

Engaging with Natural Beauty May Be Related to Well-Being Because It Connects People to  
Nature: Evidence from Three Cultures

Colin A. Capaldi, Department of Psychology, Carleton University

Holli-Anne Passmore, Department of Psychology, University of British Columbia

Ryo Ishii, Department of Psychology and Human Developmental Sciences, Nagoya University

Ksenia A. Chistopolskaya, Department of Suicidology, Moscow Research Institute of Psychiatry

Jonte Vowinckel, Department of Psychiatry and Psychotherapy, University of Bonn

Evgeni L. Nikolaev, Department of Social and Clinical Psychology, Ulianov Chuvash State

Gennady I. Semikin, Valeology Department, Bauman Moscow State Technical University

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**CORRESPONDING AUTHOR:**

Colin A. Capaldi  
Department of Psychology  
Carleton University  
1125 Colonel By Drive  
Ottawa, Ontario  
Canada, K1S 5B6  
colin\_capaldi@carleton.ca

### Abstract

Connecting with nature has been described by some as an important psychological need. Indeed, research shows that a strong connection to nature predicts flourishing across a wide range of well-being indices. Engaging with natural beauty may be one route by which people satisfy this presumed need to connect with nature. Based on this reasoning, the purpose of the current research was to investigate whether nature connectedness mediates the relationship between engagement with natural beauty (i.e., the tendency to notice and be moved by beauty in nature) and well-being in three different cultures. Four cross-sectional surveys involving Canadian, Japanese, and Russian undergraduate students were conducted ( $N = 1,390$ ). Engagement with natural beauty and nature connectedness were positively associated with a variety of well-being measures. Moreover, we found relatively consistent support for the indirect effect of nature connectedness in explaining the relationship between engagement with natural beauty and well-being. This finding replicated across five different measures and indices of well-being, two different measures of nature connectedness, and three different cultures. Overall, this research suggests that engaging with natural beauty may have an impact on well-being by promoting a stronger subjective connection with nature.

*Keywords:* engagement with natural beauty; nature connectedness; well-being; meaning; biophilia

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Natural environments offer countless services essential to human survival and well-being, including the provision of resources (e.g., fresh water) and the regulation of physical processes (e.g., air quality). Along with these crucial physical services, natural environments also afford nonmaterial advantages to humanity via cultural services (e.g., recreational, educational, spiritual; Millennium Ecosystem Assessment, 2005). Indeed, a wide range of benefits falls into this category, including opportunities that natural settings provide for aesthetic experiences.

People appear to be particularly disposed to perceive and seek out beauty in nature. Natural environments are the most common setting where people report experiencing beauty (Ipsos MORI, 2010) and beauty is frequently mentioned when people are asked to freely associate words related to ‘natural environment’ (Vining, Merrick, & Price, 2008). Individuals are generally willing to pay considerably more to live in scenic areas (e.g., Ambrey & Fleming, 2011), which tend to be more natural and undisturbed from human development (e.g., SEQ Regional Scenic Amenity Study, 2005). The grandeur of nature is also one of the most common triggers of profound states like awe (Shiota, Keltner, & Mossman, 2007) and peak experiences (Privette, 1983). Aesthetic experiences involving nature may be relatively common compared to other stimuli because, according to some (e.g., Appleton, 1975), they evolved to serve as a signal for natural environments and elements that would have been conducive to survival.

As with many psychological phenomena however, individual differences exist in the degree to which people notice and are impacted by beauty in nature. The Engagement with Beauty Scale (Diessner, Solom, Frost, & Parsons, 2008) includes a subscale that assesses individual differences in the tendency to engage with and be moved by natural beauty.

Development of the Engagement with Natural Beauty (EWNB) subscale has helped researchers begin to examine associations between engaging with natural beauty and overall well-being. Initial studies have found that individuals scoring higher on EWNB generally report higher levels of gratitude, satisfaction with life, and self-esteem (Diessner, Iyer, Smith, & Haidt, 2013; Diessner et al., 2008; Zhang, Howell, & Iyer, 2014). This preliminary evidence suggests that engaging with natural beauty may contribute to positive evaluations about life and oneself, and perhaps well-being more broadly, although more causal evidence is still needed (cf. Diessner, Woodward, Stacy, & Mobasher, 2015). We build upon this area of research by (a) proposing and testing a plausible theoretical explanation for the association between EWNB and well-being, and (b) examining whether this relationship holds across different populations and measures of well-being.

We premise our explanation on the biophilia hypothesis, which states that humans have an evolved inclination to connect with, and respond emotionally to, all living things including the non-human natural world (Kahn, 1997; Shepard, 1982; Ulrich, 1993; Wilson, 1984). In many ways, the biophilia hypothesis can be thought of as an extension of our psychological need for relatedness, as put forth in self-determination theory (Ryan & Deci, 2000), in that it expands the potential sources of relatedness beyond human-to-human interactions. Several researchers have referred to the biophilia hypothesis in propounding that connections to the natural world can help assuage our need to feel like we belong—not just within human society (Baumeister & Leary, 1995), but also within a larger functioning system that includes the natural world (Clayton, 2003; Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009; Passmore & Howell, 2014). Proponents of these theoretical perspectives argue that meeting basic psychological needs like (nature) relatedness leads to improved well-being, while failing to satiate basic psychological needs leads

to ill-being (Baumeister & Leary, 1995; Kellert, 1997; Ryan, 1995). Consistent with the biophilia hypothesis, and other commonly referenced theories on attention restoration (Kaplan & Kaplan, 1989) and stress-reduction (Ulrich et al., 1991), an abundance of research demonstrates that people tend to feel and function better when nature is near (Capaldi, Passmore, Nisbet, Zelenski, & Dopko, 2015; Howell & Passmore, 2013; MacKerron & Mourato, 2013; McMahan & Estes, 2015; Russell et al., 2013). Moreover, lending credence to the notion that connecting with nature can satisfy relatedness needs, experimental studies have found that people may turn to nature when their sense of belongingness is threatened (Poon, Teng, Chow, & Chen, 2015) and that nature contact can reduce some of the negative reactions to being ostracized (Poon, Teng, Wong, & Chen, 2016).

Since the beginning of the twenty-first century, researchers have increasingly directed their attention toward measuring and examining correlates of nature connectedness—the degree to which people feel subjectively connected to the natural world (Tam, 2013). Along with being an important predictor of environmental attitudes and behaviors (e.g., Mayer & Frantz, 2004; Nisbet, Zelenski, & Murphy, 2009), nature connectedness is also associated with both hedonic and eudaimonic well-being (Capaldi, Dopko, & Zelenski, 2014; Howell, Dopko, Passmore, & Buro, 2011; Howell, Passmore, & Buro, 2013; Nisbet, Zelenski, & Murphy, 2011; Wolsko & Lindberg, 2013; Zelenski & Nisbet, 2014). Individuals who are more connected to nature are presumably having their biophilic needs met to a greater extent than those who are not as connected to nature; thus, these findings arguably provide further support for the biophilia hypothesis.

Based on this theoretical framework, we hypothesize that engaging with natural beauty is associated with positive functioning because it promotes a connection with nature. Kellert (1997)

makes a similar argument in his discussion of the nine basic ways that people can value and relate to nature, and the consequences these have for individual, social, and environmental well-being. Kellert includes aesthetics as one of these basic ways and proposes that one function of experiencing beauty in nature is the sense of harmony that it provides. Philosophers have similarly noted how a sense of unity or oneness with nature appears to be a common component of aesthetic experiences involving nature (e.g., Hepburn, 1966). One of the items in the EWNB subscale explicitly refers to “a sense of oneness, or being united with the universe”. Research supports this link; feelings of self-transcendence and connectedness are commonly reported when people experience beauty in nature (Joye & Bolderdijk, 2015; Shiota et al., 2007; Williams & Harvey, 2001). It is, thus, not surprising that previous research has also shown a strong relationship between EWNB and nature connectedness (Diessner et al., 2013; Zhang, Howell, & Iyer, 2014; Zhang, Piff, Iyer, Koleva, & Keltner, 2014). Nevertheless, factor analyses that include items from both EWNB and nature connectedness measures reveal that they are empirically distinct constructs, as do regression analyses that find no major issues of multicollinearity and the potential for each construct to independently predict outcomes of interest (Zhang, Howell, & Iyer, 2014; Zhang, Piff, et al., 2014). Kellert, in theorizing how the basic ways of valuing nature, such as aesthetics, might influence individual well-being, posited that each value “reflects a profound human craving for affiliating with nature”, and that “human identity and fulfillment depend to a great extent on the satisfactory expression of these values” (p. 9). Our primary aim in the current research is to examine the veracity of this claim; we hypothesize that EWNB is related to well-being because it promotes a sense of connectedness with nature, or from the perspective of the biophilia hypothesis, because it provides a route to satiate one’s biophilic needs.

Zhang, Howell, and Iyer (2014) were also interested in examining the pattern of relations between EWNB, nature connectedness, and well-being, but their theoretical and statistical approach was different from the one presented above. While our predictions are based on previous work on human–nature interactions, Zhang, Howell, and Iyer were guided by the sensitization model of well-being, whereby people who are higher on a certain psychological characteristic are expected to benefit more from experiences that fit with that disposition (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). Based on this model, they expected nature connectedness to be more strongly associated with well-being when EWNB is high. Across two studies, they found support for the predicted moderating role of EWNB on nature connectedness’ associations with life satisfaction and self-esteem. Given that their prediction of moderation contrasts with our prediction of mediation, we separately test for each in an attempt to understand which theoretical perspective can most accurately and consistently explain the pattern of relations between EWNB, nature connectedness, and well-being.

Our secondary aim is to test the replicability of the positive associations between EWNB, nature connectedness, and well-being using various measures across samples in differing geographical locations. Previous research on the relationship between EWNB and well-being is almost exclusively based on individuals from the United States. It is important to examine the cross-cultural generalizability of findings, as countries can differ in their ideas, traditions, and values regarding beauty and nature.

For instance, academics have long written about differences in how Western and Eastern cultures have traditionally conceptualized humans’ place in nature, with typical descriptions positioning Western cultures as viewing humans in a separate, superior position to nature and Eastern cultures as viewing humans as interconnected and one with all other living things (e.g.,

Murota, 1985; Thomas, 1983; Watanabe, 1973; White, 1967). In particular, Japanese aesthetic philosophies of finding beauty in the simple, austere, and impermanent (Lomas, 2016a; Parkes, 2011) might have implications for how and where Japanese individuals experience beauty. These ideals, manifested in traditional Japanese cultural practices such as rock gardening, emphasize appreciation of beauty in nature and reflect a harmonious conception of human–nature relations (e.g., Saito, 1983; Watanabe, 1973). The belief that nature contact is beneficial to health also manifests in the modern Japanese practice of ‘shinrin-yoku’ (forest bathing; Tsunetsugu, Park, & Miyazaki, 2010). There is, of course, within-culture variability; for-example, Japanese individuals living in more nature-impoverished areas report feeling less connected to nature than those living in greener areas (Shibata, 2016). Interestingly, Shibata also found that the younger generation of Japanese hold more negative attitudes toward nature compared to the older generation. Given this rich history of scholarship and cultural practices, it is surprising that no research has, to our knowledge, examined how nature connectedness and EWNB are related to well-being in Japan.

Another lacuna in the nature connectedness–well-being literature exists in Russia. Russian culture is commonly perceived as being neither completely Eastern or Western, but rather an amalgamation of both (e.g., Berdyaev, 1910/2014; Chaadaev, 1969). Conceptualizations of Russians’ relationship to nature are similarly complex and even ambivalent at times. For instance, Zaharchenko (1990) notes that “although post-revolutionary Russians considered nature simply as a source of building material, they still respected its beauty” (p. 3). In contrast, Udalova (2009), after reviewing the writings of Russian philosophers on nature, concludes that neither an entirely utilitarian nor harmonious view of nature perfectly fit the Russian context. Instead, Udalova argues that there exists a call in Russian writings, often



spiritually framed, to both protect *and* change the natural world. Interestingly, Steinberg (2013) notes that some of the most popular saints and writers in Russian history had a close connection with nature; Leo Tolstoy, for instance, stated that “[o]ne of the first conditions of happiness is that the link between Man and Nature shall not be broken”. Further highlighting Russian ambivalence towards nature are two main attitudes identified by Plyusnin (1995): a dominionistic view of nature as a pantry for human use and a relational view of nature as ‘Mother Earth’. Trends suggesting that Russians are moving away from connecting with nature have emerged within large, international surveys. Data from the European Social Survey reveals that the younger generation of Russians place lower value on self-transcendent concerns for others and nature compared to older generations (Magun & Rudnev, n.d.). Moreover, data from the World Values Survey finds that, compared to other nations such as Japan and Canada that have experienced the postmodernization process (Inglehart, 1997), Russians place relatively more value on economic and physical security than on self-expression values such as environmental protection (Inglehart & Welzel, 2010). Russian words such as *privolje* (i.e., sense of freedom in vast, open spaces; Likhachev, 2013) and *listopad* (i.e., sight of falling leaves; Lomas, 2016b), however, suggest that the desire for a connection with nature and the noticing of beauty in nature might be more common to the Russian experience than the aforementioned trends suggest.

To help address these research gaps, and to test the generalizability of the relationships among beauty, nature, and well-being, we collected and analyzed data from samples from Canada, as well as the geographically-distant and culturally-dissimilar countries of Japan and Russia (Hofstede, Hofstede, & Minkov, 2010). Among these countries, not only do ideas, practices, and values differ, so do levels of self-reported happiness: Canada often ranks as one of

the happiest nations in the world, while Russia and Japan tend to rank considerably lower (e.g., Helliwell, Layard, & Sachs, 2015). Therefore, we investigate whether connecting with nature and appreciating natural beauty is associated with increased well-being in contexts where happiness is not already abundant and widespread.

Similar to other nature–well-being researchers (e.g., Cervinka, Röderer, & Hefler, 2012; Howell et al., 2011; Nisbet et al., 2011) and researchers in related domains (e.g., World Health Organization, 2016), we define well-being quite broadly. Thus, we assess the robustness of EWNB’s association with positive experiences and functioning (Huta & Waterman, 2014) by employing a variety of different well-being indices.

Previous research supports a positive relationship between EWNB and the cognitive component of subjective well-being (i.e., life satisfaction; Diessner, Iyer, Smith, & Haidt, 2013; Diessner et al., 2008; Zhang, Howell, & Iyer, 2014). However, whether EWNB is related to the emotional components of subjective well-being (i.e., positive and negative affect; Diener, 2009) has yet to be established. Therefore, we assess emotional well-being in all four of our samples.

We also had three of our samples complete a broad well-being measure that incorporates Ryff’s (1989) conceptualization of psychological well-being. This more eudaimonic approach to well-being focuses on functioning well, rather than a more hedonic approach that emphasizes feeling good.

EWNB has been shown to be implicated in prosocial values, personality traits, and behaviors (Diessner et al., 2013; Zhang, Piff, et al., 2014). Thus, a measure of social well-being was completed by three of our samples (Keyes, 1998).

Having a sense of meaning in one’s life has also been described as an important aspect of well-being (Steger, 2009, 2012). For this reason, we assess presence of meaning in all four

samples.

Lastly, we examine if those who engage with natural beauty experience feelings of elevation (i.e., awe, inspiration, and transcendence) more frequently. The aforementioned research on the elicitors of awe (Shiota et al., 2007) and peak experiences (Privette, 1983) suggests that they might.

Although it is possible that EWNB could relate to only some aspects of well-being, we expect EWNB to be at least weakly correlated with all of the well-being indices that we employed. If EWNB promotes a connection to nature as we are theorizing, and if nature connectedness is related to a variety of aspects of well-being as previous research suggests, then EWNB should also have positive relationships with a diverse array of well-being indices.

## **Studies 1 and 2**

### **Method**

For Study 1, we reanalyzed data from Passmore and Holder's (2017) two-week intervention study wherein participants in Canada were randomly assigned to either a nature, human-built, or a business-as-usual control condition. At the end of the study, participants completed a variety of measures, some of which assessed EWNB, nature connectedness, and hedonic and eudaimonic well-being. To avoid any effects that the intervention might have had on participant responses, we restricted our analyses to participants who were randomly assigned to the control condition, wherein behavior was not manipulated. The relationships between EWNB, nature connectedness, and well-being were not examined by Passmore and Holder as they were primarily interested in the effect that their intervention had on these (and other) constructs. Thus, the analyses based on this data that are reported in the current research are novel in that they have not been published elsewhere.

In Study 2, we employed different measures of well-being and used larger sample sizes. We also aimed to answer the call made by Capaldi et al. (2014) to expand research on human–nature relationships and well-being to non-Western countries by collecting data from Japanese and Russian samples, along with another Canadian sample. Although culture can impact the expression of how individuals value nature (Kellert, 1997), from the evolutionary perspective of the biophilia hypothesis, the need to affiliate with the natural world should persist regardless of cultural context. Thus, we predict that connecting with nature by appreciating its beauty will be associated with greater well-being across the three cultures. Ethical approval from the appropriate institutional review boards was received for the Japanese and Canadian samples; university approval was received and the principles in the Declaration of Helsinki were followed for the Russian sample.

**Participants.** University students were recruited from Canada for Study 1 ( $N = 133$ ), and Canadian ( $N = 393$ ), Japanese ( $N = 174$ ), and Russian ( $N = 690$ ) university students were recruited for Study 2. Students were offered course credit for participating. Written informed consent was obtained from participants in the Japanese and Canadian samples; verbal informed consent was obtained from the Russian participants. See Table 1 for sample demographic characteristics and descriptive statistics for the measures of interest.

**Materials.** The Natural Beauty subscale of the Engagement with Beauty Scale (Diessner et al., 2008) was used to assess EWNB. (The Artistic Beauty and Moral Beauty subscales were also included in Study 2 but were not analyzed.) Participants rated how self-descriptive four statements—measuring perceptual, physiological, emotional, and transcendental/spiritual processes thought to be involved in experiences of beauty—were on a 7-point scale ranging from 1 (*very much unlike me*) to 7 (*very much like me*). The original English version was used for the

Canadian samples (Diessner et al., 2008), while the Russian version was used for the Russian sample (Sabadosh, 2016). Because we could not locate any previously validated Japanese versions, we created our own for the Japanese sample (see Supplemental Data for the translated scale, translation procedure, and confirmatory factor analysis).

The Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004) was used to assess individuals' subjective connection to the natural world across all four samples. Participants rated how strongly they (dis)agreed with each of the fourteen statements (e.g., "I often feel a sense of oneness with the natural world around me") on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The original English version was used for the Canadian samples (Mayer & Frantz, 2004), while the Japanese version was used for the Japanese sample (Shibata, 2016). We developed a Russian version of the CNS for the Russian sample as we were not able to locate one that had been previously developed by other researchers. Three items were excluded when calculating overall nature connectedness scores for the Russian sample due to problematic factor loadings (see Supplemental Data for the translated scale, translation procedure, and confirmatory factor analyses).

The Natural World subscale from the Allo-Inclusive Identity Scale (Leary, Tipsord, & Tate, 2008) was also included to assess the degree to which people incorporated nature into their sense of self for the Canadian sample in Study 1. Adapted from the Inclusion of Others in the Self Scale (Aron, Aron, & Smollen, 1992), participants were presented with seven versions of two circles, representing the self and another entity, that ranged from no overlap (scored as a 1) to almost complete overlap (scored as a 7); participants indicated which best described their relationship or connectedness with eight animate (e.g., a wild animal) and inanimate (e.g., the Earth) elements of nature. Replacing CNS with the Allo-Inclusive Identity–Natural World

subscale (AI-NW) in analyses enabled us to test the robustness of our findings across different measures of nature connectedness.

Three aspects of well-being were assessed in Study 1. Emotional (hedonic) well-being was measured with the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). Participants rated the degree to which they experienced ten positive (e.g., enthusiastic) and nine negative (e.g., upset) feelings during the previous two weeks on a 5-point scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). Due to a technical glitch in the online survey, only nine items were employed assessing negative affect (i.e., answers to “hostile” were not recorded). Eudaimonic feelings of well-being relating to, for example, inspiration, awe, and transcendence, were measured with the 13-item Elevating Experiences Scale (EES; Huta & Ryan, 2010). Participants rated the degree to which they experienced each feeling on a 7-point scale ranging from 1 (*not at all*) to 7 (*extremely*). Finally, eudaimonic well-being related to meaning in life was assessed with the 12-item Sense of Meaning Scale (SMS; Huta & Ryan, 2010). The SMS uses a 7-point scale, ranging from 1 (*not at all*) to 7 (*extremely*), to measure how meaningful people perceive their activities and experiences to be during the previous two weeks.

For Study 2, well-being was assessed with the 14-item Mental Health Continuum Short Form (MHC-SF) and the 5-item Presence of Meaning subscale from the Meaning in Life Questionnaire (MLQ-P). We used the English version of the MHC-SF (Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2010) for the Canadian sample, the Japanese version (Ozawa-de Silva, Ozawa-de Silva, & Keyes, 2016) for the Japanese sample, and the Russian version (Žemojtel-Piotrowska et al., 2016) for the Russian sample. The MHC-SF consists of three different subscales: emotional well-being (three items asking about happiness, interest in

life, and life satisfaction); social well-being (five items referring to social acceptance, social actualization, social coherence, social contribution, and social integration); and psychological well-being (six items asking about autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance). Participants rated how frequently they experienced each aspect of well-being during the past month on a 6-point scale ranging from 1 (*never*) to 6 (*every day*). We used the English version of the MLQ-P (Steger Frazier, Oishi, & Kaler, 2006) for the Canadian sample, the Japanese version (Steger, Kawabata, Shimai, & Otake, 2008) for the Japanese sample, and the Russian version (Osin, Kuznetzova, & Malyutina, 2014) for the Russian sample. Participants rated how well each statement applied to them using a 7-point scale ranging from 1 (*absolutely untrue*) to 7 (*absolutely true*). The Japanese sample also completed the Search for Meaning subscale of the MLQ, but it is not analyzed here.

As part of another project, we also had participants complete additional questionnaires that assessed time perspectives, consideration of future consequences, and attitudes about death in Study 2. To avoid any insidious effects that reminders of death might have had on responses to other questionnaires (Pyszczynski, Solomon, & Greenberg, 2015), we included the questions about death attitudes at the end of the study.

## Results

**Correlational analyses.** As expected, significant relationships were found between EWNB and nature connectedness across all four samples ( $.44 \leq r_s \leq .65$ ). Nature connectedness and EWNB were significantly associated with positive affect, feelings related to elevation, and a sense of meaning in the Canadian sample in Study 1 ( $.19 \leq r_s \leq .52$ ), but neither nature connectedness nor EWNB significantly correlated with negative affect ( $-.01 \leq r_s \leq .04$ ). Because of this, we excluded negative affect in subsequent analyses. Nature connectedness was also

significantly related to greater well-being (i.e., emotional, social, psychological, and meaning in life) in the Canadian, Japanese, and Russian samples in Study 2 ( $.14 \leq r_s \leq .33$ ). Positive relationships between EWNB and the well-being indices were found in the Canadian, Japanese, and Russian samples in Study 2 as well, although two of the correlations were only marginally significant ( $.10 \leq r_s \leq .25$ ). See Tables 2 and 3 for specific correlations between these variables.

**Mediation analyses.** To test our hypothesis regarding the pathway between EWNB and well-being, we conducted mediation analyses using the SPSS PROCESS macro by Hayes (2013). Ten thousand bootstrap samples were run to obtain bias-corrected 95% confidence intervals for the indirect effects. We examined models wherein nature connectedness mediated the positive relationship between engaging with natural beauty and each aspect of well-being. Results largely supported our hypothesis. Compared to those low in EWNB, individuals high in EWNB had higher levels of connectedness to nature and inclusion of nature in self. In turn, individuals higher in nature connectedness had higher levels of positive affect and feelings related to elevation in the Canadian sample in Study 1, and generally had higher levels of emotional, social, and psychological well-being, and presence of meaning in the Canadian, Japanese, and Russian samples in Study 2. Confidence intervals were entirely above zero for almost all of the indirect effects, with the exception of the analyses involving CNS and a sense of meaning in the Canadian sample in Study 1, and CNS and social well-being in the Canadian sample in Study 2. Detailed results from these analyses are presented in Tables 4 and 5.

**Moderation analyses.** Using Hayes's (2013) SPSS PROCESS macro, we also conducted moderation analyses to test whether the contrasting prediction from Zhang, Howell, and Iyer (2014), where EWNB moderates the relationship between nature connectedness and well-being, was supported in the current research. Significant interactions were found in the Canadian



sample in Study 1 when CNS and EWNB were used to predict positive affect, elevating experiences, and a sense of meaning, and when AI-NW and EWNB were used to predict positive affect and elevating experiences. Results from these analyses indicated that, in general, nature connectedness was only significantly related to well-being when EWNB was high. However, almost no significant interactions between CNS and EWNB emerged for any of the indices of well-being in Study 2. The one exception was a significant interaction observed in the Russian sample for emotional well-being. Contrasting the results from Study 1 and previous research, nature connectedness was related to emotional well-being when EWNB was low and moderate, but not when it was high. See Tables S1-S5 in Supplemental Data for specific moderation results.

### **General Discussion**

While contemplating natural beauty has long been within the purview of naturalists and philosophers, psychologists have increasingly become interested in how experiences of beauty in nature can influence our feelings, thoughts, and behaviors. The current investigation expands this burgeoning area of research in several ways. First, we show that EWNB's relationship with positive functioning extends across diverse conceptualizations of well-being that is found within the field of positive psychology (Lambert, Passmore, & Holder, 2015). From feeling like one's life is meaningful to experiencing positive emotions, it appears as though individuals who notice and are moved by beauty in nature are more likely to lead flourishing lives.

We also replicate previously published findings by showing that nature connectedness is related to both hedonic and eudaimonic forms of well-being (Capaldi et al., 2015). The one exception was negative affect, which was not correlated with nature connectedness or EWNB. It is possible that the relatively low average level and small amount of variability in overall

negative affect scores reported by our sample might have restricted our ability to detect an association between these constructs. Regardless, our results add to the mixed literature on this topic, wherein some studies have found support for an inverse relationship between nature connectedness and negative emotional states, but others have not (Ginting, Näring, Kwakkenbos, & Becker, 2015; Martyn & Brymer, 2016; Nisbet et al., 2011; Wolsko & Lindberg, 2013; Zelenski & Nisbet, 2014).

Some researchers have argued that the promotion of positive states may be the primary emotional benefit of connecting with nature, and that the buffering of negative states may be secondary and less pertinent (McMahan & Estes, 2015; Nisbet et al., 2011; Zelenski & Nisbet, 2014). This appears to be inconsistent with attention restoration and stress-reduction theories, in that both theories emphasize how contact with (nonthreatening) natural environments can promote recovery from negative psychological states (Kaplan & Kaplan, 1989; Ulrich et al., 1991). Positioning the buffering of negative states as a lesser benefit of connecting with nature is also inconsistent with some of the most common reasons people give for why they seek nature contact (e.g., to escape from stressors; Home, Hunziker, & Bauer, 2012). These seemingly incongruous findings and perspectives call for deeper consideration and further research (e.g., investigating potential moderators or quantitatively summarizing existing research).

A third contribution of our studies is the evidence they provide for the generalizability of the links between nature connectedness and well-being, and between EWNB and well-being, in non-Western samples. Researchers in Japan have investigated the psychophysiological benefits of nature contact, in particular the Japanese practice of ‘shinrin-yoku’ (Tsunetsugu et al., 2010), but to our knowledge, this is the first investigation to provide evidence for well-being’s association with EWNB and nature connectedness in a Japanese sample. Moreover, to our

knowledge, our research is also the first to investigate and provide empirical support for these relationships in Russia.

Although the current research makes progress in extending this area of research beyond the Western countries of the United States and Canada (Capaldi et al., 2014), the novel countries we sampled are still fairly similar on a number of the other important societal characteristics identified by Henrich, Heine, and Norenzayan (2010). Given that evolutionary explanations are commonly employed to explain why nature is beneficial to human functioning (e.g., Kellert & Wilson, 1993; Ulrich et al., 1991), it is important that further research on human–nature relationships is conducted outside of WEIRD (i.e., western, educated, industrialized, rich, and democratic) societies (Henrich et al., 2010). This would allow for a more comprehensive assessment of the generalizability of the benefits of feeling connected to nature, in addition to providing insight into the potential impact that culture may have in shaping how people relate to nature and experience its beauty (Kellert, 1997).

A final contribution of our studies is the relatively reliable support they provide for our model inspired by the biophilia hypothesis that attempts to explain the relationship between EWNB and well-being. Results from a series of mediation analyses suggest that people who are more likely to notice and be moved by natural beauty tend to report greater well-being because, at least in part, they feel more connected to nature. From the theoretical perspective of the biophilia hypothesis, engaging with beauty in nature helps people meet their need to affiliate with nature, and thus flourish. Whether the expression of other basic values or orientations to nature that Kellert (1997) lists (e.g., utilitarian) are as effective at satiating people’s biophilic needs as engaging with natural beauty is a valuable question to pursue in future research. That nature connectedness still tends to predict well-being after controlling for EWNB suggests that

other routes to meeting biophilic needs might also be viable and important.

We were only able to replicate the exact EWNB moderation findings reported in Zhang, Howell, and Iyer (2014) in one of our samples. The incongruent results might be due to the different measures of well-being used in Study 1 compared to Study 2. For instance, the timespan that we were asking participants to report on was shorter in Study 1 (i.e., two weeks) versus Study 2 (i.e., one month or in general). Nevertheless, the well-being measures in Zhang, Howell, and Iyer were more similar to the ones employed in Study 2 (i.e., they asked about general evaluations regarding overall life satisfaction and self-esteem). Moreover, the one significant moderation effect in Study 2 in the Russian sample actually showed the opposite pattern from Zhang, Howell, and Iyer, as the strength of the relationship between nature connectedness and emotional well-being weakened as EWNB increased. Overall, we argue that the general pattern of results found across our four samples provide more convincing support for our theorized mediation model than for EWNB as a moderator of the relationship between nature connectedness and well-being.

It is important to acknowledge that the current research focuses exclusively on between-person differences. Processes documented here at the trait-level might operate differently at the state-level, although there is suggestive evidence that feeling connected to nature might mediate some of the beneficial effects of nature contact in the moment (Mayer et al., 2009). Longitudinal and experimental studies are needed to more directly test the causal claims underlying our mediation model and to uncover why some individuals are more likely to engage in natural beauty than others. It is possible that more complex models inspired by theories that are more prominent in other areas of psychological research (e.g., broaden-and-build; Fredrickson, 2004) might also be relevant in understanding more dynamic relationships between nature

connectedness, EWNB, and well-being. Nevertheless, the associations between EWNB and well-being that emerge in our studies suggests that interventions aimed at increasing awareness and openness to natural beauty could be an attractive avenue for increasing positive functioning, as well as a person's connection to nature (cf. Diessner et al., 2015).

Our samples were limited demographically in that we only recruited undergraduate students. Nonetheless, results are largely consistent across our two studies utilizing various measures of well-being and samples from three different countries and cultures. It is important that future studies recruit community samples with a wider age range and educational background more representative of the broader population. Findings should be replicated with other widely used measures of nature connectedness as well, like the Nature Relatedness Scale (Nisbet et al., 2009) or the Inclusion of Nature in Self Scale (Schultz, 2001),

EWNB's strong, significant relationship with nature connectedness suggests that experiences of natural beauty may also play an important role in encouraging proenvironmental attitudes and behavior. More direct evidence of this from experimental research would highlight that the path to sustainability may not only be a happy one, as proposed by Nisbet and Zelenski (2011), but one potentially filled with beauty as well.

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All authors declare that no competing financial interests exist.

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Table 1  
*Sample Characteristics and Descriptive Statistics for Studies 1 and 2*

Country	Study 1			Study 2			Study 2			Study 2		
	Canada			Canada			Japan			Russia		
<i>N</i>	133			393			174			690		
Age	<i>M</i> = 20.00, <i>SD</i> = 4.52			<i>M</i> = 20.12, <i>SD</i> = 3.55			<i>M</i> = 19.41, <i>SD</i> = 0.85			<i>M</i> = 20.71, <i>SD</i> = 4.94		
Female	65.41%			81.17%			58.62%			59.57%		
	<i>M</i>	<i>SD</i>	$\alpha$	<i>M</i>	<i>SD</i>	$\alpha$	<i>M</i>	<i>SD</i>	$\alpha$	<i>M</i>	<i>SD</i>	$\alpha$
EWNB	4.99	1.31	.85	5.16	1.25	.82	5.18	1.14	.78	4.87	1.40	.87
CNS	3.28	0.59	.87	3.42	0.53	.83	2.74	0.66	.84	3.24	0.71	.86
AI-NW	2.78	1.20	.86	-	-	-	-	-	-	-	-	-
PA	3.19	0.75	.88	-	-	-	-	-	-	-	-	-
NA	2.25	0.68	.83	-	-	-	-	-	-	-	-	-
EES	3.39	1.33	.95	-	-	-	-	-	-	-	-	-
SMS	3.88	1.35	.95	-	-	-	-	-	-	-	-	-
MHC-SF Emo	-	-	-	4.56	0.95	.87	3.83	1.16	.84	4.06	1.19	.85
MHC-SF Soc	-	-	-	3.64	1.10	.82	3.19	0.94	.71	3.48	1.11	.81
MHC-SF Psy	-	-	-	4.20	0.95	.85	3.41	1.10	.81	3.98	1.03	.83
MLQ-P	-	-	-	4.73	1.36	.92	3.98	1.27	.82	4.81	1.34	.88

*Note.* EWNB = Engagement with Nature Beauty; CNS = Connectedness to Nature Scale; AI-NW = Allo-Inclusive Identity-Natural World; PA = Positive Affect; NA = Negative Affect; EES = Elevating Experiences Scale; SMS = Sense of Meaning Scale; MHC-SF = Mental Health Continuum Short Form; Emo = Emotional well-being subscale; Soc = Social well-being subscale; Psy = Psychological well-being subscale; MLQ-P = Meaning in Life Questionnaire Presence.

Table 2

*Pearson Correlation Coefficients for Study 1*

	EWNB	CNS	AI-NW
PA	.19*	.25**	.27**
NA	-.01	.04	.04
EES	.38***	.43***	.52***
SMS	.37***	.33***	.44***

*Note.* Degrees of freedom was 131. EWNB = Engagement with Natural Beauty; CNS = Connectedness to Nature Scale; AI-NW = Allo-Inclusive Identity–Natural World; PA = Positive Affect; NA = Negative Affect; EES = Elevating Experiences Scale; SMS = Sense of Meaning Scale.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Table 3  
*Pearson Correlation Coefficients for Study 2*

	Canadian sample		Japanese sample		Russian sample	
	EWNB	CNS	EWNB	CNS	EWNB	CNS
MHC-SF Emotional	.18***	.25***	.25***	.27***	.22***	.27***
MHC-SF Social	.10 <sup>†</sup>	.14**	.16*	.33***	.19***	.27***
MHC-SF Psychological	.15**	.27***	.24**	.32***	.19***	.21***
MLQ-P	.19***	.24***	.13 <sup>†</sup>	.24**	.25***	.21***

*Note.* Due to partially missing data, the degrees of freedom ranged from 386 to 388 for the Canadian sample, from 168 to 170 for the Japanese sample, and from 682 to 684 for the Russian sample. EWNB = Engagement with Natural Beauty; CNS = Connectedness to Nature Scale; MHC-SF = Mental Health Continuum Short Form; MLQ-P = Meaning in Life Questionnaire Presence.  
<sup>†</sup> $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Table 4  
*Mediation Analyses for Study 1*

Well-being outcome measure	Total effect of EWNB to well-being (path c)	EWNB to CNS (path a)	CNS to well-being (path b)	Direct effect of EWNB to well-being (path c')	Indirect effect of CNS (ab) [95% CI]
PA	.11*	.28***	.27 <sup>†</sup>	.04	.07 [.01, .15]
EES	.38***	.28***	.73**	.18 <sup>†</sup>	.20 [.08, .35]
SMS	.38***	.28***	.37	.27*	.10 [-.01, .24]
Well-being outcome measure	Total effect of EWNB to well-being (path c)	EWNB to AI-NW (path a)	AI-NW to well-being (path b)	Direct effect of EWNB to well-being (path c')	Indirect effect of AI-NW (ab) [95% CI]
PA	.11*	.43***	.14*	.05	.06 [.01, .13]
EES	.38***	.43***	.49***	.17*	.21 [.11, .33]
SMS	.38***	.43***	.39***	.21*	.17 [.08, .28]

*Note.* Regression coefficients are unstandardized. EWNB = Engagement with Natural Beauty; CNS = Connectedness to Nature Scale; AI-NW = Allo-Inclusive Identity–Natural World; PA = Positive Affect; EES = Elevating Experiences Scale; SMS = Sense of Meaning Scale. Variance inflation factors were smaller than 5 and tolerance levels were above 0.20. This suggests that multicollinearity is not an issue (Menard, 1995).

<sup>†</sup> $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Table 5

*Mediation Analyses for Study 2*

Well-being outcome measure	Total effect of EWNB to well-being (path c)	EWNB to CNS (path a)	CNS to well-being (path b)	Direct effect of EWNB to well-being (path c')	Indirect effect of CNS (ab) [95% CI]
Canadian sample					
MHC-SF Emotional	.13***	.28***	.41***	.02	.11 [.05, .18]
MHC-SF Social	.09 <sup>†</sup>	.28***	.27 <sup>†</sup>	.01	.07 [-.004, .15]
MHC-SF Psychological	.11**	.28***	.55***	-.04	.15 [.09, .23]
MLQ-P	.20***	.28***	.53**	.06	.15 [.05, .25]
Japanese sample					
MHC-SF Emotional	.26***	.25***	.36*	.17*	.09 [.02, .17]
MHC-SF Social	.13*	.25***	.45***	.02	.11 [.05, .20]
MHC-SF Psychological	.23**	.25***	.43**	.12	.11 [.04, .20]
MLQ-P	.14 <sup>†</sup>	.25***	.42**	.04	.11 [.04, .20]
Russian sample					
MHC-SF Emotional	.19***	.24***	.39***	.09*	.10 [.06, .14]
MHC-SF Social	.15***	.24***	.43***	.05	.11 [.07, .15]
MHC-SF Psychological	.14***	.24***	.28***	.07*	.07 [.04, .10]

MLQ-P	.25***	.24***	.24***	.18***	.06 [.02, .10]
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*Note.* Regression coefficients are unstandardized. EWNB = Engagement with Natural Beauty; CNS = Connectedness to Nature Scale; MHC-SF = Mental Health Continuum Short Form; MLQ-P = Meaning in Life Questionnaire Presence. Variance inflation factors were smaller than 5 and tolerance levels were above 0.20, suggesting that multicollinearity is not an issue (Menard, 1995).

† $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

## **Supplemental Data**

Engaging With Natural Beauty May Be Related to Well-Being Because It Connects People to  
Nature: Evidence From Three Cultures



Table S1

*Moderation Analyses Involving Connectedness to Nature Scale and Engagement with Natural Beauty Subscale in Study 1*

Predictor	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Outcome: PA				
Constant	3.10	0.07	42.87	< .001
CNS	0.15	0.14	1.06	.29
EWNB	0.08	0.06	1.29	.20
CNS*EWNB	0.19	0.08	2.47	.01
Outcome: EES				
Constant	3.17	0.11	27.73	< .001
CNS	0.43	0.23	1.91	.06
EWNB	0.30	0.10	2.99	.003
CNS*EWNB	0.48	0.12	3.90	< .001
Outcome: SMS				
Constant	3.69	0.12	30.18	< .001
CNS	0.12	0.24	0.51	.61
EWNB	0.37	0.11	3.45	< .001
CNS*EWNB	0.40	0.13	3.03	.003

*Note.* EWNB = Engagement with Natural Beauty; CNS = Connectedness to Nature Scale; PA = Positive Affect; EES = Elevating Experiences Scale; SMS = Sense of Meaning Scale. The variance inflation factor was smaller than 5 and tolerance was above 0.20, suggesting that multicollinearity is not an issue (Menard, 1995).

Table S2

*Moderation Analyses Involving Allo-Inclusive Identity–Natural World and Engagement with Natural Beauty Subscale in Study 1*

Predictor	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Outcome: PA				
Constant	3.12	0.07	45.21	< .001
AI-NW	0.09	0.06	1.32	.19
EWNB	0.08	0.06	1.41	.16
AI-NW*EWNB	0.09	0.04	2.15	.03
Outcome: EES				
Constant	3.29	0.11	30.73	< .001
AI-NW	0.40	0.10	4.04	< .001
EWNB	0.22	0.09	2.53	.01
AI-NW*EWNB	0.13	0.06	2.11	.04
Outcome: SMS				
Constant	3.81	0.11	33.21	< .001
AI-NW	0.33	0.11	3.08	.003
EWNB	0.24	0.09	2.58	.01
AI-NW*EWNB	0.09	0.07	1.32	.19

*Note.* EWNB = Engagement with Natural Beauty; AI-NW = Allo-Inclusive Identity–Natural World; PA = Positive Affect; EES = Elevating Experiences Scale; SMS = Sense of Meaning Scale. The variance inflation factor was smaller than 5 and the tolerance level was above 0.20, suggesting that multicollinearity is not an issue (Menard, 1995).

Table S3

*Moderation Analyses for the Canadian Sample in Study 2*

Predictor	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Outcome: MHC-SF Emotional				
Constant	4.59	0.05	84.83	< .001
CNS	0.42	0.12	3.62	< .001
EWNB	0.01	0.05	0.15	.88
CNS*EWNB	-0.06	0.06	-0.94	.35
Outcome: MHC-SF Social				
Constant	3.68	0.06	57.66	< .001
CNS	0.29	0.14	2.10	.04
EWNB	-0.01	0.06	-0.13	.90
CNS*EWNB	-0.08	0.07	-1.14	.26
Outcome: MHC-SF Psychological				
Constant	4.23	0.05	79.05	< .001
CNS	0.56	0.12	4.88	< .001
EWNB	-0.05	0.05	-1.03	.30
CNS*EWNB	-0.07	0.06	-1.05	.29
Outcome: MLQ-P				
Constant	4.74	0.08	61.28	< .001
CNS	0.53	0.17	3.17	.002
EWNB	0.06	0.07	0.77	.44
CNS*EWNB	-0.01	0.09	-0.14	.89

*Note.* EWNB = Engagement with Natural Beauty; CNS = Connectedness to Nature Scale; MHC-SF = Mental Health Continuum Short Form; MLQ-P = Meaning in Life Questionnaire Presence. The variance inflation factor was smaller than 5 and the tolerance level was above 0.20, suggesting that multicollinearity is not an issue (Menard, 1995).

Table S4

*Moderation Analyses for the Japanese Sample in Study 2*

Predictor	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Outcome: MHC-SF Emotional				
Constant	3.82	0.09	41.80	< .001
CNS	0.36	0.14	2.46	.01
EWNB	0.17	0.09	1.97	.05
CNS*EWNB	0.02	0.10	0.15	.88
Outcome: MHC-SF Social				
Constant	3.16	0.07	43.55	< .001
CNS	0.45	0.11	3.94	< .001
EWNB	0.02	0.07	0.34	.73
CNS*EWNB	0.03	0.08	0.38	.71
Outcome: MHC-SF Psychological				
Constant	3.38	0.09	39.54	< .001
CNS	0.43	0.14	3.19	.002
EWNB	0.14	0.08	1.69	.09
CNS*EWNB	0.06	0.09	0.64	.52
Outcome: MLQ-P				
Constant	3.98	0.10	39.08	< .001
CNS	0.42	0.16	2.63	.01
EWNB	0.03	0.10	0.27	.79
CNS*EWNB	-0.04	0.11	-0.37	.71

*Note.* EWNB = Engagement with Natural Beauty; CNS = Connectedness to Nature Scale; MHC-SF = Mental Health Continuum Short Form; MLQ-P = Meaning in Life Questionnaire Presence. The variance inflation factor was smaller than 5 and the tolerance level was above 0.20, suggesting that multicollinearity is not an issue (Menard, 1995).

Table S5

*Moderation Analyses for the Russian Sample in Study 2*

Predictor	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Outcome: MHC-SF Emotional				
Constant	4.10	0.05	87.09	< .001
CNS	0.39	0.07	5.60	< .001
EWNB	0.08	0.04	2.16	.03
CNS*EWNB	-0.08	0.04	-2.08	.04
Outcome: MHC-SF Social				
Constant	3.50	0.04	79.45	< .001
CNS	0.44	0.07	6.63	< .001
EWNB	0.04	0.03	1.23	.22
CNS*EWNB	-0.05	0.04	-1.27	.20
Outcome: MHC-SF Psychological				
Constant	3.99	0.04	96.25	< .001
CNS	0.28	0.06	4.59	< .001
EWNB	0.07	0.03	2.11	.03
CNS*EWNB	-0.04	0.03	-1.16	.25
Outcome: MLQ-P				
Constant	4.85	0.05	90.31	< .001
CNS	0.24	0.08	2.98	.003
EWNB	0.17	0.04	4.09	< .001
CNS*EWNB	-0.08	0.04	-1.73	.08

*Note.* EWNB = Engagement with Natural Beauty; CNS = Connectedness to Nature Scale; MHC-SF = Mental Health Continuum Short Form; MLQ-P = Meaning in Life Questionnaire Presence. The variance inflation factor was smaller than 5 and the tolerance level was above 0.20, suggesting that multicollinearity is not an issue (Menard, 1995).

### Japanese Version of the Engagement with Beauty Scale

**【Instruction】** 次の質問はあなたが、美しいと認識したり感じたりした経験についての質問です。この質問はあなたの好きなことや大切だと考えていることを質問しているのではなく、あなたが何を美しいと感じるか聞くものです。各質問に1~7の段階で答えてください。1=全くそう思わない、2=そう思わない、3=あまりそう思わない4=どちらでもない、5=少しそう思う、6=そう思う、7=強くそう思う

質問1-4は自然界（山、岩、湖、海、砂漠 植物、花、木、動物など）に関する質問です。人間は含みません。

1. 自然の美しい面が1つ以上わかる
2. 自然の美しさを感じたとき、胸がいっぱいになる、胸がすっとする、鼓動が速くなるなど体が反応する。
3. 自然の美しさを感じたとき、畏敬の念、驚嘆、興奮、感心など感情の動きを感じる。
4. 自然の美しさを感じたとき、一体感、宇宙との一体感や世界全体への愛などのスピリチュアルなことを感じる

質問5-8は芸術（絵画、彫刻、音楽 ダンス、建築 詩、小説、文学など）に関するものです。

5. アートや人間の作ったものの美しさがわかる
6. 芸術作品の美しさを感じたとき、胸がいっぱいになる、胸がすっとする、鼓動が速くなるなど体が反応する。
7. 芸術作品に美しさを感じたとき、畏敬の念、驚嘆、興奮、感心など感情の動きを感じる。
8. 芸術作品に美しさを感じたとき、一体感、宇宙との一体感や世界全体への愛などのスピリチュアルなことを感じる

質問9-14は人に関することです。チャリティ、誠実、親切、思いやり、寛容、他人のための犠牲、他人への真摯な奉仕など、美德に関するものです。

9. 人類の中に美德を感じる。
10. 美德を感じたとき、胸がいっぱいになる、胸がすっとする、鼓動が速くなるなど体が反応する。
11. 美德を感じたとき、畏敬の念、驚嘆、興奮、感心など感情の動きを感じる。
12. 美德を感じたとき、一体感、宇宙との一体感や世界全体への愛などのスピリチュアルなことを感じる
13. 美德のある行動を見たとき、より良い人間になりたいと強く思う
14. 美德ある行動を見たとき、いい行いや他人への奉仕を増やしたいと強く思う。

**Note:** Three Japanese researchers who were proficient in English translated items from the Engagement with Beauty Scale into Japanese and then translated them back to English to ensure that the items retained their original meaning. Fit indices from a confirmatory factor analysis suggested that the structure outlined in Figure 1 in Diessner, Solom, Frost, Parsons, and Davidson (2008) provided a good fit for the Japanese version that we created (Comparative Fit Index [CFI] = .98; Root Mean Square Error of Approximation [RMSEA] = .05; Standardized Root Mean Square Residual [SRMR] = .06; Hu & Bentler, 1999).

### Russian Version of the Connectedness to Nature Scale

Пожалуйста, ответьте на каждый из вопросов, как вы обычно себя чувствуете. Не существует верных или неверных ответов. Просто ответьте как можно более честно, что вы в настоящий момент испытываете.

1 – полностью не согласен, 2 – не согласен, 3 – нейтрально, 4 – согласен, 5 – полностью согласен.

Сов-но неверно    Нейтрально    Сов-но верно

	1	2	3	4	5
1. Я часто испытываю чувство единения с природным миром вокруг меня.					
2. Я думаю, что природа – это сообщество, к которому я принадлежу.					
3. Я замечаю и ценю разум других живых организмов.					
4. Я часто чувствую свою отдаленность от природы.					
5. Когда я думаю о своей жизни, я воображаю себя частью большего циклического процесса жизни.					
6. Я часто чувствую родство с животными и растениями.					
7. Я чувствую, словно принадлежу Земле так же, как и она принадлежит мне.					
8. У меня есть глубокое понимание того, как мои действия влияют на природный мир.					
9. Я часто чувствую себя частью паутины жизни.					
10. Я чувствую, что все живое на Земле, люди и звери владеют общей «жизненной силой».					
11. Как дерево может быть частью леса, я чувствую себя вовлеченным в более объемный природный мир.					
12. Когда я думаю о своем месте на Земле, я рассматриваю себя как вершину в иерархии, которая существует в природе.					
13. Я часто чувствую, что я лишь маленькая часть природного мира, и что я не более важен, чем трава на земле или птицы на деревьях.					



14. Мое личное благополучие не зависит от благополучия природного мира.					
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**Note:** The fourth author translated the CNS items into Russian. The scale was then translated back into English by a bilingual colleague and some changes were made to the items to improve the retention of their original meaning. A confirmatory factor analysis was run to assess whether a single factor provided a good fit to the CNS data for the Russian sample. Fit indices suggested that there might be some model misspecification (CFI = .83; RMSEA = .09; SRMR = .06). Looking at the factor loadings, items 4 and 14 did not load significantly onto the common factor, and item 12 unexpectedly loaded negatively onto the common factor. Some translations of the CNS into other languages have also found similar issues with at least one of these items (Nishiyama, 2014; Olivos, Aragonés, & Amérigo, 2011; Pessoa, Gouveia, Soares, Vilar, & Freires, 2016). Excluding these three problematic items improved some of the fit indices (CFI = .88; RMSEA = .10; SRMR = .05) and increased internal reliability of the scale from a Cronbach's alpha of .79 to .86. Although the fit indices were still less than ideal, the remaining 11 items all loaded positively and significantly onto the common factor.

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