Research Report

aps ASSOCIATION FOR PSYCHOLOGICAL SCIENCE

Psychological Science
22(9) 1101–1106

DOI: 10.1177/0956797611418527
http://pss.sagepub.com
SAGE

Underestimating Nearby Nature: Affective Forecasting Errors Obscure the Happy Path to Sustainability

Elizabeth K. Nisbet and John M. Zelenski
Carleton University

Abstract

Modern lifestyles disconnect people from nature, and this may have adverse consequences for the well-being of both humans and the environment. In two experiments, we found that although outdoor walks in nearby nature made participants much happier than indoor walks did, participants made affective forecasting errors, such that they systematically underestimated nature's hedonic benefit. The pleasant moods experienced on outdoor nature walks facilitated a subjective sense of connection with nature, a construct strongly linked with concern for the environment and environmentally sustainable behavior. To the extent that affective forecasts determine choices, our findings suggest that people fail to maximize their time in nearby nature and thus miss opportunities to increase their happiness and relatedness to nature. Our findings suggest a happy path to sustainability, whereby contact with nature fosters individual happiness and environmentally responsible behavior.

Keywords

emotions, environmental effects, happiness, judgment

Received 6/21/10; Revision accepted 4/4/11

People habitually neglect the natural environment, yet contact with nature has considerable benefits (Frumkin, 2001). Research has shown that contact with nature can restore attentional resources (Berman, Jonides, & Kaplan, 2008), improve concentration in children with attention-deficit/hyperactivity disorder (Faber Taylor & Kuo, 2009), speed recovery from illness, and reduce stress (Ulrich, 1993); it may even reduce mortality risk (Mitchell & Popham, 2008). Psychologists often explain these findings by drawing on sociobiologist E. O. Wilson's (1984) biophilia hypothesis, which suggests that because humans evolved in natural environments and have lived separate from nature only relatively recently in their evolutionary history, people possess an innate need to affiliate with other living things. Although researchers cannot directly test the evolutionary origins of an affinity for natural environments, people's fondness for natural scenery and the popularity of outdoor activities, zoos, gardening, and pets are evidence of biophilia (Kellert, 1997). Nature can also be a source of happiness (Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009; Nisbet, Zelenski, & Murphy, 2011). Humans evolved in natural environments and still seem to thrive in them.

Modern lifestyles, however, may erode people's connection with nature (Kellert & Wilson, 1993; Schultz, 2000), leaving them unaware of nature's potential benefits. By limiting their contact with nature, people fail to maximize the advantages it offers for cognition and well-being. Avoiding contact with nature may also contribute to environmental destruction: People who do not feel related to nature are unmotivated to protect it (Schultz, 2000). Moreover, developing a close relationship with nature may depend on experiences in healthy natural environments (Ward Thompson, Aspinall, & Montarzino, 2008). Recent empirical work indicates that subjective connection with nature predicts environmentally sustainable behaviors, such as walking or cycling to conserve gas (Schultz, 2001), signing a recycling petition, and self-identifying as an environmentalist (Nisbet & Zelenski, 2009; Nisbet, Zelenski, & Murphy, 2009). That is, people who are more related to nature spend more time in nature and experience more happiness, and these effects seem to promote environmentally sustainable attitudes and behavior.

Urban design often makes contact with nature difficult (e.g., urban cores lack green space; suburbs require the use of cars); however, we suspect that people choose to avoid nearby nature (e.g., people may drive to the gym rather than jog through a park). For example, our campus buildings are connected not only by pathways through parklike surroundings,

Corresponding Author:
Elizabeth K. Nisbet, Department of Psychology, Carleton University, 1125 Colonel By Dr., Ottawa, Ontario, Canada K1S 5B6
E-mail: elizabeth_nisbet@carleton.ca

but also by underground tunnels that are frequently used, even on temperate days. Assuming that contact with nearby nature on campus would produce benefits with little effort, we wondered why people often choose to walk through the tunnels.

Recent research on affective forecasting errors may help explain this seemingly irrational behavior. When deciding on a course of behavior, people predict the hedonic consequences of pursuing various options, and these anticipated emotions have an important influence on choice (Mellers, Schwartz, & Ritov, 1999). Moreover, people make systematic errors in predicting how both important and trivial events will make them feel (T. D. Wilson & Gilbert, 2005). People may avoid nearby nature because a chronic disconnection from nature causes them to underestimate its hedonic benefits.

To test this hypothesis, we conducted two studies in which participants were randomly assigned to take walks either indoors, using tunnels (indoor condition), or outdoors in natural urban areas (outdoor condition). Drawing on the biophilia hypothesis and previous research (e.g., Kaplan, 1995; Kellert, 1997), we predicted that participants would enjoy walking outdoors more than they would enjoy walking indoors. We also anticipated that this enjoyment would cause participants who walked outdoors to feel more related to nature than participants who walked indoors (cf. Kellert, 1993). In addition, we hypothesized that participants would make affective forecasting errors, such that they would fail to anticipate their enjoyment of the outdoors. We examined forecasts and experiences in one study with a between-subjects design and in a second study with a within-subjects design.

Study 1

Method

Participants. One hundred fifty Carleton University students (85 female, 56 male, 9 unspecified), from 16 to 48 years old (M = 20.80 years, SD = 5.03), were randomly assigned to an indoor walking route (n = 78) or an outdoor walking route (n = 72) and to be either *forecasters* (n = 77) or *experiencers* (n = 73) of emotions. Participants were tested in groups of 1 to 11 students (M = 6.13, SD = 2.55).[1]

Materials. We used the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) to assess positive and negative affect, each with a 10-word list of emotions. We modified the PANAS by adding a measure of how *relaxed* participants felt, to assess low-arousal pleasant states, and measures of how *fascinated*, *curious*, and *interested* participants felt; these latter 3 items formed an ad hoc scale we used to assess the "soft fascination" described by Kaplan (1995) as restorative. Experiencers indicated how much they currently felt each emotion, using a 5-point Likert scale (from 1, *very slightly or not at all*, to 5, *extremely*); mean scores were calculated for their positive (α = .89) and negative (α = .80) affect and fascination (α = .73). Forecasters made predictions of their emotions using the same modified versions of the PANAS used by experiencers. Depending on condition, forecasters were asked to imagine how they would expect to feel after walking outside to an arboretum, using a path along a canal, or after walking across the campus using the indoor tunnel system. Mean scores were calculated for anticipated positive (α = .89) and negative (α = .89) affect and for fascination (α = .78).

Nature relatedness was assessed with a state version of the Inclusion of Nature in Self (INS) scale (Schultz, 2002).[2] This scale comprises a series of seven pairs of circles, with the two circles in each pair labeled "self" and "nature"; the pairs are ordered by degree of overlap, from a pair of adjoining circles with no overlap to a pair of circles that overlap completely to form a single, indistinguishable entity. All participants were instructed to choose the pair that best represented their current relationship with the natural environment. Responses were coded on a scale from 1 to 7, with higher numbers indicating more overlap.

Procedure. All participants met in a lab to take part in what they were told was a study on "personality and impressions of the campus area." They first completed demographic and filler questionnaires on personality and well-being. Forecasters then received a description of their walking route (indoor or outdoor) and rated their anticipated affect before departing for walks. After experiencers received a description of their walking route, we instructed them to be observant because we would later ask them about their impressions of the campus area. They then departed the lab for walks. (All participants took walks along their assigned routes; however, no further data were considered for forecasters after they rated their anticipated affect.) Experiencers in the indoor condition proceeded to their destination, the athletics building, via tunnels; experiencers in the outdoor condition exited the building and proceeded across a road to a path that follows a canal to an arboretum. The outdoor route was mainly off-campus and utilized a walking and biking path along the Rideau Canal (a commonly used green corridor that extends for 8 km through the heart of Ottawa). Although relatively picturesque, this route is typical of urban nature. An independent sample (N = 198) rated these two routes as equally familiar on a scale from 1 to 5 (indoor: M = 3.06; outdoor: M = 3.08), $t(196) = 0.13$, p = .89. This matching ensured equal bases in experience for affective forecasts. Both walks took approximately 17 min. After they finished their walk, experiencers answered questions about their impressions of the walk and reported their state affect (PANAS) and nature relatedness (INS). Walks were conducted during autumn, on days without rain and with temperatures ranging from 2.5 °C to 14.6 °C (M = 9.96 °C, SD = 4.19).[3]

Results

To test if participants were happier outdoors, we conducted a series of independent-samples t tests. Experiencers who

Table 1. Ratings of Forecasted and Experienced Affect in Study 1 as a Function of Walking Location

	Forecasters (n = 77)				Experiencers (n = 73)				
Affect	Indoor walk (n = 39)	Outdoor walk (n = 38)	t	d	Indoor walk (n = 39)	Outdoor walk (n = 34)	t	d	Walking Location × Affect Condition interaction
Positive affect	2.56 (0.78)	2.89 (0.76)	1.85†	0.43	2.41 (0.83)	3.26_a (0.62)	4.86**	1.16	$F = 4.32^*, \eta_p^2 = .03$
Negative affect	1.37 (0.66)	1.22 (0.37)	1.19	0.28	1.60_a (0.58)	1.34 (0.43)	2.12*	0.51	$F = 0.39, \eta_p^2 = .00$
Fascination	2.91 (1.02)	3.24 (0.87)	1.53	0.35	2.44_a (0.95)	3.39 (0.72)	4.80**	1.13	$F = 4.43^*, \eta_p^2 = .03$
Relaxation	3.62 (1.09)	4.03 (0.87)	1.82†	0.42	3.08_a (1.29)	4.24 (0.78)	4.57**	1.09	$F = 4.84^*, \eta_p^2 = .03$

Note: For each condition, the table presents mean scores, with standard deviations in parentheses. Subscripts indicate that the experienced affect for the indicated walking location was significantly different from the forecasted affect for the same walking location (i.e., that there was a significant location-specific, between-subjects overestimate or underestimate).
†$p < .10$. *$p < .05$. **$p < .01$.

walked outdoors reported more positive affect, relaxation, and fascination, and less negative affect, than experiencers who walked indoors. Table 1 summarizes results for both forecasted and experienced affect.

To examine forecasting errors, we conducted a series of 2 (forecaster vs. experiencer) × 2 (indoor vs. outdoor) between-subjects analyses of variance (ANOVAs) with positive affect, negative affect, fascination, and relaxation as dependent variables (see Table 1). Significant interactions indicated forecasting errors by showing that affect depended on both walking location and whether participants rated experienced affect or forecasted their affect. In general, outdoor forecasters underestimated pleasant affects (positive affect, relaxation, and fascination), whereas indoor forecasters overestimated pleasant affects (see Fig. 1). The ANOVA showed that experiencers and forecasters did not differ significantly in their ratings of positive affect (*p*s > .3), but did differ in their ratings of negative affect: Forecasters reported significantly less negative affect than experiencers, $F(1, 145) = 4.02$, $p = .05$. The interaction for negative affect was not significant. In sum, participants failed to fully anticipate the hedonic benefits of contact with nearby nature.

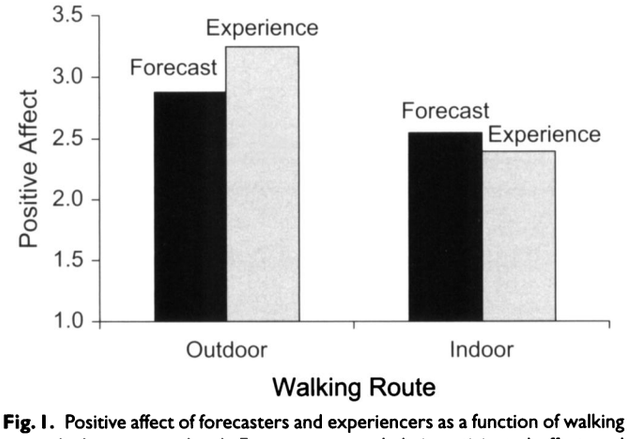

Fig. 1. Positive affect of forecasters and experiencers as a function of walking route (indoor or outdoor). Forecasters rated their anticipated affect, and experiencers rated their actual affect.

We predicted that enjoyment of the outdoor walk would facilitate feelings of nature relatedness. Indeed, INS scores were higher for experiencers who walked outdoors ($M = 4.44$, $SD = 1.64$) than for experiencers who walked indoors ($M = 3.05$, $SD = 1.61$), $t(70) = 3.63$, $p < .01$, $d = 0.86$. To determine if high nature relatedness was due to positive moods, we conducted mediation analyses using both Baron and Kenny's technique (1986) and a bootstrapping method (Preacher & Hayes, 2008). Both approaches revealed significant mediation (see Fig. 2; Sobel $Z = 3.98$, $p < .001$; bootstrapping path = 1.03, 95% confidence interval, or CI = [0.59, 1.61]).[4] The positive moods engendered by the outdoor walks seemed to promote nature relatedness.

Study 2

To replicate and extend our findings from Study 1, we conducted a second study with similar procedures. Participants ($N = 80$) took walks either indoors or outdoors, but along different routes than used in the previous study. The outdoor route was entirely on-campus and followed a walking path between a road and a river that borders the campus, ending near a campus building. The outdoor walking route did not overlap with the outdoor route used in Study 1. The indoor route began in a different building than the indoor route in Study 1, but also used

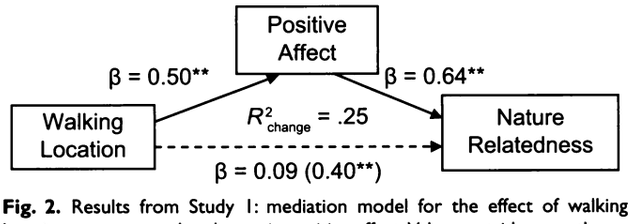

Fig. 2. Results from Study 1: mediation model for the effect of walking location on nature relatedness via positive affect. Values outside parentheses are standardized regression coefficients derived from multiple regression analyses, following Baron and Kenny's (1986) procedure. Along the lower path, the number inside parentheses is the standardized regression coefficient for the relationship between walking location and nature relatedness before the mediator was added to the model. Asterisks indicate significant coefficients (**$p < .01$).

parts of the university tunnel system. Unlike in Study 1, we assessed forecasting errors using a within-subjects design (i.e., the same participants forecasted their emotions and then rated the emotions they experienced) to ensure that forecasting errors were not limited to a between-subjects design (e.g., to see if errors would persist when participants had predicted their affect). Fascination and relaxation were not measured. Results were similar to results from Study 1: Participants who walked outdoors underestimated the substantial hedonic benefits of the walk, and participants who walked indoors overestimated their postwalk moods (Table 2 presents results for experienced and forecasted affect in both walking locations). Repeated measures ANOVAs revealed a significant interaction (Walking Location × Affect Condition) for positive but not negative affect (see Table 2), a finding similar to results from Study 1. Outdoor walks again produced greater state nature relatedness (INS score: $M = 4.18$ for outdoor participants and $M = 3.45$ for indoor participants), and this effect was again mediated by positive affect (Sobel $Z = 3.15, p < .01$; bootstrapping path = 0.62; 95% CI = [0.22, 1.18]). In sum, Study 2 replicated the major results of Study 1 within subjects and in new locations.

General Discussion

The results of two studies supported our three predictions. First, walking outdoors produced better moods than walking indoors; this result bolsters previous findings in natural environments (e.g., Berman et al., 2008; Hartig, Evans, Jamner, Davis, & Gärling, 2003; Mayer et al., 2009). Second, we extended previous research by asking participants to forecast emotions and found that they did not fully anticipate the difference between indoor and outdoor mood, despite making predictions about walks in familiar areas. Results were consistent across within-subjects and between-subjects manipulations; thus, demand effects and other biases are implausible as alternative explanations for this unique affective forecasting error. Third, walking outdoors facilitated a sense of nature relatedness; this feeling of relatedness seems to have been mediated by the positive affect produced by walking in nearby nature. Together, our results are consistent with the idea that, although people are innately drawn to nature, a general disconnection prevents them from fully anticipating nature's hedonic benefits. When people forgo the happiness benefits of nearby nature, they also neglect their nature relatedness, a construct strongly associated with environmentally sustainable attitudes and behaviors (Nisbet et al., 2009; Schultz, 2001).

Clearly, spending 15 minutes in nature will not save the environment, but the substantial effects on state nature relatedness that we observed suggest that being outdoors for even short periods is a step in the right direction. Recent empirical work on individual differences suggests that people who feel more related to nature not only spend more time in nature, but also feel happier and engage in more environmentally sustainable behavior (Mayer & Frantz, 2004; Nisbet et al., 2009; Schultz, 2002). Such findings mirror our state results nicely, and suggest a link between state nature relatedness and sustainability. Together, these studies suggest a happy path to sustainability. Rather than (or in addition to) motivating people to behave in ways that are ecologically sustainable though obligation, fear, guilt, or economic incentives, policymakers might encourage contact with nature. Correcting people's affective forecasting errors might be a useful step in this endeavor, though other, similar errors often resist easy correction (T. D. Wilson, Meyers, & Gilbert, 2001). We assume that increased time in nature and frequent experiences of state connectedness with nature promote, or even amount to, increased trait levels of connectedness with nature over time (cf. Fleeson, 2001). In addition, the positive moods associated with experiences in nature could potentially motivate people to participate in more outdoor activities. Active commuting and green exercise (fitness activities in a natural setting) could benefit both people and the environment (Bodin & Hartig, 2003).

There are, of course, important caveats to consider to avoid overgeneralizing from our results. For example, our findings do not directly show that affective forecasts are responsible for decisions about walking location, that increased contact with nature would necessarily increase trait nature relatedness, or that increased nature relatedness would, in turn, foster

Table 2. Ratings of Forecasted and Experienced Affect in Study 2 as a Function of Walking Location

	Forecasted				Experienced				
Affect	Indoor walk ($n = 40$)	Outdoor walk ($n = 40$)	t	d	Indoor walk ($n = 40$)	Outdoor walk ($n = 40$)	t	d	Walking Location × Affect Condition interaction
Positive affect	2.46 (0.82)	2.99 (0.69)	3.17**	0.71	2.01_a (0.82)	3.21_a (0.84)	6.46**	1.45	$F = 23.14^{**}, \eta_p^2 = .23$
Negative affect	1.23 (0.30)	1.17 (0.34)	0.87	0.20	1.35 (0.46)	1.15 (0.34)	2.11*	0.47	$F = 1.91, \eta_p^2 = .02$

Note: For each condition, the table presents mean scores, with standard deviations in parentheses. Subscripts indicate that the experienced affect for the indicated walking location was significantly different from the forecasted affect for the same walking location (i.e., that there was a significant location-specific, within-subjects overestimate or underestimate).
*$p < .05$. **$p < .01$.

environmentally sustainable behavior. Given past research, these links seem likely, yet they require confirmation. At the level of psychological processes, our data suggest a mediation path whereby nature's effect on subjective nature relatedness works via pleasant moods. However, because nature relatedness and affect were measured simultaneously, some caution is warranted; alternative causal paths are possible (cf. Mayer et al., 2009). There may also be limits to the generalizability of our results: Our data are bound by location, season (autumn), and sample, for example. The campus tunnels provided a nice control by blocking most natural elements, but they are probably more unpleasant than built spaces designed to emphasize aesthetics (often by drawing on nature). Nonetheless, the tunnels are used regularly and are representative of some commonly used indoor spaces (e.g., shopping malls and corporate campuses). The nearby nature traversed by our participants was also unspectacular, relative to the green spaces available to residents of most urban areas. Our findings suggest that even natural spaces in urban settings can increase happiness; the grandeur of national parks is not required.

The active ingredients (e.g., light, sounds) that produce nature's hedonic and cognitive benefits may eventually be fully identified. By matching indoor and outdoor environments on all these features, one could presumably eliminate the differential effects of indoor and outdoor environments on cognition, mood, and forecasting. Such an approach would, however, also destroy a study's ecological validity—indoor and outdoor environments are specifically characterized by these differences in features. Further distinguishing the beneficial features of nature might lead to their integration in built environments (e.g., changes in lighting, fountains, and plants). At this point, however, simulations of nature seem to confer fewer benefits than actual nature (Kahn, Severson, & Ruckert, 2009). To the extent that urban design can incorporate easily accessible nearby nature, such design might increase residents' well-being, and perhaps even environmentally sustainable behavior. Given our participants' failure to anticipate the benefits of contact with nature and their apparent behavioral avoidance of it (as indicated by the relatively frequent use of the indoor tunnels on our campus), urban nature might best be made unavoidable, rather than tucked away in parks.

Conclusion

Contact with nature has clear benefits for humans. Our research is unique in suggesting that people fail to fully anticipate the substantial happiness benefits of nearby, urban nature. We believe this effect is a window to a larger process in which human disconnection from nature is linked to environmental destruction and suboptimal well-being. We encourage researchers to develop a better understanding of these relationships, but also encourage people to take prompt action based on current knowledge. At the individual level, we strongly recommend more contact with nearby nature: It will likely make you (and the planet) happier than you think.

Acknowledgments

We thank Jassandre Adamyk, Christina Besner, Raelyne Dopko, Megan Graham, Zsuzsa Grandpierre Nagy, Sadie Litchfield, Andrea Martell, Jen Rouse, and Karin Sobocko for assistance with data collection and entry.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Funding

This work was supported by a Social Sciences and Humanities Research Council Doctoral Fellowship to the first author.

Notes

1. By chance, outdoor groups (M = 6.60 participants, SD = 2.72) were significantly larger than indoor groups (M = 5.69 participants, SD = 2.32), but controlling for group size (analysis of covariance) had no impact on results.
2. The trait version of the INS correlates strongly with similar, multi-item measures and environmental attitudes (Mayer & Frantz, 2004; Nisbet & Zelenski, 2009).
3. Controlling for temperature and cloudiness (analysis of covariance) had no impact on results.
4. A bootstrapping approach can also test multiple mediators. When all affect scales were included, only the paths for positive affect (95% CI = [0.19, 1.21]) and fascination (95% CI = [0.10, 1.20]) were significant.

References

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173–1182.

Berman, M. G., Jonides, J., & Kaplan, S. (2008). The cognitive benefits of interacting with nature. *Psychological Science*, *19*, 1207–1212.

Bodin, M., & Hartig, T. (2003). Does the outdoor environment matter for psychological restoration gained through running? *Psychology of Sport and Exercise*, *4*, 141–153.

Faber Taylor, A., & Kuo, F. E. (2009). Children with attention deficits concentrate better after walk in the park. *Journal of Attention Disorders*, *12*, 402–409.

Fleeson, W. (2001). Toward a structure- and process-integrated view of personality: Traits as density distributions of states. *Journal of Personality and Social Psychology*, *80*, 1011–1027.

Frumkin, H. (2001). Beyond toxicity: Human health and the natural environment. *American Journal of Preventive Medicine*, *20*, 234–240.

Hartig, T., Evans, G. W., Jamner, L. D., Davis, D. S., & Gärling, T. (2003). Tracking restoration in natural and urban field settings. *Journal of Environmental Psychology*, *23*, 109–123.

Kahn, P. H., Jr., Severson, R. L., & Ruckert, J. H. (2009). The human relation with nature and technological nature. *Current Directions in Psychological Science*, *18*, 37–42.

Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology, 15*, 169–182.

Kellert, S. R. (1993). The biological basis for human values of nature. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis* (pp. 42–69). Washington, DC: Island Press.

Kellert, S. R. (1997). *Kinship to mastery: Biophilia in human evolution and development*. Washington, DC: Island Press.

Kellert, S. R., & Wilson, E. O. (Eds.). (1993). *The biophilia hypothesis*. Washington, DC: Island Press.

Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology, 24*, 503–515.

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

Mellers, B., Schwartz, A., & Ritov, I. (1999). Emotion-based choice. *Journal of Experimental Psychology: General, 128*, 332–345.

Mitchell, R., & Popham, F. (2008). Effect of exposure to natural environment on health inequalities: An observational population study. *The Lancet, 372*, 1655–1660.

Nisbet, E. K., & Zelenski, J. M. (2009, September). *Individual differences in nature relatedness, materialism, and affective forecasting*. Paper presented at the 8th Biennial Conference on Environmental Psychology, Zurich, Switzerland.

Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior, 41*, 715–740.

Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2011). Happiness is in our nature: Exploring nature relatedness as a contributor to subjective well-being. *Journal of Happiness Studies, 12*, 303–322.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*, 879–891.

Schultz, P. W. (2000). Empathizing with nature: The effects of perspective taking on concern for environmental issues. *Journal of Social Issues, 56*, 391–406.

Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology, 21*, 327–339.

Schultz, P. W. (2002). Inclusion with nature: The psychology of human-nature relations. In P. Schmuck & W. P. Schultz (Eds.), *Psychology of sustainable development* (pp. 62–78). Norwell, MA: Kluwer.

Ulrich, R. S. (1993). Biophilia, biophobia, and natural landscapes. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis* (pp. 73–137). Washington, DC: Island Press.

Ward Thompson, C., Aspinall, P., & Montarzino, A. (2008). The childhood factor: Adult visits to green places and the significance of childhood experience. *Environment and Behavior, 40*, 111–1443.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS Scales. *Journal of Personality and Social Psychology, 54*, 1063–1070.

Wilson, E. O. (1984). *Biophilia*. Cambridge, MA: Harvard University Press.

Wilson, T. D., & Gilbert, D. T. (2005). Affective forecasting: Knowing what to want. *Current Directions in Psychological Science, 14*, 131–134.

Wilson, T. D., Meyers, J., & Gilbert, D. T. (2001). Lessons from the past: Do people learn from emotional experience that emotional reactions are short lived? *Personality and Social Psychology Bulletin, 27*, 1648–1661.