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The awareness aspect of trait mindfulness, but not the acceptance aspect, predicts engagement with natural beauty

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Running head: Mindfulness and engagement with natural beauty

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Keywords: beauty; nature; mindfulness; aesthetic

Abstract

The natural world often evokes feelings of beauty, and it is known that appreciation of beauty in nature is associated with a number of beneficial outcomes, such as well-being and proenvironmental behaviours. Here we aimed to increase our understanding of the psychological factors related to engagement with natural beauty, by investigating the relationship between engagement with natural beauty and trait mindfulness. Specifically, the current research aimed to examine whether the awareness aspect, or the acceptance aspect, of dispositional mindfulness was associated with aesthetic responses to the natural world. In an online survey (N = 268), trait mindfulness was assessed with the bidimensional Philadelphia Mindfulness Scale. Aesthetic responses to the natural world were assessed with the Engagement with Natural Beauty scale. Participants with higher levels of the awareness facet of trait mindfulness reported significantly higher levels of engagement with natural beauty, while controlling for connectedness to nature and openness to experience. The acceptance aspect of dispositional mindfulness did not predict engagement with natural beauty. We speculate that participants with increased levels of the awareness aspect of mindfulness likely have an increased capacity to notice and receive sensory impressions from the natural world, and may be more attuned to their ongoing bodily sensations, thus allowing them to be more aware of natural beauty, and their physical and affective responses to that beauty. The results are useful for the development of effective ways (for example, mindful awareness exercise) to increase engagement with natural beauty, which could in turn enhance the benefits associated with being in natural environments.

Keywords: beauty; nature; mindfulness; aesthetic

Introduction

“To the attentive eye, each moment of the year has its own beauty, and in the same field, it beholds, every hour, a picture which was never seen before, and which shall never be seen again.” (Emerson, 1836, p. 23)

Scenes of natural beauty, such as a magnificent sunset, light sparkling on a river, or a panoramic view of snow-capped mountains, can often elicit powerful peak experiences involving profound emotional states such as awe and wonder (Shiota, Keltner, & Mossman, 2007). While these experiences are intrinsically valuable, they can often bring about a number of beneficial effects. For example, several studies have shown that an appreciation of the aesthetic qualities of the natural world is important for many of the positive outcomes associated with natural environments to occur, such as increased well-being and prosocial behaviours (Capaldi et al., 2017; Zhang, Howell, & Iyer, 2014; Zhang, Piff, Iyer, Koleva, & Keltner, 2014; although see Passmore & Holder, 2016, for a null result). For example, Zhang, Howell, et al. (2014) found that only participants with higher levels of engagement with beauty in nature reported enhanced life satisfaction due to affiliation with nature. Importantly, engagement with natural beauty has been associated with higher levels of proenvironmental behaviour such as conservation and environmental citizenship (Diessner, Genthôs, Praest, & Pohling, 2018). Given the importance of the appreciation of natural beauty, it is crucial to understand the psychological factors related to it. Here we investigate whether trait mindfulness, which involves paying attention on purpose to present-moment experience, is related to the appreciation of natural beauty.

Mindfulness

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3 Mindfulness is a psychological capacity, or set of skills, that fosters a state of
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5 sustained attentiveness to ongoing experience, and has been defined as the self-regulation of
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7 attention on immediate experience (Bishop et al., 2004). Mindfulness, both as an intervention
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9 and as a formal practice, has been associated with a number of positive outcomes, (for
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11 reviews, see Keng, Smoski, & Robins, 2011; Vago & Silbersweig, 2012), and several studies
12
13 have shown that mindfulness training can facilitate performance on some cognitive tasks
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15 (e.g., Slagter, Lutz, Greischar, Nieuwenhuis, & Davidson, 2009; Zeidan, Johnson, Diamond,
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17 David, & Goolkasian, 2010).
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23 Of particular relevance to the current study, mindfulness can also be viewed as a
24
25 general tendency in daily life. There is natural variability among people in their level of
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27 dispositional mindfulness (Baer, Smith, & Allen, 2004; Brown & Ryan, 2003), and higher
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29 levels of trait mindfulness have been associated with improved outcomes on a number of
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31 measures, such as increased life satisfaction and reduced depression and anxiety (for reviews,
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33 see Christopher & Gilbert, 2010; Keng et al., 2011). In a well-known formulation of
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35 mindfulness by Kabat-Zinn (1994), two fundamental features of mindfulness were identified:
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37 firstly, the regulation of attention, where attention is focused on present moment experiences
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39 such as thoughts and sensations; secondly, the capacity to view experience from a stance of
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41 openness and acceptance (Bishop et al., 2004; Tang, Hölzel, & Posner, 2015; Vago &
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43 Silbersweig, 2012). Similarly, trait mindfulness is most often considered as a construct
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45 composed of two or more facets (Baer et al., 2004; Baer, Smith, Hopkins, Krietemeyer, &
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47 Toney, 2006; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008; although see Brown &
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49 Ryan (2003) for a unidimensional mindfulness scale). In the current study we measured
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51 dispositional mindfulness, focussing on the capacities for awareness and acceptance of
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53 internal experiences.
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Mindfulness and beauty

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3 Mindfulness, both as a state and a trait, should in principle engender an enhanced
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5 level of sensitivity to present moment experience (e.g., sense perceptions, thoughts, and
6
7 feelings), and induce an attitudinal stance of openness towards experience (Kabat-Zinn, 1994,
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9 2005). It seems reasonable to suppose, then, that greater receptivity towards present moment
10
11 experience may enhance the ability to engage with, and respond more deeply to, potential
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13 elicitors of beauty in the world, whether they are human-made works of art, or belonging to
14
15 the natural world. Evidence suggestive of a link between mindful awareness and beauty in
16
17 nature is provided by a study reporting that noticing natural beauty was increased in directed-
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19 attention natural beauty walks, compared to a control group who took walks without directed
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21 attention to natural beauty (Diessner, Woodward, Stacy, & Mobasher, 2015). The “directed-
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23 attention” instructions in the study could be conceptually similar to aspects of the
24
25 “awareness” facet of mindfulness, in that both involve paying attention to sensory
26
27 information on purpose. Furthermore, Harrison and Clark (2016) found that participants with
28
29 higher levels of trait mindfulness reported more frequent profound aesthetic responses to the
30
31 arts. More specifically, Harrison and Clark’s study reported that participants with higher
32
33 levels of the observing facet of trait mindfulness (as assessed by the Five Factor Mindfulness
34
35 Questionnaire (FFMQ; Baer et al., 2006)) reported more frequent intense emotional
36
37 responses (such as aesthetic chills) to the arts, while controlling for participants’ familiarity
38
39 with the arts. However, Harrison and Clark’s study examined aesthetic responses solely in
40
41 relation to the arts, therefore it is as yet unknown whether higher levels of trait mindfulness
42
43 are similarly associated with engagement with beauty in natural environments. While
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45 aesthetic responses to the arts and aesthetic responses to nature are closely related (Diessner
46
47 et al., 2008), there may well be important differences concerning the nature of aesthetic
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49 appreciation between natural scenes and art, particularly regarding the relative importance of
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51 cognitive components (such as background knowledge and information about the nature of
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3 the object of appreciation) in the formation of the aesthetic response (Carlson, 2013).
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6 Although it was only one person, it may be worth mentioning that Shapiro, Astin, Bishop, &
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8 Cordova (2005, p. 176) reported qualitative evidence in support of a possible association
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10 between mindfulness and appreciation for beauty in nature. In their study one participant,
11
12 after an 8-week mindfulness-based stress reduction (MBSR) program, reported that “I am
13
14 more mindful of the beauty in nature and in each person I come in contact with”.
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18 Interestingly, Harrison and Clark’s (2016) study found that those participants who
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20 scored higher on the non-judging subscale of the FFMQ reported fewer aesthetic experiences.
21
22 The ‘non-judging’ facet of trait mindfulness is theoretically similar to the ‘acceptance’
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24 subscale of the PMS. One explanation for this finding is that participants who exhibited a
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26 tendency towards non-judgement of their experience may have been less willing to form an
27
28 evaluative judgment of an artwork, hence not completing the entire aesthetic process.
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30 Alternatively, as the acceptance aspect of mindfulness is thought to function primarily to
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32 allow increased engagement with negative experiences (Cardaciotto et al., 2008), for the
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34 generation of positive experiences (e.g., aesthetic experiences), being attentive could be more
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36 important than being accepting. For example, only the awareness facet of mindfulness, but
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38 not the acceptance facet, appears to be correlated with nature connectedness (Howell et al.,
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40 2011). Together, these findings led us to suspect that the awareness aspect of mindfulness,
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42 but not the acceptance aspect, could be related to enhanced aesthetic responses to nature.
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48 *Engagement with natural beauty, openness to experience, and mindfulness*

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51 Previous studies have found that participants who scored higher in openness to
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53 experience (a personality trait characterised by curiosity and receptivity to new experiences;
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55 Costa & McCrae, 1992) have reported greater engagement with natural beauty (Diessner,
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57 Iyer, Smith & Haidt, 2013; Zabihian & Diessner, 2016). People who score higher in trait
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3 openness are generally more sensitive to art and beauty, and they tend to experience a wide
4 range of affective states and emotions (Terracciano, McCrae, Hagemann, & Costa, 2003),
5 and trait openness has been shown to be a consistent predictor of aesthetic responsiveness to
6 art in both survey and experimental studies (Colver & El-Alayli, 2015; Harrison & Clark,
7 2016; McCrae, 2007; Silvia & Nusbaum, 2011). Furthermore, people who engaged in
8 mindfulness meditation reported higher openness to experience scores than non-meditators
9 (van den Hurk et al., 2011), and openness to experience correlated positively with trait
10 mindfulness (Baer et al., 2006; Brown & Ryan, 2003). Individuals who are more open to
11 experience tend to be more “attentive to and curious about their inner (i.e., emotions,
12 thoughts) and outer (i.e., activities, foods, social values) experiences” (Rau & Williams,
13 2016, p.37), which are key aspects of a mindful orientation to experience.

24 *Engagement with natural beauty, connectedness to nature, and mindfulness*

25
26 Nature connectedness and engagement with natural beauty share a common domain
27 (nature), therefore it is not surprising that they are strongly positively correlated (Diessner et
28 al., 2013; Diessner et al., 2018; Zhang, Howell, et al., 2014). Nevertheless, there are
29 important distinctions between the two constructs, as connectedness to nature focusses more
30 on a cognitive evaluation of nature connection, whereas the engagement with beauty scale is
31 concerned with the affective and physiological responses evoked by natural beauty (Diessner
32 et al., 2008; Perrin & Benassi, 2009). Further, a large number of studies have shown a
33 robust positive correlation between nature connectedness and mindfulness (see Schutte and
34 Malouff (2018) for a meta-analytic investigation). This association is consistent with
35 theoretical premises linking nature and mindfulness, in that the non-judgment and awareness
36 aspects of mindfulness may promote fuller engagement with nature, and foster a deeper sense
37 of connection with nature.

The current study

In light of the literature reviewed above, it is clear that the link between engagement with natural beauty and mindfulness is suggestive, but not empirically evidenced. In particular, it is not known which of the two main aspects of mindfulness (awareness, non-judgmental acceptance of experience) are linked to engagement with natural beauty. Therefore the current study investigated the association between the awareness and non-judgmental aspects of dispositional mindfulness and the tendency to appreciate natural beauty, while controlling for openness to experience and nature connectedness. Firstly, based on the findings by Harrison and Clark (2016) showing that trait mindfulness was associated with increased frequency of aesthetic responses to the arts, we predicted that participants with a higher habitual tendency to be aware of their moment-to-moment sensations, thoughts, and feelings (i.e., those scoring higher on the awareness subscale of the PMS) would report greater appreciation of beauty in nature. Secondly, we predicted that there would be no association between the acceptance subscale of the PMS and engagement with natural beauty.

Method

Participants

An online survey with the title “Mindfulness and Beauty in Nature”, was advertised at a University in xxxx to students who could participate in exchange for course credit. The survey was also advertised to the wider community via a psychology research participation website. Two hundred and ninety-nine participants anonymously completed the survey, and after excluding 31 participants who reported meditating regularly, the final sample consisted of 268 volunteers (mean age = 23.8 years; $SD = 10.5$ years; 213 females, 55 males). Regarding demographics, 86.9 % of participants described their ethnicity as White, 4.9 % as Asian/Pacific Islander, 2.6 % as Hispanic or Latino, 1.1 % as Black or African American, and

0.4 % as Native American or American Indian. Ethnicity was not stated by 4.1 % of participants. All participants in the final sample reported either having a university degree or were currently studying for a degree. The participant information sheet and other relevant ethical information was on the first page of the survey, and after completing the survey participants were thanked and presented with a full debrief. Ethical approval for the study was obtained from the Psychology Department ethics committee at xxxx University and all participants provided informed consent.

Measures

Mindfulness

Self-reported trait mindfulness was measured using the Philadelphia Mindfulness Scale (PMS; Cardaciotto, et al., 2008). The PMS is a 20-item, bi-dimensional measure assessing the distinct components of present-centered awareness and acceptance. Items are measured on a five-point Likert-type scale ranging from 1 (never) to 5 (very often), and higher scores indicate greater levels of trait mindfulness. The PMS has good internal reliability (for the awareness subscale, Cronbach's alpha = .85, for the acceptance subscale, Cronbach's alpha = .87) and construct validity (awareness subscale was positively correlated to measures of awareness and reflection, and the acceptance subscale was negatively correlated with rumination and thought suppression; Cardaciotto et al., 2008). The scale exhibited good internal consistency for the present sample ($\alpha = .78$ for awareness and $\alpha = .89$ for acceptance).

Aesthetic experiences of nature

Participants' self-reported tendency to perceive natural beauty was assessed using the Engagement with Natural Beauty (ENB) subscale of the Engagement with Beauty scale (Diessner et al., 2008). The ENB subscale has well established predictive validity; it has been

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3 associated with proenvironmental behavior (Diessner et al., 2018), prosocial behavior
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5 (Zhang, Piff, et al., 2014), and a variety of forms of well-being (Capaldi et al., 2017; Zhang,
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7 Howell, et al., 2014). The subscale consists of 4 items (e.g., “I notice beauty in one or more
8
9 aspects of nature”), and uses a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree).
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11 Higher scores indicate a person is more likely to perceive beauty in nature. The subscale has
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13 shown high internal consistency (alphas from .80 to .83; Diessner et al., 2008; Zhang,
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15 Howell, et al. 2014), and acceptable test-retest reliability (Diessner et al., 2008). Internal
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17 consistency for the present sample was $\alpha = .85$.
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23 *Openness to experience*

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27 Openness to experience was measured Openness/Intellect subscale from the Big Five
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29 Aspect Scales (BFAS; DeYoung, Quilty, & Peterson, 2007). This subscale comprises two
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31 separate (although related) traits: openness to experience, and intellect. Only the openness
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33 facet was included in the analyses presented here, as this facet reflects aesthetic sensitivity
34
35 and emotions, whereas the intellect facet reflects engagement with more abstract and
36
37 semantic information (DeYoung, Grazioplene, & Peterson, 2012). Participants indicated their
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39 level of agreement with 10 phrases describing personality characteristics related to openness
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41 to experience (e.g., “I get deeply immersed in music”) using a 5-point Likert scale. The
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43 openness subscale has shown good internal consistency (alphas from .72 to .78; DeYoung et
44
45 al., 2007). Internal consistency for the current sample was $\alpha = .75$.
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51 *Connectedness to Nature*

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53 Perceived oneness with the natural world was measured was measured with the 14-item
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55 connectedness to nature scale (CNS; Mayer & Frantz, 2004). The scale contains 14 items
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57 (e.g., “Like a tree can be part of a forest, I feel embedded within the broader natural world”)
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3 measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).
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6 A summed score was calculated for each participant with higher scores indicating stronger
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8 connectedness to nature. Mayer and Frantz (2004) provided evidence of its reliability ($\alpha =$
9
10 .84) and validity (e.g., positive associations with environmental concern). In the current
11
12 sample the scale displayed a good level of internal consistency ($\alpha = .85$).
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14

15 16 *Procedure*

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18 Participants completed an online survey. After providing demographic information,
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20 participants completed the Philadelphia Mindfulness Scale, the Engagement with Natural
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22 Beauty subscale, the Openness/Intellect subscale of the BFAS, and then the Connectedness to
23
24 Nature scale. All participants completed these scales in the same order.
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31 **Results**

32 33 *Descriptive Statistics and Preliminary Testing*

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35 Table 1 shows descriptive statistics and observed alphas for awareness, acceptance,
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37 connectedness to nature, openness to experience, and engagement with beauty in nature. We
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39 conducted zero-order correlations for each of the measures (see Table 1) and performed
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41 Bonferroni corrections for multiple comparisons (critical significance level = .005). There
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43 was a moderate correlation between CNS and awareness, and CNS and openness, and there
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45 was also a moderate correlation between awareness and openness. There was a large
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47 correlation between ENB and CNS, and between ENB and openness. There was a weak
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49 correlation between acceptance and awareness.
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54 ***TABLE 1 HERE***
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58 *Predicting engagement with beauty in nature*

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3 Model 1 tested the primary hypothesis that the awareness facet of trait mindfulness
4 would significantly predict scores on the ENB scale, but acceptance would not be a
5 significant predictor. The results indicated that Model 1 significantly predicted engagement
6 with beauty in nature, $F(2,265) = 33.27$, $MSE = 25.75$, $p < .001$, accounting for 20.1% of the
7 variance ($R^2 = .201$). Further investigation of Model 1 revealed, as predicted, that awareness
8 was a significant predictor of engagement with beauty in nature ($p < .001$) whereas
9 acceptance did not significantly predict engagement with beauty in nature ($p = .885$). See
10 Table 2 for the model summary and collinearity statistics.
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22 ***TABLE 2 HERE***
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25 To further explore this finding, Model 2 replicated Model 1 but was extended to
26 include connectedness to nature and openness to experience, in addition to awareness and
27 acceptance. Model 2 significantly predicted engagement with beauty in nature, $F(4,263) =$
28 77.44 , $MSE = 14.90$, $p < .001$, accounting for 54.1% of the variance ($R^2 = .541$). As all
29 predictors were entered to the regression model simultaneously, Model 2 (see Table 2 for
30 summary) revealed the unique contribution of each predictor after controlling for the other
31 predictor variables. The model indicated that awareness, openness and connectedness to
32 nature were all significant predictors of engagement with beauty in nature ($p = .046$, $p < .001$,
33 and $p < .001$, respectively) whereas acceptance did not predict the outcome variable ($p =$
34 $.285$). In addition, Table 2 shows the multicollinearity statistics (Tolerance and Variance
35 Inflation Factor (VIF)) for all the predictors in Models 1 and 2. The values for VIF are all
36 considerably below 10 (all VIFs ≤ 1.47) and the tolerance statistics are all above 0.2 (all
37 values $> .68$); together these values suggest that there is no multicollinearity in the data
38 (Field, 2012).
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Discussion

Subjective experiences of beauty in nature are related to a wealth of beneficial psychological and behavioural effects, such as increased prosociality, enhanced well-being, and higher levels of proenvironmental behaviours (Capaldi et al., 2017; Diessner et al., 2018; Zhang, Howell, & Iyer, 2014; Zhang, Piff, Iyer, Koleva, & Keltner, 2014). To deepen our understanding of the psychological factors involved in the appreciation of natural beauty, here we investigated which aspects of trait mindfulness are related to the appreciation of natural beauty. We report the novel finding that the awareness facet of trait mindfulness positively predicted the occurrence of aesthetic responses in relation to the natural world. We also found that the acceptance aspect of mindfulness did not predict the occurrence of aesthetic responses in relation to the nature. Further, in agreement with previous studies, participants who scored higher in openness to experience reported greater engagement with natural beauty (Diessner et al., 2013; Zabihian & Diessner, 2016).

In accordance with our first prediction, our investigation showed that the awareness aspect of trait mindfulness (as measured by the awareness subscale of the PMS) predicted higher levels of engagement with natural beauty, after controlling for openness to experience and connectedness to nature. This association is in conceptual agreement with the finding that trait mindfulness was associated with more frequently experienced profound responses to the arts (Harrison & Clark, 2016). Although the underlying reasons for the association between the awareness aspect of trait mindfulness and enhanced engagement with beauty in nature cannot be determined from the current study, nevertheless here we offer two possible explanations that can be tested in future studies.

The awareness aspect of mindfulness relates to the capacity to pay close attention to presently occurring sensory, cognitive, and affective experiences, and is almost universally regarded as a key feature of mindfulness (Bishop et al., 2004; Lilja, Lundh, Josefsson, &

1
2
3 Kalkenström, 2012). Experimental evidence suggests that the Observing facet of trait
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5 mindfulness (measured by the FFMQ), which is conceptually closely related to the awareness
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7 subscale of the PMS, appears to be related in particular to perceptual awareness (Anicha,
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9 Ode, Moeller, & Robinson, 2012). An increased capacity to attend to, notice, and receive
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11 impressions from the natural world is likely crucial for perceiving aesthetic qualities in
12
13 nature, and indeed the sensory/perceptual appraisal of an object forms part of the initial
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15 stages of processing in models of information processing associated with aesthetic experience
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17 of both artworks and natural scenes (e.g., Marković, 2012). Moreover, an aesthetic
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19 experience requires attention to be focused on the aesthetic object while other competing
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21 streams of information are ignored (Cupchik & Winston, 1996). The ability to self-regulate
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23 attention, which is an essential characteristic of mindfulness, may therefore increase the
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25 capacity for aesthetic experience.
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32 A second potential explanation for the positive association between the awareness facet
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34 of mindfulness and aesthetic responses to the natural world is that participants with higher
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36 scores on the awareness subscale of the PMS are more attuned to their ongoing bodily
37
38 sensations, thus allowing them to be more aware of their physical and affective responses to
39
40 the beauty of the natural world. Physiological manifestations of aesthetic experiences include
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42 sensations such as goose bumps, shivers down the spine, feeling a lump in the throat, and
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44 tears (Goldstein, 1980). These types of experiences that accompany strong emotional
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46 responses may be more readily noticed by those who report greater mindful awareness of
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48 their physical sensations, leading to an amplification of the overall aesthetic response to
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50 nature.
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55 In line with our second prediction, we found that the acceptance component of
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57 mindfulness did not predict engagement with beauty in nature. This finding is consistent with
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59 previous research showing that only the awareness facet, but not the acceptance facet,
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3 correlated with nature connectedness (Howell et al., 2011). Howell and colleagues argued
4 that the acceptance aspect of mindfulness functions primarily to allow increased engagement
5 with negative experiences (Cardaciotto et al., 2008), but that for positive experiences (for
6 example, connectedness to nature, aesthetic phenomena etc.), being attentive is more
7 important being accepting. Similarly, Harrison and Clark (2016) found that the conceptually
8 related facet of 'non-judging' (from the FFMQ) negatively predicted the frequency of
9 aesthetic experiences to the arts, i.e., participants who scored higher on the non-judging
10 subscale reported fewer aesthetic experiences to the arts. Participants who exhibited a
11 tendency towards non-judgement of their experience may have failed to complete the
12 aesthetic process, as they were less prone to form an evaluative judgment of the artwork.
13 Overall, these findings suggest that the awareness facet of mindfulness, but not the
14 acceptance facet, is reliably related to aesthetic experience; future studies are needed to
15 provide a full theoretical account for this effect.
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34 Further, our study showed that connectedness with nature predicted increased
35 engagement with natural beauty, in agreement with previous studies (Diessner et al., 2013;
36 Diessner et al., 2018; Zhang, Howell, et al., 2014). This positive association is not surprising,
37 given the shared domain, and that participants with an increased sense of connection with
38 nature would be more emotionally attuned to natural beauty. We also found that openness to
39 experience predicted higher levels of appreciation of beauty in nature, in accordance with
40 previous studies (Diessner, Iyer, Smith & Haidt, 2013; Zabihian & Diessner, 2016). People
41 higher in dispositional openness tend to be more sensitive to art and beauty, whether the
42 beauty is found in nature or in human-made works of art (Colver & El-Alayli, 2015; Harrison
43 & Clark, 2016; McCrae, 2007; Silvia & Nusbaum, 2011).
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57 *Limitations*

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3 In this study our analyses are correlational so the causal nature of the association
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5 between mindfulness and engagement with beauty in nature cannot be determined. While the
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7 results show that the awareness facet of mindfulness is positively associated with
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9 appreciation of beauty in nature, it could equally be the case that appreciation of beauty in
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11 nature leads to higher levels of the awareness aspect of trait mindfulness. Further research
12
13 studies using experimental approaches are therefore needed to elucidate the potentially bi-
14
15 directional causal relationships between these constructs. A further potential limitation is that
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17 the sample included only meditation-naïve participants, which precludes generalization of the
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19 results to trained meditators. Also, the sample consisted of 21% males and 79% females, thus
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21 the external validity is best for generalizing to white women, and not as good for generalizing
22
23 to men. Finally, the current study used online self-report measures, which may contain
24
25 reporting and recall errors, and the order of the measures was not counter-balanced therefore
26
27 we cannot exclude the possibility of sequence effects. To attempt to minimize these potential
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29 problems, future studies could measure aesthetic responses during or immediately after
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31 exposure to an elicitor of natural beauty.
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37 38 *Conclusions*

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41 In summary, the present study showed that higher levels of the awareness facet of
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43 dispositional mindfulness, but not the acceptance facet, were positively associated with
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45 engagement with natural beauty. Given the close associations between appreciation of
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47 beauty in nature and well-being (Capaldi et al., 2017; Zhang, Howell, et al., 2014; Zhang,
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49 Piff, et al., 2014) and, in particular, proenvironmental behaviours (Diessner et al., 2018), we
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51 suggest that it would be worthwhile to test experimentally whether mindfulness exercises that
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53 focussed on increasing the capacity to attend to and notice present moment experience, would
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55 enhance participants' engagement with natural beauty, which may in turn lead to enhanced
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57 benefits from exposure to natural environments.
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Table 1. Descriptive statistics, observed alphas and zero-order correlations for all measures

Measure	Mean	SD	Range	Alpha	1.	2.	3.	4.	5.
1. CNS	45.95	8.52	45.00	0.851	1.0				
2. Acceptance	34.02	7.65	40.00	0.891	.028	1.0			
3. Awareness	35.66	5.94	38.00	0.782	.433*	.203*	1.0		
4. Openness	35.69	6.30	34.00	0.752	.496*	.071	.456*	1.0	
5. ENB	18.96	5.65	24.00	0.849	.680*	0.099	.448*	.563*	1

* $p < .005$; CNS = connectedness to nature scale; ENB = engagement with natural beauty

Table 2. Results of the regression model for predicting engagement with beauty in nature

Model	Predictor	b	β	t	p	95% CI	Tolerance	VIF
1	(Constant)	3.614						
	Awareness	0.425	0.446	7.956	.001	0.32, 0.53	0.96	1.043
	Acceptance	0.006	0.008	0.145	.885	-0.08, 0.88	0.96	1.043
2	(Constant)	-9.407						
	Awareness	0.095	0.1	2.002	0.046	0.02, 0.19	0.705	1.418
	Acceptance	0.034	0.046	2.072	0.285	-0.03, 0.10	0.954	1.048
	Openness	0.237	0.264	5.227	0.001	0.15, 0.33	0.682	1.466
	CNS	0.335	0.502	10.07	0.001	0.27, 0.40	0.697	1.436

b = beta; β = standardised beta; VIF = Variance Inflation Factor; CNS = connectedness to nature scale