Predictability of Mindfulness and Connectedness to Nature on Pro-environmental Behavior of Undergraduate Students

Suparada Jamparat, Chiang Mai University, Thailand
Teerawan Teerapong, Chiang Mai University, Thailand
Veerawan Wongpinpech, Chiang Mai University, Thailand

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Abstract
The purposes of this research were to study the predictability of mindfulness and connectedness to nature on pro-environmental behavior of undergraduate students. The samples were 395 undergraduate students at Chiang Mai University. Three questionnaires including the mindfulness scale, connectedness to nature scale, and pro-environmental behavior scale were used to collect data. Descriptive statistics and multiple regression analysis were performed to analyze data. The results showed that connectedness to nature could predict pro-environmental behavior at the .05 level (β=.421). Also, mindfulness could predict environmental behavior at the level of .05 (β=.104). Furthermore, connectedness to nature and mindfulness could significantly predict pro-environmental behavior (R^2=22.4). In conclusion, if students enhance mindfulness and connectedness to nature, they will consequently enhance more pro-environmental behavior.

Keywords**:** Pro-environmental Behavior, Mindfulness, Connectedness to Nature

Introduction

In the modern world, environmental issues are serious problems which are the direct effects of human activities. Basic human needs and desire for comfort and convenience have urged humans to make advances in science and technology to consume natural resources more conveniently and easily. Also, there has been the development of manufacturing processes to produce both capital and consumer goods, which causes environmental pollution such as water, air, and noise pollution. Besides, the consumption produces waste such as solid waste, waste water, and air toxics that contaminate environment. To prevent degradation of natural resources and environment, various parties encourage humans to preserve natural resources and environment. The preservation of natural resources and environment can be done in several ways, both directly and indirectly. The direct methods can be carried out at the individual, organizational, and national level such as to reduce, reuse, refurbish, remedy, apply and substitute. To monitor and prevent are methods used to guard against harm to natural resources and environment such as monitoring disposal of garbage or sewage in rivers and constructing wildfire lines. For the indirect methods, Stewart (2007) states that there are several ways to preserve natural resources and environment such as the improvement of qualities of citizens through promoting environmental education. The provision of proper environmental education can be carried out with learners of all ages in school and in educational institutions. Patterns of behavior demonstrating the protection of nature can be called 'pro-environmental behavior.'

Stewart (2007) categorizes pro-environmental behavior as conscious behavior that an individual exhibits to reduce negative effects occurring in nature and man-made environment such as using less energy and reduce waste in manufacturing. Due to the fact that pro-environmental behavior is a conscious attempt, it could always be affected by an individual's outer and inner stimuli. The behavior is related to morality, ethics, or social norms. Groot & Stege (2009) give an interesting explanation suggesting that pro-environmental behavior benefits other people while the actor did not gain advantages, referring that the actor is a sacrificer. For example, the actor who decides to use public transportation will not find it as convenient as private transportation; however, society and environment are beneficial because the act reduces pollution and congestion. Or, for the case of waste segregation, the actor must provide space to sort garbage or seek information about how to properly segregate waste, which requires an individual to devote time as well as give up the convenience of old habits and then perform the new act that benefits society. Apparently, pro-environmental behavior can reduce negative effects or increase positive effects on natural environment. Several studies discover multiple factors contributing to pro-environmental behavior and mindfulness is found to be one key factor among these factors (Brown & Kasser, 2005).

Mindfulness is considered as an important factor relating to human behavior. Buddhism defines mindfulness as a mental state with readiness to notice presented things and realize how to treat them (Payutto, 2009). The intention to be mindful is reflected via experiences and patterns of exhibited behaviors. Generally, being mindful involve a specific experience which is the experience that an individual directly encounters. There are thoughts or emotions that emerge through the experience and become the individual's attitudes which may lead to improved regulation of behavior in the similar context (Langer & Moldoveanu, 2000). Concerning pro-environmental behavior, mindfulness regulates the behavior by means of increasing awareness in choosing pro-environmental behavior i.e., considering between recycling soda cans and throwing them in a trash bin.

Besides mindfulness, connectedness to nature is found to be another factor encouraging an individual to engage in pro-environmental behavior which causes minimal negative effect on natural environment, thoughts, and an individual. Chaichantipyuth (2011) defines connectedness to nature as a state in which an individual possesses the following aspects: be aware of connectedness among all things, realize that all things are one, perceive oneself as a part of nature – not separate oneself from nature, value and respect all things equally – not merely resources that exist to serve human needs, and realize that all things are interconnected and interdependent. The realization of connectedness to nature will lead to conservation behavior. Connectedness to nature reveals the sphere that gives a sense of belonging to the natural world, including the nature which represents the ideas about 'self' (Schultz, 2002). An individual who is connected strongly to nature is likely to cause minimal harmful effect on environment because the individual's self has been embedded in nature; meanwhile, harmful behavior will be the main part endangering the individual's self (Mayer & Frantz, 2004). Hoot and Friedman (2011) investigated the relationship between specific and general interconnectedness on beliefs and pro-environmental behavior and found that the specific indicators, connectedness to nature and consideration of future consequences were related to an individual's beliefs and future pro-environmental behavior. Likewise, Mayer and Frantz (2004) stated that connectedness to nature contributed to the expansion of self which eventually led to empathy, holistic worldview, and environment protection. Moreover, connectedness to nature contributed to environmental conservationism and behavior without the intention to exploit nature. In addition, Frantz, Mayer, Norton, and Rock (2005) found that connecting oneself to nature promoted an individual's awareness which influenced the perception of connection between oneself and environment; which eventually influenced conservation behavior.

In the context of university, environmental concerns have become the primary issues stating in policies and strategies of several universities. Chiang Mai University is one among these universities that plan the strategies emphasizing conservation of nature and environment. These strategies aim to improve knowledge, technology, and innovation via biotechnology, digital technology, and other related technology to develop practical environmental and energy innovation. Also, they aim to cultivate culture and improve environmental and energy capacity to promote sustainability for university communities, including students, faculties, and university staff as well as for the communities outside the university. Moreover, each faculty is required to adopt these strategies in developing their action plans. For example, the Faculty of Humanities, Chiang Mai University establishes the Strategic Goal 1 Environment and Energy Innovation: It is required to be a leader in promoting, managing, increasing capacity, and sharing knowledge as well as sustainable technology and green innovation; for example, to reduce the use of plastics and foam at the faculty, campaign for maintaining cleanliness of spaces inside and outside buildings as well as managing all types of waste, and encourage students; faculties; and staff to be aware of environment preservation – to save water and energy and reduce the use of paper. These are carried out via putting up posters, advertising via the faculty official website, conducting class activities, conducting student activities, and engaging the faculty staff to clean spaces around the faculty (Planning Division of Office of the University, 2016). It can be seen that university students are human resources directly related to the university's policies and belong to the important group whose pro-environmental behavior must be promoted accordingly. Also, it has been noticed that Chiang Mai University focuses on launching campaigns and providing knowledge and information, which might not be sufficient for the cultivation of pro-environmental behavior. That is because an individual's decision on exhibiting behavior is originated from the conscious level affected by the individual's outer and inner factors.

Accordingly, the researcher is interested in investigating predictability of mindfulness and connectedness to nature on pro-environmental behavior of undergraduate students at Chiang Mai University. That is to investigate factors predicting the students' pro-environmental behavior as well as to provide important information for the staff, faculties, or related units at each faculty in planning the cultivation of students' pro-environmental behavior.

Objectives of the study

To investigate the predictability of mindfulness and connectedness to nature on pro-environmental behavior of undergraduate students.

Hypotheses

Mindfulness and connectedness to nature could co-predict pro-environmental behavior.

Materials and Methods

Population and participants

The study population was 28,800 undergraduate students from each faculty group (e.g., Health Science, Science, and Humanities and Social Science) at Chiang Mai University enrolling in the semester 1/2019. Stratified random sampling was performed, Yamane formula (1967 cited in Srisa-ard, 2017) was used to calculate the sample size ($\alpha = 0.05$), 395 participants were yielded.

Instruments

The instruments used in this study were divided into four sections:

Section 1: General information consisted of five items inquiring about gender, age, year of study, faculty, and major.

Section 2: The Philadelphia Mindfulness Scale (PHLMS) Thai version developed by Silpakit et al. (2011), it was a 5-point rating scale, including seldom, rarely, occasionally, often, and almost always. There were 20 items divided into two components: 1) awareness and 2) acceptance. The researcher tried out the mindfulness scale; Cronbach's alpha of .727 was found.

Section 3: Connectedness to Nature Scale (CNS) Thai version developed by Chaichantipyuth (2011), the scale was built on Mayer & Frantz (2004)'s work. It was a 5-point rating scale, including strongly disagree, disagree, partially agree and disagree, agree, and strongly agree. There were 24 items divided into four components: 1. perceive that one is connected to nature, not separate from natural environment; 2. perceive that one is connected to all things in nature as well as value and respect all things equally, not merely resources that exist to serve human needs; 3. realize that all things in nature are interdependent; and 4. realize that all things are connected in the manner that they support existence of one another. The researcher tried out CNS; Cronbach's alpha of .935 was found.

Section 4: Pro-Environmental Behavior Scale Thai version developed by Wongpinpech (2018), it was a 5-point rating scale, including never, rarely, occasionally, often, and regularly. There

were 22 items divided into five components: 1. electricity consumption, 2. water consumption, 3. consumption of environmentally friendly products, 4. commute, and 5. solid waste management. The researcher tried out the scale, Cronbach's alpha of .889 was found.

Analysis

1. Descriptive statistics, including percentage, mean, standard deviation (SD.), and Pearson's correlation coefficient were used to investigate general information regarding the participants and the study variables.
2. Multiple regression analysis (MRA) was performed to test the hypotheses.

Results

1. General information regarding the study variables: mindfulness, connectedness to nature, and pro-environmental behavior

Table 1: Mean and SD of mindfulness, overall and by component

	Mean	S.D.	Level
Mindfulness	56.3	.48	Moderate
Components of mindfulness			
1 Awareness	66.3	55.	Moderate
2 Acceptance	46.3	62.	Moderate

Table 1 shows that the participants' mindfulness, both overall and in each component were at moderate level.

Table 2: Mean and SD of connectedness to nature, overall and by component

	Mean	S.D.	Level
Connectedness to nature	76.3	40.	High
Components of connectedness to nature			
1 perceive that one is connected to nature, not separate from natural environment	62.3	48.	Moderate
2 perceive that one is connected to all things in nature as well as value and respect all things equally, not merely resources that exist to serve human needs	80.3	45.	High
3 realize that all things in nature are interdependent	89.3	52.	High
4 realize that all things in nature are connected in the manner that they support existence of one another	58.3	45.	Moderate

Table 2 shows that the participants had high level of overall connected to nature. Considering each component of connectedness to nature, it was found that the participants had high level of 'perceive that one is connected to all things in nature as well as value and respect all things equally, not merely resources that exist to serve human needs' and 'realize that all things in

nature are interdependent.' Meanwhile, the participants had moderate level of 'perceive that one is connected to nature, not separate from natural environment' and 'realize that all things are connected and support existence of one another.'

Table 3: Mean and SD of pro-environmental behavior, overall and by component

	Mean	S.D.	Level
Pro-environmental behavior	87.3	.49	High
Components of pro-environmental behavior			
1 electricity consumption	04.4	.64	High
2 water consumption	18.4	.58	High
3 consumption of environmentally friendly products	59.3	.73	Moderate
4 commute	55.3	.82	Moderate
5 solid waste management	85.3	.63	High

Table 3 shows that the participants had high level of overall pro-environmental behavior. Considering each component, it was found that the participants had high level of 'electricity consumption', 'water consumption', and 'solid waste management.' Meanwhile, the participants had moderate level of 'consumption of environmentally friendly products' and 'commute.'

2. Predictability of mindfulness and connectedness to nature on pro-environmental behavior of undergraduate students

2.1 Assessment of assumptions for MRA

Table 4: Correlation coefficient and variance inflation factor (VIF) of the study variables

	Mindfulness	Connectedness to nature	Pro-environmental behavior	VIF
Mindfulness	1	**408.	**276.	199.1
Connectedness to nature		1	**464.	199.1
Pro-environmental behavior			1	

**p = 01.

Table 4 shows that pro-environmental behavior had positive relationship with mindfulness and connectedness to nature at the statistical significance level of .01. Considering the relationship between the independent variables, it was found that mindfulness and connectedness to nature were positively related at the statistical significance level of .01. Also, VIF value was found to be lower than 5.3, indicating that the data had no multicollinearity issue (Wiratchai, 2010). Also, data distribution assessment showed that the data were normally distributed. Accordingly, this data set met the assumptions for MRA and was adequate for the next analysis.

Table 5 Analysis of predictability of mindfulness and connectedness to nature on Pro-environmental behavior performing stepwise MRA

Variables	Unstandardized coefficients (B)	Standardized coefficients (Beta)	t	P-value
1. connectedness to nature	517.	.421	8.641*	.000
2. mindfulness	107.	.104	2.138*	.033
Constant=1.540 R.=473 R Square.=224 F=56.56 ; p-value = .000				

*p<.05

Table 5 shows that mindfulness and connectedness to nature could co- predict pro-environmental behavior at the statistical significance level of .05 (F = 56.56; p-value = .000). For the t- ratio of connectedness to nature and mindfulness, the statistical significance level of .05 was found; indicating that changes in connectedness to nature and mindfulness significantly influenced changes in pro- environmental behavior. Connectedness to nature and mindfulness accounted for 22. 4% of the variance in pro- environmental behavior. The regression models predicting changes in pro-environmental behavior are presented below:

The regression model with unstandardized coefficients (B)

$$\acute{Y} = 1.540 + 0.517(\text{connectedness to nature}) + 0.107(\text{mindfulness})$$

The regression model with standardized coefficients (Beta)

$$\acute{Z} = 0.421(\text{connectedness to nature}) + 0.104(\text{mindfulness})$$

Discussion

The result of this study which reveal that connectedness to nature and mindfulness accounted for 22.4% of pro-environmental behavior of undergraduate students at Chiang Mai University supports the hypothesis. It indicates that if a person has greater connectedness to nature and mindfulness, they will perform higher pro-environmental behavior. Connectedness to nature is a concept involving an individual's perception of their level of connection to nature. Typically, connectedness to nature is described as a traditional belief which frames or guides the emergence of other beliefs about nature, including environmental projects and policies as well as concerns about environmental issues. In general, explicit feeling of connection to nature is beneficial in the manner that it helps protect environment and promote sustainability. Mayer and Frantz (2004)'s study revealed that connectedness to nature could urge an individual to engage in pro- environmental behavior which produced minimal harmful effect on natural environment as well as on one's own thoughts and identity. It was believed that connectedness to nature was the key component of the promotion of ecological behavior. In addition, Hoot and Friedman (2011)'s study indicated that connectedness to nature was related to an individual's future environmental beliefs and behavior. Similarly, Geng et al. (2015)'s study confirmed the positive role of connectedness to nature in promoting environmental behavior. The study showed that direct and indirect connectedness to nature had positive relationships with pro-environmental behavior. Also, Anderson and Krettenauer (2021)'s study showed that emotional connectedness to nature was the strongest predictor of pro-environmental behavior.

For mindfulness, it is found that mindfulness affects behavioral choices; which is related to the realization of specific experiences. Mindfulness can promote change and sustainable behavior.

A mindful individual is aware of surrounding environment and likely to pay attention and gather information about environmental effects. Also, the individual seeks an option with minimal harmful effect to environmental nature regardless of a great hindrance to exercising the selected option. According to Amel et al. (2009), it was found that mindfulness predicted sustainable behavior. Results of the study showed that everyday actions were automatic and mindfulness helped connect 'self' with the world, which encouraged pro-environmental behavior. The component of mindfulness, acting with awareness was related to the likelihood of increased pro-environmental behavior. That is consistent with Chatzisarantis and Hagger (2007)'s study discovering that mindfulness facilitated acting with intention and reduced effects of hindrances to behavior enactment. Being mindful provided the individuals with intention to enact sustainable behavior the increased opportunity to take action as planned. Brown and Kasser (2005) explained that practicing mindfulness and fostering true values were related to greater ecologically responsible behavior. To mindful reflect on one's own internal states, covert behaviors, and set of values focusing on true self rather than outer goals seemed to concurrently benefit both an individual and ecological well-being. Similarly, Tang et al. (2017)'s study showed that mindful learning affected pro-environmental behavior intention both positively and negatively. The aforementioned information is the evidence indicating that mindfulness and connectedness to nature could co-predict pro-environmental behavior.

Conclusions

According to the results of this study, it can be concluded that connectedness to nature and mindfulness significantly co-predict pro-environmental behavior of undergraduate students. Thus, related agencies could apply this information to develop guidelines for the promotion of pro-environmental behavior among undergraduate students. For example, activities that encourage the students to realize and accept their own experiences as well as activities that facilitate the students to get close to nature to enhance positive attitudes towards nature and to be part of nature should be provided. Mindfulness practice should be included to promote the students' mindfulness in the meanwhile.

Recommendations

The results from this research provide valuable information for developing strategies to promote and cultivate environmental behaviors among students in the future**.** This can be achieved by organizing activities that foster students' self**-**awareness and acceptance of their own experiences, as well as providing opportunities for students to engage closely with nature**.** These activities aim to foster a positive perspective toward the environment, instilling a sense of unity between students and nature**.** Additionally, it is recommended to encourage mindfulness practices alongside these efforts to further enhance students' self**-**awareness and promote a mindful attitude among them**.**

References

Amel, E. L., Manning, C. M., & Scott, B. A. (2009). Mindfulness and sustainable behavior: pondering attention and awareness as means for increasing green behavior. *Ecopsychology*, *1*(1), 14–25.

Anderson, J. D., & Krettenauer, T. (2021). Connectedness to Nature and Pro-Environmental Behaviour from Early Adolescence to Adulthood: A Comparison of Urban and Rural Canada. *Sustainability*, *13*(7), 3655.

Brown, K. W., & Kasser, T. (2005). Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. *Social Indicators Research*, *74*, 349–368.

Chaichantipyuth, P. (2011). The effect of buddhist-ecotherapy group on connectedness to nature and panna in interconnectedness of university students (master's thesis). Chulalongkorn University, Bangkok.

Chatzisarantis, N. L. D., & Hagger, M. S. (2007). Mindfulness and intention–behavior relationship within the theory of planned behavior. *Personality and Social Psychology Bulletin*, *33*, 663–676.

Frantz, C., Mayer, F. S., Norton, C., & Rock, M. (2005). There is no "I" in nature: The influence of self-awareness on connectedness to nature. *Journal of Environmental Psychology*, *25*, 427-436.

Geng, L., Xu, J., Ye, L., Zhou, W., & Zhou, K. (2015). Connections with Nature and Environmental Behaviors. *PLOS ONE*, *10*(5), 1-11.

Groot, J.D., & Stege, L. (2009) Mean or Green: which Values can Promote Stable Pro-environmental behaviour?. *Conservation Letter*, *2*, 61-66.

Hoot, R. E., & Friedman, H. (2011). Connectedness and environmental behavior: sense of interconnectedness and pro-environmental behavior. *International Journal of Transpersonal Studies*, *30*, 89–100.

Langer, E. J., & Moldoveanu, M. (2000). The construct of mindfulness. *Journal of Social Issues, 56*, 1–9.

Mayer, F. S., Frantz, C. M., Bruehlman-Senecal, E., & Dolliver, K. (2009). Why is nature beneficial? The role of connectedness to nature. *Environment and Behavior, 41*, 607–643.

Payutto, P. A. (2009). Buddha-dharma extended edition (15th ed.). Bangkok: Sahadhammika printing house.

Planning Division of Office of the University. *Policy strategy of the university*. (2016). Retrieved November 12, 2018, from http://planning.oop.cmu.ac.th/?p=1970

Schultz, P. W. (2002). Inclusion with nature: the psychology of human-nature relations. In P. Schmuck, & W. P. Schultz (Eds.), *Psychology of Sustainable Development*. Dordrecht: Kluwer Academic Publishers.

Silpakit, C., Wisajan, P., Silpakit, O. (2011). The validity of philadelphia mindfulness scale thai version. *Journal of Mental Health of Thailand*, 19(3), 140-147.

Srisa-ard, B. (2017). Introduction to research (10th ed.) Bangkok: Suweerivasarn.

Stewart, A. E. ((2007Individual Psychology and Environmental Psychology. *The Journal of Individual Psychology, 63*(1), .85-67

Tang, Y., Geng, L., Schultz, W. P., Zhou, K., & Xiang, P. (2017). The effects of mindful learning on pro-environmental behavior: A self-expansion perspective. *Consciousness and Cognition, 51*, 140-148.

Wiratchai, N. (2010). *Subject 21701 curriculum and teaching research unit 7 review literature and unit 10 quantitative analysis: descriptive statistics and parametric statistics Master of Education Program in Curriculum and Instruction sukhothai thammathirat open university*. Bangkok: Sukhothai Thammathirat Open University printing house.

Wongpinpech, P. (2018). Antecedents of pro-environmental behavior of undergraduate students at public universities in bangkok. *Suthiparithat Journal, 101*, 121-133.

Contact email: suparada595@gmail.com