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Running head: NATURE AND POSITIVE BODY IMAGE

The Nature of Positive Body Image: Examining Associations between Nature Exposure, Self-Compassion, Functionality Appreciation, and Body Appreciation

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### **Abstract**

Previous studies have shown that exposure to natural environments is associated with positive body image, but mechanistic pathways are not fully understood. Here, we tested one possible pathway, namely with self-compassion as a mediator of the effects of nature exposure on positive body image. A British sample of 225 women and 229 men completed measures of positive body image (body appreciation, functionality appreciation), nature exposure, and three facets of self-compassion (Self-Kindness, Common Humanity, Mindfulness). Path analysis indicated that there were significant direct paths from nature exposure to both body appreciation and functionality appreciation, with the latter also additionally mediating the effects of nature exposure on body appreciation. In addition, two facets of self-compassion (Self-Kindness and Common Humanity, but not Mindfulness) mediated the relationships between nature exposure and body appreciation and functionality appreciation, respectively. These findings lend support to calls for everyone to have easy access to natural environments.

**Keywords:** Nature exposure; Positive body image; Body appreciation; Self-compassion; Functionality appreciation

## Introduction

The salutogenic effects of natural environments (from urban greenspace to wild nature; Abraham, Sommerhalder, & Abel, 2010) on human health and well-being have been widely documented over several decades (for reviews, see Bowler, Buyung-Ali, Knight, & Pullin, 2010; Collado, Staats, Corraliza, & Hartig, 2017; Frumkin et al., 2017; Hartig, Mitchell, de Vries, & Frumkin, 2014; Kondo, Jacoby, & South, 2018; Seymour, 2016; van den Bosch & Ode Sang, 2017). Recently, scholars have extended these findings to show that exposure to natural environments is also associated with positive outcomes in terms of body image. However, potential mechanistic pathways that help explain the association between exposure to natural environments and body image remain under-researched. In this study, we examined one potential mediating mechanism that links nature exposure to multiple indices of positive body image, namely through the effects of self-compassion.

### Nature Exposure and Body Image

Associations between nature exposure and body image have been explored using cross-sectional and experimental designs. In terms of the former, greater self-reported exposure to natural environments was significantly associated with higher body appreciation in an online sample of adults from the U.S. (Swami, Barron, Weis, & Furnham, 2016). Likewise, greater time spent engaging in activities in the natural environment was significantly associated with higher body satisfaction in U.S. college women (Mitten & D'Amore, 2018). In terms of experimental research, studies with British college samples showed that exposure to photographs (Swami, Barron, & Furnham, 2018, Studies 1-3) and a film of natural, but not built (i.e., urban), environments significantly elevated state body image (Swami, Pickering, Barron, & Patel, 2018). Furthermore, exposure to real natural environments – operationalised as walks in nature as opposed to walks in a built environment (Swami, Barron et al., 2018, Study 4) or time spent in a designed green space (Swami, Barron

et al., 2018, Study 5) – was found to significantly improve state body appreciation in British community samples.

Exposure to natural environments may, therefore, offer a novel and cost-effective means of promoting healthier body image, but capitalising on these benefits requires greater understanding of mechanistic pathways (cf. Lachowycz & Jones, 2013). Drawing on Psychophysiological Stress Recovery Theory (Ulrich, 1981, 1983) and Attention Restoration Theory (Kaplan, 1995; Kaplan & Kaplan, 1989; Stevenson, Schilhab, & Bentsen, 2018) – two complementary frameworks invoking psychological mechanisms (Berto, 2014; Hartig, 2005; Hartig, Böök, Garvill, Olsson, & Gärling, 1996) – Swami, Barron, and colleagues (2018) proposed that exposure to natural environments may directly influence body image by restricting negative appearance-related cognitions and supporting speedier recovery from threats to body image. Greater time spent in natural environments may also allow individuals to distance themselves physically and mentally from urban contexts that are heavily appearance-focused (Hennigan, 2010; Holloway, Murray, Okada, & Emmons, 2014).

### **Mechanistic Pathways**

While these explanations focus on possible direct effects, a multiplicity of mechanistic pathways involving a combination of direct and indirect relationships seems more likely (Johnsen, 2011; Markevych et al., 2017). This is consistent with the broader literature suggesting that stress reduction and attention restoration may operate independently and interactively (e.g., Li & Sullivan, 2016; Pasanen, Tyrväinen, & Korpela, 2014; Ratcliffe, Gatersleben, & Sowden, 2013), but also that additional psychological variables mediate the influence of stress reduction, attention restoration, or both (see Frumkin et al., 2017). In terms of the body image literature, an example of a possible mediated pathway was proposed by Swami, Barron and colleagues (2016), who suggested that nature exposure may influence positive body image indirectly by reducing internalisation of appearance ideals. When they

tested this possibility, however, these authors failed to find evidence of mediated relationships: while internalisation of a thin and muscular ideal was associated with lower body appreciation in women and men, respectively, internalisation did not significantly mediate the relationships between nature exposure and body appreciation.

Another promising mediating pathway that may help explain associations between nature exposure and body image runs through self-compassion, which involves self-kindness rather than critical self-judgement, seeing one's experiences as part of wider common humanity rather than as separating and isolating, and holding painful thoughts and feelings in balanced awareness (i.e., mindfulness) rather than over-identifying with them (Neff, 2003). According to Kaplan and Kaplan's (1989) seminal theorising, nature exposure promotes opportunities for "cognitive quiet", that is, rumination that does not require effortful attention. In this view, the gentle stimuli, high biodiversity, and tranquillity of natural environments reduce engagement in simultaneous cognitive experiences, which promotes thoughtful deliberation (i.e., deliberation-without-attention; Kaufman, 2015, 2018; Korpela & Staats, 2014; Pretty, Rogerson, & Barton, 2017). Furthermore, by decreasing the cognitive processing load on directed attention while simultaneously fostering a stress-reduction or relaxation response, natural environments may provide a "perceptual respite in which the conscious mind... is able to function in a more contemplative state... characterized by a relative freedom from distractions psychological and environmental" (Kaufman, 2015, pp. 139-140).

This nature-induced cognitive quiet may then provide the space and cognitive tools for individuals to develop a mindset that facilitates greater self-compassion (Kaufman, 2015, 2018; van Gordon, Shonin, & Richardson, 2018). For example, attaining cognitive quiet involves eliminating cognitive clutter, which permits recovery of directed attention and affective faculties that cognitive functions require, and in turn allows greater opportunities for

self-kindness, mindfulness, and allocentrism (i.e., where individuals centre their attention and actions on others rather than themselves). Indeed, a link between self-compassion and care for the natural environment has been suggested in the literature (Greenberg & Turksma, 2015), although empirical evidence more broadly is limited to significant associations between nature exposure and trait mindfulness (Stewart & Haaga, 2018). Conversely, facets of self-compassion have been found to be significantly associated with indices of positive body image (for a review, see Braun, Park, & Gorin, 2016). In explanation, it has been suggested that reduces the occurrence of risk factors for body image disturbance and mitigates against the maladaptive outcomes of poor body image (Tylka & Kroon van Diest, 2015). Importantly, however, the potential role of self-compassion facets as mediators in the relationship between nature exposure and positive body image has not been examined.

A final point worth considering is that regular access to nature may mean that individuals spend more time outdoors engaging in activities that focus one's attention on the body's functionality rather than its aesthetics. Importantly, qualitative studies have highlighted appreciation of body functionality (i.e., what the body can do or is capable of doing; Alleva, van Breukelen, Jansen, & Karos, 2015) as an important component of positive body image (e.g., Frisé & Holmqvist, 2010; Wood-Barcalow, Tylka, & Augustus-Horvath, 2010). More recently, in developing a measure of functionality appreciation, Alleva, Tylka, and Kroon van Diest (2017) reported that functionality appreciation significantly predicted body appreciation over-and-above other measures of body image. In terms of studies of nature exposure, therefore, it might be suggested the relationship between nature exposure and body appreciation may be mediated by functionality appreciation; that is, greater exposure to nature may focus one's attention on what the body is capable of doing, which in turn results in greater body appreciation.

### **The Present Study**



The present study had two inter-related objectives. First, we sought to replicate the direct relationship between nature exposure and positive body image (operationalised in terms of body appreciation; Swami, Barron et al., 2016, 2018) in a sample of British adults. This is important in order to establish to what extent the association between nature exposure and body appreciation is robust across different samples. Second, we sought to extend current knowledge by including measures of self-compassion and functionality appreciation. In terms of self-compassion, we predicted that the lower-order facets of Self-Kindness, Mindfulness, and Common Humanity would mediate the relationship between nature exposure and body appreciation. We elected to focus on the positive-valenced facets of self-compassion because recent meta-analytic work has suggested that these facets, as opposed to negative facets, may provide a better indication of protective effects on outcome variables (Muris & Petrocchi, 2017). Based on previous work (Alleva et al., 2017), we also predicted that functionality appreciation would mediate the relationships between nature exposure and body appreciation, on the one hand, and self-compassion and body appreciation on the other hand. A graphical representation of these hypothesised associations is presented in Figure 1.

## Method

### Participants

The initial sample consisted of an online sample of 470 individuals, but we removed participants who only partially completed the questionnaire (i.e., who were missing data on 30% or more items;  $n = 12$ ) or failed an attention-check item embedded in the questionnaire ( $n = 4$ ). The final sample consisted of 225 women and 229 men, all of whom were British citizens ranging in age from 18 to 72 years ( $M = 37.22$ ,  $SD = 11.27$ ) and in self-reported body mass index (BMI) from 12.49 to 45.20 kg/m<sup>2</sup> ( $M = 26.23$ ,  $SD = 5.82$ ). The majority of participants self-reported as being of British White ethnicity (90.7%), while 5.5% self-reported as being of Asian descent, 2.9% as mixed race, and 0.9% as African Caribbean. In

terms of educational qualifications, 32.6% had completed minimum secondary schooling, 39.4% had an undergraduate degree, 17.4% had a postgraduate degree, 3.5% were in full-time higher education, and the remainder had some other qualification.

### Measures

**Body appreciation.** Body appreciation was assessed using the 10-item Body Appreciation Scale (BAS-2; Tylka & Wood-Barcalow, 2015). The BAS-2 measures acceptance of one's body, respect and care for one's body, and protection of one's body from unrealistic beauty standards (sample item: "I respect my body"). All items were rated on a 5-point scale, ranging from 1 (*never*) to 5 (*always*), and an overall score was computed as the mean of all items. Higher scores reflect greater body appreciation. BAS-2 scores have been shown to have a one-dimensional factor structure and have been judged as adequate in terms of internal consistency estimates, test-retest reliability after 3 weeks, and indices of convergent and discriminant validity, in college and community samples of English-speaking adults (for a review, see Swami, 2018). In this study,  $\omega$  for scores on this scale was .96 (95% CI = .94-.98).

**Nature exposure.** Nature exposure was measured using the Nature Exposure Scale (NES; Kamitsis & Francis, 2013). This is a 4-item scale that measures an individual's level of exposure to nature in everyday life and activities, and levels of exposure to nature outside of everyday environments (sample item: "How much do you notice the natural environments in your everyday life?"). Response anchors varied depending on the item, but all included 5-point scales. An overall score of nature exposure was computed as the mean of all four items, so that higher scores reflect greater nature exposure. Scores on the NES have been shown to have a one-dimensional factor structure (Swami, Barron et al., 2016) and adequate internal consistency and criterion validity in English-speaking adults (Kamitsis & Francis, 2013). In this study,  $\omega$  for NES scores was .76 (95% CI = .73-.79).

**Functionality appreciation.** Participants were asked to complete the 7-item Functionality Appreciation Scale (FAS; Alleva et al., 2017). The FAS measures one's appreciation of what the body does and can do (sample item: "I respect my body for the functions that it performs"). All items were rated on a 5-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). An overall score was computed as the mean of all items, such that higher scores reflect greater functionality appreciation. Scores on the FAS have been reported to have a one-dimensional factor structure, adequate internal consistency and test-retest across a 3-week period, and adequate criterion-related and construct validity in English-speaking adults (Alleva et al., 2017). In this study,  $\omega$  for scores this scale was .93 (95% CI = .90-.97).

**Self-compassion.** The survey package included three subscales from the Self-Compassion Scale (Neff, 2003), namely the Self-Kindness (5 items), Common Humanity (4 items), and Mindfulness subscales (4 items). Self-Kindness assesses the degree to which an individual extends kindness and understanding to one's self (sample item: "I'm tolerant of my own flaws and inadequacies"), Common Humanity assesses the extent to which an individual sees one's experiences as part of wider human experiences (sample item: "When things go badly for me, I see the difficulties as part of life that everyone goes through"), and Mindfulness reflects the degree to which individuals hold painful thoughts and feelings in balanced awareness (sample item: "When something upsets me, I try to keep my emotions in balance"). All items were rated on a 5-point scale ranging from 1 (*almost never*) to 5 (*almost always*), and subscale scores were computed as the mean of relevant items. Higher scores on each subscale reflect greater self-kindness, feelings of common humanity, and mindfulness, respectively. Although there is some debate concerning the factor structure of the SCS (Williams, Dalgleish, Karl, & Kuyken, 2014), recent work has suggested that SCS subscale scores are factorially valid in English-speaking samples (Neff, 2016). SCS scores have also

been judged adequate in terms of internal consistency estimates, test-retest reliability after 3 weeks, and indices of construct validity (Neff, 2016). In this study,  $\omega$  values were .92 (95% CI = .89-.95) for Self-Kindness, .90 (95% CI = .87-.93) for Common Humanity, and .86 (95% CI = .83-.89) for Mindfulness.

**Demographics.** Participants provided their demographic details, consisting of sex, educational qualifications, age, ethnicity (based on primary response categories from the United Kingdom census), height, and weight. The latter two items were used to compute participants' self-reported BMI as  $\text{kg/m}^2$ . Although there is a tendency for online samples to under-report weight and over-report height, self-reported data are generally strongly correlated with measured data ( $r_s \geq .98$ ; Bonn, Trolle Lagerros, & Bälter, 2013).

### **Procedures**

The project was approved by the relevant departmental ethics committee (approval number: ESH17-008). Data were collected via the Prolific Academic website, a crowdsourcing Internet marketplace that allows individuals to complete academic surveys for monetary compensation, on April 16, 2018. Crowdsourcing Internet marketplaces have been found to produce reliable and valid data on body image (Gardner, Brown, & Boice, 2012) and other differential constructs (Buhrmester, Kwang, & Gosling, 2011) as compared with offline samples. The project was advertised as a study on “nature and body image” and included an estimated duration (15 min; average completion time for participants was 14.0 min). Participation was limited to British citizens of adult age and fluent in English, so as to achieve a relatively homogeneous sample in terms of national identity. In addition, participation was limited to those who had an Academic Prolific score of  $\geq 96$  and Academic Prolific ID codes, along with IP addresses, were examined to ensure that no participant took the survey more than once. After providing digital informed consent, participants were directed to the scales described above, which were presented in a counter-balanced order in

Qualtrics. Demographic items were completed last. The questionnaire was anonymous and, in exchange for completion, participants were paid £1.25, which is commensurate with Academic Prolific recommendations based on questionnaire completion times. All participants received debriefing information at the end of the survey.

## Results

### Preliminary Analyses

Missing data constituted less than 0.4% of the total dataset and were missing completely at random (MCAR), as determined by Little's (1988) MCAR analysis. We, therefore, inputted missing values using pooled estimates from multiple imputations (Rubin, 1987). Where BMI computations resulted in improbable values ( $< 12$  or  $> 50$  kg/m<sup>2</sup>;  $< 4.7\%$  of the total dataset), we replaced these using pooled estimates from multiple imputations. We examined sex differences on all variables using independent-samples *t*-tests, with  $\alpha$  corrected to  $p = .05/6 = .008$  to control for Type II error. The results showed that men had significantly higher body appreciation and mindfulness scores than women, although effect sizes were small (Cohen, 1988). All other sex comparisons did not reach significance (see Table 1). Because of the sex difference on the outcome measure of body appreciation, we computed bivariate correlations between all variables for women and men separately. The results, reported in Table 1, indicated significant positive correlations between all variables in women and men. By Cohen's (1988) standards, associations in men were generally moderate-to-strong. In women, most associations were also moderate-to-strong, with the exception of relationships between body appreciation and the self-compassion facets, which were weak.

### Path Analysis

Based on the results of the correlational analysis, we conducted path analysis using the Lavaan package (Rosseel, 2012) with *R* (*R* Development Core Team, 2018) to examine the fit of the hypothesised model (see Figure 1) in the full sample. Assessment of the data for

normality indicated that they were neither univariate (all  $p < .001$ ), nor multivariate normal (Mardia's skewness = 166.15,  $p < .001$ , Mardia's kurtosis = 9.12,  $p < .001$ ), so parameter estimates were obtained using the robust maximum likelihood method with the Satorra-Bentler correction (Satorra & Bentler, 2001). To assess goodness-of-fit, we used the normed model chi-square ( $\chi^2/df$ ), with values  $< 3.0$  considered indicative of good fit (Hu & Bentler, 1999) and values up to 5.0 considered adequate (Wheaton, Muthén, Alwin, & Summers, 1977). We also used the Steiger-Lind root mean square error of approximation (RMSEA) and its 90% CI to provide a correction for model complexity. RMSEA values close to .06 are considered to be indicative of good fit and values of about .07-.08 indicative of adequate fit (Steiger, 2007). The standardised root mean square residual (SRMR) assesses the mean absolute correlation residual and is a badness-of-fit index: the smaller the values, the better the model fit. A cut-off value for SRMR indicating a reasonable fit is recommended to be  $< .09$  (Hu & Bentler, 1999). The comparative fit index (CFI) measures the proportionate improvement in fit by comparing a target model with a more restricted, nested baseline model. The CFI reflects a goodness-of-fit index and is recommended to be close to or  $> .95$  for adequate fit (Hu & Bentler, 1999). The Tucker-Lewis index (TLI) indicates a level of relative fit, with values close to or  $> .95$  for adequate fit (Hu & Bentler, 1999). Bollen's Incremental Fit Index (BL89) was also used, again, with values close to or  $> .95$  indicating an acceptable fit (Hu & Bentler, 1999).

All pathways within the hypothesised model were significant, except Mindfulness  $\rightarrow$  Body appreciation (estimate = .006, 90% CI = -.132-.144,  $p = .937$ ) and Mindfulness  $\rightarrow$  Functionality appreciation (estimate = .093, 90% CI = -.037-.224,  $p = .162$ ). After deletion of the non-significant regressions between these pathways, the adjusted hypothesised model presented good fit to the data,  $SB\chi^2_M(1) = 1.929$ , robust RMSEA = .047 (90% CI = .001-.148), robust CFI = .999, robust TLI = .988, SRMR = .008, BL89 = .999. Standardised

estimates of pathways in the final model are presented in Figure 2. Next, we assessed configural invariance (i.e., pattern of loadings of the pathways on indicators) of the final model across sex. Results showed that the model fitted the data across both women and men,  $SB\chi^2_M(2) = 3.251$ , robust RMSEA = .054 (90% CI = .001-.157), robust CFI = .999, robust TLI = .981, SRMR = .006, BL89 = .996.

Accordingly, bootstrapping procedures were used to obtain the direct, indirect, and total effects for all effects through all significant paths in the fitted model, drawing on 5,000 bootstrap samples from the dataset. The results, presented in Table 2, showed that there were significant direct and indirect effects from all pathways within the fitted model. Of note, the self-compassion facets of Self-Kindness and, to a weaker degree, Common Humanity significantly mediated the relationship between nature exposure and body appreciation. Likewise, functionality appreciation significantly mediated the relationship between nature exposure and body appreciation. The indirect pathways between nature exposure and body appreciation through self-compassion (Self-Kindness and Common Humanity, respectively) and functionality appreciation were also significant, although effects were comparatively low.

### **Discussion**

The present study had a number of inter-related aims, the first of which was to replicate the direct relationship between self-reported nature exposure and body appreciation in a sample of British adults. Our results indicated that this relationship was robust across women and men, which corroborates previous cross-sectional findings with North American adults (Mitten & D'Amore, 2018; Swami, Barron et al., 2016), as well as experimental data indicating that nature exposure improves state body image (Swami, Barron et al., 2018; Swami, Pickering et al., 2018). More broadly, the present finding is consistent with the body of evidence showing that exposure to natural environments is associated with a range of

positive physical and psychosocial outcomes (for reviews, see Bowler et al., 2010; Collado et al., 2017; Frumkin et al., 2017; Hartig et al., 2014; Kondo et al., 2018; Seymour, 2016; van den Bosch & Ode Sang, 2017). We conclude, based on accumulating evidence here and elsewhere, that the association between nature exposure and positive body image is robust, at least in English-speaking samples.

In addition to explanations posited elsewhere (e.g., that nature exposure restricts negative appearance-related cognitions and provides spaces to critically appraise unhealthy appearance ideals; Swami, Barron et al., 2016, 2018), we conjecture that repeated nature exposure provide recurrent opportunities for restoration that accumulate over time into more positive body image (see Pasanen, Ojala, Tyrväinen, & Korpela, 2018). That is, experiencing the restorative effects of nature likely supports the promotion and maintenance of more positive body experiences and activities in the long term. Examining the stability of the relationship between (self-reported or actual) nature exposure and positive body image in sites that vary in nature richness and green space coverage will be an important next step for future research. Even in the European Union, for example, green space varies across countries and regions (Kabisch, Strohbach, Haase, & Kronenberg, 2016). This is important because the characteristics of local green spaces influence the length, frequency, and character of visits (Kaźmierczak, 2013), which may in turn have an impact on body image outcomes.

Second, we examined the extent to which self-compassion – operationalised in terms of lower-order, positive-valenced facets of Self-Kindness, Mindfulness, and Common Humanity – would mediate the relationship between nature exposure and body appreciation. In broad outline, the present findings are consistent with our hypothesis that nature exposure promotes opportunities for rumination without effortful attention (i.e., “cognitive quiet”; Kaplan & Kaplan, 1989) that foster self-compassion. As proposed by Kaufman (2015, 2018),



nature environments likely reduce engagement in simultaneous cognitive experiences, which helps to promote an allocentric mindset conducive to greater self-compassion. Importantly, while earlier research has supported a link between nature exposure and trait mindfulness (Stewart & Haaga, 2018), our research extends this to show that the effects of nature exposure are consistently positive across all three self-compassion facets that were included here.

However, path analysis indicated that only two of three self-compassion facets significantly mediated the relationship between nature exposure and body appreciation. More specifically, the path between mindfulness and body appreciation was not significant in the final model, which was puzzling. It is possible that, although nature exposure is associated with greater mindfulness, the latter does not in turn relate to greater body appreciation once the effects of other self-compassion facets have been accounted for. Put differently, it appears that the link between nature exposure and body appreciation may be accounted for through improved self-kindness and greater perceptions of one's experiences as part of common humanity, rather than through greater mindfulness. This is an aspect of the present work that should be replicated in future work. For example, it may be worth examining the extent to which trait mindfulness – operationalised as a multidimensional construct in its own right (e.g., Brown & Ryan, 2003) – mediates the relationship between nature exposure and body appreciation. This anomalous finding aside, our results highlight plausible mechanistic pathways via self-kindness and common humanity that explain the impact of nature exposure on positive body image.

Third, we examined associations between nature exposure and functionality appreciation, as well as the mediating role of self-compassion. Overall, our results were consistent with our hypothesising, indicating that nature exposure was directly associated with significantly higher functionality appreciation. It is possible that regular access to

natural environments helps to focus attention on the body's functionality, possibly by highlighting what the body is capable of achieving through active participation in nature (e.g., walking, cycling, rambling, or gardening). Indeed, the available evidence suggests that European adults living in areas with high levels of green space are significantly more likely to be physically active and less likely to be overweight or obese (e.g., Sarkar, 2017). In addition, Self-Kindness and Common Humanity (but not Mindfulness) mediated the relationships between nature exposure and functionality appreciation. Thus, it seems likely that nature exposure provides opportunities for personal growth, a focus one's self, and a greater understanding of the self and one's body (cf. Adams & Morgan, 2018; Pasanen, Neuvonen, & Korpela, 2017). Taken together, the present results suggest that some facets self-compassion not only be associated with body appreciation, but are also associated with greater intra-individual attention on what the body can do or is capable of doing. Finally, our results also showed that functionality appreciation mediated the relationships between two self-compassion facets and body appreciation, which is broadly in line with previous research (Alleva et al., 2017).

There are a number of issues to bear in mind when considering the results of the present study. First, while we have interpreted our findings in line with contemporary theorising, it should be remembered that our data are cross-sectional and so causal associations should be viewed cautiously. As one example, while we have suggested that nature exposure results in greater self-compassion, it is also possible that individuals with higher levels of self-compassion more actively seek out, and spend time in, natural environments (Glennon & Barton, 2018). Likewise, while it is possible that nature exposure leads to improved body appreciation, it could also be posited that individuals with greater body appreciation are more likely to engage in body-care activities in nature (e.g., "green exercise"). Examining differences in the frequency and character of green space visits among

individuals high and low in body appreciation and/or functionality appreciation might be a worthwhile endeavour in future research. Longitudinal research may also be useful in helping to better understand causal relationships that have been demonstrated elsewhere (Swami, Barron et al., 2018).

In addition, our reliance on an online sample may reduce the generalisability of our findings. Replicating the present findings with more diverse British populations, as well as in other geographic regions, will be important to better understand the extent to which our effects are stable across populations. Another issue that may be worth examining is the manner in which nature exposure is operationalised: here, we used the Nature Exposure Scale (Kamitsis & Francis, 2013) because of its established psychometric properties, but future work may want to distinguish between passive and active activity in natural environments or operationalise nature exposure as time spent in natural environments (e.g., Pensini, Horn, & Caltabiano, 2016). Another measurement issue that should be considered was our decision to use only the positively-valenced facets of self-compassion, which we made on the basis of meta-analytic work suggesting that these facets, as opposed to negative facets, provide a better indication of protective effects on outcome variables (Muris & Petrocchi, 2017). However, not including the negative-valenced facets may have been an important oversight, as we were unable to compute global self-compassion scores (i.e., the relative balance between compassion and uncompassionate responses to oneself) and may have missed unique mediational effects of lower-order negative facets.

Future studies should also seek to include a wider array of relevant variables, the most important of which is connectedness to nature (i.e., a sense of oneness with nature; Mayer & Frantz, 2004). This is important because the self-compassion facet of mindfulness may have unique relationships with both nature exposure (Hamann & Itzvan, 2016; Richardson & Hallam, 2013; Stewart & Haaga, 2018) and connectedness to nature, which may help to

explain the lack of significant mediation effects in the present study (see also see also Swami, von Nordheim, & Barron, 2016). For example, a recent meta-analysis reported that there was a positive relationship between trait mindfulness and connectedness to nature (weighted effect size of  $r = .25$ ; Schutte & Marouf, 2018). Other neglected variables that may be worth incorporating into future studies include measures of recurrent or perceived restorative experiences in natural environments (Pasanen et al., 2018) and positive impact (McAllister, Bhullar, & Schutte, 2017). Putting together these variables alongside the variables included in the present work would allow for more complex modelling and a fuller understanding of direct and mediational pathways.

In conclusion, the present study provides further evidence that nature exposure is associated with significantly higher positive body image, where the latter is operationalised in terms of both body appreciation and functionality appreciation. In addition, we highlight possible mechanistic routes through which these positive effects are achieved, namely through the self-compassion facets of Self-Kindness and Common Humanity. Taken together, our findings are timely because they suggest that nature exposure may represent a simple and cost-effective means of promoting more positive body experiences, as well as better physical and mental health more generally. Of course, this requires that citizens have easy access to natural or designed green spaces, particularly in urban areas where town planning and green space requirements may sometimes be at odds. To this end, we support benchmark calls for everyone to have easy access to green spaces, such as Natural England's (2010) Accessible Nature Greenspace Standard, which recommends that all people should have at least two hectares of accessible green space no more than 5 min walk from home. More broadly, ensuring that adequate funding is available for the maintenance and creation of green spaces is vital, especially given that few public services offers such wide-ranging

positive effects for individuals, local communities, and national economies (Fields In Trust, 2018).

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Table 1. *Descriptive Statistics, the Results of Independent Samples t-Tests Examining Sex Differences, and Bivariate Correlations between All Variables for Women (Top Diagonal) and Men (Bottom Diagonal)*

		(1)	(2)	(3)	(4)	(5)	(6)
(1) Nature exposure			.34**	.65**	.56**	.38**	.42**
(2) Body appreciation		.32**		.30**	.16*	.15*	.17*
(3) Functionality appreciation		.44**	.39**		.44**	.43**	.39**
(4) Self-kindness		.54**	.25**	.33**		.70**	.77**
(5) Common humanity		.28**	.23**	.37**	.68**		.76**
(6) Mindfulness		.38**	.28**	.40**	.74**	.79**	
Women	<i>M</i>	3.50	3.04	3.96	2.80	3.24	3.04
	<i>SD</i>	0.80	0.87	0.72	0.84	0.81	0.76
Men	<i>M</i>	3.50	3.35	4.02	2.94	3.22	3.25
	<i>SD</i>	0.79	0.82	0.66	0.83	0.86	0.76
<i>t</i>		0.08	3.91	0.83	1.84	0.15	3.09
<i>p</i>		.937	< .001 <sup>a</sup>	.406	.066	.881	.002 <sup>a</sup>
<i>d</i>		< .01	0.37	0.08	0.17	0.01	0.29

*Note.* <sup>a</sup> Significant at Bonferroni-corrected  $p = .007$ ; \* $p < .05$ , \*\* $p < .001$ .



Table 2. *Standardised direct and indirect effects with corresponding standard error (SE) and z-scores within the final model*

Pathway	Direct effect (SE)	z	Indirect effect (SE)	z
Nature exposure → Self-kindness	.221 (.048)	4.645	-	-
Nature exposure → Common humanity	.200 (.052)	3.818	-	-
Nature exposure → Mindfulness	.207 (.050)	4.178	-	-
Nature exposure → Functionality appreciation	.226 (.040)	5.626	-	-
Nature exposure → Body appreciation	.134 (.041)	3.276	-	-
Self-kindness → Body appreciation	.533 (.053)	10.067	-	-
Common humanity → Body Appreciation	.214 (.054)	3.941	-	-
Functionality appreciation → Body appreciation	.485 (.057)*	8.495*	-	-
Nature exposure → Self-kindness → Body appreciation	-	-	.118 (.028)	4.210
Nature exposure → Common humanity → Body appreciation	-	-	.043 (.150)*	2.879*
Nature exposure → Functionality appreciation → Body appreciation	-	-	.109 (.024)	4.552
Self-kindness → Functionality appreciation	.149 (.051)*	2.938*	-	-
Common humanity → Functionality appreciation	.183 (.052)	3.526	-	-

Nature exposure → Self-kindness → Functionality appreciation → Body appreciation	-	-	.016 (.007)*	2.381*
Nature exposure → Common humanity → Functionality appreciation → Body appreciation	-	-	.018 (.007)	2.589

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*Note.* \*  $p < .05$ , all other  $ps \leq .001$

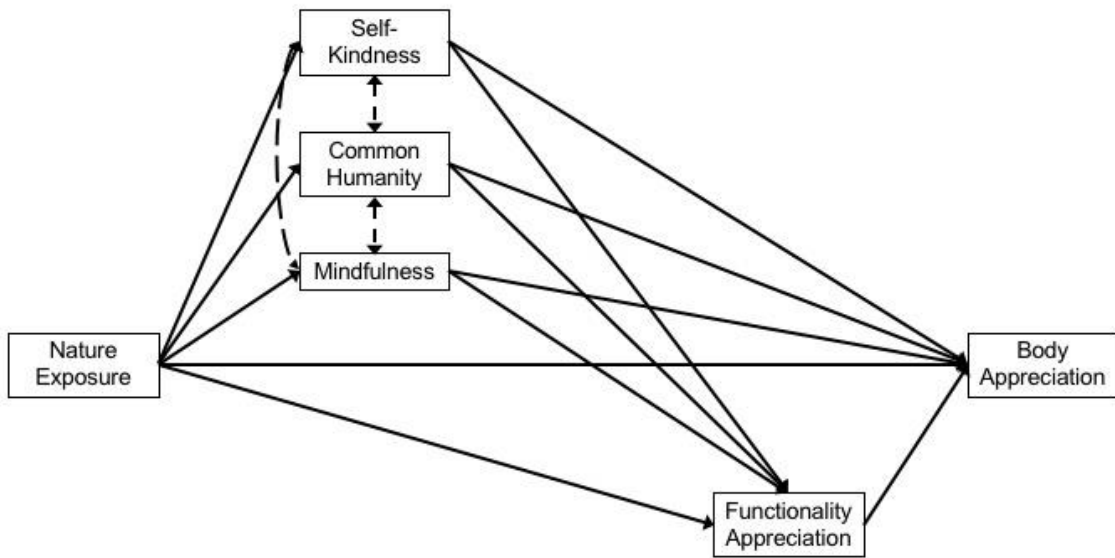


Figure 1. *Graphical Representation of the Hypothesised Relationships between Study Variables.*

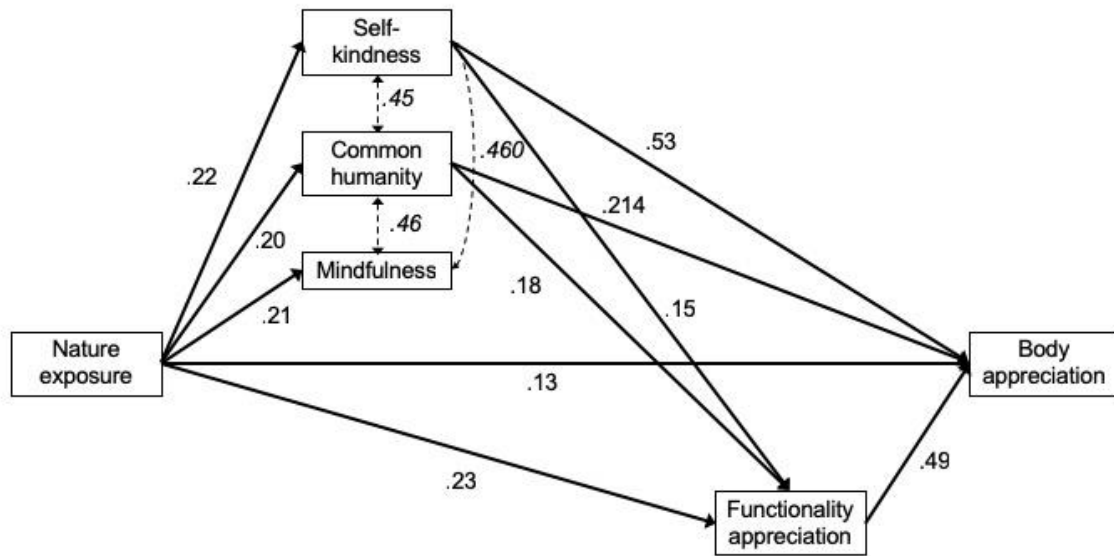


Figure 2. *Final Fitted Model with Standardised Direct Effects and Covariance Estimates in Italics.*