemlidir.

INS 3	Doğa, insanlara gıda, su ve hammadde gibi kaynaklar sağladığı için faydalıdır.
INS 4	Doğa, toprak oluşumu gibi süreçlerden sorumlu olduğu için değerlidir.
INS 5	Doğa insanlara fayda sağladığı için önemlidir.
INS 6	Bitki ve hayvanlar, insanlara sağladıkları faydalar sebebiyle değerlidir.
INS 7	Doğa, insan refahını sağladığı için önemlidir.
INS 8	Doğa yaşam kalitemizi arttırdığı için önemlidir.
INS 9	Doğa, insanlara temiz hava ve su sağladığı için değerlidir.
INS 10	Doğa bize çeşitli kaynaklar sağladığı için önemlidir.
INS 11	Doğa bize gıda ve su sağladığı için önemlidir.
REL 1	Doğada öyle manzaralar bulunur ki, bize topluluk ve halk olarak kim olduğumuzu söyler.
REL 2	Benim veya ailemin sağlığı o ya da bu şekilde doğa ile ilişkilidir.
REL 3	Doğadaki tüm bitkiler, hayvanlar, toprak vb hakkında güçlü hislere sahibim. Bunlar benim kim olduğumun ve hayatımı nasıl yaşadığımın bir parçası.
REL 4	Yaşamın bir parçası olan bitkiler ve hayvanlar benim için akraba veya aile gibidir; bu yüzden onlara nasıl davrandığımız önemlidir.
REL 5	Toprağı kullanım şeklimiz, hem bitkiler ve hayvanlar hem de gelecek kuşaklar adına, toprağa karşı hissettiğimiz sorumluluğu yansıtır.
REL 6	Geleceğini önemseydiğim ve korumaya çalıştığım bazı doğal alanlar, ben bu alanları kendi gözlerimle hiç göremeyecek olsam bile sık sık aklıma gelir.
REL 7	Çevreye olan etkilerimizi hesaba katmak ve sorumluluk almak zorundayız, çünkü bizim etkilerimiz başka insanlara zarar verebilir.

Demografik Bilgiler

Doğum yılınızı giriniz (ör. 1970):

Tamamladığınız en yüksek eğitim seviyesini işaretleyiniz:

- Ortaokul mezunu veya daha düşük
- Lise mezunu
- Üniversite
- Yüksek lisans veya üzeri

Cinsiyetinizi işaretleyiniz:

- Diğer
- Kadın
- Erkek

APPENDIX C: PRELIMINARY RESEARCH STATISTICAL ANALYSIS

TABLES

Table C.1 Values of Nature Frequency

BIRTH		Baby Bombers (1946-1964)		Gen X(1965-1980)	Millenials (1981-1996)		Gen Z (1997-2012)	Total
n		39		61	31		29	110
%		24%		38%	19%		18%	
EDUCATION		Middle School or less		High School	University		Master's degree or higher	Total
n		4		18	77		61	160
%		3%		11%	48%		38%	
GENDER		Female		Male	Prefer Not to Say		Total	
n		83		75	2		160	
%		52%		47%	1%			
		1: Strongly Disagree	2: Disagree	3: Neither agree nor disagree	4: Agree	5: Strongly Agree	Total	
INT1	n	12	23	25	49	51	160	
	%	8%	14%	16%	31%	32%		
INT 2	n	4	4	7	27	118	160	
	%	3%	3%	4%	17%	74%		
INT 3	n	1	1	0	8	150	160	
	%	1%	1%	0%	5%	94%		
INT 4	n	1	1	2	17	139	160	
	%	1%	1%	1%	11%	87%		
INT 5	n	1	2	1	10	146	160	
	%	1%	1%	1%	6%	91%		
INT 6	n	0	2	3	12	143	160	
	%	0%	1%	2%	8%	89%		
INT 7	n	1	0	4	18	137	160	
	%	1%	0%	3%	11%	86%		
INT 8	n	1	2	1	6	150	160	
	%	1%	1%	1%	4%	94%		
INT 9	n	9	6	12	28	105	160	
	%	6%	4%	8%	18%	66%		
INT10	n	0	0	1	8	151	160	
	%	0%	0%	1%	5%	94%		
INT11	n	1	0	5	9	145	160	
	%	1%	0%	3%	6%	91%		
INT12	n	1	1	2	14	142	160	
	%	1%	1%	1%	9%	89%		
INT13	n	14	11	16	24	95	160	
	%	9%	7%	10%	15%	59%		
INS 1	n	7	15	13	48	77	160	
	%	4%	9%	8%	30%	48%		

INS 2	n	2	2	3	8	145	160
	%	1%	1%	2%	5%	91%	
INS 3	n	6	5	9	25	115	160
	%	4%	3%	6%	16%	72%	
INS 4	n	5	3	7	28	117	160
	%	3%	2%	4%	18%	73%	
INS 5	n	13	17	19	26	85	160
	%	8%	11%	12%	16%	53%	
INS 6	n	18	20	17	24	81	160
	%	11%	13%	11%	15%	51%	
INS 7	n	12	14	20	36	78	160
	%	8%	9%	13%	23%	49%	
INS 8	n	3	4	11	23	119	160
	%	2%	3%	7%	14%	74%	
INS 9	n	6	4	8	20	122	160
	%	4%	3%	5%	13%	76%	
INS 10	n	5	9	12	23	111	160
	%	3%	6%	8%	14%	69%	
INS 11	n	6	3	10	21	120	160
	%	4%	2%	6%	13%	75%	
REL 1	n	1	7	14	38	100	160
	%	1%	4%	9%	24%	63%	
REL 2	n	0	1	8	28	123	160
	%	0%	1%	5%	18%	77%	
REL 3	n	4	7	20	38	91	160
	%	3%	4%	13%	24%	57%	
REL 4	n	1	5	15	33	106	160
	%	1%	3%	9%	21%	66%	
REL 5	n	1	0	6	18	135	160
	%	1%	0%	4%	11%	84%	
REL 6	n	2	11	14	33	100	160
	%	1%	7%	9%	21%	63%	
REL 7	n	0	1	2	11	146	160
	%	0%	1%	1%	7%	91%	

Table C.2 Values of Nature Factor Analysis

CODED: MAXIMUM LIKELIHOOD-DIRECT OBLIMIN-FACTOR=3-0.4			
	1	2	3
INS 9	0,872		
INS 11	0,863		
INS 10	0,838		
INS 5	0,783	0,551	
INS 8	0,76		
INS 3	0,686		
INS 7	0,664	0,51	
INS 6	0,657	0,515	
INS 4	0,65		
INT 12	0,488		
INS 2	0,406		
INS 1			
REL 3			0,736
REL 2			0,665
INT 7			0,629
REL 1			0,57
REL 6			0,561
REL 4			0,523
INT 2			-0,506
REL 5			0,504
REL 7			0,503
INT 6			-0,473
INT 11			0,407
INT 10			
INT 5			
INT 1			
INT 3			
INT 8			
INT 4			
INT 13			
INT 9			

Table C.3 CNS Frequency

BIRTH		Baby Bombers (1946-1964)		Gen X(1965-1980)		Millenials (1981-1996)		Gen Z (1997-2012)		Total
n		12		36		27		33		110
%		11%		33%		25%		30%		
EDUCATION		Middle School or less		High School		University		Master's degree or higher		Total
n		2		14		53		41		110
%		2%		13%		48%		37%		
GENDER		Female		Male		Prefer Not to Say		Total		
n		67		42		1		110		
%		61%		38%		1%				
		1: Strongly Disagree	2: Disagree	3: Neither agree nor disagree	4: Agree	5: Strongly Agree	Total			
CNS1	n	3	16	16	36	39	110			
	%	3%	15%	15%	33%	35%				
CNS2	n	2	6	14	25	63	110			
	%	2%	5%	13%	23%	57%				
CNS3	n	0	5	5	16	84	110			
	%	0%	5%	5%	15%	76%				
CNS4	n	8	23	17	44	18	110			
	%	7%	21%	15%	40%	16%				
CNS5	n	5	7	17	33	48	110			
	%	5%	6%	15%	30%	44%				
CNS6	n	16	22	18	29	25	110			
	%	15%	20%	16%	26%	23%				
CNS7	n	2	4	6	21	77	110			
	%	2%	4%	5%	19%	70%				
CNS8	n	3	7	18	44	38	110			
	%	3%	6%	16%	40%	35%				
CNS9	n	3	13	11	27	56	110			
	%	3%	12%	10%	25%	51%				
CNS10	n	6	6	12	13	73	110			
	%	5%	5%	11%	12%	66%				
CNS11	n	3	11	14	24	58	110			
	%	3%	10%	13%	22%	53%				
CNS12	n	34	36	19	11	10	110			
	%	31%	33%	17%	10%	9%				
CNS13	n	7	14	22	25	42	110			
	%	6%	13%	20%	23%	38%				
CNS14	n	43	30	17	13	7	110			
	%	39%	27%	15%	12%	6%				

Table C.4 CNS Factor Analysis

CODED: MAXIMUM LIKELIHOOD-DIRECT OBLIMIN- FACTOR Eigenvalue >1 -0.4			
	1	2	3
CNS 2	0,842		
CNS 11	0,793		
CNS 9	0,789		
CNS 7	0,786		
CNS 10	0,74		
CNS 5	0,651		
CNS 1	0,611		-0,488
CNS 6	0,597		
CNS 8			
CNS 12		0,836	
CNS 13		-0,541	
CNS 14			
CNS 3			
CNS 4			0,544

APPENDIX D: RELIABILITY AND FACTOR ANALYSIS RESULTS

Table D.1 Connectedness to Nature Reliability Analysis

Reliability Statistics	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Connectedness to Nature	0,45	0,52	6
Connectedness to Nature (CNS 4 removed)	0,611	0,653	5

Table D.2 Connectedness to Nature Inter-Item CorrelationMatrix

Inter-Item Correlation Matrix						
	CNS1	CNS2	CNS4	CNS11	CNS12	CNS13
CNS1	1	0,515	-0,166	0,415	0,179	0,22
CNS2	0,515	1	-0,154	0,484	0,259	0,264
CNS4	-0,166	-0,154	1	-0,132	-0,024	0,034
CNS11	0,415	0,484	-0,132	1	0,172	0,304
CNS12	0,179	0,259	-0,24	0,172	1	-0,076
CNS13	0,22	0,264	0,34	0,304	-0,076	1

Table D.3 Connected to Nature Scale CNS4 Removed Factor Analysis

Total Variance Explained							
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2,204	44,075	44,075	1,393	27,853	27,853	0,987
2	1,083	21,657	65,733	1,043	20,852	48,705	1,566
3	0,686	13,715	79,448				
4	0,568	11,354	90,801				
5	0,460	9,199	100,000				

Factor Matrix		
	Factor	
	1	2
CNS1	0,401	0,514
CNS2	0,481	0,626
CNS11	0,468	0,423
CNS12		0,376
CNS13	0,883	-0,259
Extraction Method: Maximum Likelihood.		

Table D.4 Values of Nature Reliability Analysis

Reliability Statistics	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Instrumental Values	0,851	0,856	4
Intrinsic Value (INT 2 & INT6 Coded)	0,4	0,35	4
Intrinsic Value (INT 2 & INT6 Reverse Coded)	0,509	0,492	4
Relational Value	0,675	0,68	4
All Scale	0,731	0,77	12

Table D 5 Values of Nature Factor Analysis

Total Variance Explained							
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3,947	32,895	32,895	3,382	28,186	28,186	2,976
2	1,842	15,353	48,248	1,340	11,170	39,356	1,263
3	1,401	11,671	59,919	0,988	8,232	47,588	2,654
4	0,858	7,152	67,071				
5	0,751	6,260	73,331				
6	0,706	5,881	79,212				
7	0,600	5,001	84,213				
8	0,471	3,923	88,136				
9	0,439	3,657	91,793				
10	0,373	3,109	94,901				
11	0,340	2,831	97,732				
12	0,272	2,268	100,000				

Structure Matrix			
	Factor		
	1	2	3
INS5	0,769	-0,139	0,282
INS7	0,787		0,446
INS9	0,747	-0,138	0,408
INS10	0,792	-0,099	0,399
INT2	-0,134	0,717	
INT6	-0,097	0,792	
INT7	0,285	0,113	0,556
INT11	0,333	0,046	0,606
REL1	0,374		0,571
REL2	0,209	0,170	0,541
REL3	0,237	-0,156	0,547
REL6	0,347	-0,047	0,675

Table D.6 Other Reliability Analysis

Reliability Statistics	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Ecological Knowledge	0,565	0,58	6
Pro-Environmental Behaviour	0,493	0,494	5
Pro-Environmental Behaviour (B7.2 removed)	0,463	0,463	4
Pro-Environmental Behaviour (B7.2 & B7.3 removed)	0,479	0,462	3

APPENDIX E: VALUES OF NATURE & CONNECTEDNESS TO NATURE QUESTIONS

Table E.1. Values of Nature versus Connectedness to Nature In the Study

VALUES OF NATURE	CONNECTEDNESS TO NATURE
REL1: There are landscapes in nature that reflect who we are as a community and as a people. <u>community</u> , Klain et al. 2017, mean = 4,38	CNS1: I often feel connected to the nature around me. <u>connectedness</u> , Mayer and Frantz, 2004, mean = 3,92
REL2: My or my family's health is connected to nature in some way. <u>health</u> , Klain et al. 2017, mean = 4,47	CNS2: Nature feels like a community of which I am a part. <u>community</u> , Mayer and Frantz, 2004, mean = 4,21
REL3: I have strong feelings about all the plants, animals, soil, etc., in nature. These are part of who I am and how I live my life. <u>identity</u> , Klain et al. 2017, mean = 4,04	CNS11: I feel like I am part of nature, like a tree is part of a forest. <u>being part of nature</u> , Mayer and Frantz, 2004, mean = 3,96
REL6: Some natural areas that I care about and try to protect often come to mind, even though I may never see them with my own eyes. <u>wildness</u> , Klain et al. 2017, mean = 4,22	CNS12: When I consider my place in the world, I see myself as at the top of nature's hierarchy. <u>dominance over nature</u> , Mayer and Frantz, 2004, mean = 3,03
INT2: Humans have the right to use nature however they please. Klain et al. 2017, mean = 2,03	CNS13: I often feel like I am just a small part of the natural world and not more important than the grass on the ground or the birds in the trees. <u>being part of</u> , Mayer and Frantz, 2004, mean = 3,54
INT6: Parts of nature that don't appeal to the eye have no meaning. Winter 2007, Feucht et al. 2023, mean = 1,97	
INT7: Nature has value in and of itself, independent of human attribution. Feucht et al. 2023, mean = 4,44	
INT11: Nature is valuable in its own right. Lengieza et al. 2023, mean = 4,65	
INS5: Nature is important because it benefits people. Lengieza et al. 2023, mean = 4,25	
INS7: Nature is valuable because it ensures human welfare. Lengieza et al. 2023, mean = 4,3	
INS9: Nature is valuable because it provides us with clean air and water. Lengieza et al. 2023, mean = 4,35	
INS10: Nature is important because it gives us various resources. Lengieza et al. 2023, mean = 4,46	

APPENDIX F: CORRELATION MATRIX

		Park ID	Visit Frequency Score	Visit Reason Score	CNS Score	Instrumental Score	Intrinsic Score	Relational Score	Environmental Concern Score	Eco-Knowledge Score	Eco-Anxiety Score	Well-being Score	PEB Score	Age	Gender	Income Level	Education Level	Actual PEB Score
Park ID	Correlation Coefficient																	
	Sig. (2-tailed)																	
	N																	
Visit Frequency Score	Correlation Coefficient	-0.054																
	Sig. (2-tailed)	0.569																
	N	112																
Visit Reason Score	Correlation Coefficient	-0.023	-0.034															
	Sig. (2-tailed)	0.807	0.721															
	N	112	112															
CNS Score	Correlation Coefficient	0.037	.384**	0.178														
	Sig. (2-tailed)	0.7	<.001	0.06														
	N	112	112	112														
Instrumental Score	Correlation Coefficient	0.138	0.008	0.028	.310**													
	Sig. (2-tailed)	0.146	0.935	0.773	<.001													
	N	112	112	112	112													
Intrinsic Score	Correlation Coefficient	0.049	-0.041	0.034	0.029	0.108												
	Sig. (2-tailed)	0.61	0.665	0.323	0.758	0.257												
	N	112	112	112	112	112												
Relational Score	Correlation Coefficient	0.028	0.12	.257**	.510**	.476**	.248**											
	Sig. (2-tailed)	0.767	0.206	0.006	<.001	<.001	0.008											
	N	112	112	112	112	112	112											
Environmental Concern Score	Correlation Coefficient	0.062	-0.034	-0.12	-0.077	-0.122	-0.007	-0.134										
	Sig. (2-tailed)	0.516	0.322	0.206	0.417	0.201	0.944	0.159										
	N	112	112	112	112	112	112	112										
Eco-Knowledge Score	Correlation Coefficient	-.208*	-0.005	0.034	0.08	-0.022	.218*	.239*	0.179									
	Sig. (2-tailed)	0.028	0.962	0.324	0.404	0.816	0.021	0.011	0.059									
	N	112	112	112	112	112	112	112	112									
Eco-Anxiety Score	Correlation Coefficient	0.05	.131*	0.035	0.019	-0.158	0.17	-0.143	0.057	0.031								
	Sig. (2-tailed)	0.602	0.043	0.32	0.843	0.037	0.073	0.133	0.554	0.743								
	N	112	112	112	112	112	112	112	112	112								
Well-being Score	Correlation Coefficient	0.03	.247**	0.058	.206*	0.015	0.011	0.175	.229*	.194*	-0.125							
	Sig. (2-tailed)	0.754	0.009	0.541	0.03	0.873	0.31	0.065	0.015	0.04	0.19							
	N	112	112	112	112	112	112	112	112	112	112							
PEB Score	Correlation Coefficient	-0.174	0.152	.218*	.358**	-0.004	.234*	0.175	0.015	.339**	0.064	0.104						
	Sig. (2-tailed)	0.067	0.109	0.021	<.001	0.967	0.013	0.065	0.873	<.001	0.505	0.274						
	N	112	112	112	112	112	112	112	112	112	112	112						
Age	Correlation Coefficient	-0.027	0.067	0.026	0.125	0.052	-0.023	0.121	0.016	.233*	0.055	.268**	.283**					
	Sig. (2-tailed)	0.774	0.481	0.782	0.19	0.589	0.814	0.203	0.871	0.013	0.565	0.004	0.002					
	N	112	112	112	112	112	112	112	112	112	112	112	112					
Gender	Correlation Coefficient	-0.077	0.004	0.116	0.019	-0.063	-0.064	-0.044	0.017	0.079	-0.004	0.085	0.022	0.1				
	Sig. (2-tailed)	0.422	0.963	0.223	0.845	0.512	0.439	0.649	0.855	0.411	0.968	0.374	0.816	0.234				
	N	112	112	112	112	112	112	112	112	112	112	112	112	112				
Income Level	Correlation Coefficient	-0.048	-0.15	0.086	-0.164	0.037	0.024	0.038	0.045	0.057	-0.119	0.03	-0.009	.278**	.225*			
	Sig. (2-tailed)	0.617	0.115	0.369	0.083	0.702	0.805	0.305	0.637	0.549	0.21	0.752	0.323	0.003	0.017			
	N	112	112	112	112	112	112	112	112	112	112	112	112	112	112			
Education Level	Correlation Coefficient	-.425**	-.238*	0.067	-0.128	-0.117	.186*	0.025	0.036	.306**	0.118	-0.06	.206*	-0.072	0.103	.283**		
	Sig. (2-tailed)	<.001	0.012	0.48	0.178	0.219	0.049	0.796	0.313	0.001	0.216	0.527	0.029	0.448	0.278	0.002		
	N	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112		
Actual PEB Score	Correlation Coefficient	-0.183	-0.163	0.074	-0.069	0.046	-0.148	-0.126	-0.11	-0.085	-0.027	-0.16	-0.029	0.029	0.034	0.034	0.136	
	Sig. (2-tailed)	0.054	0.087	0.438	0.469	0.629	0.12	0.185	0.246	0.374	0.78	0.032	0.761	0.759	0.725	0.325	0.151	
	N	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	

Note. * $p < .05$, ** $p < .01$

APPENDIX G: PATH ANALYSIS RESULTS

Table G.1 Pro-environmental Behaviour Path Analysis with CNS as a Mediator

Regression Weights	Estimate	S.E.	C.R.	P
CNS_SCORE <--- INS_SCORE	0.045	0.069	0.652	0.514
CNS_SCORE <--- INT_SCORE	-0.118	0.089	-1.321	0.187
CNS_SCORE <--- REL_SCORE	0.597	0.092	6.502	***
PEB_SCORE <--- ECO KNOWLEDGE SCORE	0.296	0.071	4.168	***
PEB_SCORE <--- CNS_SCORE	0.42	0.114	3.687	***
Note. *** p<0.001				

Variances	Estimate	S.E.	C.R.	P
INS_SCORE	0.026	0.003	7.45	***
INT_SCORE	0.015	0.002	7.45	***
REL_SCORE	0.014	0.002	7.45	***
ECO KNOWLEDGE SCORE	0.049	0.007	7.45	***
Note. *** p<0.001				

Table G.2 Pro-environmental Behaviour Path Analysis with Values as a Mediator

Regression Weights	Estimate	S.E.	C.R.	P
Value_Score <--- CNS_SCORE	0.253	0.06	4.214	***
PEB_SCORE <--- Value_Score	0.094	0.177	0.528	0.598
PEB_SCORE <--- ECO_KNOW_SCORE	0.307	0.075	4.079	***
Note. *** p<0.001				

Variances	Estimate	S.E.	C.R.	P
CNS_SCORE	0.019	0.003	7.45	***
ECO_KNOW_SCORE	0.049	0.007	7.45	***
Note. *** p<0.001				

Table G.3 Pro-environmental Behaviour Path Analysis with Relational Value as a Mediator

Variances	Estimate	S.E.	C.R.	P
REL_SCORE <--- CNS_SCORE	0.455	0.071	6.404	***
PEB_SCORE <--- REL_SCORE	0.137	0.138	0.993	0.321
PEB_SCORE <--- ECO_KNOW_SCORE	0.297	0.075	3.964	***
Note. *** p<0.001				

Variances	Estimate	S.E.	C.R.	P
CNS_SCORE	0.019	0.003	7.45	***
ECO_KNOW_SCORE	0.049	0.007	7.45	***
Note. *** p<0.001				

Table G.4 Well-being Path Analysis with CNS as a Mediator

Regression Weights	Estimate	S.E.	C.R.	P
CNS_SCORE <--- INS_SCORE	0.045	0.069	0.652	0.514
CNS_SCORE <--- INT_SCORE	-0.118	0.089	-1.321	0.187
CNS_SCORE <--- REL_SCORE	0.597	0.092	6.502	***
Wellbeing_SCORE <--- ECO_KNOWLEDGE_SCORE	0.113	0.072	1.577	0.115
Wellbeing_SCORE <--- CNS_SCORE	0.384	0.115	3.353	***
Note. *** p<0.001				

Variances	Estimate	S.E.	C.R.	P
INS_SCORE	0.026	0.003	7.45	***
INT_SCORE	0.015	0.002	7.45	***
REL_SCORE	0.014	0.002	7.45	***
ECO_KNOWLEDGE_SCORE	0.049	0.007	7.45	***
Note. *** p<0.001				

Table G.5 Well-being Behaviour Path Analysis with CNS as a Mediator - Other Potential Predictors

Regression Weights	Estimate	S.E.	C.R.	P
CNS_SCORE <--- INT_SCORE	-0.118	0.089	-1.321	0.187
CNS_SCORE <--- INS_SCORE	0.045	0.069	0.652	0.514
CNS_SCORE <--- REL_SCORE	0.597	0.092	6.502	***
Wellbeing_SCORE <--- CNS_SCORE	0.405	0.111	3.64	***
Wellbeing_SCORE <--- Eco_Concern_Score	0.084	0.031	2.727	0.006
Wellbeing_SCORE <--- Eco_Anxiety_Score	-0.059	0.037	-1.584	0.113
Note. *** p<0.001				

Variances	Estimate	S.E.	C.R.	P
INT_SCORE	0.015	0.002	7.45	***
INS_SCORE	0.026	0.003	7.45	***
REL_SCORE	0.014	0.002	7.45	***
Eco_Concern_Score	0.245	0.033	7.45	***
Eco_Anxiety_Score	0.168	0.023	7.45	***
Note. *** p<0.001				

APPENDIX H: SUMMARY TABLE OF LITERATURE REVIEW

#	1st Author	Title	Paper/Book	Year	Location	Methodology	Analyse Methodology	Field or Not	Sample Size	Values	CNS	PEB	Well-being	Eco-Anxiety	Eco-Knowledge	Study Findings	Paper Link	Cite
1	Paul C. Stern	A value-belief-norm theory of support for social movements: The case of environmentalism	Human Ecology	1999		Telephone Interview	Principle Component Analysis (PCA)	Not	420	X		X				The VBN theory, when compared with other prevalent theories, offers the best available account of support for the environmental movement.	https://www.jstor.org/stable/24707060	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. <i>Human ecology review</i> , 81-97.
2	Laura Pasca	An Analysis of the Connectedness to Nature Scale Based on Item Response Theory	Environmental Psychology	2017	-	Item Response Theory	Reliability & Validity Analysis	Not	321		X					In the first study, previous works that had used the Spanish version of the CNS scale were included, and the scale was reduced to seven items (CNS-7). In the second study, this new scale was tested. Therefore, it would be appropriate to use a reduced version of the scale	https://www.frontiersin.org/articles/10.3389/fpsyg.2017.01330/full	Pasca, L., Aragonés, J. I., & Coello, M. T. (2017). An analysis of the connectedness to nature scale based on item response theory. <i>Frontiers in psychology</i> , 8, 1330.
3	Mei-Fang Chen	An examination of the value-belief-norm theory model in predicting pro-environmental behaviour in Taiwan	Asian Journal of Social Psychology	2015	Taiwan	Survey	Path Model	Not	757	X		X				The findings of this empirical study confirm that both the direct effects of the postulated causal chain of the VBN theory on pro-environmental behaviour and the mediation effects of NEP, AC, AR, and PN exist.	https://onlinelibrary.wiley.com/doi/epdf/10.1111/ajsp.12096?asml_referrer	Chen, M. F. (2015). An examination of the value-belief-norm theory model in predicting pro-environmental behaviour in Taiwan. <i>Asian Journal of Social Psychology</i> , 18(2), 145-151.
4	Avista, R. P.	Antecedents of environmental values and pro-environmental behavior intentions: A self-determination theory approach	Environmental Psychology	2023	New York	Hand-base survey with university students (self-reported peb)	SEM	University Students	293, 187, and 275	X		X				Shows intrinsic values support pro-environmental behavior.	https://www.sciencedirect.com/science/article/pii/S0272494423000713	Avista, R. P., & Niemiec, C. P. (2023). Antecedents of environmental values and pro-environmental behavior intentions: A self-determination theory approach. <i>Journal of Environmental Psychology</i> , 88, 102023.
5	Ranata Cervinka	Are nature lovers happy? On various indicators of well-being and connectedness with nature	Journal of Health Psychology	2012	Austria	On-site Survey	Regression	Field	547		X		X			Psychological well-being, meaningfulness and vitality were found to be robustly correlated with Connectedness with nature (CN).	https://journals.sagepub.com/doi/abs/10.1177/1359105311416873	Cervinka, R., Röderer, K., & Heller, E. (2012). Are nature lovers happy? On various indicators of well-being and connectedness with nature. <i>Journal of health psychology</i> , 17(3), 379-388.
6	Anastasia Gkargkavouzi	Assessing the structure and correlations of connectedness to nature, environmental concerns and environmental behavior in a Greek context	Current Psychology	2021	Greece	Phone interview	SEM	Not	400	X		X				While altruistic/relational concerns had a significant but negative correlation with personal practices. Only egoistic concerns showed a significant and positive relationship with environmental action.	https://link.springer.com/article/10.1007/S12144-018-9912-9	Gkargkavouzi, A., Paraskevopoulos, S., & Masioti, S. (2021). Assessing the structure and correlations of connectedness to nature, environmental concerns and environmental behavior in a Greek context. <i>Current Psychology</i> , 40, 154-171.

7	Matthias Winfried Kleespies	Connection to nature and relational values: an empirical study of human-nature relationships to explore essential factors in environmental education and environmental psychology	Environmental Education Research	2021	Germany	Online Survey	-	Not	1300	X	X	X			Relational values were found to enhance environmental protection motivation independently of instrumental and intrinsic values. RVs and the Connectedness to Nature Scale showed that RVs and connectedness to nature were different constructs, while RVs included connection to nature to some extent.	https://www.tandfonline.com/doi/full/10.1080/13504622.2021.1963418	Kleespies, M. W. (2021). Connection to nature and relational values: an empirical study of human-nature relationships to explore essential factors in environmental education and environmental psychology. <i>Environmental Education Research</i> , 27(10), 1517-1518.
8	Sophia Winkler-Schor	Determining the role of eudaimonic values in conservation behavior	Conservation Biology	2020	US	Survey at Denali National Park and Preserve	Latent Profile Analysis	Field	667	X		X			It was found that participants with high altruistic and biospheric values reported the strongest intentions to engage in conservation behaviors (CB).	https://conbio.onlinelibrary.wiley.com/doi/abs/10.1111/cobi.13622	Winkler-Schor, S., van Riper, C. J., Landon, A., & Keller, R. (2020). Determining the role of eudaimonic values in conservation behavior. <i>Conservation Biology</i> , 34(6), 1404-1415.
9	Youssef El Ghafraoui	Diverse values of nature shape human connection to dryland landscapes in Spain	Journal of Arid Environment	2023	Spain	On-site Survey	Descriptive Analysis	Field	191	X	X				Connection with traditional agricultural and high mountains were mostly related to relational value.	https://www.sciencedirect.com/science/article/pii/S0140196323000940	El Ghafraoui, Y., Quintas-Soriano, C., Pacheco-Romero, M., Murillo-López, B. E., & Castro, A. J. (2023). Diverse values of nature shape human connection to dryland landscapes in Spain. <i>Journal of Arid Environments</i> , 216, 105023.
10	Anthony Amoah	Does environmental knowledge drive pro-environmental behaviour in developing countries? Evidence from households in Ghana	Environment, Development and Sustainability	2021	Africa	Household Survey	Multinomial Logit Model	Not	1650			X		X	Environmental (ecological) knowledge shows a positive and highly significant association with pro-environmental behaviour.	https://www.researchgate.net/profile/Thomas-Addoah-publication/340737504_Does_environmental_knowledge_drive_pro-environmental_behaviour_in_developing_countries_Evidence_from_households_in_Ghana/links/5e9e42d2299bf13079ad85d/Does-environmental-knowledge-drive-pro-environmental-behaviour-in-developing-countries-Evidence-from-households-in-Ghana.pdf	Amoah, A., & Addoah, T. (2021). Does environmental knowledge drive pro-environmental behaviour in developing countries? Evidence from households in Ghana. <i>Environment, Development and Sustainability</i> , 23(2), 2719-2738.
11	Paul K. Lutz	Eco-anxiety in daily life: Relationships with well-being and pro-environmental behavior	Ecological and Social Psychology	2023	Canada	Preregistered daily diary study	Lagged Analysis	Not	132			X	X	X	Generally, eco-anxiety and pro-environmental behavior have a positive relationship.	https://www.sciencedirect.com/science/article/pii/S266622723000230	Lutz, P. K., Zelenski, J. M., & Newman, D. B. (2023). Eco-anxiety in daily life: Relationships with well-being and pro-environmental behavior. <i>Current Research in Ecological and Social Psychology</i> , 4, 100110.
12	Jean-Baptiste Pavani	Eco-Anxiety motivates pro-environmental behaviors: a Two-Wave Longitudinal Study	Motivation and Emotion	2023	France	Survey with French adults	Multiple Regression Analysis	Not	167			X		X	Present study confirm that eco-anxiety motivates pro-environmental behaviors	https://link.springer.com/article/10.1007/s11031-023-10038-x	Pavani, J. B., Nicolas, L., & Bonetto, E. (2023). Eco-anxiety motivates pro-environmental behaviors: a two-wave longitudinal study. <i>Motivation and Emotion</i> , 47(6), 1062-1074.
13	Kai MA Chan	Editorial overview: Relational values: what are they, and what's the fuss about?	Current Opinion in Environmental Sustainability	2018	-	Literature Review	-	-	-	X					Relational values offering a measurable, context-based alternative to economic-focused frameworks by integrating diverse social science and humanities perspectives to promote justice and sustainability.	https://www.sciencedirect.com/science/article/pii/S1877343518301222	Chan KM, Gould RK, Pascual U. 2018. Editorial overview: Relational values: What are they, and what's the fuss about? <i>Current Opinion in Environmental Sustainability</i> 35: A1–A7.
14	Sonja Maria Geiger	Environment-Specific vs. General Knowledge and Their Role in Pro-environmental Behavior	Frontiers in psychology	2019	Germany	Online Survey	SEM	Not	228			X		X	The study shows that ecological knowledge and pro-environmental behaviour has a positive correlation.	https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2019.00718/full	Geiger, S. M., Geiger, M., & Wilhelm, O. (2019). Environment-specific vs. general knowledge and their role in pro-environmental behavior. <i>Frontiers in psychology</i> , 10, 718.
15	Torsten Masson	Explaining the difference between the predictive power of value orientations and self-determined motivation for proenvironmental behavior	Environmental Psychology	2021	Germany	With mostly university students (self-reported peb)	Regression	University Students	200 and 435	X		X			Self-determined motivation uniquely predicts self-reported pro-environmental behavior better than biospheric, altruistic, or egoistic value orientations.	https://www.sciencedirect.com/science/article/pii/S0272494421000086?via=ih3DHub	Masson, T., & Otto, S. (2021). Explaining the difference between the predictive power of value orientations and self-determined motivation for proenvironmental behavior. <i>Journal of Environmental Psychology</i> , 73, 101555.
16	Arias-Arévalo, P.	Exploring intrinsic, instrumental, and relational values for sustainable management of social-ecological systems	Ecology and Society	2017	Colombia	Face to face, urban vs rural	Logistic Regressions	Field	589	X					Multiple values are necessary for environmental management to tackle social conflicts.	https://www.jstor.org/stable/26799016	Arias-Arévalo, P., Martín-López, B., & Gómez-Baggethun, E. (2017). Exploring intrinsic, instrumental, and relational values for sustainable management of social-ecological systems. <i>Ecology and Society</i> , 22(4).
17	Matthias Winfried Kleespies	Exploring the Construct of Relational Values: An Empirical Approach	Frontiers in Psychology	2020	Germany	Survey with students	CFA-Path Models	Not	350, 138, 878	X	X	X			It is stated that relational value and connectedness to nature overlap.	https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2020.00209/full	Kleespies, M. W., & Dierkes, P. W. (2020). Exploring the construct of relational values: An empirical approach. <i>Frontiers in Psychology</i> , 11, 209.
18	Shruti Ashish Lahoti	Exploring the Nexus between Green Space Availability, Connection with Nature, and Pro-Environmental Behavior in the Urban Landscape	Sustainability	2024	India	Face to face Survey	Logistic Regressions	Not	2414		X	X			A regression analysis underscored stronger PEB among those reporting a deeper connection with nature.	https://www.mdpi.com/2071-1050/16/13/5435	Lahoti, S. A., Dhyani, S., Sahle, M., Kumar, P., & Saito, O. (2024). Exploring the nexus between green space availability, connection with nature, and pro-environmental behavior in the urban landscape. <i>Sustainability</i> , 16(13), 5435.

19	Viren Swami	Exposure and connectedness to natural environments: An examination of the measurement invariance of the Nature Exposure Scale (NES) and Connectedness to Nature Scale (CNS) across 65 nations, 40 languages, gender identities, and age groups	Environmental Psychology	2024	Global	Online Survey (participants across 65 nations, 40 languages)	MG-CFA	Not	56,968		X					The CNS-7 (7-item Connectedness to Nature Scale) may be a suitable tool for measuring nature connectedness on a global scale. However, the NES appears to be inadequate for capturing nature exposure cross-culturally, indicating the need for alternative measures.	https://www.sciencedirect.com/science/article/pii/S0272494424002056	Swami, V., White, M. P., Voracek, M., Tran, U. S., Aavik, T., Ranjbar, H. A., ... & Lombardo, C. (2024). Exposure and connectedness to natural environments: An examination of the measurement invariance of the Nature Exposure Scale (NES) and Connectedness to Nature Scale (CNS) across 65 nations, 40 languages, gender identities, and age groups. <i>Journal of Environmental Psychology</i> , 99, 102432.
20	Andreas Samus	How do urban green spaces increase well-being? The role of perceived wildness and nature connectedness	Environmental Psychology	2022	Monheim, Germany	Survey at Urban forest and landscape park	PROCESS (Model 4)	Field	84		X		X			Findings suggest that both an urban forest and a landscape park can support well-being. However, the magnitude of the effect of nature on well-being may be influenced by the degree to which people experience nature connectedness in these environments.	https://www.sciencedirect.com/science/article/pii/S0272494422000950	Samus, A., Freeman, C., van Heezik, Y., Krumme, K., & Dickinson, K. J. (2022). How do urban green spaces increase well-being? The role of perceived wildness and nature connectedness. <i>Journal of Environmental Psychology</i> , 82, 101850.
21	Shun Kageyama	Human-nature connectedness is positively correlated with the perceived value of nature regardless of urbanization levels	Sustainability Science	2024	Japan	Postal Survey	Multi-group SEM	Not	688	X	X					Findings suggest that HNC positively correlates with the perceived values of nature, regardless of urbanization levels. These results indicate that considering HNC is crucial in nature management to understand people's value perceptions and conservation attitudes as well as to enhance their value perceptions toward surrounding nature under varying urbanization levels.	https://link.springer.com/article/10.1007/s11625-024-01563-w	Kageyama, S., Saito, T., Tajima, Y., & Hashimoto, S. (2024). Human-nature connectedness is positively correlated with the perceived value of nature regardless of urbanization levels. <i>Sustainability Science</i> , 1-18.
22	Matthias Winfried Kleespies	Impact of biological education and gender on students' connection to nature and relational values	PLoS One	2020	Germany	Survey with students	Correlation	Not	417, 593, 223	X	X					The study shows that RV's and CNS has positive correlation.	https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0242004	Kleespies, M. W., & Dierkes, P. W. (2020). Impact of biological education and gender on students' connection to nature and relational values. <i>PLoS One</i> , 15(11), e0242004.
23	Carena van Riper	Integrating multi-level values and pro-environmental behavior in a U.S. protected area	Sustainability Science	2019	Alaska	On-site survey in Denali National Park and Preserve, Alaska	SEM	Field	641	X		X				When looking at the SEM model used in the study biospheric value has the highest coefficient between the three types of pro-environmental behaviour variables.	https://link.springer.com/article/10.1007/s11625-019-00677-w	van Riper, C., Winkler-Schor, S., Foelske, L., Keller, R., Bräito, M., Raymond, C., ... & Johnson, D. (2019). Integrating multi-level values and pro-environmental behavior in a US protected area. <i>Sustainability Science</i> , 14(5), 1395-1408.
24	JeVrey A. Joireman	Integrating social value orientation and the consideration of future consequences within the extended norm activation model of proenvironmental behaviour	British Journal of Social Psychology	2001	-	Review	-	-	-	X		X				This study shows the positive relation between pro-environmental behaviour and biospheric consequences which is related to intrinsic (biospheric) value.	https://bpspsychub.onlinelibrary.wiley.com/doi/abs/10.1348/014466601164731	Joireman, J. A., Lassane, T. P., Bennett, J., Richards, D., & Solaimani, S. (2001). Integrating social value orientation and the consideration of future consequences within the extended norm activation model of proenvironmental behaviour. <i>British journal of social psychology</i> , 40(1), 133-155.
25	Jana Kachler	Intrinsic, instrumental and relational values behind nature's contributions to people preferences of nature visitors in Germany	Ecosystems and People	2024	Germany	Face to face Survey	Redundancy analysis (RDA)	Field	127	X						This study highlights the plurality of values and concerns NCP (nature's contribution to people). Through this study, relational values resonated more broadly than intrinsic and instrumental values. Our study highlights the plurality of values within protected area visitors regarding NCP preferences and values, which are highly diverse and context dependent.	https://www.tandfonline.com/doi/abs/10.1080/26395916.2024.2342361	Kachler, J., Felipe-Lucia, M. R., Isaac, R., Bonn, A., & Martín-López, B. (2024). Intrinsic, instrumental and relational values behind nature's contributions to people preferences of nature visitors in Germany. <i>Ecosystems and People</i> , 20(1), 2342361.
26	Seb O'Connor	Making intrinsic values work: integrating intrinsic values of the more-than-human world through the Life Framework of Values	Sustainability Science	2019	England-Scotland	Video-recorded Interview (Post-normal, more-than-human participatory approach)	Non-quantitative	Not	40	X						The Life Framework can be used as a tool to articulate and deliberate complex ecosystem values. However, this study has been specifically conducted on a marine ecosystem.	https://link.springer.com/article/10.1007/s11625-019-00715-7	O'Connor, S., & Kenter, J. O. (2019). Making intrinsic values work: integrating intrinsic values of the more-than-human world through the Life Framework of Values. <i>Sustainability Science</i> , 14(5), 1247-1265.
27	Judith I. M. de Groot	Mean or green: which values can promote stable pro-environmental behavior?	Conservation Letters	2009	-	Review	-	-	-	X		X				Promoting pro-environmental behaviour goes from supporting altruistic and biospheric values and reducing the relative strength of egoistic values.	https://conbio.onlinelibrary.wiley.com/doi/abs/10.1111/j.1755-263X.2009.00048.x	De Groot, J. I., & Steg, L. (2009). Mean or green: which values can promote stable pro-environmental behavior? <i>Conservation Letters</i> , 2(2), 61-66.
28	Helen E. Perkins	Measuring love and care for nature	Environmental Psychology	2010	Australia	Survey with tourists	Multiple Regression Analysis	Field	261		X	X				Love and Care for Nature (LCN) scale is a 15-item scale which is a consistent, valid and unique scale that assess individuals' emotional and altruistic connections to nature	https://www.sciencedirect.com/science/article/pii/S0272494410000551	Perkins, H. E. (2010). Measuring love and care for nature. <i>Journal of environmental psychology</i> , 30(4), 455-463.
29	Julie Whitburn	Meta-analysis of human connection to nature and proenvironmental behavior	Conservation Biology	2020	-	Meta analyse	-	-	-		X	X				It shows a deeper connection to nature may partially explain why some people behave more proenvironmentally than others.	https://conbio.onlinelibrary.wiley.com/doi/abs/10.1111/cobi.13381	Whitburn, J., Linklater, W., & Abrahams, W. (2020). Meta-analysis of human connection to nature and proenvironmental behavior. <i>Conservation biology</i> , 34(1), 180-193.

30	Hongmai Zhang	National forest park visitors' connectedness to nature and pro-environmental behavior: The effects of cultural ecosystem service, place and event attachment	Journal of Outdoor Recreation and Tourism	2023	China	On-site survey at Dongping National Forest Park	SEM	Field				X	X					The results indicated visitors' connectedness to nature influenced their PEB not only directly but also indirectly through their perceived value of cultural ecosystem services, place attachment, and event attachment.	https://www.sciencedirect.com/science/article/pii/S2211078023000166	Zhang, H., Cai, L., Bai, B., Yang, Y., & Zhang, J. (2023). National forest park visitors' connectedness to nature and pro-environmental behavior: The effects of cultural ecosystem service, place and event attachment. <i>Journal of Outdoor Recreation and Tourism</i> , 42, 100621.
31	Michael L. Lengieza	Nature as community: An overlooked predictor of pro-environmental intentions	Environmental Psychology	2017	US	Online survey with students and a panel	SEM	Students & Panel	322, 430 and 451	X		X	X					The existence of three key factors is confirmed, and the relationship between NAC and PEB is validated. Additionally, it is established that NAC is a distinct concept from CNS which is explained as nature as community which is more related with relational value.	https://www.sciencedirect.com/science/article/pii/S027494423001755	Lengieza, M. L., Aviste, R., & Swim, J. K. (2023). Nature as community: An overlooked predictor of pro-environmental intentions. <i>Journal of Environmental Psychology</i> , 91, 102127.
32	Andrew J. Howell	Nature connectedness: Associations with well-being and mindfulness	Personality and individual differences	2011	Canada	Survey with students	Confirmatory factor analysis	Not	452, 275			X		X				Significant associations emerged among measures of nature connectedness and indices of wellbeing.	https://www.sciencedirect.com/science/article/pii/S0191886911001711	Howell, A. J., Dopko, R. L., Passmore, H. A., & Buro, K. (2011). Nature connectedness: Associations with well-being and mindfulness. <i>Personality and individual differences</i> , 51(2), 166-171.
33	Michael L. Lengieza	Nature contact, nature connectedness and associations with health, wellbeing and pro-environmental behaviours	Journal of Environmental Psychology	2020	England	Face to Face Home Survey	Linear regressions	Not	4960			X	X	X				Nature connectedness was positively related to eudaimonic wellbeing and both types of pro-environmental behaviour. Moreover, connectedness moderated key relationships between nature contact, wellbeing and pro-environmental behaviours.	https://www.sciencedirect.com/science/article/pii/S027494419301185	Martin, L., White, M. P., Hunt, A., Richardson, M., Pahl, S., & Burt, J. (2020). Nature contact, nature connectedness and associations with health, wellbeing and pro-environmental behaviours. <i>Journal of environmental psychology</i> , 68, 101389.
34	Chelsea Batavia	Nature for whom? How type of beneficiary influences the effectiveness of conservation outreach messages	Biological Conservation	2018	US	Online Panel	Logistic Regression	Not	1141	X			X	X				It is recommended that conservation efforts appeal to non-anthropocentric values, emphasizing the intrinsic value and moral significance of nature for nature conservation.	https://www.sciencedirect.com/science/article/pii/S0006320718308711	Batavia, C., Bruskotter, J. T., Jones, J. A., Vucetich, J. A., Gosnell, H., & Nelson, M. P. (2018). Nature for whom? How type of beneficiary influences the effectiveness of conservation outreach messages. <i>Biological Conservation</i> , 228, 158-166.
35	Gail L. Markle	Pro-Environmental Behavior: Does It Matter How It's Measured? Development and Validation of the Pro-Environmental Behavior Scale (PEBS)	Human Ecology	2013	US	Survey with university students	Reliability & Validity Analysis	Not	303-174-104				X					Pro-Environmental Behavior Scale (PEBS) is valid and reliable.	https://link.springer.com/article/10.1007/s10745-013-9614-8	Markle, G. L. (2013). Pro-environmental behavior: Does it matter how it's measured? Development and validation of the pro-environmental behavior scale (PEBS). <i>Human ecology</i> , 41, 905-914.
36	Kutlu Kagan * Türkarslan	Psychometric properties of the Hogg Eco-Anxiety Scale (HEAS-13) and the prediction of pro-environmental behavior	Environmental Psychology	2023	Turkey	Online Survey	Hierarchical Regression Analysis	Not	605				X			X		Interventions to boost pro-environmental behaviors could focus on managing anxiety symptoms, reducing behavioral issues, and strengthening activist identity and commitment.	https://www.sciencedirect.com/science/article/pii/S027494423001950	Türkarslan, K. K., Kozak, E. D., & Yıldırım, J. C. (2023). Psychometric properties of the Hogg Eco-Anxiety Scale (HEAS-13) and the prediction of pro-environmental behavior. <i>Journal of Environmental Psychology</i> , 92, 102147.
37	Sarah C. Klain	Relational values resonate broadly and differently than intrinsic or instrumental values, or the New Ecological Paradigm	PLoS ONE	2017	US & Costa Rica	Online Panel & Face to Face Survey	Factor & Comparative Analysis	Field & Online	400, 253 and 260	X								This study suggests a relational value framing as a new direction for innovation when it comes to ecosystem service assessments and designing conservation initiatives.	https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0183962	Klain, S. C., Olmsted, P., Chan, K. M., & Satterfield, T. (2017). Relational values resonate broadly and differently than intrinsic or instrumental values, or the New Ecological Paradigm. <i>PLoS one</i> , 12(8), e0183962.
38	CO Asanza-Reyes	Relational values shape people's connectedness to nature in a former military protected area of Ecuador	Environmental Conservation	2024	Ecuador	Online Survey	Sankey diagram	Not	400	X		X		X				This study examines the connectedness to nature and relational values of local communities in a former military protected area in Ecuador. The research shows that relational values (e.g., care, belonging, spiritual meaning) have a strong impact on connectedness to nature.	https://www.cambridge.org/core/journals/environmental-conservation/article/relational-values-shape-peoples-connectedness-to-nature-in-a-former-military-protected-area-of-ecuador/164A1E6F872C4F05974CCDA46422C04F	Asanza-Reyes, C. O., Castro, A. J., Raquena-Mullor, J. M., López-Rodríguez, M. D., & Quintas-Soriano, C. (2024). Relational values shape people's connectedness to nature in a former military protected area of Ecuador. <i>Environmental Conservation</i> , 51(1), 17-26.
39	Austin Himes	Relational values: the key to pluralistic valuation of ecosystem services	Current Opinion in Environmental Sustainability	2018	-	Review	-	-	-	X								The inclusion of relational values in pluralistic methods of valuation enables greater epistemic justice, makes power asymmetries visible, and offers a framework for the articulation of human nature relationships that challenges the Western dichotomic model.	https://www.sciencedirect.com/science/article/pii/S1877345117302634	Himes, A., & Muraca, B. (2018). Relational values: the key to pluralistic valuation of ecosystem services. <i>Current opinion in environmental sustainability</i> , 35, 1-7.
40	Michael L. Lengieza	Relationships between people and nature: Nature connectedness and relational environmental values	Current Opinion in Psychology	2025	-	Literature review	-	-	-	X		X	X					The findings indicate a positive relationship between individuals' nature connectedness and their relational environmental values, highlighting the importance of social, cultural, and emotional bonds with nature in promoting pro-environmental behavior.	https://www.sciencedirect.com/science/article/pii/S2352250224001970	Lengieza, M. L., & Aviste, R. (2025). Relationships between people and nature: Nature connectedness and relational environmental values. <i>Current Opinion in Psychology</i> , 62, 101984.
41	IPBES	Summary for Policymakers of the Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services	IPBES	2022	-	Review	-	-	-	X								This report gives a comprehensive perspective about value assessment.	https://zenodo.org/records/7410287	IPBES. 2022. Summary for Policymakers of the Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Pascual U, et al., eds. IPBES secretariat. https://doi.org/10.5281/zenodo.6522392

42	Claudio D. Rosa	The 7-items version of the connectedness to nature scale: A study of its validity and reliability with Brazilians	Current Psychology	2022	Brazil	Survey with students who enrolled different courses	Descriptive Analysis	Students	224		X	X			According to the study, CNS-7 valid and reliable. Also, due to the various factors, no clear conclusion has been established regarding the relationship between CNS and PEB.	https://link.springer.com/article/10.1007/s12144-020-01026-2	Rosa, C. D., Collado, S., Profice, C. C., & Pires, P. P. (2022). The 7-items version of the connectedness to nature scale: A study of its validity and reliability with Brazilians. <i>Current Psychology</i> , 41(8), 5105-5110.
43	F. Stephan Mayer	The connectedness to nature scale: A measure of individuals' feeling in community with nature	Environmental Psychology	2004	US	Survey with class students or randomly chosen public places	Correlation	Field & Students & Outside Members of University	60, 102, 270, 135, 57		X	X			According to the study, CNS is a reliable and valid scale. Also, human-nature relationship is important both for nature well and human well. Lastly, moderately among positive relationship between the CNS and eco-friendly actions.	https://www.sciencedirect.com/science/article/pii/S0272494404000696	Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. <i>Journal of environmental psychology</i> , 24(4), 503-515.
44	Viktoria Feucht	The different values of nature: a comparison between university students' perceptions of nature's instrumental, intrinsic and relational values	Sustainability Science	2023	Germany	Online Survey	Exploratory Factor Analysis & Correlation	University Students	1885	X		X			The study revealed that a pluralistic understanding of values toward nature is widespread among German students, with both ecosystem services and the intrinsic value of nature being broadly appreciated. Relational values, however, varied more across groups and are considered an important potential source of motivation for environmental conservation actions.	https://link.springer.com/article/10.1007/s11625-023-01371-8	Feucht, V., Dierkes, P. W., & Kleespies, M. W. (2023). The different values of nature: a comparison between university students' perceptions of nature's instrumental, intrinsic and relational values. <i>Sustainability Science</i> , 18(5), 2391-2403.
45	S. Diaz	The Global Assessment Report on Biodiversity and Ecosystem Services Summary for Policymakers	IPBES	2019	-	Review	-	-	-	X					The NCP framework, conceptually developed in 2017, was applied in this global assessment report, where 18 NCP categories were identified (e.g., food, materials, climate regulation, learning & inspiration, identity & belonging, etc.).	https://files.ipbes.net/ipbes-web-prod-public-files/inline-files/ipbes_global_assessment_report_summary_for_policymakers.pdf	IPBES (2019). Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Diaz, J. Settele, E. S. Brondizio E.S., H. T. Ngo, M. Guze, J. Agard, A. Armeth, P. Balvanera, K. A. Brauman, S. H. M. Burchart, K. M. A. Chan, L. A. Garibaldi, K. Ichii, J. Liu, S. M. Subramanian, G. F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razaque, B. Reyers, R. Roy Chowdhury, Y. J. Shin, I. J. Visseren-Hamakers, K. J. Willis, and C. N. Zayas (eds.). IPBES secretariat, Bonn, Germany. 58 pages.
46	Teaghan L. Hogg	The Hogg Eco-Anxiety Scale: Development and validation of a multidimensional scale	Global Environmental Change	2021	Australia	Online survey with students	PCA	University Students	334				X		Eco-anxiety is a quantifiable and multifaceted psychological experience. HEAS-13 exhibited a unique four-dimensional structure and a high degree of reliability and validity.	https://www.sciencedirect.com/science/article/pii/S0959378021001709	Hogg, T. L., Stanley, S. K., O'Brien, L. V., Wilton, M. S., & Wiersma, C. R. (2021). The Hogg Eco-Anxiety Scale: Development and validation of a multidimensional scale. <i>Global Environmental Change</i> , 71, 102391.
47	Jasper O. Kanter	The importance of deliberation in valuing ecosystem services in developing countries—Evidence from the Solomon Islands	Global Environmental Change	2011	Solomon Islands	Focus Group	χ^2 & Kendall's Tau-b	Field	447	X					In rural, intrinsic values show up easier, and instrumental values show up harder. Due to this, the need for mixed methodologies and interdisciplinary approaches to capture the full significance of nature highlighted.	https://www.sciencedirect.com/science/article/pii/S0959378011000021	Kanter, J. O., Hyde, T., Christie, M., & Fazel, I. (2011). The importance of deliberation in valuing ecosystem services in developing countries—evidence from the Solomon Islands. <i>Global Environmental Change</i> , 21(2), 505-521.
48	Genovaitė Liobikienė	The Importance of Environmental Knowledge for Private and Public Sphere Pro-Environmental Behavior Modifying the Value-Belief-Norm Theory	Sustainability	2019	Lithuania	Face to face Survey	Confirmatory factor analysis	Not	1007			X		X	Action-based environmental knowledge and awareness of behavioral consequences both positively contribute to the prediction of private and public pro-environmental behavior.	https://www.mdpi.com/2071-1050/11/12/3324	Liobikienė, G., & Polkus, M. S. (2019). The importance of environmental knowledge for private and public sphere pro-environmental behavior: modifying the value-belief-norm theory. <i>Sustainability</i> , 11(12), 3324.
49	Takuro Uehara	The importance of relational values in gaining people's support and promoting their involvement in social-ecological system management: A comparative analysis	Frontiers in Marine Science	2022	Japan	Online Survey	Regression	Not	864, 1136, 1000	X		X			It has shown that fostering relational values can promote pro-SES behaviours in order to achieve a desired SES state.	https://www.frontiersin.org/articles/10.3389/fmars.2022.1001180/full	Uehara, T., Sakurai, R., & Hidaka, T. (2022). The importance of relational values in gaining people's support and promoting their involvement in social-ecological system management: A comparative analysis. <i>Frontiers in marine science</i> , 9, 1001180.
50	Caroline Winter	The Intrinsic, Instrumental and Spiritual Values of Natural Area Visitors and the General Public: A Comparative Study	Journal of Sustainable Tourism	2007	Australia	Mailed survey with general public, tourists and recreationists	Factor Analysis & Correlation	Field (tourists from natural park)	659	X					Spiritual value is clearly important for some visitors and tourism industry has an opportunity to educate tourists about their own values.	https://www.tandfonline.com/doi/abs/10.2167/jost6860	Winter, C. (2007). The intrinsic, instrumental and spiritual values of natural area visitors and the general public: A comparative study. <i>Journal of sustainable tourism</i> , 15(6), 599-614.
51	Van Den Born	The missing pillar: Eudemonic values in the justification of nature conservation	Environmental Planning and Management	2018	-	Review	-	-	-	X					This shows eudemonic/relational values (expressing the meaningful life) constitute a crucial third pillar in the justification of nature conservation.	https://www.tandfonline.com/doi/abs/10.1080/09640568.2017.1342612	Van Den Born, R. J., Arts, B., Admiraal, J., Beringer, A., Knights, P., Molinaro, E., ... & De Groot, W. T. (2018). The missing pillar: Eudemonic values in the justification of nature conservation. <i>Journal of Environmental Planning and Management</i> , 61(5-6), 841-856.
52	Marybeth Pereira	The Relationship between Connectedness to Nature, Environmental Values, and Pro-environmental Behaviours	University of Worcester	2015	Australia	Online Survey	Mediation Analysis	Not	76	X	X	X			The results showed that connectedness to nature, altruistic values and biospheric values were positively related to pro-environmental behaviours; and that environmental values partially mediated the relationship between connectedness to nature and pro-environmental behaviour.	https://warwick.ac.uk/fac/cross_fac/iatl/research/reinventon_archive/volume8issue2/pereira/?utm_source=chatgpt.com	Pereira, M., & Forster, P. (2015). The relationship between connectedness to nature, environmental values, and pro-environmental behaviours. <i>Reinvention: An international journal of undergraduate research</i> , 8(2).
53	Alison Pritchard1	The Relationship Between Nature Connectedness and Eudaimonic Well-Being: A Meta-analysis	Journal of Happiness Studies	2020	-	Meta analyse	-	-	-		X		X		Result of this research: positive relation between nature connectedness and eudaimonic well-being and nature connectedness.	https://link.springer.com/article/10.1007/s10902-019-00118-6	Pritchard, A., Richardson, M., Sheffield, D., & McEwan, K. (2020). The relationship between nature connectedness and eudaimonic well-being: A meta-analysis. <i>Journal of happiness studies</i> , 21, 1145-1167.

54	Colin A. Capaldi	The relationship between nature connectedness and happiness: a meta-analysis	Frontiers in Psychology	2014	-	Meta analyse	-	-	-	X						The relationship between connection to nature and happiness appears positive and meaningful, but this is not defined as well-being.	https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2014.00976/full?amp=1	Capaldi, C. A., Dopko, R. L., & Zelenitski, J. M. (2014). The relationship between nature connectedness and happiness: A meta-analysis. <i>Frontiers in psychology</i> , 5, 92737.
55	Ed Diener	The satisfaction with life scale	Journal of Personality Assessment	1985	-	Survey with students	Correlation	Not	176, 163			X				This article reports the development and validation of a scale to measure global life satisfaction, the Satisfaction With Life Scale (SWLS).	https://www.tandfonline.com/doi/abs/10.1207/s15327727jpa4901_13	Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. <i>Journal of personality assessment</i> , 49(1), 71-75.
56	Seungk Shin	The value of eudaimonism for understanding relationships among values and pro-environmental behavior	Journal of Environmental Psychology	2022	US	On-site and In-person Survey	Path Model	Not	1103	X		X				This study demonstrates that pro-environmental behavior is shaped by a range of human values, with eudaimonic/relational values playing a particularly significant role.	https://www.sciencedirect.com/science/article/pii/S0272494422000238	Shin, S., van Riper, C. J., Stadman, R. C., & Suski, C. D. (2022). The value of eudaimonism for understanding relationships among values and pro-environmental behavior. <i>Journal of Environmental Psychology</i> , 86, 101778.
57	Elisabeth Veiðvåg Høiseeth	Value asymmetries in Norwegian forest governance: The role of institutions and power dynamics	Ecological Economics	2023	Norway	Literature, in-depth interviews and survey	Linear regressions	Not	15, 1694	X						Intrinsic and relational values are higher than instrumental values for Norwegians. women and non-forest owners show higher appreciation for relational values than men and forest owners.	https://www.sciencedirect.com/science/article/pii/S0921800923002367	Høiseeth, E. V., Vedeld, P., Vatn, A., & Gómez-Baggethun, E. (2023). Value asymmetries in Norwegian forest governance: The role of institutions and power dynamics. <i>Ecological Economics</i> , 214, 107973.
58	Unai Pascual	Valuing nature's contributions to people: the IPBES approach	Current Opinion in Environmental Sustainability	2017	-	Review	-	-	-	X						It provides a framework for how nature's contributions to people (NCP) can be inclusively assessed in decision-making processes and emphasizes various conceptual definitions.	https://www.sciencedirect.com/science/article/pii/S1877343517300040	Pascual, U., Balvanera, P., Diaz, S., Pataki, G., Roth, E., Stenseke, M., ... & Yagi, N. (2017). Valuing nature's contributions to people: the IPBES approach. <i>Current opinion in environmental sustainability</i> , 26, 7-16.
59	Christian Martin	Where do biospheric values come from? A connectedness to nature perspective	Journal of Environmental Psychology	2017	US	Online Survey	Latent Profile Analysis (LPA)	Not	494, 95, 271	X	X	X				All three studies consistently supported that connection with nature positively impacts biospheric values and that biospheric values, in turn, encourage sustainable behaviors.	https://www.sciencedirect.com/science/article/pii/S0272494417300592	Martin, C., & Czellar, S. (2017). Where do biospheric values come from? A connectedness to nature perspective. <i>Journal of Environmental Psychology</i> , 52, 56-68.
60	Austin Himes	Why nature matters: A systematic review of intrinsic, instrumental, and relational values	BioScience	2024	-	Systematic Review	-	-	-	X						Diverse values in decision-making helps policymakers uncover intangible costs and benefits, foster inclusivity, resolve conflicts, encourage collaboration, and strengthen conservation efforts, while future research should refine value frameworks to represent broader cultural perspectives and human-nature relationships.	https://academic.oup.com/bioscience/article-abstract/74/1/25/7499505	Himes, A., Muraca, B., Anderson, C. B., Athayde, S., Beery, T., Cantú-Fernández, M., ... & Zent, E. (2024). Why nature matters: A systematic review of intrinsic, instrumental, and relational values. <i>BioScience</i> , 74(1), 25-43.
61	Kai M. A. Chan	Why protect nature? Rethinking values and the environment	PNAS	2016	-	Review	-	-	-	X						It moves the conservation debate beyond the traditional instrumental and intrinsic values by proposing a third category of values, referred to as relational values.	https://www.pnas.org/doi/abs/10.1073/pnas.1525002113	Chan, K. M., Balvanera, P., Benessaiah, K., Chapman, M., Diaz, S., Gómez-Baggethun, E., ... & Turner, N. (2016). Why protect nature? Rethinking values and the environment. <i>Proceedings of the national academy of sciences</i> , 113(6), 1462-1465.