Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 12 [10] September 2023 : 140-149

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD

ORIGINAL ARTICLE **OPEN ACCESS**

From Mindful Observation to Pro-Environmental Behaviour: The Mediating Role of Connectedness Facet of Awe Emotion

V. Swedhaa Shanmathi, M. Vinothkumar*
Department of Psychology, Bharathiar University, Coimbatore -641046, Tamil Nadu, India
***Corresponding Author:** E-mail Id: vinoth1330@gmail.com

ABSTRACT
Numerous studies have examined the psychological factors that impact pro-environmental behaviour. Two such factors, the observational aspect of mindfulness and awe emotion significantly predict pro-environmental behaviour. Notably, mindfulness is associated with the experience of awe. However, research on awe emotion and its relationship with pro-environmental behaviors and mindfulness is limited. The present study aims to explore the connection between the observational facet of mindfulness and pro-environmental behavior through the connectedness facet of awe emotion. Data were collected from 204 undergraduate students majoring in forestry or its related courses, aged from 18 to 21 years using a purposive sampling technique. The measures employed included the Awe Experience Scale (AWE-S), the Five Facets of Mindfulness Questionnaire (FFMQ), and the Pro-Environmental Behaviour Scale. To test the mediation, Hayes' PROCESS macro analysis was utilized. The results indicate that the connectedness facet of awe emotion mediates the relationship between observational characteristics of mindfulness and pro-environmental behaviour. Thus, this study offers a new perspective on the interplay between specific characteristics of mindfulness and awe emotion in the context of pro-environmental behaviour.
Keywords: *awe, pro-environmental behaviour, mindfulness, connectedness, observing*

Received 01 .09.2023 Revised 05.09.2023 Accepted 23.09.2023

INTRODUCTION

Over the past few decades, every nation has faced environmental challenges [1]. Among the environmental problems, threats that top the list in endangering environmental sustainability are global warming, urban air pollution, loss of biodiversity, and water shortages [2]. Intensive industrialization since the past century has affected the environment [3], and the ecosystems have been more negatively affected by human behaviours in the past 50 years than in any other period in history [4]. Most environmental issues are caused by people's actions, such as large-scale tree cutting, burning fossil fuels, etc.,[5,6], and these issues may therefore be controlled by modifying the related behaviourto minimizetheir impacts on the environment [7]. If an individual's behaviour improves the natural environment and its condition or harms the environment as little as possible, then it is referred to as Pro-environmental Behaviour [8]. Numerous studies have investigated the factors supportingpro-environmental behavior [9] and found that factors like mindfulness [10,11], nature connectedness[12, 13, 15] and awe emotion[16] have registered their significant association with pro-environmental behaviour.

Mindfulness refers to the deliberate awareness of current internal states and external behavior [17,18]. Recent literature reviews mentioned that mindfulness has the potential to ameliorate an individual's lifestyle as well as behaviors that are sustainable. [19,20]. Also, it affects the behavioral selections pertaining to the awareness of particular experiences [21]. Since mindfulness deepens individuals' connection with nature [22], it strengthens the bond between individuals and nature, thereby increasing awareness of pro-environmental behavioral choices [14]. Specifically, one facet of mindfulness, known as *observing*, enhances individuals' experience by increasing attention to environmental stimuli and was also found to be distinctive in predicting pro-environmental behavior [14].

Like mindfulness, awe emotion has also been found to promote pro-environmental behaviors [23]. When an individual responds emotionally to something perceived as unusually vast that challenges his existing mental framework and stimulates a demand to adjust his mental structures, then it means he is experiencing awe emotion [24]. Awe emotion has the tendency to make individuals feel small and insignificant by diverting their attention away from their self-interest towards phenomena larger than

themselves. Both empirical [25] and qualitative [26] studies on awe show that awe emotion is multifaceted (for example, connectedness, openness and acceptance, perception of time, vastness, profoundness, etc.) and among them connectedness facet is one of the characteristics found commonly in those studies. The connectedness facet of awe involves individuals experiencing feelings of connectedness to other people as well as the environment beyond themselves [25]. Since this facet of awe is found to increase the collective engagement of people (e.g., social behaviors, and actions towards sustainability) in an individualistic culture and collectivistic culture [27], we argue that the connectedness facet is associated with pro-environmental behavior, in which the former prompts the latter.

Awe influences an individual's attention [28, 29]. As stated by the researcher Michelle Shiota, awe emotion might be a temporary form of mindfulness because a person experiencing awe emotion becomes focused on that phenomenal thing that elicits awe emotion. In this sense, mindfulness and awe are considered to be related [30]. As mindfulness enhances various forms of connectedness, such as nature connectedness [11] and social connectedness [31] through focused attention, we argue that observing facet of mindfulness might be related to the connectedness facet of awe emotion, with the former potentially enhancing the latter.

Based on the studies mentioned above and the rationale provided, the current research intends to provide evidence that the connectedness facet of awe emotion can mediate the relationship between pro-environmental behavior and the observing facet of mindfulness.

Theoretical framework

Mindfulness and Pro-environmental behaviour (PEB)

In recent years, research in environmental psychology has begun to investigate the association between ecological behavior and mindfulness [32]. Empirical studies have shown that mindfulness has a significant connection with pro-environmental behaviors related to food, travel, and residence [33]. Several review studies have also suggested that mindfulness could potentially enhance sustainability-based behaviors and lifestyles [19, 20], with mindfulness constructs playing a significant role in motivating sustainable behavioral changes (34). Given that mindfulness is multifaceted [35], various instruments are available to measure its different facets. However, not all aspects of mindfulness contribute equally to sustainable behaviors [36].

For instance, "acting with awareness," a facet of mindfulness, showed a positive correlation with sustainable actions [37]. Studies using the Mindful Attention Awareness Scale [18], which specifically evaluates the attention aspect of mindfulness, have also reported a positive association between environmental behavior, mindfulness, and ecological footprints [33]. Conversely, research utilizing the Five Facet Mindfulness Questionnaire [38], a self-reported measure assessing observing, non-reactivity, non-judging, describing, and acting with awareness (described later), did not replicate these results [14]. Instead, this study found that the observing and no reactivity facets were positively associated with pro-environmental behavior. Similarly, research conducted by Geiger, Otto, and Schrader[68] using the Comprehensive Inventory of Mindfulness Experiences (CHIME) questionnaire [39] revealed a strong correlation between the awareness/observing facet and ecological behavior, while acting with awareness did not show the same correlation. Consequently, Geiger et al. [50] proposed that only specific facets of mindfulness directly correlate with sustainable consumption behaviors, a viewpoint also emphasized by Geiger et al. [41] and Hunecke & Richter [49]. Hence, the observing facet, which involves paying attention to internal and external experiences [38], emerges as a critical aspect of mindfulness [40] and consistently predicts pro-environmental behaviors due to its heightened environmental awareness [41]. As a result, this facet is deemed suitable for the current study.

Furthermore, both prior research and theoretical considerations advise against viewing mindfulness as a direct predictor of pro-environmental behavior [42]. Several studies have delved into potential mechanisms that underlie the link between pro-environmental behavior and mindfulness. Fischer et al. (38) propose that mindfulness could foster sustainable consumption by disrupting routines, reducing attitude-behavior discrepancies, cultivating non-materialistic values and well-being, and promoting pro-social behavior. Similarly, Patel & Holm [78] suggest that the association between mindfulness and workplace pro-environmental behavior could be mediated by connectedness to nature, non-materialism, and openness to change.

However, only a handful of empirical studies have investigated these potential mediators. Notably, Barbaro and Pickett [15] found that both mindfulness and its observing facet, along with pro-environmental behavior, are mediated by a strong connection to nature. Additionally, the observing facet was indirectly linked to organic food consumption by constructing meaning to life, meaning related to sustainability, and personal norms [43]. Studies by Panno et al. [35] and Geiger et al. [68] revealed that social dominance and health-related behaviors mediated the association between ecological behavior and mindfulness. Given

that only specific mindfulness features are directly tied to pro-environmental behavior [44], our study seeks to elucidate the relationship between the observing facet and pro-environmental behavior by considering the connectedness facet of awe emotion as a potential mediator.

Awe emotion as a mediator

Awe boasts a rich history and has been explored extensively across various fields, including religion, philosophy, sociology, and psychology. It stands as a fundamental emotion intricately woven into religious, political, nature, and art experiences [24]. It carries mixed emotional valences [45]. While past interpretations often intertwined awe with fear (e.g., Burke, 1770), recent research has shifted this perspective, classifying awe as a positive emotion [46, 47] and also as a self-transcendent emotion [48]. Notably, Keltner and Haidt [26]) introduced a cognitive prototypical approach encompassing key features: perceived vastness and accommodation, to elucidate awe. Vastness can manifest physically (e.g., Mount Everest) or socially (e.g., fame), as well as perceptually or abstractly (e.g., contemplating eternity, infinite universe). Any stimulus, devoid of power or threat yet perceived as immense, can evoke a sense of vastness. Like Piaget's concept, accommodation involves mental reorganization to incorporate novel experiences into existing mental frameworks. Thus, awe is an emotional response of an individual to something perceived as unusually vast, challenging his existing mental framework and urging him to adjust his mental structures to accommodate it [24]. Contemporary psychological interpretations of awe largely stem from this prototypical approach [25].

Likewise, Bonner and Friedman identified ten themes tentatively linked to awe experiences, categorizing them into emotional (numinous, profoundness, fear, connectedness), cognitive (openness, acceptance, vastness, ineffable wonder, existential awareness), and sensory (presence, heightened perceptions) aspects. While grouped, these facets interrelate, with no single theme prevailing. Vastness and existential awareness often intermingle with a sense of connectedness [26].

Moreover, to empirically capture the complete range of awe experiences, Yaden et al. [27] devised a scale based on six facets: vastness, self-diminishment, altered time perception, need for accommodation, connectedness, and physical sensations. Among these, the connectedness facet, where individuals feel connected to others and their environment, has been found to heighten the collective engagement of people in both individualistic and collectivistic cultures [27]. This connectedness underpins a sense of unity with surroundings, encompassing nature and fellow humans, which could be pivotal in prompting pro-environmental behavior.

Curiously, awe emotion might also intersect with mindfulness in two dimensions. Initially, akin to Michelle Shiota's view, an individual, when experiencing awe emotion focuses his attention on that exceptional thing which elicits the awe emotion. This response can be considered a temporary form of mindfulness [30]. Second, with regard to smallness, both awe and mindful experiences can yield feelings of connectedness with others while also reducing self-awareness [49]. From these concepts, an empirical exploration of the link between awe and mindfulness arises. We are particularly interested in the observing facet of mindfulness and the connectedness facet of awe. Given that observation enhances the experience by intensifying attention to the environment, we hypothesize that observation may also enhance an individual's connectedness facet of awe.

Considering awe's capacity to foster a broader existential perspective, nurturing concern for other people as well as the environment [29,50], recent research delves into the correlations between awe, pro-environmental behavior, and pro-social behavior. Several studies demonstrate awe's role in enhancing pro-environmental behavior through nature-connectedness [23] and reducing social dominance [16], alongside fostering pro-social conduct [51]. Provided awe's potential to trigger pro-environmental actions and its possible relationship with mindfulness, we hypothesize that the connectedness facet of awe can mediate the interconnection between the observing facet of mindfulness and pro-environmental behavior.

Thus far, empirical research directly linking mindfulness and awe emotion remains scarce. We posit from prior research and review papers that the connectedness facet of awe can mediate the connection between pro-environmental behavior and the observing facet of mindfulness. This research aims to achieve two primary objectives: firstly, spotlight the distinctive facet of mindfulness, observation, and its interplay with pro-environmental behavior and awe emotion. Secondly, it tries to shed light on the unexplored psychological factor of the connectedness facet of awe concerning mindfulness and pro-environmental behavior. We anticipate a direct correlation between the observing facet of mindfulness and pro-environmental behavior and the connectedness facet of awe emotion (H1). Furthermore, given that the observing facet of mindfulness can amplify experiences by sharpening attention to environmental stimuli [14], we also propose that the connectedness facet of awe emotion is augmented through heightened environmental attention, thereby influencing pro-environmental behavior (H2).

MATERIAL AND METHODS

Participants and Procedure

Data were obtained from 204 undergraduate students (49.5% male, 50.5% female) majoring in forestry or its related courses, residing in and around Coimbatore district, with the age range of 18 to 21 years. We employed a purposive sampling technique in selecting the population. Forestry students exhibit a higher willingness to embrace pro-environmental behaviors, [52] and they are exposed to nature as a part of their curriculum. Since mindfulness [53] and awe emotion [54] are significantly related to nature, these students were found to be a suitable sample for investigating the relationship between pro-environmental behaviour, mindfulness, and awe. The author approached the participants in person, inside the respective educational institutions, and the volunteered participants, prior to the study, had signed an informed consent form. Upon the consent, they provided demographic details and were administered a series of self-report questionnaires. The participant's mean age was 19.27 years (SD=0.94). About 29.9% of the sample were from urban areas, 26% were from suburban areas, and 44.1% were from rural areas. About 36.8% were from a joint family, 41.2% from a nuclear family, and 22.1% were from a single-parent family. After completion, the participants were thanked and debriefed. Participants were not given any financial compensation, and their anonymity was guaranteed.

Measures

Five Facet Mindfulness Questionnaire [38] was used to assess the observing facet of Mindfulness. This questionnaire had 39 items which are grouped under five facets, namely *acting with awareness* which indicates the conscious behavioral attention of an individual at the moment, contrasts to "autopilot" behaviour where the attention is focused elsewhere; *observing,* which refers to intentional attention to internal and external experience; *non-reactivity* whichmeans the capability to permit thoughts and feelings to pass through without becoming engrossed in them; *describing* which indicates the capability of an individual to name his inner experiences through words and *non-judging* which mean to adopt a nonjudgmental attitude toward thoughts and feelings (35). All these items are scored on a 5-point Likert scale (1= Never or very rarely true, 5= very often or always true). The Cronbach's α for observing facet was 0.75.

The Awe Experience Scale [25] was used to assess the connectedness facet of awe emotion. This scale consisted of 30 items which are grouped under six facets, namely *vastness* which refers to perceptual as well as conceptual vastness; *need for accommodation* which refers to changes in the existing mental schemas that allow one to mentally process and integrate an experience; *altered time perception* which refers to time dilation, *self-diminishment* which refers to reduced salience of one's self in certain aspects, *connectedness* which refers to feelings of connection with others and surrounding beyond one's self, and *physical sensations* which refers to changes in one's physiology. All these items were scored on a 7-point scale (1 = Strongly Disagree, 2 = Moderately Disagree, 3 = Somewhat Disagree, 4 = Neutral, 5 = Somewhat Agree, 6 = Moderately Agree, 7 = Strongly Agree). The Cronbach's α for the connectedness facet was 0.68

To measure the pro-environmental behaviour for the present study, a questionnaire was developed by the author as a Pro-environmental behaviour Scale based on the review of the literature. This scale consisted of 6 statements and each statement was rated on a 5-point Likert scale (1= Never, 2= Rarely, 3=Sometimes, 4=often, 5=Always). The statements were like "Encouraging and making my family members and friends take part in environmental protective activities/camps," "Turning off the tap when the water overflow unnecessarily (e.g., while brushing, washing, etc.)," "Recycling waste newspapers, cans or bottles," "Growing small plants in my surroundings," "Reuse or repair items in my home/room instead of throwing them away," "Writing letters to environmental departments or authorities about any serious environmental issues." The CFA was conducted to check the model fit. By the following criteria, RMR< 0.08, RMSEA < 0.08, AGFI> 0.90 [55], CFI > 0.90 [56], and GFI > 0.90, NFI > 0.90 [57], the model fit was evaluated. The analyses show that the calculated p-value was 0.644, which is greater than 0.05, and CMIN/DF was 0.770, which is also less than 5 [58], and the values RMR= 0.033, RMSEA= 0.000, AGFI= 0.974, CFI= 1.00, GFI= 0.989, NFI= 0.943 indicted perfect model fit. The Cronbach's α was 0.64, which is within the acceptable range [59]. Also, Sociodemographic details, namely age, gender, residence, and family type were collected.

RESULTS

Table 1 presents the means, standard deviations, and correlations of the variables taken for the study. A z-test is carried out using skewness and kurtosis to check the normality of the data. Since the sample was medium-sized (50<n=204<300) and the z values were within the range of -3.29 and +3.29, the data was assumed to be normally distributed [60]. Consequently, further analyses were carried out. Conforming to hypothesis 1, observing the facet of mindfulness shows a significant positive relationship with the

connectedness facet of awe emotion (r= 0.38, p<0.001) and pro-environmental behaviour (r=0.34, p<0.001). Similarly, the connectedness facet is also positively related to pro-environmental behaviour (r=0.36, p<0.001), thus supporting Hypothesis 1.

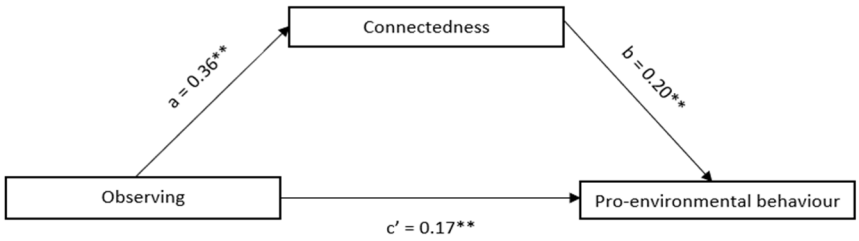

Fig. 1 Model of observing facet as a predictor of pro-environmental behaviour, mediated by connectedness facet with unstandardized coefficient values. Bold paths represent significant pathways. *Note*. **p<0.01

Table 1. Mean, standard deviation, and correlation among variables investigated in the study

Variables	1	2	3	Mean	SD
Pro-environmental behaviour	1			19.13	3.70
Observing	.34**	1		30.58	5.23
Connectedness	.36**	.38**	1	25.96	5.00

*Note.**p< .05; ** p< .01. n=204 participants

Table 2. Total, direct and indirect effects

	Connectedness			Pro-environmental behaviour		
	B	LLCI	ULCI	B	LLCI	ULCI
Total effect						
Constant				11.79**	8.927	14.659
Observing				0.239**	0.1474	0.332
				F (1,202) =26.196; p<0.000; R^2=0.115		
Direct effect						
Constant	14.887**	11.072	18.70	8.831**	5.681	11.982
Observing	0.362**	0.239	0.485	0.168**	0.071	0.264
Connectedness				0.199**	0.098	0.299
	F (1,202) =33.74; p<0.000; R^2= 0.14			F (2,201) =21.598; p<0.000; R^2 =0.177		
		Effect		BootLLCI		BootULCI
Indirect effect		0.072		0.027		0.128

1*B= unstandardized coefficients. * p<0.05; **p<0.01.*

1*LLCI= lower limit CI;*

1*ULCI= upper limit CI*

To examine the underlying mechanism between observing facet and pro-environmental behaviour, Model 4 of Hayes' PROCESS (N=5000) was used [61]. Table 2 shows the total, direct, and indirect effects of observing facets on pro-environmental behaviour. The results confirm that the observing facet significantly predicts the connectedness facet (β=0.36, 95%CI [0.24, 0.48]) and the connected facet significantly predicts pro-environmental behaviour (β=0.20, 95% CI [0.10, 0.30]). Also, observing the facet's indirect effect is statistically significant, showing evidence of a mediation effect (β= 0.07, 95%CI [0.03, 0.13]). Thus hypothesis 2 is verified. Though the total effect of observing facet on pro-environmental behavior is significant (β= 0.24, 95% CI [0.15, 0.33]), the direct effect is also statistically confirming that this relation is partially mediated by the connectedness facet (β= 0.17, 95% CI [0.07, 0.26]). This shows that the

connectedness facet is a significant mediator, even though not counting for the entire correlation between pro-environmental behaviour and the observing facet.

DISCUSSION

The present study was designed to serve two main purposes concerning pro-environmental behaviour. Firstly, our goal was to establish the relationship between the observing facet of mindfulness and pro-environmental behavior, as well as its association with the connectedness facet of awe emotion. Recent research has suggested that specific aspects of mindfulness are positively linked to sustainable consumption behaviors [43,36,44]. Our findings align with prior studies, indicating that a particular facet of mindfulness, namely observing, is indeed positively correlated with pro-environmental behavior [62,14]. Additionally, we observed a connection between the observing facet of mindfulness and the connectedness facet of awe emotion, emphasizing the distinctive nature of the observing facet and its relationships with pro-environmental behavior and awe emotion. Thus, Hypothesis 1 received empirical support.

Secondly, the present study focused on investigating whether the connectedness facet of awe emotion mediates the link between the observing facet of mindfulness and pro-environmental behavior. The observing facet signifies an individual's attention to external stimuli and directs their focus toward experiences within the surrounding environment, thereby enhancing their connection with nature [14]. Moreover, being aware of an individual's own body and external surroundings has enhanced ecological behavior [62]. Accordingly, we hypothesized and confirmed that the observing facet of mindfulness amplifies the experience of connectedness, a component of awe emotion, consequently increasing the likelihood of pro-environmental behavior. This supports the notion of the connectedness facet as a potential mediator. In this context, we suggest that a lack of attention to external stimuli might hinder the development of feelings of connectedness toward those stimuli. When individuals bring external stimuli into their sphere of awareness, it can enhance their sense of connectedness to these stimuli. Thus, Hypothesis 2 was substantiated.

Hence, the present study aimed to make novel contributions to our understanding of pro-environmental behavior by investigating the specific facet of awe emotion, connectedness, and its connection with pro-environmental behavior. Additionally, it explored the intersection of awe facets and mindfulness facets, focusing on the connectedness facet of awe emotion and the observing facet of mindfulness in relation to pro-environmental behavior. Previous research has demonstrated that unique aspects of mindfulness are linked to pro-environmental behavior [44]. Mindfulness enhances pro-environmental behavior [63] and induces self-transcendence and positive emotions [64]. Awe, also considered a self-transcendence positive emotion [48], has been found to be related to pro-environmental behavior [23]. The concept of self-transcendence aligns with the connectedness facet of awe emotion [25]. Awe emotion, as a self-transcendence experience, shifts one's focus away from immediate self-interest [65] and encourages a broader existential perspective that encompasses the well-being of others, society, and the environment [29,50]. Therefore, grounded on these insights and the findings of the present study, we suggest that the observing facet of mindfulness enhances pro-environmental behavior by triggering the connectedness facet of awe emotion. This underscores the importance of exploring different characteristics or facets of awe emotion in relation to various aspects of mindfulness concerning pro-environmental behavior. The findings also imply that paying greater attention to stimuli, as facilitated by the observing facet, may be a key antecedent to the connectedness experienced in awe emotion.

Numerous researches have shown that mindfulness indirectly predicts pro-environmental behavior through various mediators, such as social dominance orientation [32], connectedness to nature [14], and health behaviors [62]. This suggests the possibility of additional mediators in this association that warrant further investigation. Thus, the present study extends prior research on pro-environmental behavior by delving into why mindfulness enhances such behavior. This contributes to our understanding of the antecedents of pro-environmental behavior, shedding light on the previously unexplored facet of awe-emotion and connectedness in relation to pro-environmental behavior. Moreover, it clarifies why individuals who are attentive to external stimuli tend to endorse pro-environmental behavior, supporting previous research suggesting mindfulness as an indirect predictor of pro-environmental behavior [42].

The practical implications of this study suggest that enhancing mindfulness training may prompt individuals to engage in pro-environmental behavior. Mindfulness training programs that specifically emphasize mindful observation may effectively cultivate the connectedness facet of awe emotion, as there is evidence linking mindfulness, connectedness to nature, and self-transcendence experiences. Mindfulness-based interventions have been successfully used in schools to enhance the health and well-being of students and teachers [66, 67]. Incorporating mindfulness training in environmental education

programs could motivate students to participate in pro-environmental behavior by fostering feelings of connectedness with nature. However, it's important to acknowledge some limitations in the present study. Firstly, the study focused solely on the observing facet of mindfulness and the connectedness facet of awe emotion, excluding the other facets of both constructs. Secondly, the sample consisted only of college students majoring in forestry or its related courses, limiting the generalizability of the findings. Thirdly, the pro-environmental behavior scale used in this study included a limited number of statements and did not cover a wide range of pro-environmental behaviors, although the confirmatory factor analysis showed a good model fit. Therefore, future research should expand on these findings by considering various dimensions of awe and mindfulness in relation to pro-environmental behavior and measuring a broader range of pro-environmental behaviors to gain a more comprehensive understanding of these relationships. In conclusion, this study investigated the relationship between the observing facet of mindfulness, the connectedness facet of awe emotion, and pro-environmental behavior. The results revealed that the observing facet of mindfulness influences the connectedness facet of awe emotion, which in turn partially mediates the effects of the observing facet on pro-environmental behavior. This suggests the potential benefits of incorporating mindfulness training or practices into educational programs that involve outdoor activities. Overall, the findings offer a new perspective on the interplay between specific characteristics of mindfulness and awe emotion in the context of pro-environmental behavior.

Funding Information
The first author V.S.S was supported by Grant RFD/2019-20/GEN/PSY/377 from the Indian Council of Social Science Research (ICSSR), New Delhi.

Conflict of Interest
There is no conflict of interest.

Data Availability
The data will be provided based on the request from the corresponding author

Authors' Contributions
V.S.S., and M.V. both contributed to the conceptualization, methodology, collecting data, analyzing the data, writing, drafting, and finalization of this article.

Author's Disclosure Statement
There are no competing financial interests.

REFERENCES

1. Fritz, S., See, L., Carlson, T., Haklay, M., Oliver, J., Fraisl, D., Mondardini, R., Brocklehurst, M., Shanley, L., Schade, S., Wehn, U., Abrate, T., Anstee, J., Arnold, S., Billot, M., Campbell, J., Espey, J., Gold, M., Hager, G., & West, S. (2019). Citizen Science and the United Nations Sustainable Development Goals. *Nature Sustainability, 2*(10), 922-930. https://doi.org/10.1038/s41893-019-0390-3
2. Watts, N., Adger, W. N., Agnolucci, P., Blackstock, J., Byass, P., Cai, W., ... & Costello, A. (2015). Health and climate change: policy responses to protect public health. *The Lancet*, *386*(10006), 1861-1914. https://doi.org/10.1016/S0140-6736(15)60854-6
3. Pearson, P. J., & Foxon, T. J. (2012). A low carbon industrial revolution? Insights and challenges from past technological and economic transformations. *Energy Policy*, *50*, 117-127. https://doi.org/10.1016/j.enpol.2012.07.061
4. Millennium Ecosystem Assessment (2005). *Ecosystems and human well-being: Synthesis.* Island Press. https://www.millenniumassessment.org/documents/document.356.aspx.pdf
5. Vlek, C., & Steg, L. (2007). Human Behavior and Environmental Sustainability: Problems, Driving Forces, and Research Topics. *Journal of Social Issues*, *63*(1), 1-19. https://doi.org/10.1111/j.1540-4560.2007.00493.x
6. Winter, D.D.N., & Koger, S.M. (2004). The psychology of environmental problems (2nd ed.). Lawrence Erlbaum Associates.
7. Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, *29*(3), 309-317. https://doi.org/10.1016/j.jenvp.2008.10.004
8. Larson, L. R., Stedman, R. C., Cooper, C. B., & Decker, D. J. (2015). Understanding the multi- dimensional structure of pro-environmental behavior. Journal of Environmental Psychology, 43, 112-124. https://doi.org/10.1016/j.jenvp.2015.06.004
9. Bamberg, S., &Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, *27*(1), 14-25. https://doi.org/10.1016/j.jenvp.2006.12.002

10. Wamsler, C., & Brink, E. (2018). Mindsets for sustainability: Exploring the link between mindfulness and sustainable climate adaptation. *Ecological Economics*, *151*, 55-61. https://doi.org/10.1016/ j. ecolecon.2018.04.029
11. Hanley, A. W., Bettmann, J. E., Kendrick, C. E., Deringer, A., & Norton, C. L. (2020). Dispositional mindfulness is associated with greater nature connectedness and self-reported ecological behavior. *Ecopsychology*, *12*(1), 54-63. https://doi.org/10.1089/eco.2019.0017
12. Brügger, A., Kaiser, F. G., & Roczen, N. (2011). One for all? Connectedness to nature, inclusion of nature, environmental identity, and implicit association with nature. *European Psychologist*, *16*(4), 324-333. https://doi.org/10.1027/1016-9040/a000032
13. Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, *24*(4), 503-515. https://doi.org/10.1016 /j.jenvp.2004.10.001
14. Barbaro, N., & Pickett, S. M. (2016). Mindfully Green: Examining the effect of connectedness to nature on the relationship between mindfulness and engagement in pro-environmental behavior. *Personality and Individual Differences*, *93*, 137-142. https://doi.org/10.1016/j.paid.2015.05.026
15. Rosa, C. D., Profice, C. C., & Collado, S. (2018). Nature experiences and adults' self-reported pro-environmental behaviors: The role of connectedness to nature and childhood nature experiences. *Frontiers in Psychology*, *9*, 1055. https://doi.org/10.3389/fpsyg.2018.01055
16. Zhao, H., Zhang, H., Xu, Y., Lu, J., & He, W. (2018). Relation between awe and environmentalism: The role of social dominance orientation. Frontiers in Psychology, 9, 2367. https://www.frontiersin.org /articles/10.3389 /fpsyg.2018.02367
17. Kabat-Zinn, J. (1990). *Full Catastrophe Living: Using the Wisdom of Your Mind to Face Stress, Pain and Illness.* Dell Publishing
18. Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*(4), 822-848. https://doi.org/10.1037/0022-3514.84.4.822
19. Barrett, B., Grabow, M., Middlecamp, C., Mooney, M., Checovich, M. M., Converse, A. K., ... & Yates, J. (2016). Mindful climate action: Health and environmental co-benefits from mindfulness-based behavioral training. *Sustainability*, *8*(10), 1040. https://doi.org/10.3390/su8101040
20. Chatzisarantis, N. L. D., & Hagger, M. S. (2007). Mindfulness and the intention-behavior relationship within the theory of planned behavior. *Personality and Social Psychology Bulletin*, *33*(5), 663-676. https://doi.org/10.1177/0146167206297401
21. Van Gordon, W., Shonin, E., & Richardson, M. (2018). Mindfulness and nature. *Mindfulness*,*9*(5), 1655-1658. https://doi.org/10.1007/s12671-018-0883-6
22. Yang, Y., Hu, J., Jing, F., & Nguyen, B. (2018). From Awe to Ecological Behavior: The Mediating Role of Connectedness to Nature. *Sustainability*, *10*(7), 2477. https://doi.org/10.3390/su10072477
23. Keltner, D., & Haidt, J. (2003). Approaching awe, a moral, spiritual, and aesthetic emotion. Cognition and *Emotion*, *17*(2), 297-314. https://doi.org/10.1080/02699930302297
24. Yaden, D. B., Kaufman, S. B., Hyde, E., Chirico, A., Gaggioli, A., Zhang, J. W., & Keltner, D. (2019). The development of the Awe Experience Scale (AWE-S): A multifactorial measure for a complex emotion. *The Journal of Positive Psychology*, *14*(4), 474-488. https://doi.org/10.1080/17439760.2018.1484940
25. Bai, Y., Maruskin, L. A., Chen, S., Gordon, A. M., Stellar, J. E., McNeil, G. D., ... & Keltner, D. (2017). Awe, the diminished self, and collective engagement: Universals and cultural variations in the small self. *Journal of personality and social psychology*, *113*(2), 185-209. https://doi.org/10.1037/pspa0000087
26. Sung, B., & Yih, J. (2016). Does interest broaden or narrow attentional scope? Cognition and Emotion, 30(8), 1485-1494. https://doi.org/10.1080/02699931.2015.1071241
27. Prade, C., &Saroglou, V. (2016). Awe's effects on generosity and helping. The Journal of Positive Psychology, 11(5), 522–530.https://doi.org/10.1080/17439760.2015.1127992
28. D'Ardenne, K. (2019, January 3). Research that takes your breath away: The impact of awe. ASU News. https://news.asu.edu/20190103-research-takes-your-breath-away-impact-awe.
29. Rehman, A.U., You, X., Wang, Z., & Kong, F. (2023). The link between mindfulness and psychological well-being among university students: The mediating role of social connectedness and self-esteem. Current Psychology, 42(11), 11772-11781. https://doi.org/10.1007/s12144-021-02428-6
30. Panno, A., Giacomantonio, M., Carrus, G., Maricchiolo, F., Pirchio, S., &Mannetti, L. (2018). Mindfulness, Pro-environmental Behavior, and Belief in Climate Change: The Mediating Role of Social Dominance. Environment and Behavior, 50(8), 864–888. https://doi.org/10.1177/0013916517718887
31. Brown, K. W., & Kasser, T. (2005). Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. Social indicators research, 74(2), 349-368. https://doi.org/10.1007/s11205-004-8207-8
32. Fischer, D., Stanszus, L., Geiger, S., Grossman, P., & Schrader, U. (2017). Mindfulness and sustainable consumption: A systematic literature review of research approaches and findings. Journal of Cleaner Production, 162, 544-558. https://doi.org/10.1016/j.jclepro.2017.06.007
33. Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietmeyer, J., Sauer, S., Walsh, E., Duggan, D., & Williams, J. M. G. (2008). Construct Validity of the Five Facet Mindfulness Questionnaire in Mediating and Nonmeditating Samples. *Assessment, 15*(3), 329-342. https://doi.org/10.1177/1073191107313003

34. Geiger, S. M., Grossman, P., & Schrader, U. (2019). Mindfulness and sustainability: Correlation or causation? *Current Opinion in Psychology*, *28*, 23-27. https://doi.org/10.1016/j.copsyc.2018.09.010
35. Amel, E. L., Manning, C. M., & Scott, B. A. (2009). Mindfulness and sustainable behaviour: Pondering attention and awareness as means for increasing green behavior. Ecopsychology, 1(1), 14-25. https://doi.org/10.1089/eco.2008.0005
36. Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, *13*(1), 27-45. https://doi.org/10.1177/1073191105283504
37. F Erfassung von Achtsamkeit: Das Comprehensive Inventory of Mindfulness Experiences [Construction and first validation of the Comprehensive Inventory of Mindfulness Experiences]. Diagnostica, 60(3), 111–125. https://doi.org/10.1026/0012-1924/a000109
38. Lilja, J. L., Lundh, L.-G., Josefsson, T., &Falkenström, F. (2013). Observing as an essential facet of mindfulness: A comparison of FFMQ patterns in meditating and non-meditating individuals. *Mindfulness, 4*(3), 203–212. https://doi.org/10.1007/s12671-012-0111-8
39. Colombo, S. L., Chiarella, S. G., Raffone, A., & Simione, L. (2023). Understanding the Environmental Attitude-Behaviour Gap: The Moderating Role of Dispositional Mindfulness. *Sustainability*, *15*(9), 7285. https://doi.org/10.3390/su15097285
40. Richter, N., &Hunecke, M. (2020). Facets of mindfulness in stages of behavior change toward organic food consumption. *Mindfulness*, *11*(6), 1354-1369.https://doi.org/10.1007/s12671-020-01351-4
41. Hunecke, M., & Richter, N. (2019). Mindfulness, construction of meaning, and sustainable food consumption. *Mindfulness*, *10*(3), 446-458.https://doi.org/10.1007/s12671-018-0986-0
42. Geiger, S. M., Fischer, D., Schrader, U., & Grossman, P. (2020). Meditating for the Planet: Effects of a Mindfulness-Based Intervention on Sustainable Consumption Behaviors. *Environment and Behavior*, *52*(9), 1012– 1042. https://doi.org/10.1177/0013916519880897
43. Sundararajan, L. (2002). Religious Awe: Potential Contributions of Negative Theology to Psychology, "Positive" or otherwise. *Journal of Theoretical and Philosophical Psychology*, *22*, 174-197. https://doi.org /10.1037/h0091221
44. Shaver, P., Schwartz, J., Kirson, D., & O'Connor, C. (1987). Emotion knowledge: Further exploration of a prototype approach. *Journal of Personality and Social Psychology*, *52*(6), 1061-1086. https://doi.org/10.1037/0022-3514.52.6.1061
45. Campos, B., Shiota, M. N., Keltner, D., Gonzaga, G. C., & Goetz, J. L. (2013). What is shared, and what is different? Core relational themes and expressive displays of eight positive emotions. *Cognition & emotion*, *27*(1), 37-52. https://doi.org/10.1080/02699931.2012.683852
46. Stellar, J. E., Gordon, A. M., Piff, P. K., Cordaro, D., Anderson, C. L., Bai, Y., Maruskin, L. A., & Keltner, D. (2017). Self-transcendent emotions and their social functions: Compassion, gratitude, and awe bind us to others through prosociality. *Emotion Review, 9*(3), 200–207. https://doi.org/10.1177/1754073916684557
47. Yaden, D. B., Haidt, J., Hood Jr, R. W., Vago, D. R., & Newberg, A. B. (2017). The varieties of self-transcendent experience. *Review of general psychology*, *21*(2), 143-160. https://doi.org/10.1037/gpr0000102
48. Cheung, W. Y., Luke, M. A., & Maio, G. R. (2014). On attitudes towards humanity and climate change: The effects of humanity esteem and self-transcendence values on environmental concerns. *European Journal of Social Psychology*, *44*(5), 496-506. https://doi.org/10.1002/ejsp.2037
49. Piff, P. K., Dietze, P., Feinberg, M., Stancato, D. M., & Keltner, D. (2015). Awe, the small self, and prosocial behavior. *Journal of Personality and Social Psychology, 108*(6), 883–899.https://doi.org/10.1037/pspi0000018
50. Fytopoulou, E., Karasmanaki, E., Tampakis, S., &Tsantopoulos., G. (2023). Effects of curriculum on environmental attitudes: A comparative analysis of environmental and non-environmental disciplines. *Education Sciences, 13,* 554. https://doi.org/10.3390/educsci13060554
51. Vitagliano, L. A., Wester, K. L., Jones, C. T., Wyrick, D. L., & Vermeesch, A. L. (2023). Group nature-based mindfulness interventions: Nature-based mindfulness training for college students with anxiety. *International Journal of Environmental Research and Public Health, 20*, 1451. https://doi.org/10.3390/ijerph20021451
52. Ballew, M. T., & Omoto, A. M. (2018). Absorption: How Nature Experiences promote Awe and other positive emotions. *Ecopsychology, 10*(1), 26-35. https://doi.org/10.1089/eco.2017.0044
53. Hair, J.F., Anderson, R.E., Tatham, R.L., Black, W.C., & Babin, B.J. (2006). *Multivariate Data Analysis* (6th ed.). Pearson Education.
54. Daire, H., Joseph, C., & Michael, R.M. (2008). Structural Equation Modeling: Guidelines for Determining Model Fit. *Electronic Journal of Business Research Methods, 6*(1), 53-60. https://doi.org/10.21427/D7CF7R
55. Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118
56. Hair, J.F. Jr., Anderson, R.E., Tatham, R.L., & Black, W.C. (1998). *Multivariate Data Analysis* (5th ed.). Prentice-Hall.
57. Shi, J., Mo, X., & Sun, Z. (2012). Content validity index in scale development. *Zhong Nan Da Xue Xue Bao Yi Xue Ban, 37*(2), 152–155. https://doi.org/10.3969/j.issn.1672-7347.2012.02.007
58. Kim, H. Y. (2013). Statistical notes for clinical researchers: Assessing normal distribution (2) using skewness and kurtosis. *Restorative Dentistry & Endodontics, 38*, 52-54. https://doi.org/10.5395/rde.2013.38.1.52
59. Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* Guilford Press.

60. Geiger, S. M., Otto, S., & Schrader, U. (2018). Mindfully green and healthy: An indirect path from mindfulness to ecological behavior. *Frontiers in Psychology*, *8,* 2306. https://doi.org/10.3389/fpsyg.2017.02306
61. Thiermann, U.B., Sheate, W.R. (2022). How Does Mindfulness Affect Pro-environmental Behaviors? A Qualitative Analysis of the Mechanisms of Change in a Sample of Active Practitioners. Mindfulness, 13, 2997-3016. https://doi.org/10.1007/s12671-022-02004-4
62. Garland, E. L., & Fredrickson, B. L. (2019). Positive psychological states in the arc from mindfulness to self-transcendence: Extensions of the Mindfulness-to-Meaning Theory and applications to addiction and chronic pain treatment. Current Opinion in Psychology, 28, 184-191. https://doi.org/10.1016/ j.copsyc.2019.01.004
63. Rudd, M., Vohs, K. D., & Aaker, J. (2012). Awe Expands People's Perception of Time, Alters Decision Making, and Enhances Well-Being. Psychological Science, 23(10), 1130–1136. https: //doi.org/10.1177/0956797612438731
64. Gold, E., Smith, A., Hopper, I., Herne, D., Tansey, G., & Hulland, C. (2010). Mindfulness-based stress reduction (MBSR) for primary school teachers. *Journal of child and family studies*, *19*(2), 184-189. https://doi.org/10.1007/s10826-009-9344-0
65. McKeering, P., & Hwang, Y. S. (2019). A Systematic Review of Mindfulness-Based School Interventions with Early Adolescents. *Mindfulness, 10*, 593–610. https://doi.org/10.1007/s12671-018-0998-9
66. Burke, E. (1770). *A philosophical enquiry into the origin of our ideas of the sublime and beautiful* (6th ed.). J. Dodsley. http://www.archive.org/details/philosophicalenq00burk/
67. Patel, T., & Holm, M. (2018). Practicing mindfulness as a means for enhancing workplace pro- environmental behaviors among managers. Journal of Environmental Planning and Management, 61(13), 2231-2256.https://doi.org/10.1080/09640568.2017.1394819

CITATION OF THIS ARTICLE

V. Swedhaa Shanmathi, M. Vinothkumar. From Mindful Observation To Pro-Environmental Behaviour: The Mediating Role Of Connectedness Facet Of Awe Emotion. Bull. Env.Pharmacol. Life Sci., Vol 12[10] September: 140-149.