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BASE FOR ELECTRONIC EDUCATIONAL SCIENCES

ISSN: 2718-0107

Base for Electronic Educational Sciences, 7(1), 20-35; 2026

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Understanding Nature Connectedness: The Role of Mindfulness, Emotional Sensitivities, Outdoor Experience, and Problematic Mobile Phone Use

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APA Citation:

Alkış Küçükaydın, M. (2026). Understanding Nature Connectedness: The Role of Mindfulness, Emotional Sensitivities, Outdoor Experience, and Problematic Mobile Phone Use. *Base for Electronic Educational Sciences*, 7(1), 20-35.

Submission Date: 11/10/2025

Acceptance Date: 28/03/2026

Publication Date: 29/03/2026

Abstract

Although previous literature has examined adolescents' levels of nature connectedness, especially in the context of gender, age and culture, the factors associated with adolescents' nature connectedness have not been addressed much. The current study examines the variables that facilitate and leverage adolescents' nature connectedness and the hindrances to nature connectedness. A total of 1,316 high school students from the Central Anatolia Region of Turkey participated in the study. A priori analyses showed that adolescents had low levels of nature connectedness. Path analysis results indicated that mindfulness was leverage to nature connectedness. However, problematic mobile phone use was a variable that hindered nature connectedness directly and through the frequency of experiencing nature. The study also showed that disgust sensitivity in nature influenced outdoor recreation preferences related to nature connectedness. The results highlight the importance of mindfulness in adolescents' increasing nature connectedness and the dangers of problematic mobile phone use.

Keywords: adolescents, mindfulness, nature connectedness, problematic mobile phone use



Introduction

Nature connectedness is a psychological construct that addresses people's connection to nature as a subjective perception (Mayer & Frantz, 2004). Researchers have pointed out that this psychological construct is an important factor in human physical, mental and emotional well-being (Fyfe-Johnson et al., 2021). Cui and Yang (2022) reported that children with high nature connectedness are happier, and Arola et al. (2023) mentioned that nature is potentially a good healer. At this point, the issue of nature connectedness has been frequently addressed in health, happiness and well-being research (Choe, Jorgenden, & Sheffield, 2020), and researchers have drawn attention to the importance of nature connectedness, especially in child and adolescent health (Skar, Gundersen, & O'Brien, 2016; Soga, Yamanoi, Tsuchiya, Koyanagi, & Kanai, 2018). Some governments see the disconnection of children and adolescents from nature as a social problem (HM Government, 2018). For this reason, it has been emphasized that nature connectedness should be investigated, and precautionary policies should be taken to improve connectedness (Riechers, Balázi, Garcia-Llorente, & Loos, 2021). At this point, the study attempts to understand adolescents' nature connectedness and addresses the leverage points and hurdles in nature connectedness.

Especially in studies covering the last decade, it has been observed that nature connectedness is strongly related to mindfulness and acts as an important lever (Schutte & Malouff, 2018). Accordingly, mindful individuals resort to nature experiences to fulfil their emotional needs, which increase nature connectedness (Howell, Dopko, Passmore, & Buro, 2011). In mindfulness, certain experiences intensify, bringing along certain behavioural regulations (Walach, Buchheld, Butenmüller, Kleinknecht, & Schmidt, 2006). However, behavioural adjustments are related to the frequency of the experience (Soga et al., 2018). Experiencing nature has been associated with time pressure and problematic phone use in school-age adolescents (Mjaavatn, Frostad, & Pijl, 2016; Zhang, Goodale, & Chen 2014). The literature suggests using outdoor recreation activities to increase the nature connectedness of adolescents who experience time pressure due to various reasons and have problematic phone use (Zhu, 2024). Adolescents may sometimes have feelings of disgust and fear towards what exists in nature (Bixler & Floyd, 1997). This is a significant challenge for a powerful lever such as significant nature experience (Sugiyama, Hosaka, Takagi, & Numata, 2021). Therefore, considering the levers and barriers to these levers together when addressing nature connectedness may provide a useful way to predict adolescent health.

There are two reasons why we focus on adolescents in this study. The first is that the health and well-being provided by nature are known to contribute to adolescent life (Nisbet, Zelenski, & Grandpierre, 2019; Richardson et al., 2020; Riechers et al., 2021). The other is that adolescents are the number one beneficiaries of the measures to be taken and public policies to be developed on nature in the future (Price et al., 2022). Therefore, nature connectedness is a significant issue regarding adolescent health and the future. In this context, we first focus on understanding what nature connectedness is.

Theoretical Background

Nature Connectedness

The issue of human nature connectedness has been seriously addressed in the last decade (Barbaro & Pickett, 2016; Cui & Yang, 2022; Dadvand et al., 2015). This is due to nature's psychological and physiological contributions (Riechers et al., 2021) and the improvements offered by pro-environmental behaviours (Mackay & Schmitt, 2019). Since humans constantly interact with nature, nature connectedness is a critical leverage point for well-being (Fyfe-Johnson et al., 2021) and increasing ecological sustainability (Soga et al., 2018). Therefore, it has been suggested that pathways to nature connectedness be increased (Lekies & Brensinger, 2017; Mjaavatn et al., 2016). Pathways to being nature connectedness are operationalized with the term "leverage points" in Riechers et al. (2021) definition. According to Schutte and Malouff (2018), mindfulness is one of the leverage points for being nature connectedness.

Mindfulness

Brown and Ryan (2003) defined "mindfulness" as individuals being attentive to what is happening in the present and being aware of it. Accordingly, a mindful person must be aware of their experiences (Hamann & Ivrtzan, 2017). It has been reported that individuals who have experiences in nature will experience positive emotional effects with their mindfulness, strengthening the state of being nature connectedness (Unsworth, Palicki, & Lustig, 2016). In addition, according to Brown and Ryan (2003), mindfulness increases individuals' sensitivity to inner needs, and individuals make arrangements to meet these needs. If individuals gain experience in nature to fulfil their emotional needs, we can expect a strong relationship between mindfulness and nature connectedness.

Howell et al. (2011) reported strong relationships between mindfulness and nature connectedness in a study conducted with undergraduate students from an urban university in Canada. Another study conducted with undergraduate students in the United States reported that mindfulness affects nature connectedness and pro-environmental behaviours (Barbaro & Pickett, 2016). This situation has led to intervention studies that arouse the idea that nature connectedness will also increase if mindfulness is increased. It has been observed that mindfulness interventions such as mindful walking in nature or individual participation in nature have been tried to increase the state of nature connectedness (Choe et al., 2020; Nisbet et al., 2019). In these intervention studies, the effect of the frequency of experiencing nature has been pointed out in order to achieve the desired result.

Experience Nature

It is important for children and adolescents to "experience nature" by spending more time in nature (Cui & Yang, 2022). The first reason for emphasizing this issue is direct interaction with nature's contributions to health and well-being (Fyfe-Johnson et al., 2021) and its effects on cognitive functions (Dadvand et al., 2015). The second reason is that nature experiences influence pro-environmental attitudes and behaviours towards nature (Soga et al., 2018). From this perspective, it is important for adolescents who will provide public support for nature conservation in the future to experience nature. The literature emphasizing the importance

of nature experiences in nature connectedness has also examined what makes it difficult to experience nature directly (Skar et al., 2016).

The literature has pointed to two main barriers to experiencing nature. The first is the loss of opportunity for interaction, which makes it challenging to experience (Lekies & Brensinger, 2017). The scheduled lifestyles of school-age adolescents or the time pressure created by situations such as exams are considered an essential loss of interaction opportunities (Zhang et al., 2014). Another factor is the use of electronic media, especially problematic mobile phone use that prevents being in touch with nature (Mjaavatn et al., 2016).

Time Pressure

Previous studies on barriers to experiencing nature have reported that children under time pressure have fewer opportunities to experience nature. A nationwide survey conducted in Norway with 3,160 parents of children aged 6-12 years showed that children who do not experience time pressure spend more time in nature and play with pleasure (Gundersen, Skår, O'Brien, Wold, & Follo, 2016). Another study, also conducted in Norway, reported that children who live with planned time cannot play freely in nature (Skar et al., 2016). McFarland, Zajicek, and Waliczek (2014) found a relationship between the time available to children and participation in outdoor activities in their study of children aged 3-5 and their parents in the USA. In Japan, an Asian country, it has also been reported that the extinction of experience over the last few decades has negatively affected nature connectedness (Soga et al., 2018). From this perspective, we examine whether the time pressure experienced by adolescents in Turkey, an Eastern country, hinders nature connectedness. This is because, in Turkey, adolescents are subjected to long class hours due to the education system and attend study sessions after school.

Problematic Mobile Phone Use

The negative consequences of not being able to regulate one's mobile phone use are defined as "problematic mobile phone use" (Billieux, 2012). While problematic mobile phone use has many previously reported adverse effects (Busch & McCarthy, 2021), there are also signs that it is an obstacle to experiencing nature (Soga et al., 2018). At this point, Minor et al. (2023) study is quite remarkable. The study conducted with 701 young adults for two years reported that exposure to nature reduced digital impulse. Zhu (2024) also reported that nature-based interventions can prevent problematic phone use. A recent study conducted with 910 adolescents in Turkey also reported that adolescents have problematic phone use (Acikgoz, Acikgoz, & Acikgoz, 2022). However, we do not know whether problematic phone use decreases nature connectedness. Therefore, this study examines problematic phone use and time pressure as inhibitors of nature connectedness.

Outdoor Recreation Preferences

Empirical evidence has pointed to the importance of nature connectedness by reporting that spending time in natural areas offers physiological and psychological contributions (Mackay & Schmitt, 2019; Price et al., 2022). For this reason, it has been mentioned that more green spaces or natural areas should be close to individuals' living spaces (Hamann & Ivtzan, 2017; Hunt et al., 2017). Being connected to the natural world increases

proportionately to the time spent outdoors (Howell et al., 2011), and pro-environmental behaviours develop (Barbaro & Pickett, 2016). Again, outdoor visits to natural areas develop knowledge and attitudes towards the natural environment (Fyfe-Johnson et al., 2021; Gundersen et al., 2016). Therefore, outdoor preferences are also related to nature connectedness. However, the literature on outdoor visits has emphasized that young people, in particular, may sometimes have negative feelings towards what exists in nature (Bixler & Floyd, 1997). These emotions are mainly discussed under disgust and fear in the literature.

Disgust and Fear in Nature

Understanding emotions towards natural environments has been proposed as an effective way to understand the nature theme that is effective in adolescents' nature connectedness (Clayton et al., 2017). In this context, fear of nature may also carry a disgust component (Simaika & Samways, 2010). Fear and disgust may prevent adolescents from having opportunities and preferences to experience nature. For example, Sugiyama et al. (2021) reported in a study conducted with university students in Tokyo those events that arouse fear and disgust in nature impact outdoor recreation preferences. Green (2023), who conducted a study with 4-5-year-old Alaskan children, reported that during a nature walk, children were uncomfortable with wet grass and feared getting lost in nature, which interfered with their outdoor experiences. With today's rapid proliferation of urbanization, the issue of disgust and fear in nature has been frequently addressed (Zsido, Coelho, & Polák, 2022). Turkey is also experiencing rapid urbanization, and green and blue areas are rapidly decreasing. Therefore, in this study, we try to understand the effect of disgust and fear in nature on adolescents' nature connectedness.

Aim of Study

Based on the evidence presented in the previous literature, the following model was tested (Fig.1). First, the effect of mindfulness on nature connectedness in adolescents was tested. This effect was tested both directly and through the frequency of nature experiences. Then, it was hypothesized that nature experiences would be influenced by problematic phone use and time pressure. Specifically, the direct effect of problematic phone use and time pressure on nature attachment and the indirect effect through experiencing nature were tested. Similarly, it was hypothesized that feelings of fear and disgust would influence outdoor activity preferences. Based on this assumption, the direct relationship of fear and disgust with nature connectedness was tested. It was also hypothesized that fear and disgust would be related to nature connectedness by influencing outdoor preferences. Age and gender were used as control variables in the study. Although nature connectedness is frequently discussed in the literature, no study focuses on all these variables in adolescents. Therefore, the model to be created will contribute to understanding the levers and hindrances affecting nature connectedness. In addition, the importance of investigating the measures to be taken for the hindrances in future applications aiming to increase nature connectedness will be emphasized.

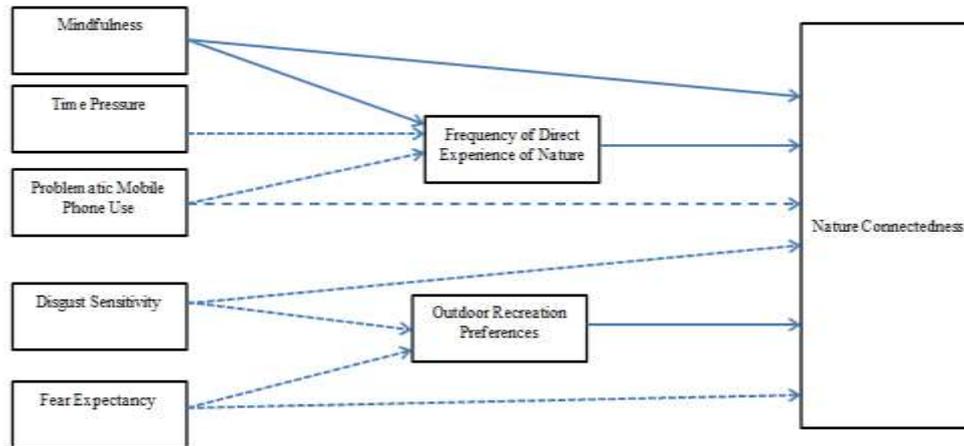


Fig. 1. Hypothesized model (Dashed arrows represent negative correlation)

Method

Participants and Procedure

The participants were adolescents studying in public high schools, randomly selected from the Central Anatolia Region of Turkey and asked to participate voluntarily. The schools of the adolescents participating in the study are located in the city centre. There are no blue-green areas or recreation areas around the schools. Students can only experience nature through special trips organized by schools or with family support outside of school.

For the implementation, school principals were first contacted, and then consent was obtained from the parents. A total of 1,316 students ($M=15.98$, $SD=1.05$, age range = 13-17 years), 794 (60.3%) female and 522 (39.7%) male, participated in the study. Since the number of participants who answered "I do not identify myself as a male or a female" or "I prefer not to say" was very small (3 adolescents), they were excluded from the statistical analysis.

Participants completed the anonymized self-report scales as a paper-and-pencil test during a school day in the presence of their classroom teacher. Before data collection, participants were assured of confidentiality and told they could withdraw from the study at any time. Students answered the questionnaire for 30-40 minutes. The Bartın University Ethics Committee approved permission for the study (2024-SBB-0100).

Instruments

Nature Connection Index (NCI)

In the previous literature, many measurement tools are used to determine nature connectedness (Cheng & Monroe, 2012; Nisbet & Zelenski, 2013; Schultz, 2001). However, the Nature Connection Index (NCI, Hunt et al., 2017) developed by Natural England was preferred in the current study. An extensive database has been created in many countries using the NCI, and studies have been conducted on its usability in various age groups (Richardson et al., 2020; Price et al., 2022). The NCI was used in this study's adolescent sample. The instrument contains six items, 7-point

Likert-type (1= strongly disagree...7= strongly agree) assessing nature connectedness. The items measure the individual's nature connectedness with an overall score ranging from 0 to 100. The NCI was translated into Turkish within the scope of this study.

Smartphone Application-Based Addiction Scale (SABAS)

The scale developed by Csibi, Griffiths, Cook, Demetrovics, and Szabo (2018) was used to determine adolescents' problematic mobile phone use. The scale consists of six items in a 6-point Likert type (1= strongly disagree...6= strongly agree). A high score on the scale indicates a high likelihood of problematic mobile phone use. The scale was previously adapted into Turkish by Gökler and Bulut (2019).

Frequency of Direct Experience of Nature (FDEN)

Three questions were asked to determine the frequency of direct experience of nature among adolescents. These included how often they observed natural areas, wild plants and wildlife in their immediate surroundings over the past month. The related items were adapted from a previous study conducted by Soga et al. (2018) with children. The scale items are in 6-point Likert type (1=never...6= almost every day). High scores on the scale also mean that the nature experience is high.

Time Pressure

Two questions were asked to assess the time pressure felt by adolescents. In the Turkish education system, students are subjected to intensive high school education to prepare for a university education. In this context, many attend after-school tutoring or supportive education centers, such as tutoring and study centers. This situation is frequently discussed and debated in Turkish education. This is a frequently discussed and emphasized issue in Turkish education. Moreover, it has been observed that this type of question has been used in the literature to assess time pressure (Soga et al., 2018). Therefore, in this study, Turkish adolescents were asked the following questions: "How many times a week do you attend after-school tutoring or supportive education activities such as academic education, studying, and tutoring centers?" and "How many times a week do you have time problems to complete lessons, homework, etc.?" Responses were collected on a 5-point Likert scale (1= none ... 5 = almost every day). A high score on the scale means that adolescents experience time pressure. Cronbach's alpha coefficient of the scale is .61.

Disgust Sensitivity and Fear Expectancy Scale

The items in Bixler and Floyd's (1997) study were used to determine adolescents' disgust sensitivity and fear states. However, a pre-survey was conducted to determine whether the items assessed feelings of disgust and fear in Turkish students. The scale items were appropriate for 20 students (12 females and eight males) from another school not included in the sample. In this context, one item was removed (Getting wet from a water droplet from a tree) because it was found that it did not affect disgust sensitivity for Turkish adolescents. However, it was included in the original scale. In this context, there were 20 questions on the disgust sensitivity scale and 12 on the fear expectancy scale. In the disgust sensitivity scale, the relevant items were scored on a 3-point Likert scale (0=not disgusting, 1=to slightly disgusting, 2=to extremely disgusting). Similarly, the items related to fear sensitivity were evaluated on a 3-point Likert scale (0=not

fearful, 1=to slightly fearful, 2=to extremely fearful). High scores on the scales are associated with high fear and disgust.

Outdoor Recreation Preferences (ORP)

Participants were asked a single question to determine their outdoor activity preferences: "Do you prefer to spend your leisure time indoors (e.g. home, cinema, cafe) or outdoors (e.g. forest, green and blue field, garden)?" The answers were evaluated on a 3-point Likert scale (1= indoors, 2= do not have any preference, 3=outdoors).

Mindfulness Questionnaire

The Freiburg Mindfulness Inventory measured participants' mindfulness (Freiburg; Walach et al., 2006). The Inventory consists of one dimension and 14 items. Participants were asked to answer the items in the Inventory by thinking about the last three days. A high score on the 4-point Likert-type scale (1= rarely...4= almost always) means that mindfulness is also high. The scale has been frequently used in previous studies where nature connectedness was associated with mindfulness (Hamann & Ivtzan, 2017; Unsworth et al., 2016). The scale was adapted to Turkish in this study. All scales had acceptable goodness-of-fit values (Kline, 2015).

Data Analysis

Within the study's scope, the data's normality tests were performed first. In this context, the skewness and kurtosis coefficients of the data (-0.37 and 0.88 for nature connectedness; -0.76 and 0.78 for disgust sensitivity; -0.20 and -0.51 for fear sensitivity; 1.49 and 1.17 for time pressure; -0.08 and 0.70 for problematic mobile phone use; -0.40 and -1.60 for outdoor recreation preferences; 0.74 and -0.02 for frequency of direct experience of nature) were found to be suitable for parametric tests (Tabachnick & Fidell, 2007). Correlations between variables were then calculated. Path analysis was performed using the AMOS 21 program to test the model. Indirect effects were calculated with 5,000 bootstrapped iterations at a 95% confidence interval. In the tested model, nature connectedness is the dependent variable, disgust and fear sensitivity, time pressure, and problematic mobile phone use are independent variables, and outdoor recreation preferences and frequency of direct nature experience are mediating variables. R^2 and the total coefficient of determination for each endogenous variable were calculated to assess the model's goodness of fit.

Results

The results of the descriptive analysis of the variables in the study are presented in Table 1. Accordingly, adolescents' level of nature connectedness ($M=48.75$, $SD=8.70$) and their nature experience are low ($M=8.13$, $SD=3.76$). On the other hand, adolescents' scores on the problematic mobile phone use scale were high ($M=22.22$, $SD=7.24$). Moreover, according to the responses to the scales, adolescents do not experience time pressure ($M=1.72$, $SD=1.14$). They experience some disgust ($M=25.67$, $SD=7.37$) and fear ($M=12.84$, $SD=5.62$) towards what they see in nature. However, this level of fear and disgust is not extreme. The level of mindfulness of adolescents is medium ($M=35.21$, $SD=7.47$). In addition, 42.6% of the adolescents reported that they prefer outdoor environments, and 33.6% prefer indoor environments.

When the relationships between the variables analyzed in the study were examined, it was seen that nature connectedness was not related to time

pressure ($r=-0.01$, $p>0.05$), disgust ($r=-0.03$, $p>0.05$) and outdoor preferences ($r=-0.05$, $p>0.05$) but had a high level and negative relationship with problematic phone use ($r=-0.89$, $p<0.01$). We also found a high level and negative relationship between problematic phone use and the frequency of direct experience of nature ($r=-0.86$, $p<0.01$). In addition, we found a medium level relationship between disgust and fear in nature ($r=0.51$, $p<0.01$) and a low level and positive relationship between fear in nature and problematic phone use ($r=0.25$, $p<0.01$). Time pressure, which we included in the study, had no significant relationship with any variable ($p>0.05$).

Table 1. Descriptive Analysis Results (N= 1,316)

	<i>M (SD)</i>	1	2	3	4	5	6	7	8
1.NCI	48.75 (8.70)	-							
2. Problematic Mobile Phone Use	22.22 (7.24)	0.89**	-						
3. Nature Experiences	8.13 (3.76)	0.25**	-0.86**	-					
4.Time Pressure	1.72 (1.14)	0.06	0.00	-0.01	-				
5.Disgust Sensitivity	25.67 (7.37)	-0.09*	0.16**	-0.26**	0.03	-			
6.Fear Expectancy	12.84 (5.62)	-0.04	0.25**	-0.20**	0.07*	0.51**	-		
7. Outdoor Recreation Preferences	2.12 (.84)	0.29**	-0.12**	0.22**	0.02	-0.10*	0-.05	-	
8.Mindfulness	35.21 (7.47)	0.26**	-0.19**	0.22**	0.06	-0.00	-0.07*	0.16**	-

** $p < 0.01$; * $p < 0.05$

After examining the relationships between the variables in the study, path analysis was conducted (Fig.2). The goodness of fit index values obtained from the analysis indicated that the measurement model was validated ($\chi^2/df = 3.01$, $N=1,316$, $p < 0.001$, RMSEA = 0.05 [95% CI; 0.03/ 0.07], S-RMR = 0.00, AGFI = 0.98, NFI = 0.99, GFI = 0.99, CFI = 0.99, TLI = 0.98).

The study has direct and indirect effects associated with nature connectedness. The results of the analysis showed that mindfulness was related to nature connectedness both directly ($\beta=0.69$, S.E.=0.03, 95% CI [0.40/0.78], $p<0.05$) and indirectly through frequency of nature experiences ($\beta=0.11$, S.E.=0.01, 95% CI [0.06/0.16], $p<0.05$; $\beta_{total}=0.80$, $p<0.05$). Moreover, problematic phone addiction was related to nature connectedness both directly ($\beta=-0.05$, S.E.=0.03, 95% CI [-0.09/-0.04], $p<0.05$) and indirectly through the frequency of nature experiences ($\beta=-0.02$, S.E.=0.02, 95% CI [-0.03/-0.01], $p<0.05$; $\beta_{total}=-0.07$, $p<0.05$). Feeling disgust in nature was not directly related to nature connectedness ($\beta=-0.20$, S.E.=0.13, $p>0.05$), but disgust affected outdoor recreation preferences, which in turn was related to nature connectedness ($\beta=-0.12$, S.E.=0.00, 95% CI [-0.19/-0.01], $p<0.01$). It was also found that both outdoor recreation preferences ($\beta=0.22$, S.E.=0.01, 95% CI [0.15/0.30], $p<0.05$) and nature experiences were associated with nature connectedness ($\beta=0.26$, S.E.=0.02, 95% CI [0.15/0.30], $p<0.05$). In the

study, the explained variance rate of the frequency of experiencing nature was 15%, the explained variance rate of outdoor recreation preferences was 22%, and the explained variance rate of commitment to nature was 62% when all variables were included in the model.

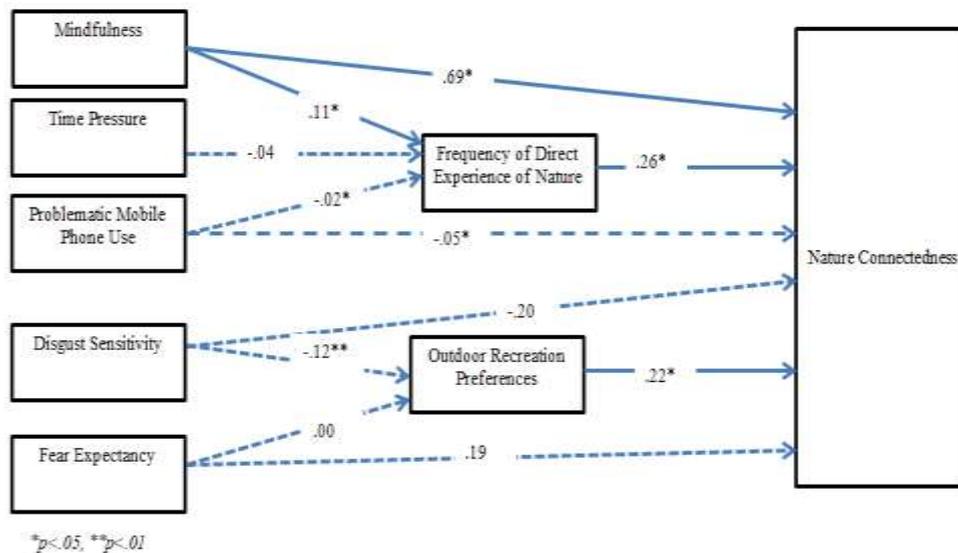


Fig.2. Model of study (** $p < 0.01$; * $p < 0.05$)

Discussion

This study examined adolescents' mindfulness, experiencing nature and outdoor preferences, which we hypothesized to be a lever in their nature connectedness. In addition, we examined time pressure, disgust, fear sensitivity in nature, and problematic phone use as hindrances to nature's connectedness.

Consistent with previous results, we found a positive relationship between mindfulness and nature connectedness (Richardson et al., 2020; Zhu, 2024). Mindfulness is an individual's focus on the experience of the present moment and a deeper connection with inner thoughts, feelings, and the environment (Walach et al., 2006). This inner focus and connection can increase when interacting with natural environments. Nature connectedness refers to the individual's emotional connection to the natural environment and the desire to live in harmony (Nisbet & Zelenski, 2013). Accordingly, in nature, individuals become aware of both the moment they live and their environment (Ray, Franz, Jarrett, & Pickett, 2021). Therefore, individuals with mindfulness feel nature, and their nature connectedness may be easy.

Visual, auditory and tactile natural stimuli can be easily perceived through mindfulness. Natural rhythms and cycles can be felt through mindfulness. Mindful individuals can more intensely experience the natural beauty, sounds, smells and textures around them. This intense experience can increase sensitivity to nature and encourage more attention to natural environments. Furthermore, while being in nature, individuals are likely to be more in touch with their inner world and realize how their interactions with their natural environment make them feel. This may

facilitate a greater connection to nature and a deeper connection to natural environments.

Our analysis showed that problematic phone use strongly inhibits nature connectedness. In addition, problematic phone use indirectly hinders nature connectedness by reducing the frequency of experiencing nature. Minor et al. (2023) reported that if the fascination and attractiveness of mobile phones outweigh the attractiveness of natural environments, nature connectedness will decrease. Moreover, the mobile design of current phones is a prominent digital stimulus even in natural environments (Schilhab, Stevenson, & Bentsen, 2018). This means that the allure of mobile phones can also distract the focus in natural areas. Therefore, even when experiencing nature frequently, the problematic use of mobile phones is an inhibitor of nature connectedness. Usually, nature is known to increase social contacts and facilitate communication (Jennings & Bamkole, 2019). In this case, individuals needing social communication and new relationships can communicate in natural environments without mobile phones (Zhou, Yang, Yu, & Guo, 2022). However, things are changing when it comes to adolescents. Adolescents frequently prefer mobile phones to stay in touch with friends, make new friends and expand their social circles (Busch & McCarthy, 2021). Areas such as quick access to entertainment, independence and the pursuit of freedom are easier to access through mobile phone use. This has diminished the fun, communication and independence nature offers.

The study found that disgust sensitivity affects outdoor recreation preferences and that outdoor recreation preferences are related to nature connectedness. Individuals with disgust sensitivity may avoid potential risks or microbial threats in natural environments. Therefore, these individuals would be expected to prefer spending time indoors or in more sterile environments. According to Sugiyama et al. (2021), disgust sensitivity in nature is either due to previous negative experiences in nature or lack of experience. Accordingly, adolescents who have experienced a negative situation in nature may have developed a disgusted reaction towards nature. To overcome this, they need to experience more nature. Similarly, adolescents without experience are expected to experience nature more. Because negative perceptions can sometimes lead to the idea that one should be disgusted even if there is no negative situation, we need to understand whether the disgust sensitivity of adolescents is due to negative experiences or lack of experience. However, we do not have this information in the current study. We only have evidence that disgust, preference for outdoor recreation and nature connectedness are related.

Our analyses provided insights into the levers and hindrances of nature connectedness. However, we found that time pressure and fear sensitivity, which we tested in the study, were not directly or indirectly related to nature connectedness. There may be several reasons behind the hypothesized lack of effect of time pressure on nature connectedness. First, most studies in the literature linking time pressure and nature connectedness were conducted with children (Gundersen et al., 2016; McFarland et al., 2014; Skar et al., 2016). This means children are under time pressure due to parental supervision and cannot spend time freely in nature. However, this may be different for adolescents. Therefore, factors other than time pressure may be related to nature connectedness in

adolescents. Second, even if adolescents are experiencing time pressure, they may have developed a coping strategy and perception of being nature connected. Perhaps adolescents under time pressure have different strategies to show nature connectedness and do not associate time pressure with nature connectedness. To understand this, it may be necessary to use different measurement tools. Finally, it may be that adolescents do not really feel time pressure. At least for them, this pressure may not be serious enough to be associated with nature.

Similarly, it was found that adolescents' fear sensitivity was not related to nature connectedness. Adolescents' fear may be related to how these feelings are expressed or processed rather than affecting their level of nature connectedness. Perhaps adolescents have developed different strategies to cope with or express their fears differently rather than associating them with nature connectedness. Moreover, adolescents' fears of nature may vary depending on their experiences, the environments they are exposed to, and the events they experience in the natural environment (Sugiyama et al., 2021). The majority of adolescents in the current study may not have had a negative experience in nature or may not have experienced fear in natural environments. Moreover, cultural or individual differences may influence the relationship between fear sensitivity and nature connectedness (Sedawi, Ben Zvi Assaraf, & Reiss, 2020). Fear of nature is not a common trait in Turkish culture. To the best of our knowledge, fear of nature has not been addressed in the Turkish literature to date. Of course, there may be different reasons behind this situation, but hearing a rustle in the forest, being caught in a storm, or buzzing a swarm of bees may not be very scary for Turkish adolescents.

Limitations and Implications

The current study has some limitations. The first is that the direction of the relationships in the model tested is uncertain due to the instantaneous data collection. For example, although mindful individuals have a high level of nature connectedness, the opposite may be possible. Similarly, problematic phone use may increase due to decreased nature connectedness. This situation is related to the model and cross-sectional design assumed in the study.

In previous studies on nature connectedness, it is seen that a Google map of the schools where the data were collected was presented, and the natural areas owned were marked. We want to point out that these studies usually have quite large samples. The current study collected data from only one region in Turkey. There are no natural areas, such as open green areas, meadows, or parks, in the region where the sample is located. Therefore, the sample represents only an urban area.

Finally, there are other variables related to adolescents' nature connectedness that we did not include in the model we tested in this study and that deserve to be examined in future studies. Nevertheless, this study contributes to the growing literature on nature connectedness by showing the relative contribution of contexts that facilitate and hinder adolescents' nature connectedness. This also points to potential implications for practice. The findings point to the need for intervention programs to increase mindfulness and nature experiences and reduce problematic phone use to increase nature connectedness in adolescents.

Conclusion

It is important in terms of human-nature interaction to understand the facilitators that act as levers in increasing adolescents' nature connectedness and the inhibitors that hinder their nature connectedness. In this study, we found that adolescents' mindfulness, outdoor recreation preferences and frequency of experiencing nature are the levers that facilitate nature connectedness. These results show no simple and single way to increase adolescents' natural connectedness. Accordingly, it seems necessary to adopt blue-green area management, healthy urban planning, supportive school management and complementary approaches to increasing adolescents' nature connectedness.

In addition, disgust sensitivity and problematic mobile phone use in nature were hindrances to nature connectedness. This suggests that more nature experiences can reduce disgust sensitization and detachment from problematic mobile phone use. However, this should not be seen as a framed antidote to the pathway to nature connectedness. Understanding other unaddressed hindrances to nature connectedness would also contribute to expanding the literature.

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