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Review

Mindfully green: Examining the effect of connectedness to nature on the relationship between mindfulness and engagement in pro-environmental behavior

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ABSTRACT

Mindfulness reflects heightened awareness and attention to the present moment, in both experience and behavior. Research has begun to examine mindfulness in the domain of pro-environmental behavior, and documents positive relationships with connectedness to nature, and engagement in pro-environmental behavior. Two independent studies with two different samples were conducted to test the study hypotheses. It was hypothesized that mindfulness would be significantly correlated with self-reported pro-environmental behavior (Hypothesis 1) and that that connectedness to nature indirectly affects the relationship between mindfulness and pro-environmental behavior (Hypothesis 2). Participants completed measures of mindfulness across five facets, connectedness to nature, and their engagement in 17 daily pro-environmental behaviors. Results support Hypothesis 1 in that mindfulness is significantly associated with pro-environmental behavior (Studies 1 and 2). Results also support Hypothesis 2 in that connectedness to nature indirectly affects the relationship between mindfulness and pro-environmental behavior (Studies 1 and 2). Post hoc analyses reveal that the facets of *observing* and *nonreactivity* are particularly important in the context of pro-environmental behavior (Study 2). We discuss these findings as they relate to the conceptualization of mindfulness as a means of behavioral regulation.
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1. Introduction

There has been an influx of research investigating the psychology underlying pro-environmental behavior (Bamberg & Möser, 2007 for review). Pro-environmental behaviors minimize the negative impact, or have a positive impact, on the natural environment (Kollmuss & Agyeman, 2002). Research investigating the psychological underpinnings of pro-environmental behavior has focused on interpersonal determinants—family norms (Gronhoj & Thogersen, 2012), morality (Bratanova, Loughnan, & Gatersleben, 2012), and environmental settings (Miao & Wei, 2013)—and intrapersonal determinants of pro-environmental behavior—environmental attitudes (Milfont & Duckitt, 2010), cognitive motivation (Barbaro, Pickett, & Parkhill, 2015), and connectedness to nature (Mayer & Frantz, 2004).

Mindfulness reflects intentional awareness of experiences and behavioral functioning (Brown & Ryan, 2003; Kabat-Zinn, 1990). Research demonstrates that mindfulness impacts behavioral choices related to the awareness of specific experiences (Chatzisarantis & Hagger, 2007). Being mindful, *generally*, can intensify *specific* experiences, which may lead to better behavioral regulation (Langer & Moldoveanu, 2000) in the context of those specific experiences. We argue that mindfulness is related to pro-environmental behaviors through the process of enhancing experiences with nature. Accordingly, the current research investigates the effect of connectedness to nature on the relationship between mindfulness and engagement in pro-environmental behavior.

Research investigating mindfulness and engagement in pro-environmental behavior is limited. Amel, Manning, and Scott (2009) found that mindfulness predicts sustainable behavioral choices—assessed by a single item measure asking "how green" participants' behavioral choices were. Amel et al. suggests that because many everyday behaviors are carried out automatically (Bargh & Chartrand, 1999), mindfulness creates a greater self-world connection that motivates pro-environmental behavior. Research also shows that mindfulness is significantly correlated with pro-environmental behaviors concerning diet, transportation, and housing (Brown & Kasser, 2005), suggesting that mindfulness focuses attention to available sustainable options. Consistent with the notion of mindfulness as a means of behavioral regulation (Langer & Moldoveanu, 2000), research indicates that mindfulness positively influences decision-making processes (Black, Sussman, Johnson, & Milan, 2012), influences behavioral motivation (Levesque & Brown, 2007), and that awareness inhibits automatic behavioral choices by making alternative behavioral choices more salient (Dijksterhuis & van Knippenberg, 2000). Regarding pro-

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environmental behavior, mindfulness might function to regulate behavior by increasing awareness of pro-environmental options (e.g., recycling a soda can vs. throwing a soda can in a trash bin). This relationship may be affected by greater self-world connection (Amel et al., 2009) as a result of mindfulness enhancing one's focus to specific experiences, like feelings and thoughts about the natural world (Bishop et al., 2004).

Mindfulness has been shown in to enhance experiences with nature. One study found that mindfulness was significantly associated with greater connectedness to nature (Howell, Dopko, Passmore, & Buro, 2011). Peripheral empirical research shows that aspects of mindfulness, such as attentional capacity (Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009) and internal awareness (Leary, Tipsord, & Tate, 2008) are both related to greater connectedness with nature. Research suggests that mindfulness enhances moment-to-moment experiences (Brown & Ryan, 2003) by enhancing one's self-world connection (Amel et al., 2009) and orientating one's focus toward the natural environment (Bishop et al., 2004), resulting in a stronger connection to nature (Howell et al., 2011).

Connectedness to nature reflects the extent to which one feels part of the natural world (Mayer & Frantz, 2004), and includes nature within the cognitive representation of the self (Schultz, 2002). It is argued that individual's who have a strong connection with nature are less likely to harm the environment because the self is embedded with nature, and thus, harmful behaviors would in essence be harming the self (Mayer & Frantz, 2004). Researchers have investigated the utility of connectedness to nature as a predictor of engagement in pro-environmental behavior and document this significant relationship in a number of studies (Hoot & Friedman, 2011; Dutcher, Finley, Luloff, & Johnson, 2007; Davis, Green, & Reed, 2009; Mayer & Frantz, 2004). Connectedness to nature can motivate individuals to engage in pro-environmental behaviors that have minimal negative impacts on the natural environment, and cognitively, themselves.

The current research utilizes a correlational design in order to expand on previous research by investigating the impact of total trait mindfulness and the unique effects of mindfulness facets on engagement in pro-environmental behavior. We aim to synthesize previous research on mindfulness and connectedness to nature into a cohesive model to better understand the psychological processes that encourage engagement in pro-environmental behavior. We hypothesize that mindfulness will be positively correlated with self-reported pro-environmental behavior (Hypothesis 1). Because mindfulness reflects awareness of behavioral functioning and may intensify experiences with nature, and connectedness to nature motivates engagement in pro-environmental behavior, we hypothesize that connectedness to nature will indirectly affect the relationship between mindfulness and pro-environmental behavior (Hypothesis 2). Two independent studies were conducted with two different samples to test the research hypotheses.

2. Study 1

Study 1 aims to secure initial support for the hypothesized model of the indirect effect of connectedness to nature on the relationship between mindfulness and pro-environmental behavior. The current research utilizes the conceptualization that mindfulness enhances experiences (Brown & Ryan, 2003) and behavioral regulation specific to these experiences (Chatzisarantis & Hagger, 2007). The current research assess daily pro-environmental behaviors (e.g., recycling, buying local products and food, carpooling), which frequency might increase as a result of greater mindfulness.

2.1. Method

2.1.1. Participants

We recruited 360 undergraduate students (68% female, 76% White) at a Midwestern University. Participants' mean age was 20.11 years ($SD = 3.86$).

2.1.2. Procedure

Participants were recruited from the Psychology Department Participant Pool. Prospective participants were provided a link to the online study hosted by SurveyMonkey. Participants read the informed consent online and upon consent to participate in the study, entered demographic information and completed questionnaires. Participants were debriefed online and received partial course credit. The research was approved by the Institutional Review Board at the university in which the research was conducted.

2.1.3. Measures

The five facets of mindfulness questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) was used to measure mindfulness. The FFMQ contains 39 items measured on a five-point Likert scale from 1 (*never* or *very rarely true*) to 5 (*very often* or *always true*). Following Baer et al. (2006) a total mindfulness composite score was calculated by summing participant responses on all 39 items ($\alpha = 85$), with higher scores indicating greater mindfulness. Composite scores were calculated for each facet of mindfulness: *nonreactivity* to inner experience ($\alpha = .74$; e.g. "In difficult situations, I can pause without immediately reacting"); *observing* ($\alpha = .80$; e.g. "I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow"); *acting* with awareness ($\alpha = .84$; e.g. "I find myself doing things without paying attention"); *describing* ($\alpha = .85$; e.g. "I can easily put my beliefs, opinions, and expectations into words"); and *nonjudging* of experience ($\alpha = .81$; e.g. "I make judgments about whether my thoughts are good or bad").

Participants completed the connectedness to nature scale (CNS; Mayer & Frantz, 2004) to measure perceived oneness with the natural world. The CNS contains 14 items measured on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). A composite score was calculated for each participant ($\alpha = .75$) with higher scores indicating stronger connectedness to nature.

Pro-environmental behavior was measured using a modified version of the pro-environmental behavior scale (PEB; Whitmarsh & O'Neill, 2010). The original scale included 24 items; however the first seven questions were omitted because they are not relevant to the majority of undergraduate students (e.g., "installed insulation products in your home.") Using the remaining 17 items, participants indicated how often they engaged in each behavior (e.g., "Buy environmentally friendly products," "Recycle," "Buy products with less packaging") on a 4-point scale (0 = *never*, 1 = *occasionally*, 2 = *often*, 3 = *always*). Composite scores were created for each participant ($\alpha = .77$) with higher scores indicating more frequent engagement in pro-environmental behavior.

2.2. Results

All statistical analyses were conducted using SPSS version 21. Zero-order correlations and descriptive statistics of study variables are displayed in Table 1. Mindfulness is positively correlated with more frequent engagement in pro-environmental behavior, supporting Hypothesis 1 (see Table 1). We proceeded by testing the indirect effect of connectedness to nature on this relationship following the Baron and Kenny (1986) causal steps method. Mindfulness was significantly associated with pro-environmental behavior ($\beta = .19$, $t(309) = 3.45$, $p < .01$), and greater connectedness to nature ($\beta = .28$, $t(332) = 5.21$, $p < .01$). After statistically controlling for mindfulness, connectedness to nature was significantly associated with pro-environmental behavior ($\beta = .29$, $t(308) = 5.11$, $p < .01$). The distribution of the product of coefficients method (Tofighi & MacKinnon, 2011) was used to confirm mediation. As hypothesized, connectedness to nature mediates the relationship between mindfulness and pro-environmental behavior ($Mab = .038$, $SEab = .06$; 95% CI [.02, .06]), resulting in a 37% reduction in the standardized coefficient (see Fig. 1).

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