The Impact of Nature on Mental Health During the Corona Virus (Covid-19)

Timea Fodor

18456866

Submission of Thesis and Dissertation

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Name: Timea Fodor

Student Number: 18456866

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Abstract

The ongoing Covid-19 pandemic has increased depression, anxiety and stress in the general population. Although online resources have been provided to better manage mental health, being outdoors, specifically in nature has been found to lower anxiety, stress and depression under the current circumstances. **Aims:** The current study aims to investigate the relationship between spending time in nature and psychological well-being during Covid-19, while controlling for confounding variables. It also aims to explore the relationship between nature beliefs and mental health scores. Lastly, this study aims to examine the differences in mental health scores between different ET (urban, rural, town). **Methodology:** A total of 402 participants were recruited through social media. They completed an online survey containing demographic data, DASS-21, and EQ. **Results:** Results of the hierarchical multiple regression showed that spending time in nature predicted mental health scores after controlling for demographics, explaining an additional 3.5% of the variance. The standard multiple regression indicated that NB was a significant predictor of mental health scores, whereas ABCV and FBDB were not significant predictors. Lastly, the one-way between groups ANOVA showed significant differences in mental health scores between ETs. Living in rural areas presented the lowest DASS-21 mean score (M = 14.66), followed by town areas (M = 20.48), and urban areas having the highest mean score (M = 21.90, SD = 14.65). **Conclusion:** Findings suggest that the benefits of spending time in nature during the CV should not be disregarded, but used as a tool to manage mental health during the current pandemic. The current study expands the novel subject that personal beliefs about nature influence mental health scores, highlighting the importance for further research. Lastly, it demonstrates the importance of rural areas being reserved for mental health.

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Introduction

Current state

The last few months have changed our lives dramatically since the beginning of the year, when the outbreak of Covid19, a new strain of coronavirus (CV) spread throughout the world from Wuhan, China, starting from the 31st of December 2019 (Torales, O'Higgins, Castaldelli-Maia, & Ventriglio, 2020). The World Health Organisation (2020), on the 5th of October, reported 34.8 million cases of the virus worldwide, and of those, one million people have died. The virus has led to an overwhelming burden on healthcare systems, as some people develop pneumonia or respiratory problems due to the virus, requiring intensive care (Munk, Schmidt, Alexander, Henkel, & Henning, 2020). Due to the rapidly spread virus, the government imposed restrictions such as, social distancing, quarantining, etc. (Liu et al., 2020; Saltzman, Hansel, & Bordnick, 2020).

Covid19 and Mental Health

The CV has not only affected the healthcare system and those who have contracted it, but also the general population, with an increase in depression, anxiety, and stress (Fullana, Hidalgo-Mazzei, Vieta, & Radua, 2020; Lades, Laffan, Daly, & Delaney, 2020; Liu et al., 2020). Depression is seen to have increased as a result of the CV because of the losses that came with the pandemic, such as, job losses, and losing family or friends due to the CV (Gruber et al., 2020). Additionally, the uncertainty of the current worldwide situation has increased anxiety within the public (Torales et al., 2020).Whereas, stress has heightened in the general population because of closure of schools, being held off work, and social distancing (Khoo & Lantos, 2020). Overall, psychological well-being has lowered due to the current pandemic (Liu et al., 2020). Although the long-term effects of mental health from the virus are not yet known, Torales et al. (2020) proposes that the decrease in psychological well-being due to the CV is a long-term concern.

The prolonged concern of the decrease in mental well-being accumulates from the negative impact that stress, depression, and anxiety can have on health. Prolonged stress for example can result in the development of coronary heart disease (Gianaros & Jennings, 2018). Depression affects the person not only internally but also on a physical level, from slowing recovery rates to fatality (Meeks, Murrell, & Mehl, 2000). Lastly, having anxiety is shown to increase the possibility of cardiovascular events by 36% (Davidson, Alcantara, & Miller, 2018). The concern of the long-term negative outcomes from the CV on psychological well-being led to authorities attempting to provide resources to better manage mental health.

Resources for mental health during Covid19

Authorities have tackled the issue in a number of ways. Some include: providing mental health education on platforms such as 'WeChat' in China and Tiktok worldwide, as well as books on self-help made freely available for the public online (Liu et al., 2020). Moreover, so far research has reported an increase in online counsellors in China, Australia (Marshall, Dunstan, & Bartik, 2020), and Germany (Thome, Coogan, Fischer, Tucha, & Faltraco, 2020). Additionally, there is an underlying emphasis online for selfcare to assure well-being during this difficult time, an example of a self-care tool suggested includes meditation (Saltzman et al., 2020). For example, short meditations have been created with the intention of making it accessible for multiple groups, including ones with busy schedules such as frontline healthcare workers (Saltzman et al., 2020). Specific focus is given to anxiety and stress around the CV in some of these meditations (Behan, 2020). The HSE in Ireland is also providing mindfulness programmes for self-care to help with the current situation, as well as programmes to manage stress (Health Service Executive (HSE), 2020). Interestingly, mental health apps on Google Play store such as 'Calm' and 'Headspace' have been top two and three out of the health and fitness apps in March 2020 (Marshall et al., 2020). This may

reiterate the huge impact the CV has had psychologically, and the need for mental health tools. However, online resources have not been the only tools for improving mental well-being. Additionally, time outdoors may also be beneficial for mental health (Pouso et al., 2021).

Outdoors and mental health during the CV

Spending more time outdoors was encouraged by worldwide government for well-being (Naomi, 2020). However, it became increasingly difficult for people to benefit from outdoors during the virus as social distancing became the norm and outdoors induced fear of contracting the virus due to a higher population outdoors, as well as increasing the possibility of contracting the virus (Dustin et al., 2020). Therefore, anxiety decreased as a result of isolating oneself during the corona virus (Dzhambov et al., 2020). On the contrary, the benefits from outdoors on mental health may be diminished as a consequence (Callaghan et al., 2020). Regardless, recent research has found spending time in outdoor nature to be associated with better mental health (Soga, Evans, Tsuchiya, & Fukano, 2020). Before any further review, it must be noted that the mentioning of ‘nature’ and ‘nature-like’ in this study refers to areas that range from a small garden or park in an urban area to untouched nature, which includes features such as plants or wildlife (Bratman, Hamilton, & Daily, 2012).

Nature and CV

Specifically, spending time outdoors in nature, or having a view of the nature from the inside of one’s house, has been beneficial for psychological well-being during the CV as found in a cross-sectional study of 3,000 adults in Japan (Soga et al., 2020). Similar findings were found in a student population in Bulgaria, however it must be considered that they had an insufficient sample size (Dzhambov et al., 2020). Nonetheless, a large cross-sectional sample of 6, 080 in Europe found that having access to public nature outdoors, having a view from indoors to outside nature, or having access to public nature such as a garden has

decreased anxiety and depression, and overall an increase in positive mood (Pouso et al., 2021). Generally, the benefits of nature have been evident during the CV. However, more research is needed to better understand the newly developing topic. The benefits of nature during the CV may be because the quality of the environment one has access to can affect mental health differently, with nature-like areas being more beneficial for mental health than urbanized environments (Kolokotsa, Lilli, Lilli, & Nikolaidis, 2020).

Urban versus rural environments

Consequently, there seems to be a division in urban versus rural environments in regards to mental health (Bakolis et al., 2018). Urban areas typically include fast pace living, as well as noise pollution, crowding (due to high population in urban areas), and traffic, which are all factors that increase stress (Fan, Das, & Chen, 2011; Hedblom et al., 2019; Sturm & Cohen, 2014). Hence, moving from rural to urban areas can impact mental health negatively (Li et al., 2009) and stress due to urban living may be what increase the risk of mental illness (Lederbogen et al., 2011). For instance, research found an increase in depression and anxiety in urban dwellers (Bakolis et al., 2018). However, when parks or other nature-like areas surround 20% of urban neighbourhoods, depression has been found to decrease by 11% (Cox et al., 2017). Additionally, nature in neighbourhoods has shown decreased anxiety levels (Beyer et al., 2014). Generally, rural areas may overall improve mental health (Roe & Aspinall, 2011). However, there seems to be more of a focus in research on urban nature and mental health, therefore, more research including rural areas is needed. Also a gap in the literature remains as town areas are not considered in comparison to urban or rural areas, hence future studies need to address this gap. It must be considered that although the detrimental effects of living in urban areas are shown in research, majority of people live in urban areas.

Why do humans benefit from nature

Approximately 75% of Europe lives in urbanized environments, and in American alone, 90% of people's lives are spent indoors (Evans & McCoy, 1998; Grahn & Stigsdotter, 2010; Maller et al., 2005; Thompson Coon et al., 2011;). This omits the benefits of spending time outdoors, and in nature on mental health (Naomi, 2020; Richardson et al., 2013). Since evidence suggests people may benefit from nature during the CV (Naomi, 2020), and nature has been seen as superior for mental health compared to an urban/ city-like environment (Bakolis et al., 2018), further focus in this review will be investigating why humans obtain psychological and physiological benefits from nature. Past research has found a number of aspects of nature being important in acquiring the benefits of nature including: spending time (Maller, Townsend, Pryor, Brown, & St Leger, 2005), viewing nature (Kaplan, 2001), and hearing nature sounds (Lechtzin et al., 2010; Newbold, Luton, Cox, & Gould, 2017; Saadatmand et al., 2013). Such benefits have been understood through a series of theories, including, the biophilia hypothesis (Fraser, 2017), the attention restoration theory (Stevenson, Schilhab, & Bentsen, 2018), and stress reduction theory (Alvarsson, Wiens, & Nilsson, 2010; Bratman et al., 2012).

Biophilia

The importance of nature for well-being has been account for since the Middle Ages (Bratman et al., 2012; Marselle, Irvine, Lorenzo-Arribas, & Warber, 2014). This is because humans, plants and animals are not independent of each other, but rather an interrelated ecosystem (Maller et al., 2005). Research shows humans may benefit from nature through the biophilia hypothesis (Fraser, 2017). The theory suggests humans have an innate biological feeling to be in harmony with nature, which improves people's well-being (Howell, Dopko, Passmore, & Buro, 2011). This is evident in older adults and children. For example, current research reported older adults finding nature a place where one can cope

during the CV (Naomi, 2020). Additionally, research found children to have a drive for savannah like places (Balling & Falk, 1982). Which is in line with the savannah hypothesis (Berto, Barbiero, Barbiero, & Senes, 2018), where the first hominids are believed to have evolved in African savannahs, leaving a lasting influences on humans in liking savannah environments as it assisted well-being and survival (Kahn, 1997). Furthermore, the biophilia hypothesis can also be seen in zoos, as it is one of the most attended place as an amenity, when compared to the attendance of all the sports combined together (Lumber, Richardson, & Sheffield, 2017). The bond humans are suggested to have with nature does not terminate here, as research shows that attention can be restored as a means of spending time in nature and stress can be reduced (Kaufman, 2015). These are further explained through the attention restoration theory and the stress reduction theory (Berto, 2014).

Stress reduction and attention restoration

Both theories coincide in nature (Snell, McLean, McAsey, Zhang, & Maggs, 2018). However there are differences between the two (Sullivan, & Kaplan, 2015). The stress reduction theory is a 'psycho-evolutionary theory' which sees humans as having been part of natural environments for a long period of time, due to having evolved from savannahs (Kahn, 1997), hence why nature may still benefit humans psychologically and physiologically, as this same adaptation may not have been fully achieved in urban living (Berto, 2014), with things like noise pollution still negatively impacting humans (Fan et al., 2011). The stress reduction theory sees nature as an aid in lowering stress. Research shows exposure to nature is helpful with both acute and chronic stress (Marselle et al., 2019). Japanese forest research found that nature activate the parasympathetic system, relaxing the human body (Lee et al., 2011; Li et al., 2011; Park, Tsunetsugu, Kasetani, Kagawa, & Miyazaki, 2009). Additionally, walking in countryside like places or green corridor environments reduced stress, in comparison to walking in urban areas (Baklien, Ytterhus, & Bongaardt, 2015; Marselle et al.,

2014). A suggested explanation for the relaxing effects may be that volatile substances, called phytoncides in forests (antimicrobial compounds that come from trees; like wood essential oils) are released in such natural settings (Ohtsuka, Yabunaka, & Takayama, 1998).

Conversely, attention restoration theory, a 'psycho-functionalist' theory, proposes humans have an innate attraction to natural aspects like water, green vegetation, etc. as it meant survival evolutionally (Berto, 2014), and now those same environments restore attention fatigue (Stevenson et al., 2018). The reason why it restores attention fatigue, is because nature allows the usage of human involuntary attention, allowing fascination of the environment, rather than having to pay close attention to stimuli, hence why Ohly et al., (2016) suggests spending more time in nature to restore mental fatigue. Contrarily, urban environments have been found to consist of attention based tasks daily, which influence the usage of directed attention, meaning close attention is given to stimuli, resulting in becoming overloaded cognitively and mentally fatigued (Laumann, Garling, & Stormark, 2003; (Marselle, Warber, & Irvine, 2019). Although mental fatigue can be diminished due to the use of involuntary attention in nature, there are also personal factors that perhaps influence whether one attains restoration from nature. Research shows a connection to nature is of importance in perceiving the restorative effects of nature (Berto et al., 2018; Hartig, Kaiser, & Bowler, 2001). A connection to nature is the belief that humans belong to nature and nature belongs to humans, and this connection to nature improves well-being (Berto et al., 2018). Hence, personal preconceptions about nature are important in attaining the benefits nature has to offer. Therefore, it is reasonable to suggest that nature can be beneficial depending on the beliefs one has about nature. This raises the question whether simply believing nature is beneficial for mental health impacts the mental health benefits received from nature. Interestingly, no study to knowledge has researched this, which may be of importance since it can determine whether one actually obtains the mental health benefits

from nature. This may have significance during the CV as mental health has been negatively impacted, increasing anxiety, depression and stress. However research during the CV has shown that nature is beneficial for depression, anxiety and stress (Beyer et al., 2014; Cox et al., 2017; Marselle et al., 2019), hence, it is critical to better understand the factors that influence the benefits of nature, such as beliefs about nature.

Current study

As can be seen in the literature review above, nature has demonstrated to be useful for mental health. Psychological well-being from nature can derive from spending time in nature, living in rural rather than urban environments and having certain positive beliefs about nature. However, the current study would like to investigate if these factors still improve mental health in the context of the current pandemic. The importance of nature is crucial to consider in the current pandemic because although there have been measures taken to improve mental health during the CV through online resources such as counselling or self-help tools, the negative outcomes the CV has had on mental health may be a long-term disruption in the general population, as there is no end date to the disruption the virus has caused in society (Liu et al., 2020; Saltzman et al., 2020; Torales et al., 2020). Hence, the current resources provided online may not be feasible long-term, as counselling for example can be expensive and therefore not accessible for a large part of the population for a long period of time. Therefore, inexpensive ways to improve mental health must be explored, such as nature (Liu et al., 2020).

Interestingly, no study to date in Ireland has explored the impact of spending time in nature on mental health during the CV. Hence why the current study would like to focus on this area. Additionally, since rural environments are found to be better for mental health than urban environments (Bakolis et al., 2018), this study would like to see if this is the case in the CV context. However, other studies did not take into account town areas, hence this gap in

the literature must also be addressed. Lastly, another factor that needs to be considered to better understand why humans benefit from nature, includes beliefs about nature. Prior research has shown that positive beliefs about nature can affect mental health outcomes (Berto et al., 2018). However, studies have only tackled this area by researching whether the belief that humans belong to nature and nature belongs to humans impacts the restorative outcomes of nature on attention, however, no studies have looked at whether the belief that nature is beneficial for mental health impacts the mental health benefits that are obtained from nature, which could be important in influencing mental health outcomes. Since no prior studies have attempted to research this, the gap in the literature must be tackled.

To sum up research and to address the importance of researching the benefits of nature on mental health during the CV, Kaplan (2001) explains it best; he proposes nature should not be seen as a facility, rather a fundamental need for well-being.

Aims

Therefore, the aim of the present study is to investigate the relationship between spending time in nature and psychological well-being during the CV, in the general population, while controlling for any confounding variables, such as age, gender, socioeconomic status, and level of education as they can interfere with mental health status (Pouso et al., 2021; Soga et al., 2020). This study also aims to explore the relationship between nature beliefs (how beneficial nature is to manage mental health during the CV) and mental health scores. Lastly, this study aims to explore the difference between living environment (urban, rural versus town areas) and mental health during the CV. Such aims led to the subsequent questions and hypothesis:

Research Question 1:

Does spending time in nature improve mental health after controlling for demographics, during the CV?

Hypothesis 1:

There will be a relationship between people who more often spend time in nature and their mental health after controlling for demographics, during the CV.

Research question 2:

Is there a relationship between participants' beliefs of how beneficial nature is to their mental health during CV, and their scores on a measure of mental health?

Hypothesis 2:

There will be a relationship of how much people benefit from nature exposure during the CV, depending on their beliefs of the benefits of nature.

Research question 3:

Is there a difference in mental health scores for people living in a rural, urban, or town environment?

Hypothesis 3:

Living in a rural environment will have a better effect on mental well-being, than living in an urban or a town environment, during the CV.

Methodology

Participants

The current study used non-probability, convenience sampling to recruit participants. No incentives were provided for participation in the study. Participants were recruited online, through the researcher's social media account, including Facebook and Instagram. In compliance with the ethics board, participants were required to be 18 years of age or over, for consent purposes. Participation in this study was entirely voluntary.

A priori was conducted using G*Power to calculate the required sample size. The parameters were set as following: a medium effect size = 0.15, a significance level of 0.05, a power of 0.95, and lastly the number of predictors were set to 6. As a result the priori suggested a total sample size of 146.

The current study originally had 413 participants, of which 11 were excluded from the analysis, due to being under the age of 18, in order to be in compliance with the ethics board. The ultimate sample was 402, consisting of 101 males, 297 females and 4 other.

Measures

Demographics. Data on gender, age, socioeconomic status, and education level was collected.

Environment Questionnaire (EQ). The EQ was specifically developed for this study, as no suitable questionnaire was found to directly address the current research questions. This study included measures on: accessibility to nature, frequentness in nature, nature beliefs, and environment type (ET). The current study had some similar measures to past research, including collecting frequency of days spent in nature and duration (hours) (Soga et al., 2020). However, other studies mostly focused on studying: nature inside the home (e.g. plants), nature view from inside to outside (e.g. window view) or having a front garden (Dzhambov et al., 2020; Pouso et al., 2021). Whereas, the current study wanted to

focus on a more general spectrum; nature accessibility within 2km (since there were travel restrictions in Ireland during level 5 of the CV people could only travel within 2km). Measurement differences were also present in the approaching ET.

The current study addressed ET by asking a simple self-report question, instead of measuring ET by directly recruiting people from such backgrounds (Li et al., 2009), or directly exposing participants to rural versus urban areas and researching the short-term effects (Roe & Aspinall, 2011). Moreover, questions were also developed for the novel approach of nature beliefs.

New research questions were developed for nature beliefs as past research has only explored whether the belief that nature belongs to humans and humans belong to nature influenced attention restoration (Berto et al., 2018). This is an approach studying the attention restorative effects of nature, however, the current study instead took a novel approach aiming to look at it from a mental health perspective, hence new questions were developed to address nature beliefs in the context of mental health (see Table 1).

The EQ is a 10-item self-report measure. Questions are grouped based on the scales they use. The newly developed questions are presented in Table 1.

Table 1

EQ questions, scoring and Cronbach's alpha (where applicable)

Question	Scoring	Cronbach's Alpha
On average how many days a week do you visit nature?	0, 1, 2, 3, 4, 5, 6, 7	.34.
On average, how many hours do you spend in nature on each visit?	None, less than 1 hour, 1-2 hours, 3-4 hours, more than 4 hours	
In the past 7 months how often did you spend time in nature surroundings?	Not very often, rarely, sometimes, often, very often	.81
Do you believe that nature is an effective way to manage mental health? (NB)	Not at all effective, slightly effective, moderately effective, very effective, extremely effective	
Whether or not you believe that nature is effective in managing mental health, do you usually feel better after spending time in nature? (FBDB)	Much worse, somewhat worse, about the same, somewhat better, much better	
How much do you agree with the following statement; Having access to nature during the corona virus potentially helped me manage my mental health. (ABCV)	Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree	

Do you live within 2km of a garden (personal or public), park, forest, woodlands, waterside, trail or any other nature-like/ green area?	Yes, no	
Did you consciously use visits to nature as a way to manage your mental health during the coronavirus?	Yes, no	
Which one best describes the kind of nature you had access to? (you can select multiple answers)	Personal garden, public garden, window view of nature, countryside, forest/woodlands, park, waterside (e.g. sea, river, lake), none	
Do you live in a rural, urban, or a town environment?	Rural, urban, town	

Depression, Anxiety and Stress Scale (DASS-21). DASS-21 is a 21-item self-report measure, which has three scales, each containing 7-items, measuring emotional states such as depression, anxiety and stress (Lovibond & Lovibond, 1995). Items from each scale are added to sum up the scores for depression, anxiety and stress. The twenty-one items are read by the users and answered on a 4-point Likert Scale, ranging from 0-3, 0 = did not apply to me at all, and 3 = applied to me very much or most of the time. The depression scale measures hopelessness, dysphoria, anhedonia, self-deprecation, inertia, absence of interest, and low value of life, an example includes: “I couldn’t seem to experience any positive feelings at all.” Further, the anxiety scale measures autonomic arousal, situational anxiety,

skeletal muscle effects, and subjective experience of anxiety. An anxiety-item includes: "I felt I was close to panic." Lastly, the stress scale measures long-term stress, including nervous arousal, difficulty relaxing, agitation, being easily upset, irritability, over-reacting, and being impatient. An item from the stress scale is: "I found it difficult to relax." Higher scores on any of the three scales indicate higher depression, anxiety or stress. DASS-21 has been found to be a valid measure of depression, anxiety and stress, meaning that it measures what it is supposed to measure (Parkitny & McAuley, 2010). Moreover, DASS-21 has excellent internal and external reliability (Crawford & Henry, 2003). Firstly, internal reliability is evident in the Cronbach's alpha scores, with a medium Cronbach's alpha score found for anxiety (0.81) and stress (0.89), and a high alpha score for depression (0.91) (Lovibond & Lovibond, 1995). Similar scores were found when replicated (Crawford & Henry, 2003). Secondly, external reliability of DASS-21 is apparent as it has been widely applicable to both clinical and non-clinical sample (Crawford & Henry, 2003). Hence, it constitutes for a suitable measure of mental health for our non-clinical sample (see Appendix F).

Study design

The current study took a quantitative approach, with an observational, cross-sectional design. A survey was used to gather data.

Analyses

Hypothesis 1. There were six predictor variables (PV) for the first hypothesis, included: age, gender, socioeconomic status, education, and ofteness in nature, with ofteness in nature being the tested predictor, the criterion variable was mental health scores. This was assessed through a hierarchical multiple regression. Demographics were entered in the first block, and nature exposure was entered in the second block, to analyse if nature exposure has a significant role in predicting mental health after controlling for demographics.

Hypothesis 2. For the second hypothesis the PV's were: nature belief (NB), access belief CV (ABCV), and feeling better despite belief (FBDB) (see Table 1 for full length questions). The criterion variable was mental health scores. This hypothesis was assessed by a standard multiple regression to examine if mental health scores were predicted by any of the PV's.

Hypothesis 3. Finally, a one-way between groups ANOVA was caried out to assess the third hypothesis. This was to test if there would be significant differences in the mean scores on the measure of mental health scores across the three ETs. The independent variable was ET (rural, urban, town), and mental health was the dependent variable.

Procedure

Pilot study. A pilot study of three participants was firstly carried out to test the readability and comprehension of the newly adapted EQ, and to determine the duration it would take participants to complete the survey. Participants were asked to time the amount of it took to complete the questionnaire, and after completing the questionnaire were asked to give feedback on the clarity of the questions in the EQ. No changes were made as a result to of feedback on the EQ, and the conclusion was that the entire questionnaire would take approximately ten minutes to complete.

Current study. Participants in this study were recruited from social media outlets. The survey was posted on the researchers social media accounts, specifically Instagram and Facebook, as well as in open forums in Ireland on Facebook. The posts included an outline of the study, the time it would take to complete the study, and the requirement to be over 18 years of age to participate. If the participant was collected from Instagram, they were directed from a link in the researcher's bio to the Google Forums survey, whereas if participants were collected from Facebook, a link was available in the created 'post' which directed the

participant to the survey. Once the participant clicked into the link, an Information Sheet was provided including the requirements for participating in this study, which were to be over the age of 18 and have lived in the same household for the last eight months (see Appendix A). Participants were informed that the survey would take approximately ten minutes to complete. Also, information on voluntary participation was included outlining that participants could withdraw at any stage before submitting their results, as after that point they would not be identifiable, remaining completely anonymous. Information on the purpose of the research, what the data will be used for, any risks and benefits from participating, contact numbers in case of any distress caused, and lastly contact emails from both the researcher and supervisor were also included. In order to continue partaking in the survey at this point participants had to check the 'yes' box to reading the above information, agreeing with the above information and agreeing to participate. Participants were consequently brought to the first questions on the survey, which collected demographics, including: gender, age, economic status and level of education (see Appendix B). Followed by the EQ (see Appendix C) then DASS-21 (see Appendix D). Once the questionnaires had been completed, participants were provided with a Debriefing Sheet (see Appendix E). This last part consisted of the true purpose of the study, the aims, and why the information was withheld in the first place, being that cultural or personal biases may have influenced how they answered the survey. Although this study tried to eliminate any risks, participants were encouraged to contact helplines provided if they had experienced any distress or discomfort. Such organisations included The AWARE support line, HSE mental health services, the Samaritans and Pieta House.

Results

Descriptive Statistics

Descriptive statistics for the study variables are presented in Table 2 and 3.

Table 2

Frequencies for categorical variables (n = 402). For' nature type', multiple answers were chosen.

Variable	Frequency	Valid %
Gender		
Male	101	25.1
Female	297	73.9
Other	4	1.0
Economic Status		
Lower class	62	15.4
Middle class	331	82.3
Upper class	9	2.2
Education		
Primary	11	2.7
Secondary	116	28.9
Higher	275	68.4
Nature Within 2km		
Yes	392	97.5
No	10	2.5

Nature Type		
Personal garden	255	63.4
Public garden	118	29.3
Window view	140	34.8
Countryside	236	58.7
Forest/Woodlands	251	62.4
Park	195	48.5
Waterside	260	64.7
Conscious Nature Visits		
Yes	305	75.9
No	97	24.1
Environment		
Rural	164	40.8
Urban	99	24.6
Town	139	34.6

Note:

Table 3

Descriptive statistics for continuous variables

Variable	*M* [95% CI]	*SD*	Range
Age	36.82 [35.48, 38.17]	13.68	54
ONS	3.00 [2.88, 3.11]	1.16	4
FBDB	3.62 [3.56, 3.68]	.61	2
NB	3.20 [3.11, 3.29]	.88	4
ABCV	3.32 [3.24, 3.41]	.88	4
Hours in Nature	2.03 [1.96, 2.10]	.75	4
DASS-21	18.46 [17.08, 19.83]	14.01	62

Note: ONS = Oftenness in Nature Surroundings.

Inferential Statistics

Hierarchical multiple regression was performed to investigate the ability of Oftenness in Nature Surroundings to predict mental health outcomes (depression, anxiety, and stress), after controlling for demographics (gender, age, economic status, and level of education). Preliminary analyses were conducted to ensure no violation of the assumption of normality, linearity, and homoscedasticity. Additionally, correlations among the predictor variables (gender, age, economic status, level of education, and mental health) were examined and these are presented in Table 3. The correlations between the predictor variables ranged from --.05 to .40. Tests for multicollinearity also indicated that all Tolerance and VIF values were in an acceptable range. These results indicated that there was no violation of the assumptions of multicollinearity and that the data was suitable for multiple regression analysis.

Table 4

Correlations (Pearson's r) between the model variables

Variable	1.	2.	3.	4.	5.	6.
1. Mental Health Scores	-					
2. Gender	.07	-				
3. Age	-.32***	-.30***	-			
4. Economic Status	-.17***	-.05	.05	-		
5. Level of Education	-.24***	-.22***	.23***	.09*	-	
6. ONS	-.32***	-.30***	.40***	.08*	.25***	-

Note: Statistical significance = *p < .05, ***p < .001

In the first step of the hierarchical multiple regression, four predictor variables were entered: gender, age, economic status, and level of education. This model was statistically significant (F (4, 396) = 18.03, p < .001) and explained 15.4% of the variance in mental health scores (see Table 4 for full details). After the entry of Oftenness in Nature Surroundings at Step 2, the total variance explained by the model was 18.9% (F (5, 396) = 18.43, p < .001). The introduction of Oftenness in Nature Surroundings explained an additional 3.5% in mental health scores, after controlling for gender, age, economic status, and level of education; this change was statistically significant (R^2 Change = .035; F(1, 395) = 17.12, p < .001).

In the final model, all predictor variables uniquely predicted mental health scores to a statistically significant degree. (gender, age, economic status, level of education, and Oftenness in Nature Surroundings) All five variables were negative predictors of mental health scores. Age (β = -.22, p = < .001) and Oftenness in Nature Surroundings (β = -.21, p < .001) were the strongest predictors (see Table 4 for full results).

Table 5

Hierarchical multiple regression Model of Mental Health scores

Variable	R^2	R^2 Change	*B*	*SE*	*β*	*t*
Step 1	.15***					
Gender			-1.86	1.47	-.06	-1.26
Age			-.29	.05	-.29	-5.86***
Economic Status			-5.16	1.63	-.15	-3.17**
Level of Education			-4.55	1.28	-.17	-3.57***
Step 2	.19***	.035***				
Gender			-2.96	1.47	-.10	-2.02*
Age			-.23	.05	-.22	-4.38***
Economic Status			-4.80	1.60	-.14	-3.00**
Level of Education			-3.79	1.26	-.14	-3.00**
ONS			-2.55	.62	-.21	-4.14***

Note: Statistical significance = *$p < .05$, **$p < .01$, ***$p < .001$

Multiple regression analysis was performed to determine whether mental health scores could be explained by three variables including: NB, ABCV, and FBDB. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. However, for the three variables the data was skewed to the left. Nonetheless, non-normality in regression analysis can be acceptable (Barnes, 1982), hence, the decision to carry out a multiple regression analysis was made. The correlations between the predictor variables and the criterion variable, included in the study were examined (see Table 5 for full details). All predictor variables were significantly correlated with the

criterion variable, namely NB (r = -.21, p < .001), ABCV (r = -20, p < .001), and FBDB (r = -.14, p = .002). The correlations between the predictor variables were assessed and r values ranged from .58 to .63. Tests for normality also indicated that all Tolerance and VIF values were in an acceptable range. These results indicated there was no violation of the assumptions of multicollinearity, and that the data was suitable for examination through multiple regression analysis.

Table 6

Correlations (Pearson's r) between the model variables

Variable	1.	2.	3.	4.
1. Mental Health Scores	-			
2. NB	-.21***	-		
3. ABCV	-.20***	.63***	-	
4. FBDB	-.14**	.58***	.59***	-

Note: Statistical significance = **p < .01, ***p < .001

Since no a priori hypotheses had been made to determine the order of entry of the predictor variables, a direct method was used for the analysis. The three predictor variables explained 5.3% of variance in mental health scores (F(3, 398) = 7.46, p < .001). One of the three variables was found to uniquely predict mental health scores to a statistically significant level: NB (β = -.15, p = .022) (see Table 6 for full details).

Table 7

Multiple regression model predicting Mental Health scores

Variable	R^2	*B*	*SE*	*β*	*t*
Model	.05***				
NB		-2.44	1.06	-.15*	-2.31
ABCV		-2.57	1.53	-.11	-1.68
FBDB		.24	1.02	.01	.23

Note: Statistical significance = *$p < .05$, ***$p < .001$

A one-way between groups ANOVA was conducted to determine if there were ET differences in mental health scores. Participants were divided into three groups according to their ET (rural, urban, town). There was a statistically significant difference in mental health scores for the three ETs, ($F(2, 224.65) = 12.20$, $p < .001$). The effect size indicated a small difference in mental health scores (eta squared = .05)

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for people living in urban areas ($M = 21.90$, $SD = 14.65$) was significant higher ($p < .001$) than people living in rural areas ($M = 14.66$, $SD = 11.29$), but not town areas ($p = .710$; $M = 20.48$, $SD = 15.41$). There was a statistically significant difference in mean scores between people living in town areas and rural areas ($p = .001$).

Discussion

The current study aimed to determine whether spending time in nature predicts mental health scores after controlling for confounding variables during the CV, while also aiming to address the gap in the literature by exploring the relationship between people's nature beliefs in helping them to manage psychologically and the relation this has to their mental health scores. Lastly, this study aimed to investigate the difference in ETs (urban, rural, town) and mental health scores.

Supporting the first hypothesis, spending time in nature was a significant predictor of mental health scores, after controlling for demographics, during the CV. The final model accounted for 18.9% of the variance in mental health scores. Both demographics (gender, age, economic status, and level of education) and spending time in nature negatively predicting mental health scores. However, age and spending time in nature were the strongest predictors of mental health scores. Spending time in nature accounted for an additional 3.5% of the variance in mental health scores. Meaning, the more often participants spent time in nature, the better their mental health was. However, results must be considered critically as the standardized beta value indicated a small correlation -.21.

Interestingly, NB was a significant predictor of mental health scores, however ABCV and FBDB did not significantly predict mental health scores. Meaning, the belief that having access to nature helped to manage mental health during the CV did not determine mental health scores. For example, one could believe that having access to nature helped them to manage their mental health, but not have better mental health scores as a result. Additionally, feeling better after spending time in nature did not have an impact on mental health scores. For instance, one could feel better after spending time in nature but not show better mental health scores. Moreover, NB was found to predict mental health negatively, meaning that the

more effective subjects believed nature to be in managing their mental health, the better their mental health was. However, the correlation was very weak (-.15).

In support of the third hypothesis, there was a statistically significant difference between the three groups (rural, town, and urban). Living in rural environment had the lowest mean score (M = 14.66) and living in a town environment had a lower mean score (M = 20.48,) than living in an urban environment (M = 21.90). This indicated that living in rural areas was better for mental health than living in either urban or town areas, whereas living in a town area was better for mental health than living in an urban area. It must be noted that the effect size was small (eta squared = .05).

Hypothesis one

Results of the first hypothesis are consistent with recent research; Soga et al. (2020) found that the frequency of nature use was negatively correlated with anxiety and depression (Soga et al., 2020). Pouso et al. (2021) also found that having direct outdoor contact with nature was linked to better mental health, particularly lower depression and anxiety (Pouso et al., 2021), and Dzhambov et al. (2020) found that engaging with greenery improved mental health. However, none of these studies took into consideration stress as a factor of mental health, which was increased during the CV (Khoo & Lantos, 2020). Instead, our study has; the DASS-21 questionnaire measured not only depression anxiety but also stress, hence we consider that stress was lowered in the current study. This is consistent with field studies that also found that spending time in nature showed reduced stress (Lee et al., 2011; Li et al., 2011). They further explained that this may be due to activation of the parasympathetic nervous system, allowing the body to rest and digest, which may be also be an explanation for why participants in our study benefited from spending time in nature, however, this remains a speculation until further field studies are carried out. Although our study was not a field study, it supports field research that shows nature exposure lowers stress. This point is

accordance with the stress reduction theory, which suggests that spending time in nature aids the reduction of stress (Ulrich et al., 1991).

Another reason for why our findings may have found that spending time in nature improved mental health could have been due to the multisensory experience of spending time in nature. For example, research found, viewing nature, hearing nature and being physically present in nature impacts mental health positively (Kaplan, 2001; Lechtzin et al., 2010; Maller et al., 2005). This perhaps explains the importance of experiencing nature directly for its benefits. Nonetheless, personal factors can also influence if the benefits from nature are obtained. These factors include prior positive experiences in nature, or as our results show, NB can influence the benefits obtained from nature.

Research suggests that having prior positive experiences in nature could result in better mental health outcomes (Berto et al., 2018). For example, a positive prior experience in nature such as the ability to immerse oneself in nature (by being "present" while in natural environments and not being overwhelmed by cognitions or "external stimuli") can influenced mental health positively (Berto et al., 2018;). Moreover, as we have seen from our second finding, people's NB could be a determinant in obtaining the positive benefits of nature. Therefore, we must consider past personal experiences in nature and personal beliefs as factors that could influence the mental health benefits that can be received from nature. However, further studies including these aspects are needed to better understand why people benefit from nature during the CV. Overall, the finding of the first hypothesis contributes to recent research that during the CV pandemic nature may be an important aspect of people's lives for maintaining better mental health. It also contributes to research that direct experience of nature is beneficial for mental health. That is not to say that indirect experiences do not have the possibility of being as effective for mental health, as other

studies found that window views of nature during the CV pandemic were (Soga et al., 2020). Hence, both possibilities must be taken into account in future studies.

Hypothesis two

The second hypothesis was a novel approach. Past studies found that the belief that nature belongs to humans and humans belong to nature (known as 'nature connection') affected perceived attention restoration, suggesting that there must be some pre-disposition towards nature in receiving its restorative effects. Hence, it raised the curiosity of whether believing nature is an effective way to manage mental health influenced mental health scores. NB being a predictor of mental health scores, adds to research that not only personal factors like connection to nature, prior personal experiences, and the ability to immerse in nature predict the positive benefits of nature (Berto et al., 2018; Hartig et al., 2001; Ulrich et al., 1991). Instead, NB should also be included as a factor that may predict the benefits one can extract from nature. Further studies should look at the correlation between the factors that influence the perceived benefits of nature, as there is a possibility there are relationships between these variables that need to be better understood. Surprisingly, an unexpected area our finding has contributed to is ecological behaviour, as not only attitudes towards nature may influence ecological behaviour (Verbrugge, Van den Born, & Lenders, 2013), but NB perhaps also need to be considered.

Interestingly, ABCV was not a predictor of mental health scores. Therefore, one may believe nature is beneficial for mental health and that may have positive effects of their mental health, but just not so in the context of the CV pandemic. This finding is of importance, as it raises the question whether nature can be just as beneficial during a pandemic or whether it loses its mental health effects when experiencing global adversity. Alternatively, beliefs about the benefits of nature during the CV might have not developed yet, as the global atrocity has only taken place in the last year, hence a longer period of time

is needed to develop positive beliefs about the benefits of nature during the CV. From which we can interpret that beliefs about nature may take longer to develop. Although, further longitudinal studies are needed to come to such conclusions.

Moreover, FBDB not predicting mental health scores makes sense in the current context, as it shows that people had to have had the belief that nature is good for their mental health to influence mental health scores positively. This highlights the importance of NBs in influencing mental health scores, rather than still feeling better after spending time in nature, despite NB. Overall, this finding underlines the importance of including pre-dispositions people have about nature in future research. For example, future research that aims to understand why humans benefit from nature should consider NB as a factor.

Hypothesis three

The third hypothesis coincided with past research that compared mental health differences in urban and rural areas, despite the different scales that were used; one used the Mood Adjective Checklist (Roe & Aspinall, 2011), another the Symptom Checklist-90 (Li et al., 2009), and Paykel, Abbott, Jenkins, Brugha, & Meltzer (2003) used the Revised Clinical Interview Schedule. This may show the consistency in findings despite difference in psychometrics. Hence, more attention should be given to this area in Ireland, as it may be relevant in improving mental health, particularly during the current CV pandemic. In contrast, other studies found no difference between rural and urban areas (Parikh, Wasylenki, Goering, & Wong, 1996). A reason for this as suggested by Human & Wasem (1991) could be that there can be fewer resources, in both medical and psychological domains in rural areas, therefore, it may not be better than urban areas. However, the results of our study show that Ireland perhaps no longer has this scarcity in rural areas, potentially due to the technological advances. For example, mental health services are widely operating online, making it accessible to people who cannot travel far away, including people from rural areas.

Nonetheless, new studies are needed to determine if this is the case. Other explanations include, rural areas had less crowding when being outside due to lower population than urbanized areas, hence there may have been less anxiety about contracting the virus in rural areas. Interestingly, we took into account town areas, which other studies have not, and we found that town areas are better than urban areas for mental health but not rural. It seems that there is better mental health the more nature is available for people, however, more studies would need to confirm this. Another reason for mental health being better in rural and town areas could be attributed to a better sense of community in these areas, which has a positive impact on health (Kitchen, Williams, & Chowhan, 2011). This may have been of great importance for people during the CV. Again, further studies are needed to clarify this.

This finding contributed to research showing that rural areas are better than urban areas for mental health, but it also added another component to consider, that being, town areas. It also contributed to the beginning of research in Ireland showing that not only spending time in nature may contribute to better mental health, but also living in rural environments, which should be a further developed domain in future research. Further research should not only try to better understand why rural environments and town environments may be better for mental health than urban environments, but also to consider the benefits urban nature may have during the current pandemic, as this should not be left unconsidered since prior research shows its benefits (Sturm & Cohen, 2014).

Strengths and limitations

Some strengths evident in the current study include good internal reliability and validity for the newly developed Likert scale with a Cronbach's alpha of .81, that measured: how often one spent time in nature, NB, ABCV, and FBDB. This study's strength also includes adding to recent research of the potential benefits of nature during the CV, which is a novel approach. The topic of NB influencing mental health scores is also novel, adding an

additional variable to consider in further research. Additionally, this study took place during the CV pandemic while Ireland was in lockdown, potentially displaying a more accurate representation of the benefits of nature on mental health during the CV, shedding a more accurate light on the findings. A major strength was having a large sample size allowing for effects size to be more precise and providing a better representation of the current study, allowing for generalizability of results. Nonetheless, this study posed some limitations that must be considered.

Firstly, the internal reliability between the days and hours spent in nature did not have an acceptable Cronbach's alpha as expected, hence, not providing that aspect of the questionnaire with good internal reliability and validity. It was presumed that the more days one spent in nature the more hours one would spend in nature on each visit. However, it seems that participants who spend time in nature for more days, spend less time on each visit than people who visit nature once a week for example. Therefore, this parametric was not measuring what we thought it was. This must be considered in future studies. Furthermore, although this study controlled for some confounding variables, there may be other variables identified in research that should be controlled for as they may interfere with mental health, including marital status, and employment status, prior and during the CV (Pouso et al., 2020). Finally, it should be considered that this study was a cross-sectional study preventing from drawing any causal effects, hence longitudinal studies may be more suitable for such an approach.

Implications

The current study poses important theoretical and practical implications. Firstly, the finding that NB was a mediator of mental health provides research with additional understanding of the theoretical framework of why humans benefit from nature psychologically. However, it is not yet clearly understood the relationships this has with other

confounding variables and causality is not inferred. Instead, it complements the idea that the relationship humans have to nature is more complex and that further research is needed, i.e., cross-sectional and longitudinal studies. Furthermore, there are practical implications for government policy. Essentially, it should be clearly encouraged in future pandemics to turn to nature as a resource for mental well-being as well as other online resources that have been provided during this pandemic by the HSE. This could add to the tools used to better manage mental health, which would help to be better equipped in dealing with current and future pandemics psychologically. Moreover, results generate theoretical implications for rural areas, with the need of expanding the field further due to the finding in this study that rural areas are best for mental compared to urban or town areas. Future studies should include 'town' areas, when comparing rural and urban areas. Additionally, there are practical implications for rural and urban planning. Since rural areas were best for mental health in comparison to urban and town areas, it is proposed that rural areas be conserved and not further urbanized, as rural areas might pose benefits that urban, or town areas cannot for mental health.

Conclusion

The current study found spending time in nature was associated with better mental health scores during the CV. This is a similar finding to recent cross-sectional research during the CV, as well as past field research. Such finding highlights the importance of spending time in nature for mental health during the CV, implying that current government policy during the CV pandemic should encourage people to spend time in nature and include nature as an additional tool as well as online resources to manage mental health during the CV and future pandemics.

Moreover, NB was a predictor of mental health scores, whereas ABCV was not, and neither was FBDB. NB of the benefits for mental health adds an additional variable to the

framework of why humans extract mental health benefits from nature. Our study contributes to a novel approach. Overall, it highlights that not only personal factors such as nature connection, past experiences in nature, and ability to immerse oneself in nature should be considered in understanding why nature is beneficial for mental health, but that NB should also be included in the framework. However, future studies should address the correlation and causality between these variables, since the importance of nature for mental health during the CV has been evident in this study, further research to be better understood why this was the case is needed.

Lastly, living in rural areas showed the best mental health scores, in comparison to town or urban areas. Our study provides support for previous studies that found rural areas to have better mental health benefits than urban areas, contributing to prior research by confirming findings as well as adding ‘town’ as an additional variable to be considered in future studies. Broader implications for rural and urban planning could be perhaps not to further urbanize rural areas, as it may pose benefits for humans that urban, or town areas cannot.

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Appendix A

Information Sheet

My name is Timea Fodor and I am a student in final year of Psychology. You are invited to participate in a research study that will form the basis for an undergraduate thesis. As part of my final year project I must carry out research of my chosen topic. My interest is in environment and mental health.

Before partaking in this study, please read the following information sheet which will include information about the study and what to expect if you decide to participate in this study. Note: you can only take part in this study if you are 18 years of age or over and if you have lived in the same household for the last 8 months.

Do I have to participate, and will anyone be able to identify me if I take part?
Participation in this study is entirely voluntary. You do not have to participate if you do not wish to. If you choose to participate, you can exit the study at any point during the survey. However, once you complete and submit the survey you can no longer withdraw from the study as there will be no personal information collected that can make you identifiable. If you take part in this study, your personal identity will remain completely anonymous throughout the entirety of the study.

What is the purpose of this research and what will I have to do?
The purpose of this research is to study people's surrounding environment and the impact it may have on their mental health. If you decide to participate, you will have to complete a questionnaire, which will include questions on: demographics, the surroundings in your

environment, and mental health. The study will take approximately between 10 to 15 minutes to complete.

What will my data be used for?

The data collected will be used for a dissertation of a final year project in Psychology, in the National College of Ireland. The anonymous data will be kept in the National College of Ireland and only used for the purpose and duration of this research.

What are the risk and benefits of participating in this study?

Partaking in this study will contribute to Environmental Psychology research, which may not benefit you directly, however, it will add to research understanding the current environment people live in, and how that affects them, which can impact policy decisions in relation to environmental planning. It will also contribute to a final year Psychology student's project. We do not intend to cause any psychological distress, however some topics in this study may be sensitive for some, as the nature of the study includes topics on mental health, such as, stress, depression and anxiety. If you decide to partake in this study and you experience any psychological distress, some contact numbers are provided:

The AWARE Support Line. Phone number: 1800 80 48 48

HSE mental health services. Phone number: 1800 111 888.

Samaritans. Phone number: 116 123.

Pieta House. Phone number: 1800 247 247.

If you have any further queries about this study you can contact:

The researcher: Timea Fodor

Email: x18456866@student.ncirl.ie

or

The supervisor: Dr. April Hargreaves

Email: April.Hargreaves@ncirl.ie

Thank you for your time!

Have you read the above information?

☐Yes

Do you agree with the above information?

☐Yes

Do you agree to participate?

☐Yes

Appendix B

Demographics

What gender are you?

○Male

○Female

○Other

What is your age?

Show answer here

What economic status do you fall into?

○Lower class

○Middle class

○Upper class

What level of education do you have completed?

○No education

○Primary education

○Secondary education

○Higher education

Appendix C

Environment and Mental Health

The next couple of questions will include the word 'nature' often. This will be defined below. 'Nature' refers to any area that ranges from a small garden or park in an urban area to untouched nature in wilderness. This typically includes features such as plants or wildlife.

Do you live within 2km of a garden (personal or public), park, forest, woodlands, waterside, trail or any other nature-like/ green area?

○Yes

○No

In the past 7 months how often did you spend time in nature surroundings?

○Not very often

○Rarely

○Sometimes

○Often

○Very often

Which one best describes the kind of nature you had access to? (you can select multiple answers)

☐Personal garden

☐Public garden

☐Window view of nature

☐Countryside

☐Forrest/Woodlands

☐Park

☐Waterside (e.g. sea, river, lake)

☐None

On average how many days a week do you visit nature?

○1

○2

○3

○4

○5

○6

○7

Did you consciously use visits to nature as a way to manage your mental health during the coronavirus?

○Yes

○No

Do you believe that nature is an effective way to manage mental health?

○Not at all effective

○Slightly effective

○Moderately effective

○Very effective

○Extremely effective

Whether or not you believe that nature is effective in managing mental health, do you usually feel better after spending time in nature?

○Much worse

○Somewhat worse

○About the same

○Somewhat better

○Much better

On average, how many hours do you spend in nature on each visit?

○None

○Less than 1 hour

○1-2 hours

○3-4 hours

○More than 4 hours

How much do you agree with the following statement; Having access to nature during the corona virus potentially helped me manage my mental health.

○Strongly disagree

○Disagree

○Neither agree nor disagree

○Agree

○Strongly agree

Do you live in a rural, urban, or a town environment?

○Rural

○Urban

○Town

Appendix D

Please read each statement and check a number 0, 1, 2, or 3 which indicates how much the statement applied to you OVER THE PAST WEEK. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 = did not apply to me at all

1 = applied to me to some degree, or some of the time

2 = applied to me to a considerable degree or a good part of the time

3 = applied to me very much or most of the time

I found it hard to wind down

〇0 = did not apply to me at all

〇1 = applied to me to some degree, or some of the time

〇2 = applied to me to a considerable degree or a good part of the time

〇3 = applied to me very much or most of the time

I was aware of dryness of my mouth

〇0 = did not apply to me at all

〇1 = applied to me to some degree, or some of the time

〇2 = applied to me to a considerable degree or a good part of the time

〇3 = applied to me very much or most of the time

I couldn't seem to experience any positive feeling at all

〇0 = did not apply to me at all

〇1 = applied to me to some degree, or some of the time

〇2 = applied to me to a considerable degree or a good part of the time

〇3 = applied to me very much or most of the time

I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)

〇0 = did not apply to me at all

〇1 = applied to me to some degree, or some of the time

〇2 = applied to me to a considerable degree or a good part of the time

〇3 = applied to me very much or most of the time

I found it difficult to work up the initiative to do things I tended to over-react to situations

〇0 = did not apply to me at all

〇1 = applied to me to some degree, or some of the time

〇2 = applied to me to a considerable degree or a good part of the time

〇3 = applied to me very much or most of the time

I tended to over-react to situations

〇0 = did not apply to me at all

〇1 = applied to me to some degree, or some of the time

〇2 = applied to me to a considerable degree or a good part of the time

〇3 = applied to me very much or most of the time

I experienced trembling (e.g. in the hands)

○0 = did not apply to me at all

○1 = applied to me to some degree, or some of the time

○2 = applied to me to a considerable degree or a good part of the time

○3 = applied to me very much or most of the time

I felt that I was using a lot of nervous energy

○0 = did not apply to me at all

○1 = applied to me to some degree, or some of the time

○2 = applied to me to a considerable degree or a good part of the time

○3 = applied to me very much or most of the time

I was worried about situations in which I might panic and make a fool of myself

○0 = did not apply to me at all

○1 = applied to me to some degree, or some of the time

○2 = applied to me to a considerable degree or a good part of the time

○3 = applied to me very much or most of the time

I felt that I had nothing to look forward to

○0 = did not apply to me at all

○1 = applied to me to some degree, or some of the time

○2 = applied to me to a considerable degree or a good part of the time

○3 = applied to me very much or most of the time

I found myself getting agitated

〇0 = did not apply to me at all

〇1 = applied to me to some degree, or some of the time

〇2 = applied to me to a considerable degree or a good part of the time

〇3 = applied to me very much or most of the time

I found it difficult to relax

〇0 = did not apply to me at all

〇1 = applied to me to some degree, or some of the time

〇2 = applied to me to a considerable degree or a good part of the time

〇3 = applied to me very much or most of the time

I felt down-hearted and blue

〇0 = did not apply to me at all

〇1 = applied to me to some degree, or some of the time

〇2 = applied to me to a considerable degree or a good part of the time

〇3 = applied to me very much or most of the time

I was intolerant of anything that kept me from getting on with what I was doing

〇0 = did not apply to me at all

〇1 = applied to me to some degree, or some of the time

〇2 = applied to me to a considerable degree or a good part of the time

〇3 = applied to me very much or most of the time

I felt I was close to panic

○0 = did not apply to me at all

○1 = applied to me to some degree, or some of the time

○2 = applied to me to a considerable degree or a good part of the time

○3 = applied to me very much or most of the time

I was unable to become enthusiastic about anything

○0 = did not apply to me at all

○1 = applied to me to some degree, or some of the time

○2 = applied to me to a considerable degree or a good part of the time

○3 = applied to me very much or most of the time

I felt I wasn't worth much as a person

○0 = did not apply to me at all

○1 = applied to me to some degree, or some of the time

○2 = applied to me to a considerable degree or a good part of the time

○3 = applied to me very much or most of the time

I felt that I was rather touchy

○0 = did not apply to me at all

○1 = applied to me to some degree, or some of the time

○2 = applied to me to a considerable degree or a good part of the time

○3 = applied to me very much or most of the time

I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)

○0 = did not apply to me at all

○1 = applied to me to some degree, or some of the time

○2 = applied to me to a considerable degree or a good part of the time

○3 = applied to me very much or most of the time

I felt scared without any good reason

○0 = did not apply to me at all

○1 = applied to me to some degree, or some of the time

○2 = applied to me to a considerable degree or a good part of the time

○3 = applied to me very much or most of the time

I felt that life was meaningless

○0 = did not apply to me at all

○1 = applied to me to some degree, or some of the time

○2 = applied to me to a considerable degree or a good part of the time

○3 = applied to me very much or most of the time

Appendix E

Debriefing Sheet

Dear participant,

Welcome to the end of the study! Thank you so much for your participation. This is a debriefing form, which will provide you with the true purpose of the experiment and inform you why information has been withheld from you at the beginning of the of the survey. There will also be contacts provided in case you have experienced any distress.

The true purpose of this study was to investigate if exposure to surrounding nature benefitted mental health during the corona virus. The aim of the present study was to investigate the relationship between having access to nature and psychological well-being during the Corona Virus, as research shows an increase in depression, anxiety and stress in the general population due to the virus. A potential reason could be because of disturbances of everyday life that the virus created, such as having to quarantine. Research shows that having access to nature can benefit mental health, which was why this study focused on whether nature exposure has had a positive impact on mental health during the Corona Virus.

This information was withheld at the beginning of the experiment. The reason for this was because people can have biases on what they think of nature. These biases can form from upbringing or cultural influences, which could have affected how participants would answer questions on the questionnaire, resulting in not collecting accurate data.

This study tried to take the least minimal risks in making you feel any discomfort, however, if you feel you have been affected in any way or have been caused any distress, here are some contacts for mental health:

The AWARE Support Line. Phone number: 1800 80 48 48

HSE mental health services, Phone number: 1800 111 888.

Samaritans. Phone number: 116 123.

Pieta House. Phone number: 1800 247 247.

If you would like to seek any further information, or have any further questions, don't hesitate to contact:

The researcher: Timea Fodor

Email: x18456866@student.ncirl.ie

or

The supervisor: Dr. April Hargreaves

Email: April.Hargreaves@ncirl.ie

Thank you for your time!

Appendix F

DASS Questionnaire

DASS21 Name: Date:

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you **over the past week**. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree or a good part of time
3 Applied to me very much or most of the time

1 (s)	I found it hard to wind down	0	1	2	3
2 (a)	I was aware of dryness of my mouth	0	1	2	3
3 (d)	I couldn't seem to experience any positive feeling at all	0	1	2	3
4 (a)	I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5 (d)	I found it difficult to work up the initiative to do things	0	1	2	3
6 (s)	I tended to over-react to situations	0	1	2	3
7 (a)	I experienced trembling (e.g. in the hands)	0	1	2	3
8 (s)	I felt that I was using a lot of nervous energy	0	1	2	3
9 (a)	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10 (d)	I felt that I had nothing to look forward to	0	1	2	3
11 (s)	I found myself getting agitated	0	1	2	3
12 (s)	I found it difficult to relax	0	1	2	3
13 (d)	I felt down-hearted and blue	0	1	2	3
14 (s)	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15 (a)	I felt I was close to panic	0	1	2	3
16 (d)	I was unable to become enthusiastic about anything	0	1	2	3
17 (d)	I felt I wasn't worth much as a person	0	1	2	3
18 (s)	I felt that I was rather touchy	0	1	2	3
19 (a)	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3
20 (a)	I felt scared without any good reason	0	1	2	3
21 (d)	I felt that life was meaningless	0	1	2	3

Appendix G

SPSS Transcript

Frequencies

Statistics

		what gender are you?	what economic status do you fall into?	what level of education do you have completed?	Do you live in a rural, urban, or a town environment?
N	Valid	402	402	402	402
	Missing	0	0	0	0

Descriptives

Total score of DASS questionnaire

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Rural	164	14.66	11.286	.881	12.92	16.40	0	56
Urban	99	21.90	14.648	1.472	18.98	24.82	0	57
Town	139	20.48	15.408	1.307	17.90	23.07	0	62
Total	402	18.46	14.005	.699	17.08	19.83	0	62

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial
1	(Constant)	53.435	5.298		10.085	.000	43.019	63.852		
	what gender are you?	-1.859	1.471	-.062	-1.264	.207	-4.751	1.033	.068	-.063
	what age are you?	-.295	.050	-.288	-5.860	.000	-.394	-.196	-.317	-.282
	what economic status do you fall into?	-5.164	1.628	-.147	-3.171	.002	-8.365	-1.963	-.175	-.157
	what level of education do you have completed?	-4.554	1.276	-.172	-3.570	.000	-7.062	-2.046	-.239	-.177
2	(Constant)	57.306	5.277		10.859	.000	46.931	67.681		
	what gender are you?	-2.959	1.466	-.099	-2.018	.044	-5.842	-.076	.068	-.101
	what age are you?	-.228	.052	-.222	-4.377	.000	-.330	-.125	-.317	-.215
	what economic status do you fall into?	-4.801	1.598	-.137	-3.004	.003	-7.944	-1.659	-.175	-.149
	what level of education do you have completed?	-3.793	1.264	-.144	-3.002	.003	-6.278	-1.309	-.239	-.149
	In the past 7 months how often did you spend time in nature surroundings?	-2.554	.617	-.211	-4.138	.000	-3.768	-1.341	-.318	-.204

a. Dependent Variable: Total score of DASS questionnaire