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Eco-Anxiety

A Preliminary Study using the Hogg Eco-Anxiety Scale with Participants in a Small Island State

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Abstract

The ecological crisis is having profound impacts on mental health and psychological well-being. One such psychological experience is eco-anxiety, which is characterised by anxiety regarding environmental degradation and its implications on all aspects of life. Despite growing trends in research on eco-anxiety, studies that investigate this phenomenon in the small island state of Malta are lacking. This paper presents a preliminary study within a small island state context that collected quantitative data on eco-anxiety and its four dimensions: (1) rumination, (2) affective symptoms, (3) behavioural symptoms and (4) anxiety about personal impacts, measured using the Hogg Eco-Anxiety Scale (HEAS). Self-perceived eco-anxiety, demographic variables, and levels of anxiety about environmental events and personal impacts, alongside their relationship to eco-anxiety, were also investigated. Data was collected from 243 Maltese adults using an online survey. Following data analysis, eco-anxiety levels were found to be relatively low, while self-perceived eco-anxiety was generally scored higher. Eco-anxiety was significantly higher in individuals working in a climate or environment-related field. More so, anxiety about climate change and one's carbon footprint accounted for the greatest proportion of variance in eco-anxiety scores. Despite limitations in generalisability and contextualisation of the scale, this paper supports eco-anxiety as a relevant psychological concept within the local research agenda, highlighting the importance of such conversations in stimulating environmental engagement and facilitating hope in the face of environmental issues within a small island state.

Keywords: eco-anxiety, environmental events, personal impacts, ecological crisis, climate change, small island state

Eco-Anxiety: A Preliminary Study using the Hogg Eco-Anxiety Scale with Participants in a Small Island State

The present ecological crisis is composed of interconnected environmental issues, including climate change, the loss of nature and biodiversity, and issues of pollution and waste. The United Nations (2021) aptly labels such predicaments as the "triple planetary crisis". The effects of the ecological crisis on human health, particularly mental health, have relatively recently begun to surface in scholarly literature and everyday conversations, signalling a growing recognition of and the need for research on the mental health effects of environmental threats. This study, conducted in a small island state context, focuses on eco-anxiety as an emotional reaction to the ecological crisis, which manifests as anxiety stemming from the declining environmental condition of the planet (Albrecht, 2011).

Eco-Anxiety: What is it?

Passmore et al. (2022) provide a comprehensive definition for eco-anxiety, being the "persistent feelings of worry, anxiety, dread, or doom regarding environmental degradation and the impacts and implications of climate change on our planet as a whole" (p. 3). The prevailing consensus among scholars is that eco-anxiety represents a non-pathological reaction to environmental deterioration and its consequences rather than a mental health disorder necessitating treatment (Sackett, 2019). Nonetheless, eco-anxiety may present itself on a continuum with varying types and degrees of emotional, cognitive, social and functional implications that can be both adaptive and maladaptive in nature (Lutz et al., 2023; Verplanken & Roy, 2013). Eco-anxiety can escalate to a state of significant distress and be deemed "potentially disabling" (Albrecht, 2019; Doherty & Clayton, 2011). As an example, Hickman et al.'s (2021) research, conducted among youth from 10 different countries, reveals that almost half of participants believed their feelings about environmental issues were affecting their ability to function. This implies the perceived potential 'paralysing' effects of feeling eco-anxious, and demonstrates how perceptions towards emotions about the ecological crisis influence actions

taken in response to them (Miceli & Castelfranchi, 2019). This highlights the need to measure individuals' self-perceived eco-anxiety.

Eco-anxiety, with its multidimensional and continuum nature, has also been found to impact environment-related behaviour (Pavani et al., 2023; Hogg et al., 2024), with this relationship being affected by other mediating and moderating variables, such as self-efficacy (Innocenti et al., 2023). Kurth and Pihkala (2022) distinguish between practical and debilitating eco-anxiety that either promote or hinder pro-environmental behaviours (Andrews & Hoggett, 2019).

There is ongoing debate among researchers and mental health professionals regarding what constitutes *eco-anxiety*, which, unlike climate anxiety, encompasses a broader range of concerns about the ecological crisis and related environmental events (Clayton, 2020; Kurth & Pihkala, 2020; Pihkala, 2020). Studies that have operationalised climate and eco-anxiety levels using standardised scales have found overall low levels of eco-anxiety (Clayton & Karazsia, 2020; Hogg et al., 2021; Whitmarsh et al., 2022; Wullenkord et al., 2021). This has prompted debate on whether the concept 'eco-anxiety' is to encapsulate both milder forms of fear/ worry and stronger anxiety symptoms, or be reserved solely for the latter with other concepts, such as 'eco-worry', used to describe milder affective responses to the ecological crisis (Pihkala, 2020; Lutz et al., 2023). In this study, we adopt Pihkala's (2022) definition of eco-anxiety, viewing it from a non-pathological perspective. This includes their conceptualisation of "practical eco-anxiety, the potential of paralyzing eco-anxiety, and eco-anxiety as a moral emotion" (Pihkala, 2022, p. 3).

Possible Sources of Eco-Anxiety

Eco-anxiety arises from multiple aspects of the ecological crisis, including its uncertain, unpredictable, uncontrollable, overwhelming and future-oriented nature (Pihkala, 2020). Pihkala (2020) refers to these features as the "classic ingredients in anxiety" (p. 2). Eco-anxiety also

stems from personal experience and awareness of the crisis's profound impacts, including environmental, emotional, physical, social, and political pressures, alongside the recognition of one's role in exacerbating environmental issues (Albrecht, 2011; Norgaard, 2011). Eco-anxiety may also stem from existential awareness of and concern for environmental events occurring outside one's geographical zone with the media offering information on the latest events on the ecological crisis alongside their implications in this globalised world (Pihkala, 2020; Passmore et al., 2023).

The Special Eurobarometer 538 survey highlights climate change as being the most pressing concern for Maltese participants (European Commission, 2023). However, a MaltaToday study (Debono, 2024) found that only 2.2% of Maltese voters identified climate change as the EU's biggest issue while global conflicts rank the highest, most likely due to media focus on current wars. These findings emphasise the need for more studies on eco-anxiety and the media's potential influence.

Another contributing factor to eco-anxiety is risk perception. Evidence suggests that this varies according to sociodemographic factors (van der Linden, 2015). According to the Climate Change Risk Perception Model (van der Linden, 2015), factors such as being younger, female, and possessing a higher level of education are associated with a heightened perception of climate change risks. Various studies have found that women were significantly more likely to report feeling eco-anxious and eco-worried (Boluda-Verdu et al., 2022; Clayton et al., 2023; Closson et al., 2022; Heeran et al., 2022; Niedzwiedz & Katikireddi, 2023; Poortinga et al., 2019; Wullenkord et al., 2021). In addition, Niedzwiedz & Katikireddi (2023) assert that eco-anxiety is higher in individuals who have a high level of education, which is attributed to increased climate change awareness and risk perception (Arya & Kumar, 2023).

Conclusions regarding the association between eco-anxiety and age are mixed. While some studies found higher eco-anxiety in older participants (Clayton et al., 2023; Niedzwiedz

and Katikireddi, 2023), others showed the contrary (Boluda-Verdu et al., 2022; Clayton & Karazsia, 2020; Heeran et al., 2022; Whitmarsh et al., 2022). Researchers attribute this to mixed media messages (Fernando, 2023), young individuals' perceptions of inadequate governmental responses (Hickman et al., 2021), and socially organised climate change denial that contributes to a sense of apathy and diminished agency (Ojala, 2012; Norgaard, 2006).

Working in the environment field implies heightened awareness of the ecological crisis and direct exposure to environmental degradation, (Head, 2016). Such individuals, including climate first responders and environmental professionals, tend to perceive climate change as more serious and display elevated levels of eco-anxiety (Clayton et al., 2017; Cunsolo et al., 2020; Hoggett & Randall, 2018; Pollack, 2020).

This study examines the level of eco-anxiety among a sample of Maltese adults in response to various environmental issues, building on previous studies investigating Maltese people's concern about certain environmental events which contribute to the ecological crisis. The Environment and Resources Authority (2020) reported that 61% of Maltese respondents were highly concerned about water pollution, likely influencing eco-anxiety due to its prominence in Malta's coastal areas. Similarly, Mifsud (2010) found that waste management was a key concern among Maltese youth. The Environmental Attitudes Survey (Environment and Resources Authority, 2020) recently identified air pollution, loss of natural habitats, and waste management as the key environmental concerns for adults in Malta. Similar findings emerged from Briguglio's (2015) social media question analysis whereby pollution in the form of litter, noise and traffic were mentioned as factors that suppressed Maltese respondents' wellbeing. Meanwhile, one fifth of respondents mentioned the beauty of the island's environment, the sea and sunshine as factors positively contributing to their wellbeing. Refalo and Conrad (2009) note a discrepancy between concern and actual personal behaviour in favour of the environment. On the other hand, Gozitan farmers who believed that climate change is occurring were more concerned about climate change risks, such as reduced crop production due to perceived change

in seasonal duration, and more supportive of farm-related adaptation efforts (Galdies & Galdies, 2016). More so, the perception of climate change as a public health threat may be the strongest driver behind mitigation policy support and willingness to act (DeBono et al., 2012). These studies suggest that eco-anxiety and concern for the environment as experienced by Maltese individuals is shaped by multiple environmental stressors, may particularly involve heightened concern for pollution and waste issues, and may or may not transpire into resulting pro-environmental behaviours.

Malta's Environmental and Sociodemographic Context

Malta is a small island state in the middle of the Mediterranean Sea with a population of 563,443 (National Statistics Office, 2024). The climate in Malta is characteristically Mediterranean, featuring mild, wet winters and hot, dry summers (Malta Resources Authority, 2024). The annual mean, maximum and minimum air temperatures have increased since 1952, while the rainfall rate has decreased with noticeable extended periods of drought, especially since 2000 (Galdies, 2022). Maltese waters have also experienced a marine heatwave in the summer of 2024 (TVM News, 2024).

Malta ranks among the most densely populated nations within the European Union (Eurostat, 2023). With limited space and competing pressures for development, this small island state has the highest proportion of land covered by artificial surfaces in the European Union; almost a quarter (23.7%) of its land consists of artificial surfaces (Eurostat, 2018).

Air pollution is considered one of Malta's greatest environmental challenges, alongside biodiversity protection, such as illegal trapping and hunting of protected bird species, waste management and water conservation (Environment and Resources Authority, 2020; European Commission, 2022). Malta's waste generation per capita output stood at 6,847 kilograms in 2020, notably higher than the EU average of 4,815 kilograms (Eurostat, 2024). Inadequate waste management also impacts water resources, placing significant pressure on both water sources

and their quality (Environment and Resources Authority, 2020). Malta experienced the highest increase in greenhouse gas emissions within the EU in early 2024, showing an 8.8% growth compared to the same period the previous year (Eurostat, 2024). Household electricity consumption in Malta also surged by 63.9% between 2012 and 2022, far outpacing the EU average (Eurostat, 2024).

Malta's unique socio-demographic factors, including its colonial history, Roman Catholic traditions, and small geographic size, significantly shape the population's environmental attitudes and behaviours (Mifsud, 2012). These cultural influences contribute to the complex dynamics of eco-anxiety in the island state. In the Maltese context, eco-anxiety is being tackled through non-governmental organisations (NGOs) initiatives like BirdLife Malta's *Blooming Minds*, which promotes ecotherapy for mental health, and Friends of the Earth Malta's *CALM-EY* (Coping with Anxiety and Lowering Mental Health Effects in Youth) project, focused on reducing climate-related anxiety in youth. Eco-anxiety was also mentioned in APS Bank's Malta Sustainability Forum in 2021 and featured in an article in THINK Magazine (Camilleri, 2022). These initiatives show that most of the efforts to tackle eco-anxiety in Malta do not come from academia, but rather NGOs, fora and the media. Current local scientific research on the psychological realms of the ecological crisis tends to investigate cognitive and behavioural factors, such as attitudes towards, concerns about, satisfaction with and knowledge of the environment, alongside perceptions towards solutions to environmental challenges and environment-related behaviour (Refalo & Conrad, 2009; DeBono et al., 2010; Galdies & Galdies, 2016; Agius, 2019; Environment and Resources Authority, 2020; European Commission, 2023). The emotional component, including eco-anxiety, remains scarce in local research.

The Current Study

This paper aims to investigate eco-anxiety in Malta, a small island state, using the Hogg Eco-Anxiety Scale (Hogg et al., 2021) that assesses four dimensions of eco-anxiety: (i)

rumination, (ii) affective symptoms, (iii) behavioural symptoms and (iv) anxiety about one's personal impacts. This study aims to measure participants' self-perceived eco-anxiety, their frequency of anxiety regarding seven global environmental events and six personal behaviours affecting the environment, demographic differences in eco-anxiety levels, and to identify relationships of these variables with eco-anxiety.

The overall scope of the study is to offer preliminary findings on the emotions that individuals from the small island state of Malta feel in response to the overall ecological crisis. It contributes to further local research, possibly using other tools to be able to triangulate findings. Understanding the emotional responses of Maltese people towards global and local environmental issues can enhance knowledge of the connections between environment-related emotions, cognitions and behaviours, having broad implications on sustainability, well-being, interpersonal relationships, community engagement, education, healthcare, therapy, and policy development.

Methodology

This study and its findings form part of a larger research project that employed an explanatory sequential mixed methods research design. The present article reports on the quantitative findings obtained through a self-administered online survey. Participants had the choice of answering in either English or Maltese. The questionnaire took approximately six minutes to complete, and data was collected between November 2022 and March 2023.

Sample

A total of 243 participants, who were Maltese, and aged between 18 and 70 years, completed the questionnaire. Recruitment was done through non-probability volunteer sampling through social media, word-of-mouth and the University of Malta's Registrar. This sampling method using a voluntary sample of participants allowed efficient data collection (Farrokhi & Mahmoudi, 2012). While limited in representativeness, this pragmatic approach

provided valuable preliminary insights into eco-anxiety. The study serves as a foundation for future research with more representative sampling methods.

The Research Instrument

The research instrument, distributed through SurveyMonkey, used the 13-item Hogg Eco-Anxiety Scale (HEAS) (2021) to measure eco-anxiety. The HEAS was chosen given that it evaluates eco-anxiety's cognitive, behavioural, and emotional dimensions, alongside personal accountability for the ecological crisis (Hogg et al., 2021). It is a short, straightforward tool that is easy to administer and has been validated across multiple populations, including Turkey (Uzun et al., 2022), France (Mathe et al., 2023), Australia and New Zealand (Hogg et al., 2021), Spain and Argentina (Rodríguez Quiroga et al., 2024), Italy (Innocenti et al., 2021; Innocenti et al., 2023; Rocchi et al., 2023) and Germany (Heinzel et al., 2023). The scale's successful use in Italy, which shares cultural and climatic similarities with Malta (Fischer, 2014; WorldData, 2022), supports its applicability in this study (Innocenti et al., 2023). Nonetheless, Malta, as a small island state, presents unique characteristics that warrant dedicated investigations into eco-anxiety, including the current study.

Permission to use and translate the test in Maltese was granted by the primary author of the HEAS via email correspondence. Both English and Maltese versions were put online.

The HEAS asked participants how often they had been bothered by symptoms when thinking about climate change and other global environmental conditions (e.g., global warming, ecological degradation, resource depletion) within the past 2 weeks. This was measured on a 4-point scale (0 = "rarely/ not at all", 1 = "several of the days", 2 = "over half of the days", 3 = "nearly everyday"). Symptoms included affective symptoms (4 items), rumination (3 items), behavioural symptoms (3 items) and anxiety about one's personal impact (3 items) on the planet (Hogg et al., 2021). The items, their sequence, and the response options were maintained as in the original HEAS (2021) with the exception of the first response option, which was modified

from “Rarely” to “Rarely/Not at all.” The addition of “Not at all” was made for respondents who had not experienced the specific symptom, and as suggested after the piloting of the questionnaire.

The research instrument included demographic items of gender, age, education level, and whether participants worked in climate or environment-related fields, with examples like environmental science, environmental law, environmental engineering, conservation and sustainability being given (Peach, 2021).

Self-perceived eco-anxiety was measured by asking participants to self-report the extent to which they experienced eco-anxiety (0 = “Rarely/ not at all”, 1 = “Sometimes”, 2 = “Often”, 3 = “Almost always”).

Hogg et al. (2021) assessed participants’ anxiety about seven environmental issues and six personal behavioural impacts related to the environment using items adapted from Homburg et al. (2007) and Helm et al., (2018). These scales were incorporated into this study’s questionnaire. Local environmental events were later examined qualitatively through focus groups, though this aspect is beyond the scope of this article.

The seven environmental issues included climate change, species extinction, ecological degradation, resource depletion, ocean pollution, deforestation and the ozone hole. These environmental issues were directly adopted from Hogg et al.’s (2021) questionnaire. As a result, these issues were not modified to reflect the geographical context of Malta. For example, “ocean pollution” was not changed to “sea pollution”. Malta’s unique social, cultural, geographical, political, and educational context—as a small island state—underscores the importance of tailoring the concept of eco-anxiety to its specific circumstances. This contextualisation is crucial for effectively defining and studying eco-anxiety, opening new opportunities for further research. Moreover, the use of the term “ozone hole”, with “ozone depletion” provided as its definition, may introduce some scientific imprecision and

oversimplification, given that the former specifically refers to the thinning of the ozone layer over Antarctica (NASA Ozone Watch, 2024). Another issue in terminology may arise from the inclusion of "ecological degradation" as a separate environmental phenomenon. While "ecological degradation" is generally considered an umbrella term for resource depletion, species extinction, and deforestation in the United Nations' 2030 Agenda for Sustainable Development (2015), Hogg et al. (2021) may have chosen to differentiate these issues to better capture participants' perceptions of each specific threat. People's emotional responses and conceptualisations of these issues can be nuanced, influenced by their individual risk perceptions, knowledge, and the prominence of certain terms in media and public discourse. However, using "ecological degradation" alongside other specific environmental threats may impact the discriminant validity of the items, as participants may interpret these terms differently.

The six personal behavioural impacts which contribute to these environmental threats were included, rated using a 4-point scale (0 = "Never/ rarely", 1 = "Sometimes", 2 = "Often", 3 = "Almost always"). These were one's carbon footprint, waste production, energy consumption, water consumption, meat eating and air travel. There is some overlap in these personal impacts, such as the involvement of water, waste and energy consumption in meat consumption and air travel (González et al., 2020; UK Civil Aviation Authority, 2024), and the intrinsic inclusion of these personal impacts to one's carbon footprint. Nonetheless, anxiety about the six personal impacts was measured separately to gain a more nuanced understanding of how individuals perceive and respond to both broad and granular dimensions of eco-anxiety. On the other hand, the use of broad impacts and their constituent specific behaviours influences the interpretation of the results, and may introduce item redundancy, as their interrelatedness may have led to conflating anxiety about specific behaviours with broader anxiety about their overall carbon footprint. This issue could be resolved through the revision of the terms used to refer to anxiety about specific personal impacts in subsequent uses of this questionnaire.

Alongside limitations in terminology use and implications, the HEAS may lead to the *floor effect*, attributed to its focus on more maladaptive aspects of eco-anxiety (Hogg et al., 2024). Ágoston et al. (2022) released the Eco-Anxiety Questionnaire, capturing both adaptive and maladaptive aspects. This scale was released after decisions regarding which scale to use for this study had been made.

Items in Hogg et al.'s (2021) questionnaire provided definitions of some terms in order to increase validity and reliability. The definitions of the respective environmental events and personal impacts were given as follows:

- Species extinction (the extinction of entire animal populations)
- Ecological degradation (the destruction of ecosystems such as the Great Barrier Reef)
- Resource depletion (the reduction of the world's natural resources such as water and food)
- Ozone hole (the depletion of the ozone layer)
- Carbon footprint (the amount of greenhouse gases you emit)
- Air travel (taking long-haul flights that emit high levels of carbon dioxide)

Data Analysis

The data was cleaned on Microsoft Excel and analysed using the Statistical Package for Social Sciences (SPSS) using descriptive and inferential statistics to reach the study's aims outlined above. To measure differences between groups, Kruskal Wallis H tests and Mann-Whitney U tests were conducted given that data was collected from a volunteer sample and did not satisfy parametric assumptions. Additionally, Spearman's rank correlation coefficient was utilised to examine the presence and strength of correlations between variables and factors, as the data did not follow a normal distribution.

Reliability and Validity

To ensure the validity of the results, a pilot test was conducted with nine participants. Two of the pilot study participants were proficient in Maltese orthography, grammar and syntax. The pilot study was performed to identify and rectify any issues in the items, data collection procedures, conceptual understanding and English-to-Maltese translations (Flick, 2018). The research objectives outlined above guided the construction of some additional questions, ensuring content validity (Lynn, 1986; Rattray & Jones, 2007), and the gathered data was accurately analysed using appropriate tests. Lastly, the construct validity of the HEAS was accepted given the confirmatory factor analysis undergone in Hogg et al.'s (2021) research study, that differentiated items measuring eco-anxiety from those measuring Generalised Anxiety Disorder (Spitzer et al., 2006).

Utilising the HEAS also contributed to the reliability of the findings, as it has been validated across diverse populations, including Mediterranean countries. Internal consistency was evaluated using Cronbach's alpha, a commonly used statistic for assessing the interrelatedness of test items (Tavakol & Dennick, 2011).

Ethical Considerations

Ethical considerations were a top priority during this study, following recognised guidelines and principles. The research proposal obtained ethical clearance from the Faculty Research Ethics Committee.

Informed consent was sought from all participants. A combined information letter and consent form was presented at the beginning of the questionnaire. This included information on participants' rights, such as the right to withdraw (Pope & Mays, 1995), the purpose of the study, what participation entails, the benefits and risks of participating, and measures undertaken to ensure confidentiality. For example, the survey data gathered via SurveyMonkey

guaranteed that participants' IP addresses were not accessible to the administrator. In the data analysis phase, measures were taken to minimise confirmation bias. The analysis was directed by the research objectives, ensuring that both significant and non-significant results were reported to help reduce publication bias.

Limitations

This study is to be viewed in light of its limitations and preliminary nature. Non-probability sampling techniques were employed, resulting in selection bias that diminished the sampling validity and generalisability of the results, besides hindering the application of parametric tests (Trochim & Donnelly, 2008). The demographic items also lacked options for “Post-Secondary Education” and “Do not work”, leading participants to classify themselves as “Tertiary Education” and “No” for environmental employment, potentially causing inaccuracies in response.

The sample was unbalanced, predominantly comprising females, the tertiary-educated, 18- to 30-year old's and individuals who do not work in an environment-related field, which limits the generalisability of the findings to the Maltese population (Cook & Campbell, 1979; Jager et al., 2017). The self-reported data collected could introduce response bias due to misunderstandings or social desirability (Rosenman et al., 2011).

Some participants had missing data: those with over 20% missing responses being excluded from the analysis, which limited the statistical power of the study (Siegel & Castellan, 1988). Furthermore, the study could not establish causality or changes over time. The application of the Hogg Eco-Anxiety Scale (2021) in a small island context may not fully capture local socio-economic and demographic characteristics, impacting generalisability and necessitating further contextualisation. Some terminology used in Hogg et al.'s (2021) study and replicated in this study may have posed scientific imprecision and validity issues, as mentioned in the description of the research instrument. Recent ecological events may have also affected

participants' eco-anxiety scores. Lastly, input from an environmental expert could have enhanced the pilot study.

Results

The Hogg Eco-Anxiety Scale shows a high internal consistency when applied to a Maltese context with Cronbach's alpha being at .916.

Eco-Anxiety and Demographics

Table 1 presents sample demographics, statistics from the HEAS, and results from the Kruskal-Wallis H and Mann-Whitney U tests conducted to identify differences in eco-anxiety scores across age, gender, education, and environment-related occupation.

Table 1

Demographic information of sample participants and tests for differences in demographics for eco-anxiety

Demographics			Eco-Anxiety Score		<i>H</i>	<i>U</i>
	<i>N</i>	%	<i>M</i>	<i>SD</i>		
Gender						4378.50
Female	185	76.1	1.56	0.50		
Male	54	22.2	1.52	0.59		
Other [†]	3	1.23	2	.27		
Prefer not to say [†]	1	0.41	1.69	NA		
Age					0.96	
18-30 years	123	50.6	1.55	0.52		
31-45 years	52	21.4	1.54	0.54		
46-60 years	54	22.2	1.59	0.50		
61+ years	14	5.8	1.62	0.61		
Highest educational level						3223.50
Secondary education	34	14	1.53	0.56		
Tertiary education	209	86	1.57	0.52		
Work in Environment Field						3214.50*
Yes	44	18.1	1.76	0.69		
No	184	75.7	1.51	0.47		
Unsure [†]	15	6.2	1.54	0.38		
Total	243		1.56	0.52		

* $p < .05$

^{All†} These demographic groups were excluded from their respective Mann-Whitney *U* tests.

The differences in eco-anxiety scores for the age, gender and highest education level groups were not statistically significant. However, the differences between those who work ($Mdn = 1.65$) and do not work ($Mdn = 1.38$) in an environment-related field were statistically significant, $U = 3214.500$, $z = -1.988$, $p = .047$. Therefore, significantly higher eco-anxiety scores were present in participants working in an environment-related field compared to those who did not. The effect size " r " of 0.13 and Cohen's d '0.48 indicate a small but statistically significant difference in eco-anxiety scores between participants who work and those who do not work in an environment-related field.

With regards to the four dimensions of eco-anxiety, as proposed by Hogg et al. (2021), participants scored highest on the dimension measuring their anxiety about personal impacts, followed by rumination, affective symptoms and behavioural symptoms respectively, as can be seen in Table 2.

Table 2

Sample participants' scores on eco-anxiety dimensions

	Score	
	<i>M</i>	<i>SD</i>
Eco-Anxiety Dimensions		
Affective symptoms	1.54	0.65
Rumination	1.66	0.69
Behavioural symptoms	1.22	0.45
Anxiety about personal impacts	1.83	0.75

Eco-Anxiety and Self-Perceived Eco-Anxiety

Approximately half of participants (51.4%) reported that they sometimes experience anxiety related to climate change and environmental problems, 12.8% rarely or never

experience eco-anxiety, 29.2% often experience eco-anxiety and 6.6% almost always do. The mean self-perceived eco-anxiety score was 2.30 ($SD = .77$)

A Spearman rho correlation test showed a positive and moderate-to-strong two-tailed correlation between eco-anxiety scores and self-perceived eco-anxiety, $rs(238) = .626, p < .001$. A Kruskal-Wallis H comparing HEAS scores across self-reported eco-anxiety levels showed statistically significant results (see Table 3), with a large effect size ($\eta^2 = .38$) indicating that self-perceived eco-anxiety accounts for substantial variance in HEAS scores, supporting the scale's concurrent validity.

Table 3

Kruskal Wallis H Test statistics and effect sizes for eco-anxiety and self-perceived eco-anxiety

Eco-Anxiety and Self-Perceived Eco-Anxiety	<i>N</i>	Mean Ranks	<i>Mdn</i>	<i>H</i>	η^2
Self-Perceived Eco-Anxiety					
Rarely/not at all	30	61.40	1.08	95.49 3*	.38
Sometimes	12				
	4	96.48	1.31		
Often	70	168.70	1.77		
Almost always	16	206.56	2.35		

* $p < .001$

Eco-Anxiety and Anxiety about Seven Environmental Events

In descending order, the environmental event that participants were most anxious or distressed about was deforestation ($M = 2.76$), followed by ocean pollution ($M = 2.71$), resource depletion ($M = 2.64$), ecological degradation ($M = 2.47$), species extinction ($M = 2.45$), climate change ($M = 2.31$) and the ozone hole ($M = 2.14$).

A Spearman rho correlation test showed a positive and moderate-to-strong two-tailed correlation between anxiety about environmental events and eco-anxiety scores, $rs(213) = .656, p < .001$.

Kruskal-Wallis H tests comparing eco-anxiety scores of participants with varying frequency of anxiety felt about each environmental event produced statistically significant results (see Table 4). The effect sizes on eco-anxiety scores were large for all seven environmental events, except for the moderate effect size of anxiety about the ozone hole ($\eta^2 = .12$). It could be assumed that anxiety about climate change accounted for the greatest variance in eco-anxiety scores, being 34%, while anxiety about the ozone hole accounted for 12%, being the least variance in eco-anxiety scores.

Table 4

Kruskal Wallis H Test statistics and effect sizes for eco-anxiety and anxiety seven environment events

Eco-Anxiety and Environmental Event	<i>n</i>	Mean Ranks	<i>Mdn</i>	<i>H</i>	η^2
Climate Change				77.94*	.34
Never/rarely	27	40.26	1.00		
Sometimes	117	99.49	1.46		
Often	54	136.06	1.77		
Almost always	20	189.80	2.24		
Species Extinction				50.40*	.19
Never/rarely	32	79.72	1.20		
Sometimes	99	100.08	1.38		
Often	78	136.88	1.62		
Almost always	30	184.80	2.08		
Ecological Degradation				57.78*	.22
Never/rarely	36	64.93	1.15		
Sometimes	94	105.47	1.38		
Often	73	138.23	1.70		
Almost always	37	177.78	1.92		
Resource Depletion				41.19*	.15
Never/rarely	13	73.19	1.24		
Sometimes	98	98.22	1.38		
Often	90	127.13	1.54		
Almost always	38	175.29	2.20		
Ozone Hole					.12

Never/rarely	60	89.96	1.24	32.52*	
Sometimes	102	116.39	1.46		
Often	63	139.33	1.62		
Almost always	15	191.57	2.00		
Ocean Pollution				48.19*	.18
Never/rarely	18	62.17	1.15		
Sometimes	81	96.87	1.38		
Often	92	125.29	1.54		
Almost always	48	170.58	1.89		
Deforestation				50.90*	.20
Never/rarely	14	64.79	1.15		
Sometimes	85	93.40	1.38		
Often	84	122.07	1.54		
Almost always	55	169.85	1.85		

* $p < .001$

Note. $df =$

Eco-Anxiety and Anxiety about Personal Impacts

Maltese participants were most anxious about their personal waste production ($M = 2.51$, $SD = 0.87$), followed by their carbon footprint ($M = 2.41$, $SD = 0.89$), their energy consumption ($M = 2.33$, $SD = 0.86$), water consumption ($M = 2.15$, $SD = 0.90$), meat consumption ($M = 1.78$, $SD = 0.88$) and air travel ($M = 1.75$, $SD = 0.82$). A Spearman rho correlation test showed a positive and moderate correlation between anxiety about the six personal impacts and eco-anxiety, $r_s(240) = .491$, $p < .001$.

Kruskal Wallis H tests, done to compare eco-anxiety scores of participants who “rarely/not at all”, “sometimes”, “often” or “almost always” felt anxious about the six personal impacts with HEAS eco-anxiety produced statistically significant results (see Table 5). The effect

sizes on eco-anxiety scores for anxiety about one's carbon footprint and waste production were large, while those for anxiety about one's air travel, meat consumption, water consumption and energy consumption were moderate. This means that anxiety about one's carbon footprint (19%) and one's waste production (16%) accounted for the largest variance in eco-anxiety scores, while anxiety about one's water consumption accounted for the least variance (6%).

Table 5*Kruskal Wallis H test statistics and effect sizes for eco-anxiety and anxiety six personal impacts*

Eco-Anxiety and Environmental Event	<i>n</i>	Mean Ranks	<i>Mdn</i>	<i>H</i>	η^2
Carbon Footprint				48.86*	.19
Never/rarely	38	57.59	1.00		
Sometimes	94	117.78	1.46		
Often	81	137.53	1.62		
Almost always	27	167.43	1.85		
Waste Production				41.83*	.16
Never/rarely	33	57.77	1.00		
Sometimes	81	116.07	1.46		
Often	98	132.70	1.54		
Almost always	28	164.55	1.77		
Air Travel				33.81*	.12
Never/rarely	109	95.60	1.38		
Sometimes	92	131.59	1.54		
Often	30	155.38	1.77		
Almost always	9	192.44	2.00		
Meat Consumption				24.75*	.08
Never/rarely	114	99.85	1.38		
Sometimes	77	127.92	1.54		
Often	36	148.11	1.73		
Almost always	12	176.29	2.08		
Water Consumption				18.27*	.06
Never/rarely	63	88.81	1.24		
Sometimes	96	127.72	1.54		
Often	62	133.35	1.62		
Almost always	18	141.97	1.65		
Energy Consumption				20.77*	.07
Never/rarely	40	83.51	1.15		
Sometimes	104	115.66	1.46		
Often	74	139.10	1.69		
Almost always	22	148.07	1.65		

* $p < .001$ Note. $df = 3$

Discussion

This study shows relatively low levels of eco-anxiety within the Maltese adult sample, in line with findings reported in Hogg et al. (2024), Clayton and Karazsia (2020), Whitmarsh et al. (2022) and Wullenkord et al. (2021). Self-perceived eco-anxiety levels were higher than the eco-anxiety score measured using the HEAS. Significant differences are observed in HEAS eco-anxiety scores across varying levels of self-reported eco-anxiety, demonstrating an increase in both measures. As Hogg et al. (2021) posit, “this suggests that people relate with the term and many feel they have experienced eco-anxiety” (p. 3), thus further highlighting the need to study eco-anxiety in different contexts. Hickman et al.’s (2021) study shows that more than 45% of youth participants stated that environment-related emotions affect their daily life and functioning. Future research could explore Maltese beliefs about eco-emotions, including perceptions of their nature and controllability, which may influence emotional regulation (Ford & Gross, 2018).

The study’s quantitative findings indicate a small but statistically significant difference in eco-anxiety scores between those who work and do not work in an environment-related field. Notably, those engaged in environment-related work exhibited higher eco-anxiety scores, aligning with previous research highlighting eco-anxiety as common among climate scientists and environmental workers (Clayton et al., 2017; Cunsolo et al., 2020; Hoggett & Randall, 2018). This tendency is attributed to their heightened awareness of the ecological crisis and direct exposure to environmental degradation (Head, 2016). These findings prompt further exploration into the influence of occupation on eco-anxiety levels, and whether heightened eco-anxiety motivates individuals to pursue environmentally adaptive employment, or conversely, that is, whether working in such employment makes persons more aware of environmental degradation and sustainability issues.

In contrast to earlier research, this study found no significant differences in eco-anxiety scores between males and females, nor between individuals with secondary and tertiary

education. Previous studies indicate that females typically exhibited a greater risk perception related to climate change (Wullenkord & Reese, 2021) and higher levels of eco-anxiety compared to males (Boluda-Verdu et al., 2022; Clayton et al., 2023; Closson et al., 2022; Heeran et al., 2022; Niedzwiedz & Katikireddi, 2023; Poortinga et al., 2019; Wullenkord et al., 2021). Niedzwiedz & Katikireddi (2023) also found that individuals with higher education levels exhibited higher eco-anxiety levels. Innocenti et al.'s (2023) study that measured Italian participants' eco-anxiety using the HEAS found that a higher education reduced the risk of eco-paralysis when one is affected by eco-anxiety. Given that Italy is geographically and socio-culturally close to Malta, these findings offer a basis for comparison. However, our current study did not find any correlation between eco-anxiety and education, pointing towards potential cultural and contextual differences in the effect of education level on eco-anxiety. Further investigation in this area is needed to understand these differences.

Similar to Clayton et al. (2023) and Niedzwiedz and Katikireddi (2023), age differences in eco-anxiety scores were not statistically significant. On the other hand, these findings contrasted to those of Boluda-Verdu et al. (2022), Clayton & Karazsia (2020), Heeran et al. (2022) and Whitmarsh et al. (2022), who found that younger participants reported significantly higher climate and eco-anxiety. Additionally, a study conducted by MISCO, and published on *LovinMalta* (MISCO, 2022) and *The Malta Business Weekly* (Camilleri, 2022), found that 16- to 34-year old's descriptively displayed higher concern for the environment compared to their older counterparts. The lack of significant associations of age, gender and education with eco-anxiety could be explored further through the investigation of potential moderating factors, such as self- and collective efficacy. These may influence the relationships' strength and direction, thus providing a more comprehensive overview of the diverse eco-anxiety experiences across different demographic groups (Homburg and Stolberg, 2006; Mead et al., 2012). There is a significantly moderate positive correlation between anxiety about the environmental impact of personal behaviours and eco-anxiety. The HEAS dimension 'anxiety about personal impacts'

had the highest mean score from the four dimensions, indicating that anxiety about one's impact on the ecological crisis and responsibility for addressing environmental issues is a big component of Maltese participants' eco-anxiety. Hogg et al.'s (2024) research found a positive association between the eco-anxiety dimension of "anxiety about personal impacts" and pro-environmental behaviour, indicating a potential effect of participants' relatively high anxiety about personal impacts on pro-environmental engagement.

There are also statistically significant differences in eco-anxiety scores among participants with varying levels of concern regarding personal impacts with anxiety related to one's carbon footprint and waste production showing the most substantial effects on eco-anxiety scores. Participants in this study expressed the highest levels of anxiety regarding their waste production. Maltese youths in Mifsud's (2010) study showed particular concern for waste management, while concern about waste management was scored high in the study conducted by the Environment and Resources Authority (2020). This may indicate that Maltese people are anxious about the general waste management of the country and their contribution to it. The Eurobarometer 538 survey shows that a significant majority of Maltese participants (91%) were involved in waste reduction and recycling efforts (European Commission, 2023). While this study did not examine the relationship between eco-anxiety regarding waste production and behaviours related to waste reduction and recycling, it is reasonable to speculate that concerns about waste generation could lead to practical eco-anxiety, which may encourage individuals to engage in waste reduction and sorting practices. This potential connection suggests that eco-anxiety might serve as a motivating factor.

Meanwhile, participants expressed the least anxiety about their air travel. The Eurobarometer 538 survey also shows that considering the carbon footprint of transportation when planning vacations was the action performed by Maltese participants (European Commission, 2023). Similar to the above assumption, this may suggest a potential link between low eco-anxiety concerning specific environmental impacts and the absence of pro-

environmental behaviour to mitigate such impacts. The high anxiety regarding deforestation observed in this study aligns with the elevated concerns about the country's natural environment, and the loss of nature, species, habitats, and trees reported by Maltese participants in the Environmental Attitudes Survey (Environment and Resource Authority, 2020). Ocean pollution also emerged as a prevalent concern among participants in the Environment and Resource Authority survey, ranking as the second most significant environmental issue that caused anxiety in this study. The findings from this governmental authority can be corroborated by MaltaToday's (2020) survey in which 76.3% of respondents showed high concern for marine pollution. It can therefore be concluded that deforestation, species extinction and ocean pollution have a large effect on eco-anxiety scores, as experienced by Maltese individuals.

The Eurobarometer 538 found that climate change was the most pressing issue for the Maltese (European Commission, 2023). Anxiety about climate change accounts for 34% of variance in eco-anxiety scores in this study, which may point to the strong impact of climate change concern on eco-anxiety levels in Maltese people. Nonetheless, only 2.2% of respondents to MaltaToday's 2024 survey mentioned climate change as the most pressing issue for the EU, trumped by concern about wars (Debono, 2024). MaltaToday attributed this to heightened media information on current wars occurring that led to a lower level of concern for climate change. Research points to the effect of salient issues in the media on what people think about and prioritise (McCombs, 2014). In line with this, climate change news could decrease in times of war in several countries (Shao & Yu, 2023). Nonetheless, Djerf-Pierre et al. (2024) found that climate change beliefs were not affected by shifts in climate change media attention in Sweden. The above has implications for media outlets and consumers, and calls for analyses on the quantity and quality of environment-related information, environmental issue salience, and their effects on concern about the ecological crisis, levels of eco-anxiety and pro-environmental engagement.

Conclusion and Recommendations

The findings of the current study contribute to the expanding body of knowledge concerning eco-anxiety, and represent preliminary data on eco-anxiety in the small island state of Malta. This study uncovers the heightened eco-anxiety in individuals working in a climate or environmental-related job, prompting further investigation into this relationship, while acknowledging the significance of investigating eco-anxiety's relationship with other socio-demographic factors. Given the "floor effect" observed in this study's results, future research could recruit individuals with high eco-anxiety levels to investigate eco-anxiety's relationship with other variables said to be correlated, such as demographics, efficacy beliefs and pro-environmental behaviour. The low eco-anxiety levels observed also contribute to ongoing debates about its conceptualisation among scholars, specifically about whether the term should apply only to severe anxiety symptoms or also include milder forms is questioned (Pihkala, 2020; Lutz et al., 2023). Nonetheless, eco-anxiety includes "practical eco-anxiety", "paralysing eco-anxiety" and "moral emotion" (Pihkala, 2022, p. 3), that paves the path for local studies on the relationships of eco-anxiety with pro-environmental engagement and values to capture eco-anxiety's continuum. Other local research avenues include the standardised contextualisation of the HEAS with alterations in certain terminology used to address limitations in scientific accuracy.

Additionally, eco-anxiety emerges as a multifaceted emotional response resulting from both direct and indirect experiences with environmental issues, and considerations of one's individual contribution to these challenges. This is reflected in the positive and significant correlations found between eco-anxiety and concerns regarding environmental events and personal impacts. Alongside the multifaceted nature of eco-anxiety are the intricacies of cognitively, emotionally, and behaviourally navigating the ecological crisis, which influence and are influenced by other factors not investigated in this study, including feelings of individual and collective efficacy, environmental self-identity, pro-environmental values, and ecological

citizenship (Bourban, 2023; Huang, 2016; Pickering & Dale, 2023) Verplanken et al., 2020).

Future research may explore these concepts within the Maltese population, together with a more in depth investigation of the dimensions encompassing eco-anxiety, including rumination, affective symptoms, behavioural symptoms and anxiety about one's personal impact. Such data would provide contextual insights into Maltese individuals' current experiences of the ecological crisis and identify strategies to promote hope and meaning-focused coping strategies, ultimately fostering meaningful and effective environmental engagement.

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