

# Understanding and enhancing the experience of nature of visitors in “Ramat Hanadiv”

## *Final report*

Agathe Colléony, Danielle Bashan, Liat Levontin & Assaf Shwartz

---

### **EXECUTIVE SUMMARY**

In recent years, a growing concern has been expressed worldwide regarding a process known as the ‘extinction of experience’. Modern humans are increasingly disconnected from nature, which in turn diminishes the multitude of health and well-being benefits that people can retrieve from experiences of nature, and ultimately endangers their affinity towards nature and willingness to protect it. Finding ways to improve people’s interest and connection to nature is therefore crucial for individual, societal and environmental health, but very little is known about how this could be achieved.

In search of a solution, three studies were conducted in Ramat Hanadiv (R.H.) and the Technion to better understand the visitors’ experience of nature and find ways to experimentally enhance this experience. The first study characterizes the visitors’ experience of nature in R.H. and their intake of R.H. values during the visit and is based on a large-scale questionnaire survey of 596 visitors in 2018. The second study experimentally tested a method from psychology, i.e. priming, that uses non-invasive subtle stimuli to induce behavior change, as a mean to promote nature interactions with 303 participants in controlled settings (Technion campus) in 2018. The third study tested the impact of two stimuli that proved efficient in study 2, in real-life settings, i.e. in R.H., with an experimental design and large-scale questionnaire survey of 964 visitors in 2019.

These studies revealed that the extent to which visitors feel connected to the natural world is a strong determinant of their experience of nature later on. More importantly, we found that it is possible to go above and beyond this sense of connection to nature and use stimuli to enhance nature behaviors. In turn, increasing those nature behaviors positively affect individual positive affect. This shows a promising avenue to avert the extinction of experience and restore individual and societal health, and, potentially, environmental health. However, more research is still needed to identify proper stimuli to get people closer to nature in real-life settings, since results from the third study demonstrated that placing signs did not influence people’s behaviors (since they did not pay attention to them). Results presented in this

report provide insights on R.H. visitors' experiences of nature, observed and experimentally changed, as well as their intake of R.H. values.

## Key findings

- The **main motivations for visiting R.H are to learn, relax and thrill**. Visitors whom are more connected and aware to nature presented greater motivation to visit.
- Values known and understood by visitors mapped on two groups: (1) education, community and sustainability values; and (2) management and research. Understanding of the first group of values was associated with high household income and nature relatedness. **Visiting in R.H. did not influence the way visitors perceived both groups of values, but visitors living nearby R.H. presented better understanding of the values.**
- **Nature relatedness affected the perception of R.H. as an urban park (for those of low nature relatedness) or a nature reserve (high nature relatedness)** among visitors living nearby R.H.
- Visitors living close by reported less nature behaviors (e.g. smelling flowers, observing wildlife) during their visit but identified themselves as more attached to R.H.
- **Visitors engagement was lower for those who visited only the memorial gardens compared to those who visited the nature reserve or both parts of Ramat Hanadiv.**
- In the Technion, four stimuli (asking participants to **smell flowers, touch natural elements, observe wildlife or take pictures**) **brought participants closer to nature and enhanced the extent to which they interacted with biodiversity** on the short term (within 30min after receiving the instruction). By doing so, it also increased their positive affect after completion of the experiment.
- In the Technion, other stimuli (asking participants to listen to surrounding sounds, walk slowly, explore more areas or turn off their phone) did not bring participants closer to nature and did not affect their nature behaviors. These stimuli thus did not affect positive affect in turn.
- In R.H., **large signs at the entrance to invite visitors to smell or touch did not affect visitors' nature behaviors and positive affect**. Only 65 (6.7%) survey respondents noticed and remembered the sign.
- In R.H., during Passover, **visitors reported higher positive affect on days a butterfly activity was organized compared to other days with no activity.**
- In R.H., **visitors who felt more related to nature reported more interactions with biodiversity (e.g. smelling flowers, observing wildlife, taking pictures of animals) and stronger positive affect.**

## INTRODUCTION

Despite extensive efforts from the conservation community, biodiversity and ecosystem functions and services are still deteriorating worldwide (IPBES, 2019). Human behavior is a key determinant of the current biodiversity crisis (Cardinale et al., 2012), and solutions largely depend on changing the way people use and value nature (Keniger et al., 2013; Reddy et al., 2017). Yet, modern humans are increasingly disconnected from nature, in a process known as the 'extinction of experience' (Pyle, 1978). This is profoundly concerning, because it can diminish the multitude of health and well-being benefits that people retrieve from experiences of nature, and ultimately endangers their affinity towards nature and willingness to protect it (Soga and Gaston, 2016). Finding ways to improve people's interest and affinity toward nature could thus go a long way towards averting the biodiversity crisis, but very little is known about how this could be achieved.

The extent to which an individual feels part of the natural world is one of the main determinants of nature experiences (Lin et al., 2014; Soga and Akasaka, 2019). This sense of connection to nature primarily develops during childhood (Chawla, 1988) and evolves over the life course of an individual (Hughes et al., 2019). People who have high sense of connection to nature are more likely to experience nature more regularly (Lin et al., 2014). Mounting empirical studies demonstrated the positive relationship between quantity of nature experiences (e.g., frequency and duration of visits) and health and well-being outcomes (Cox et al., 2017b; Shanahan et al., 2016). It has been suggested that restoration benefits one receives depends not only on the quantity of experiences or features an environment provides, but also on how one chooses to interact with such environment (Duvall, 2011). However, this assumption remains unexplored. The quality of the experience of nature, i.e. how people interact with nature, was also recently suggested as an important determinant of environmental attitudes (Colléony et al., 2019). Understanding the links between human nature interactions, individual health, well-being and commitment for conservation is another important avenue for research aiming at averting the biodiversity crisis, yet still lacking. Such studies are crucial for quantifying the impacts of specific behaviors or practices on both people and the environment (Gaston et al., 2018). They will help identifying the behaviors to encourage or refrain, to ultimately provide people with meaningful experiences that have the potential to positively affect their health, well-being, affinity towards nature and willingness to protect it.

As a science focused on the exploration of human cognition, behavior and well-being, psychology has an important role to play in understanding human responses to environmental changes (Clayton, 2019). In psychology, sense of connection to nature (here-after referred as 'nature relatedness') means being part

of nature and being psychologically close to nature (see concept of psychological distance in Box 1). Methods borrowed from experimental psychology (e.g., priming; Box 1) may be used to prime those mental construals and influence behaviors. Priming was successfully used to promote environmentally friendly behaviors: participants who were shown pro-environmental messages were more positive towards and selected more environmental-friendly products than the control group participants (Tate et al., 2014). However, although such methods have been successfully used to promote environmentally-friendly behaviors (Byerly et al., 2018), to our knowledge, the effects of primes on nature interactions were never tested. Primes of distance (on any one dimension, spatial distance, temporal distance, social distance, and hypotheticality) were found to affect the perceived psychological distance of objects (Trope and Liberman, 2010). Priming psychological distance has been previously used to influence feelings of relatedness (Williams and Bargh, 2008). Thus, we expect nature relatedness to be successfully primed by spatial-distance cues. Furthermore, we suggest that people's subjective experience in nature will be influenced by psychological distance primes. That is, priming nature relatedness using a close psychological distance from nature prime could positively influence the way people interact with the natural world, which would result in improved health, well-being, and conservation outcomes (Fig. 1).

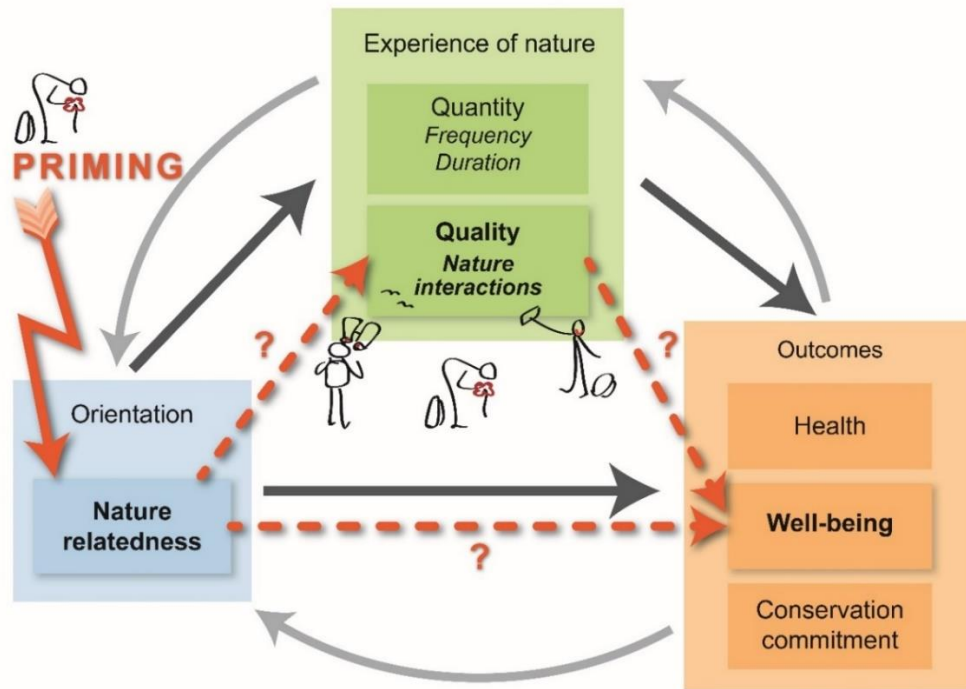
**Box 1:** Definitions of psychological distance and priming.

**Psychological distance**

The concept of psychological distance refers to the degree of overlap between the self and some other person, place, or point in time (Williams and Bargh, 2008). Different dimensions of psychological distance (time, space, social distance, and probability) affect mental construals of events, and in turn these construals guide people's choices, preferences, and behaviors (Trope et al., 2007).

**Priming**

The conception of priming means that stimuli available in the environment may affect subsequent associated behavioral responses by activating mental constructs (Molden, 2014). That is, the mere exposure to relevant stimuli can facilitate, or prime, a host of impressions, judgments, goals, and actions, often even outside of people's intention or awareness (Bargh et al., 1996). In multiple areas of research, priming was used to study the behavioral effects of activating representations of specific social contexts, such as feeling high versus low in power (e.g., Galinsky et al. 2003), or feelings of resource deficiency (Levontin et al., 2015).



**Figure 1:** Theoretical figure of the relationship between nature relatedness (orientation), experiences of nature (quantity – frequency or duration of visits, and quality – nature interactions) and outcomes (health, well-being, and conservation commitment). Grey arrows indicate pathways known from the literature (dark ones for direct effects, light ones for feedback effects). In this paper, we tested the potential effect of priming nature relatedness on nature interactions and well-being (orange dashed arrows).

The extinction of experience is a contemporary issue also affecting the population in Israel. Like other OECD countries, urbanization in Israel is high (over 90% of the population already lives in cities; CBS, 2015), and this together with modern lifestyle may prevent people from experiencing nature on its complexity. Mitigating this extinction of experience in Israel is important and understanding how this goal can be achieved remains a major challenge for future research and action alike. Ramat Hanadiv is a nature reserve attracting over half million visitors a year and promoting conservation management and education that can serve as an excellent location for exploring people’s experience of nature on its associated consequences.

Understanding the experience of nature and the means to enhance it aligns with the vision of Ramat Hanadiv to “...connect more people to the natural environment and create sustainable relationship between the two”. This reserve vigorously promotes the field of education and environmental knowledge with an emphasis on emotional connection to the nature surrounding us and fostering values of preservation and responsibility towards the environment. However, the quality of nature experience and

its influence on visitors' attitudes toward conservation remain unknown. Thus, it is not yet clear to what extent the visitors' experience is aligned with Ramat Hanadiv vision and how this experience can be heightened. In the longer term, this has potential repercussions for establishing and maintaining protected areas such as national parks (Stedman 2002). **Therefore, the goal of this overarching project was to understand how visitors in Ramat Hanadiv experience nature and how these experiences can be enhanced using simple stimulus.** Specifically, we aimed to:

- Characterize the experience of nature and understand visitors' opinions and attitudes towards Ramat Hanadiv's values (Study 1)
- Experimentally identify means to enhance the experience of nature in controlled settings (Technion – Study 2) and in real-life settings (Ramat Hanadiv – Study 3)

## **METHODS**

### **Study 1**

Throughout April 2018, we distributed questionnaires to 596 visitors of Ramat Hanadiv (R.H.), during Passover vacation. Half of the participants answered the questionnaire before their visit, the other half after their visit. Participants were offered small gifts (plant seeds) in exchange for participation. The 'before visit' survey included questions on motivations for visiting R.H., intake of values of R.H., perception of R.H. as urban park or nature reserve, nature relatedness and demographics. The 'after visit' survey included questions on intake of values of R.H., sense of place, nature relatedness, nature activities during the visit, and demographics.

#### *Nature relatedness*

We used the 6-item version of the Nature Relatedness scale (NR; Nisbet & Zelenski 2013). Participants rated their level of agreement to each statement on a 5-point scale, from 1-strongly disagree to 5-strongly agree. Based on satisfactory internal consistency (Cronbach Alpha = 0.83), we derived a single measure of NR by averaging scores of the six items.

#### *Nature activities during the visit*

Respondents were asked to report to which extent they did a list of nine nature activities during their visit, from 1 – not at all to 5 – throughout the entire visit. Activities were: take pictures of nature, touch elements of nature, listen to sounds of nature, smell flowers, pick flowers, observe the landscape, observe wildlife, observe flowers, identify plant and animal species. We derived a single measure of nature activities by averaging scores of the nine items ( $\alpha=0.76$ ).

### *Motivation to visit RH*

To measure motivation to visit R.H., we provided a list of 19 statements to participants, who were asked to report the extent to which they agree to each statement, from 1 – completely disagree, to 5 – completely agree. The 19 statements were classified into four categories of motivation: learn (3 items;  $\alpha=0.72$ ), relax (7 items;  $\alpha=0.77$ ), social (5 items;  $\alpha=0.74$ ) and thrill (2 items;  $\alpha=0.74$ ).

We also measured perception of R.H. as an urban park or a nature reserve by asking respondents to report whether they think R.H. as an urban park or a nature reserve, on a scale from 0 (urban park) to 10 (nature reserve).

### *Intake of values of Ramat Hanadiv*

To measure intake of values of R.H., we provided a list of 16 statements highlighting R.H. values in the questionnaire. The list of statements was built with R.H. management. Respondents were asked to report the extent to which they agree to each of the statement, on a scale from 1 – completely disagree, to 5 – completely agree. The values were later reclassified into two categories, based on a factor analysis, community, education and sustainability ( $\alpha=0.85$ ), and park management and research ( $\alpha=0.86$ ); 2 items from group 'memorial gardens' did not load well ( $\alpha=0.54$ ; Fig. S1 in appendix 1).

### *Sense of place*

We measured sense of place using Fuller et al.'s scale (2007) that explores attachment (four items;  $\alpha=0.86$ ), identity (five items;  $\alpha=0.76$ ) and reflection (five items;  $\alpha=0.74$ ).

### *Demographics*

Additionally, we asked respondents to provide their gender, year of birth, marital status, number of children, average income (on a scale from 0 below average to 10 above average; they were told average household income is 15,400NIS), education level (below high school, high school, bachelor degree, second degree, third degree). We also asked them whether they live nearby R.H. (yes/no), and the urbanization level of their current place of residence and childhood place of residence (large city, medium sized city, kibbutz or moshav).

### *Statistical analyses*

We conducted linear models to explore how motivations to visit R.H., intake of values of R.H., nature activities and sense of place during the visit vary with the types of visitors (demographics variables). All analyses were conducted in R 3.3.3.

## Study 2

We designed an experiment to identify two stimuli that enhance nature interactions and increase positive affect in turn. From March to June 2018, 303 participants were asked to spend 30 minutes minimum outside, in the campus of the Technion, and then to return to the lab to answer a questionnaire survey, in exchange for a monetary compensation (30NIS; Fig. S2 in appendix 1). Nine experimental groups were defined, with a specific instruction for each: a control group, with no specific instruction, and eight groups, for eight different stimuli tested (i.e. observe wildlife, listen to surroundings sounds, smell flowers, take pictures, walk more slowly than usual, touch natural elements, turn off your phone, and explore as many different places as possible). Participants were randomly attributed to each group. The questionnaire survey measured positive affect as a proxy of subjective well-being, nature relatedness, self-reported nature interactions, and demographics.

### *Positive affect*

We used the Positive and Negative Affect Scale (PANAS), a 20-item measure of positive (10 items, e.g., “excited”, “inspired”) and negative (10 items, e.g., “upset”, “distressed”) affect (Watson et al., 1988). Participants reported their affect using a 5-point Likert scale. Internal consistency was satisfactory (Cronbach Alphas; PANAS positive = 0.83; PANAS negative = 0.85). We derived single measures of positive affectivity and negative affectivity by averaging scores of items of each scale.

### *Self-reported nature interactions*

To measure nature interactions (NI), i.e. the extent to which participants interacted with nature, we provided a list of 37 specific NI, i.e. observe, smell, listen, touch and take pictures (e.g., ‘did you see a bird?’, ‘did you see a wild boar?’, ‘did you touch leaves?’, ‘did you smell pine trees?’) and asked participants to answer yes/no for each behavior. We added to this list six control behaviors, not related to nature (e.g., ‘did you smell car pollution?’, ‘did you take a picture of buildings?’), and one behavior considered as potentially harmful for nature (‘did you pick flower(s)?’) to ensure participants think about the items while answering. A score of NI was derived for each participant by summing the number of “yes” answers regarding the NI participants reported (ranging from 0 to 37).

As in study 1, we used the NR scale (Cronbach Alpha = 0.82) to measure nature relatedness. Finally, we recorded gender and age. We kept track of the day, time and weather during the experiment.

### *Statistical analyses*

We analyzed the effect of the primes on positive affectivity through NI using a multi-categorical mediation model with the PROCESS procedure (Hayes, 2012) for SPSS. That is, in the mediation model, the effect of



each prime is analyzed in comparison to the control group. We included negative affectivity as a covariate to control for its potential effect on NI. As in the mediation model for study 1, indirect effects were estimated using a non-parametric bootstrapping procedure. Fisher's Least Significant Different (LSD) post-hoc tests were used to determine the respective effects of each intervention.

### **Study 3**

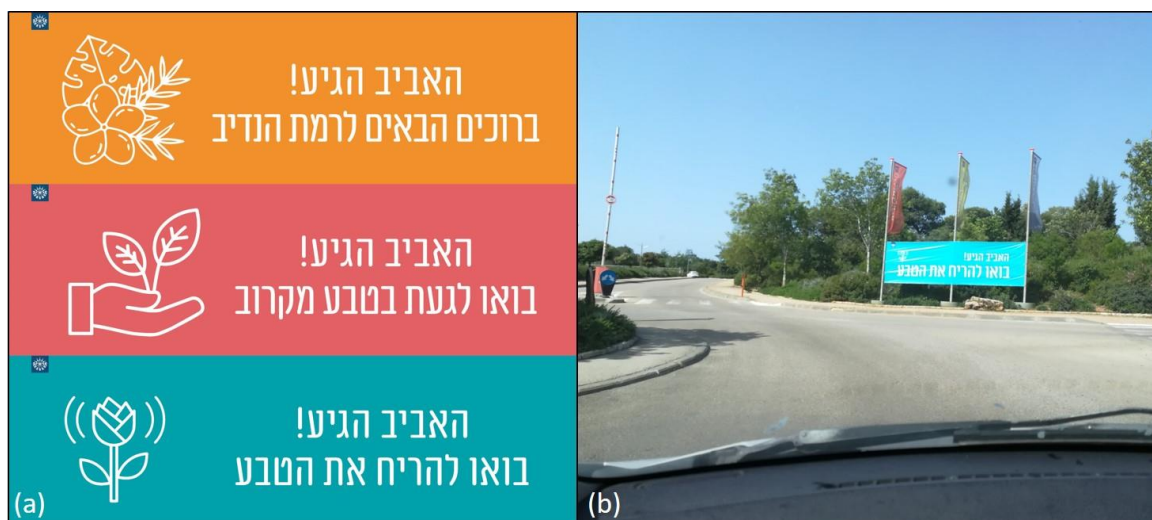
We designed an experiment to prime nature relatedness using the two stimuli identified in study 2 (i.e. touch and smell, see results) in Ramat Hanadiv. We tested for an additional prime, in the form of activities organized on the theme of butterflies. The prime stimuli consisted in large signs installed at the entrance of the reserve, inviting the visitors to either touch natural elements, enjoy the smells of nature, or simply enjoy their visit (control; Fig. 2). Throughout April and May 2019, we distributed questionnaires to 964 visitors of Ramat Hanadiv, on nine non-consecutive days (Saturdays and Passover holidays). Participants were offered small gifts (healthy snacks) in exchange for participation. The questionnaire survey measured positive affect, nature relatedness, self-reported nature interactions, and demographics.

As in study 1 and 2, we used the PANAS scale (Cronbach Alphas; PANAS positive = 0.87; PANAS negative = 0.83) to measure positive affect, the NR scale (Cronbach Alpha = 0.84) to measure nature relatedness, and the list of 37 behaviors to measure nature interactions. To increase external validity, we used a second scale to measure positive affect, the Overall Happiness scale (OHS; Hartig et al. 2003), a thermometer-like scale ranging from 0 (not happy at all) to 10 (very happy); we also measured nature relatedness with another measure, the graphical measure of inclusion of nature in self (INS; Schultz 2001): this scale consists of seven pairs of overlapping circles labeled nature and self, differing in the degree of overlap. Participants selected the pair of circles that represent best how interconnected they feel with the natural world, and a score of INS is derived, ranging from 1 (completely separated circles) to 7 (completely overlapping circles). Finally, we recorded gender, age and whether they were first-time visitors.

Additionally, we collected the pictures visitors uploaded on the website of Ramat Hanadiv during the experimental days. We coded the pictures according to the day it was posted (condition), the location (memorial garden or nature reserve), the focus of the picture (people, nature, feature), the nature elements (landscape, close-up or middle), whether it shows a scenery (yes/no), whether it shows tree/flower/fruit (yes/no), whether it shows animal(s) (yes/no) and whether it shows water (yes/no).

Finally, we conducted behavioral observations of visitors' nature interactions during the days of condition control, touch and smell (not for butterfly activity days). One experimenter (AC) observed for 60 minutes consecutively visitors' nature interactions in the butterfly garden, the iris garden, and the fragrance

garden, using the focus sample method: during 60 minutes, the experimenter observed a single person at a time, for 2 minutes maximum, while the person enters in the selected area (e.g. butterfly garden); after 2 minutes, the observer records behaviors of the next person entering the area for 2 minutes, and so on. One 60 minutes session was done per day per area. The observer did not record any personal information, but estimated age and gender of the observed person, and noted the number of persons accompanying. Twice a day, the experimenter also recorded visitors' nature interactions along transects in the memorial garden. For 10 minutes approximately, the experimenter walked along the selected transect and recorded the number of visitors passing by, and the number of nature interactions that were seen. In both protocols, recorded behaviors were: smell nature elements, touch nature elements, take picture (regular, close-up, selfie), pick flower, observe wildlife, smash insect or tramp grass, point at natural element, catch insect or feed animal. No other behavior or personal information was recorded, and no photo/video/sound recording was taken.



**Figure 2:** (a) The three banners that were displayed during the study. (b) View from a car on one of the banners displayed at the entrance of Ramat Hanadiv.

### Statistical analyses

Analyses were done using R and SPSS. We conducted generalized linear models to explore differences in nature interactions and well-being between conditions. We then analyzed the relationship between nature relatedness and well-being, and the extent to which NI mediate this relationship among visitors of the nature reserve using a mediation model in PROCESS (Hayes, 2012) for SPSS. We first ran a mediation model with NR as the independent variable, NI as the mediator, and positive affectivity as the dependent variable, while we controlled for age, gender, being first-time visitors or not, and negative affectivity.

Negative affectivity was included as a covariate to control for its potential effect on NI and to make sure variability in positive affectivity would not be solely due to an effect of negative affectivity. Then, we repeated this mediation model with the other measure of nature relatedness (INS), and also with the other measure of positive affect (OHS). Combining the two measures of nature relatedness and the two measures of positive affect resulted in four distinct mediation models, for which the mediator and the covariates were identical. Indirect effects were estimated using a non-parametric bootstrapping procedure. A bias-corrected bootstrap interval (CI) was then generated for this parameter estimate, and a CI that does not include zero indicates a significant mediation effect (Preacher and Hayes, 2008).

To analyze differences in the pictures posted, we conducted chi-square tests on the different attributes of the pictures, depending on the condition. There was no significant difference for any of the attributes of the pictures between conditions. Similarly, we conducted linear models to test for differences in the amount of nature interactions observed by the experimenter between conditions but did not find any. We thus do not develop these in the results section.

Questionnaire surveys can be found in appendix 2, 3, and 4, for study 1, 2, and 3, respectively.

## **RESULTS**

### **Study 1**

The main motivations for visiting Ramat Hanadiv were learn (mean =  $3.95 \pm 0.91$ ), relax (mean =  $3.86 \pm 0.76$ ) and thrill (mean =  $3.65 \pm 1.09$ ; Fig. 3). The motivation social (mean =  $2.96 \pm 0.96$ ) was much lower than the others. Thrill was significantly lower than learn and relax, and social was significantly lower than all other motivations (Fig. 3).

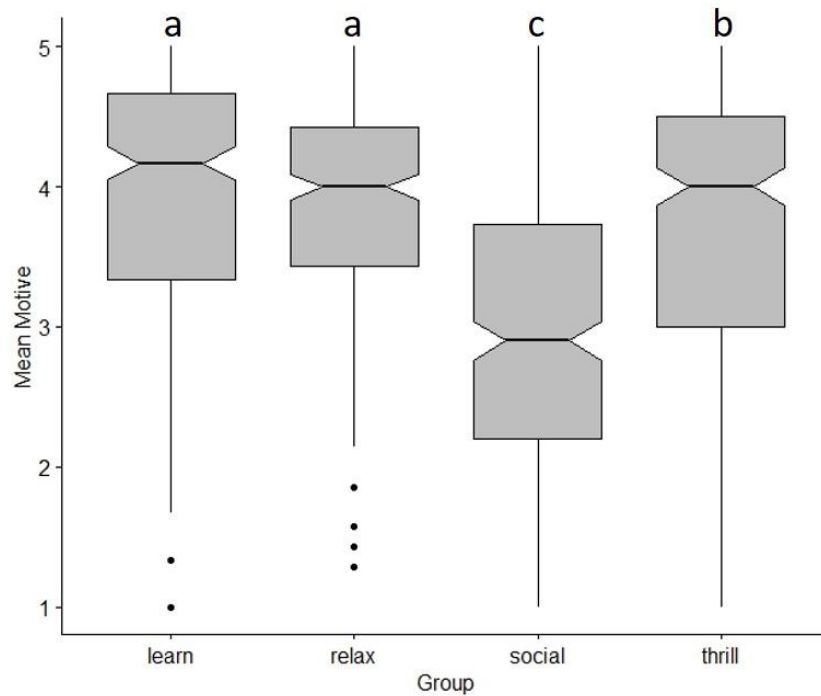


Fig. 3: Visitors' motivations per group (learn, relax, social and thrill). Different letters represent significant differences between groups of motivations (Wilcoxon test).

Visitors who reported being more connected to nature reported higher scores of motivations in general than other respondents (Table 1). More educated respondents reported higher levels for motivation 'learn'; respondents who grew up in more rural environment reported lower scores for motivation 'learn'. Older respondents reported higher scores for motivation 'social'. Finally, the motivation 'thrill' was positively associated with the level of education of respondents.

Table 1: Summary statistics of variables explaining motivations. Results of the most parsimonious model after model selection based on AIC are shown. Empty cells are for variables that were omitted in the model selection process. Significant results are highlighted in bold characters.

	Motivation - Learn			Motivation - Relax			Motivation - Social			Motivation - Thrill			
	Linear model			Linear model			Linear model			Linear model			
	<i>Estimate</i>	<i>SE</i>	<i>p-value</i>	<i>Estimate</i>	<i>SE</i>	<i>p-value</i>	<i>Estimate</i>	<i>SE</i>	<i>p-value</i>	<i>Estimate</i>	<i>SE</i>	<i>p-value</i>	
Intercept	0.39	0.94	0.67	2.45	0.3	<0.001	-0.62	0.95	0.51	-0.34	1.07	0.75	
Nature relatedness	<b>0.33</b>	<b>0.07</b>	<b>&lt;0.001</b>	<b>0.37</b>	<b>0.06</b>	<b>&lt;0.001</b>	<b>0.37</b>	<b>0.07</b>	<b>&lt;0.001</b>	<b>0.34</b>	<b>0.08</b>	<b>&lt;0.001</b>	
Live nearby	no (reference)	-	-	-	-	-	-	-	-	-	-	-	
	yes	-	-	-	0.03	0.1	0.71	-0.11	0.13	0.39	-0.007	0.13	0.95
Marital status	Married (reference)	-	-	-	-	-	-	-	-	-	-	-	
	Other	-0.3	0.21	0.14	-0.08	0.16	0.6	-0.004	0.22	0.98	-0.12	0.25	0.62
	Single	<b>-0.54</b>	<b>0.25</b>	<b>0.03</b>	-0.06	0.21	0.76	0.08	0.28	0.75	-0.43	0.32	0.17
Average income	-0.04	0.02	0.07	-0.03	0.02	0.07	0.008	0.02	0.74	-0.03	0.03	0.29	
Age	-	-	-	0.004	0.003	0.21	<b>0.01</b>	<b>0.005</b>	<b>0.009</b>	0.009	0.005	0.09	
Gender	female (reference)	-	-	-	-	-	-	-	-	-	-	-	
	male	-	-	-	-0.07	0.09	0.39	0.01	0.12	0.91	-0.03	0.13	0.8
Education	Below high school	-	-	-	-	-	-	-	-	-	-	-	
	High school	<b>2.57</b>	<b>0.9</b>	<b>0.004</b>	-	-	-	1.49	0.9	0.1	2.69	1.02	0.009
	Professional degree	<b>2.73</b>	<b>0.87</b>	<b>0.002</b>	-	-	-	1.5	0.89	0.09	<b>2.91</b>	<b>1</b>	<b>0.004</b>
	First degree	<b>2.78</b>	<b>0.87</b>	<b>0.001</b>	-	-	-	1.36	0.88	0.12	<b>2.61</b>	<b>0.99</b>	<b>0.009</b>
	Second degree	<b>2.7</b>	<b>0.87</b>	<b>0.002</b>	-	-	-	1.32	0.88	0.13	<b>2.47</b>	<b>0.99</b>	<b>0.01</b>
Urbanization place of childhood	Big city (reference)	-	-	-	-	-	-	-	-	-	-	-	
	Medium sized city	-0.07	0.14	0.58	-	-	-	-	-	-	-	-	
	Kibbutz or moshav	<b>-0.3</b>	<b>0.14</b>	<b>0.03</b>	-	-	-	-	-	-	-	-	
Urbanization current place of residence	Big city (reference)	-	-	-	-	-	-	-	-	-	-	-	
	Medium sized city	-	-	-	0.06	0.1	0.71	0.11	0.13	0.39	-	-	-
	Kibbutz or moshav	-	-	-	-0.19	0.13	0.13	0.12	0.17	0.48	-	-	-
Number of children	-	-	-	0.03	0.03	0.33	0.03	0.04	0.47	-0.01	0.05	0.8	

Visitors who reported being more connected to nature, and those who live nearby R.H. showed a higher understanding of R.H. values in general (Table 2). Women also showed a better understanding of the values than men. Respondents who grew up in a rural environment showed lower understanding of the research and management values of R.H. than respondents who grew up in a big city. Finally, older respondents, and those with higher income reported better understanding of the education, community and sustainability values of R.H. than younger and lower income respondents. Understanding of those two types of values did not vary between visitors asked before their visit, and those asked after their visit.

Table 2: Summary statistics of variables explaining intake of values of Ramat Hanadiv. Results of the most parsimonious model after model selection based on AIC are shown. Empty cells are for variables that were omitted in the model selection process. Significant results are highlighted in bold characters.

		Research and management			Education, community and sustainability		
		Linear model			Linear model		
		<i>Estimate</i>	<i>SE</i>	<i>p-value</i>	<i>Estimate</i>	<i>SE</i>	<i>p-value</i>
Intercept		2.97	0.14	<0.001	2.59	0.19	<0.001
Nature relatedness		<b>0.30</b>	<b>0.04</b>	<b>&lt;0.001</b>	<b>0.28</b>	<b>0.04</b>	<b>&lt;0.001</b>
Gender	female (reference)	-	-	-	-	-	-
	male	<b>-0.19</b>	<b>0.06</b>	<b>0.001</b>	<b>-0.20</b>	<b>0.06</b>	<b>0.001</b>
Living nearby R.H.	no (reference)	-	-	-	-	-	-
	yes	<b>0.28</b>	<b>0.06</b>	<b>&lt;0.001</b>	<b>0.24</b>	<b>0.07</b>	<b>&lt;0.001</b>
Age		-	-	-	<b>0.00</b>	<b>0.00</b>	<b>0.03</b>
Income		-	-	-	<b>0.04</b>	<b>0.01</b>	<b>0.006</b>
Urbanization place of childhood	Big city (reference)	-	-	-	-	-	-
	Medium sized city	-0.10	0.07	0.14	-	-	-
	Kibbutz or moshav	<b>-0.17</b>	<b>0.07</b>	<b>0.02</b>	-	-	-
Urbanization current place of residence	Big city (reference)	-	-	-	-	-	-
	Medium sized city	-	-	-	0.06	0.07	0.39
	Kibbutz or moshav	-	-	-	-0.1	0.08	0.21
Survey	After visit (reference)	-	-	-	-	-	-
	Before visit	0.05	0.06	0.35	0.01	0.06	0.8

Respondents who live nearby Ramat Hanadiv perceived it more as urban park than those living farther away (Table 3); respondents who were more connected to nature perceived R.H., more as a nature

reserve than those less connected to nature. The strength of the relationship between nature relatedness and perception of R.H. as a nature reserve increased for respondents living nearby R.H. (Fig. 4). Respondents who felt more connected to nature reported more nature activities than those who felt less connected to nature; visitors who live nearby R.H. reported less nature activities than those living farther (Table 4). Visitors living nearby Ramat Hanadiv identified themselves as more attached to R.H. (Table 5). Visitors who felt more connected to nature also reported higher scores for all dimensions of sense of place compared to respondents who felt less connected to nature.

Table 3: Summary statistics of variables explaining perception of Ramat Hanadiv as an urban park or nature reserve. Results of the most parsimonious model after model selection based on AIC are shown. Significant results are highlighted in bold characters.

		Perception of RH as urban nature or nature reserve		
		Linear model		
		<i>Estimate</i>	<i>SE</i>	<i>p-value</i>
Intercept		<b>5.24</b>	<b>0.59</b>	<b>&lt;0.001</b>
Live nearby	no (reference)	-	-	-
	yes	<b>-2.68</b>	<b>1.13</b>	<b>0.02</b>
Nature relatedness		<b>0.48</b>	<b>0.15</b>	<b>0.002</b>
Live nearby : Nature relatedness		<b>0.68</b>	<b>0.28</b>	<b>0.01</b>

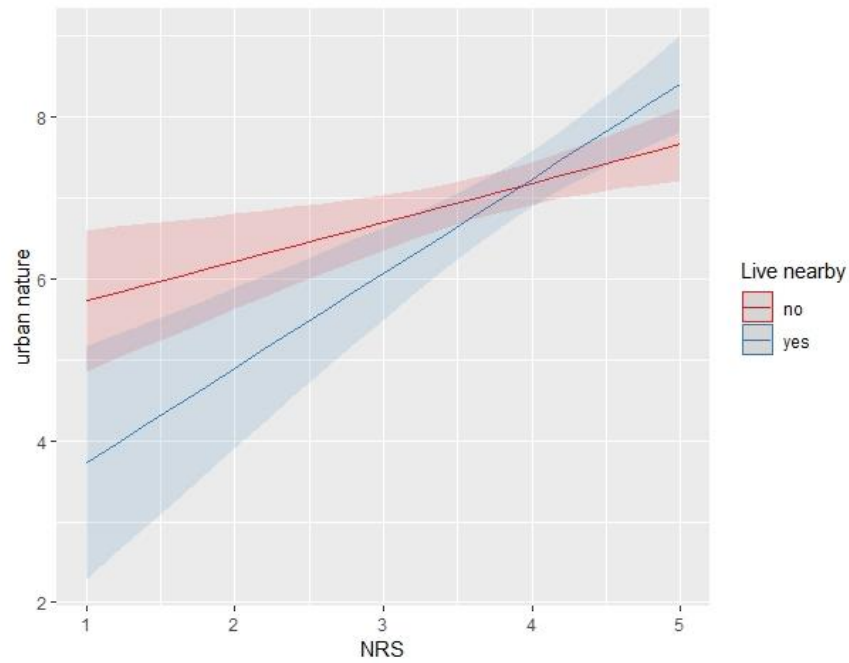


Fig. 4: Perception of Ramat Hanadiv as urban park (low value on ‘urban nature’ axis) or nature reserve (high value on ‘urban nature’ axis) depending on nature relatedness score (NRS) and whether the respondent lives nearby R.H. (blue) or not (red).

Table 4: Summary statistics of variables explaining nature activities during the visit of Ramat Hanadiv. Results of the most parsimonious model after model selection based on AIC are shown. Significant results are highlighted in bold characters.

		Nature activities		
		Linear model		
		<i>Estimate</i>	<i>SE</i>	<i>p-value</i>
Intercept		3.03	0.26	<0.001
Live nearby	no (reference)	-	-	-
	yes	<b>-0.36</b>	<b>0.11</b>	<b>0.001</b>
Gender	female (reference)	-	-	-
	male	-0.15	0.1	0.13
Nature relatedness		<b>0.22</b>	<b>0.06</b>	<b>&lt;0.001</b>
Place visited	Both (reference)	-	-	-
	Botanical garden	-0.2	0.11	0.07
	Park	-0.01	0.16	0.92



Table 5: Summary statistics of variables explaining sense of place in R.H. Results of the most parsimonious model after model selection based on AIC are shown. Empty cells are for variables that were omitted in the model selection process. Significant results are highlighted in bold characters.

		Reflection			Attachment			Identity		
		Linear model			Linear model			Linear model		
		<i>Estimate</i>	<i>SE</i>	<i>p-value</i>	<i>Estimate</i>	<i>SE</i>	<i>p-value</i>	<i>Estimate</i>	<i>SE</i>	<i>p-value</i>
	Intercept	1.96	0.28	<0.001	3.44	0.21	<0.001	2.72	0.34	<0.001
Live nearby	no (reference)	-	-	-	-	-	-	-	-	-
	yes	-	-	-	<b>0.23</b>	<b>0.09</b>	<b>0.01</b>	<b>0.32</b>	<b>0.11</b>	<b>0.006</b>
Gender	female (reference)	-	-	-	-	-	-	-	-	-
	male	-	-	-	-0.11	0.08	0.17	-	-	-
	Nature relatedness	<b>0.45</b>	<b>0.06</b>	<b>&lt;0.001</b>	<b>0.3</b>	<b>0.05</b>	<b>&lt;0.001</b>	<b>0.36</b>	<b>0.07</b>	<b>&lt;0.001</b>
Place visited	Both (reference)	-	-	-	-	-	-	-	-	-
	Botanical garden	-0.1	0.12	0.4	-0.12	0.09	0.2	-0.15	0.11	0.19
	Park	-0.26	0.16	0.11	-0.15	0.13	0.25	-0.1	0.16	0.52
Education	First degree (reference)	-	-	-	-	-	-	-	-	-
	High school	0.22	0.15	0.15	-	-	-	0.03	0.15	0.86
	Professional degree	0.29	0.17	0.09	-	-	-	<b>0.39</b>	<b>0.17</b>	<b>0.01</b>
	Second degree	<b>-0.26</b>	<b>0.13</b>	<b>0.03</b>	-	-	-	-0.06	0.12	0.6
Urbanization current place of residence	Big city (reference)	-	-	-	-	-	-	-	-	-
	Medium sized city	-	-	-	0.1	0.1	0.29	0.1	0.12	0.43
	Kibbutz or moshav	-	-	-	-0.14	0.12	0.22	-0.22	0.14	0.13
Marital status	Married (reference)	-	-	-	-	-	-	-	-	-
	Other	-	-	-	-	-	-	-0.31	0.17	0.07
	Single	-	-	-	-	-	-	0.22	0.2	0.26
	Age	-	-	-	-	-	-	0.00	0.00	0.83
	Number of children	-	-	-	-	-	-	0.09	0.05	0.05
	Income	-	-	-	-	-	-	0.01	0.02	0.7

## Study 2

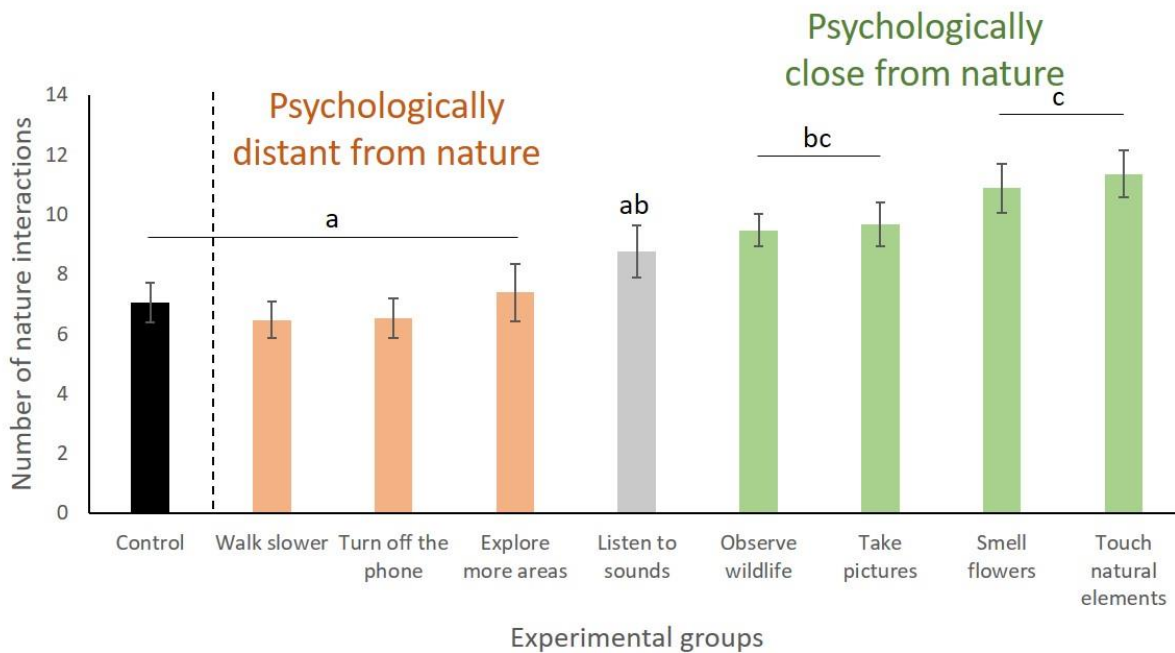
### *Identifying two primes that increase nature interactions and positive affect*

We first verified that the randomized assignment of participants to intervention groups worked properly by demonstrating that there were no differences in participants' characteristics and environmental conditions between intervention groups (e.g., age, gender, NR, temperature during the experiment, see Table S1 in appendix 1). We then verified that the primes worked as expected, using generalized linear models. For instance, to test whether 'observe wildlife' prime participants reported more wildlife observations, we compared the number of NI of the category 'observe wildlife' between this group and the control group. All primes promoted (or inhibited, in case of 'turn off the phone' condition) the targeted behavior, except for one ('walk more slowly'), in comparison to the control group, suggesting that our primes mostly worked as expected (Table 6).

**Table 6:** Summary of model estimates and standard errors (SE) testing for efficiency of each prime. In the models, each group was compared to the control group (N=34), in relation to the behavior that was primed (e.g., for the 'observe wildlife' group, dependent variable was the sum of 'observe' behaviors).

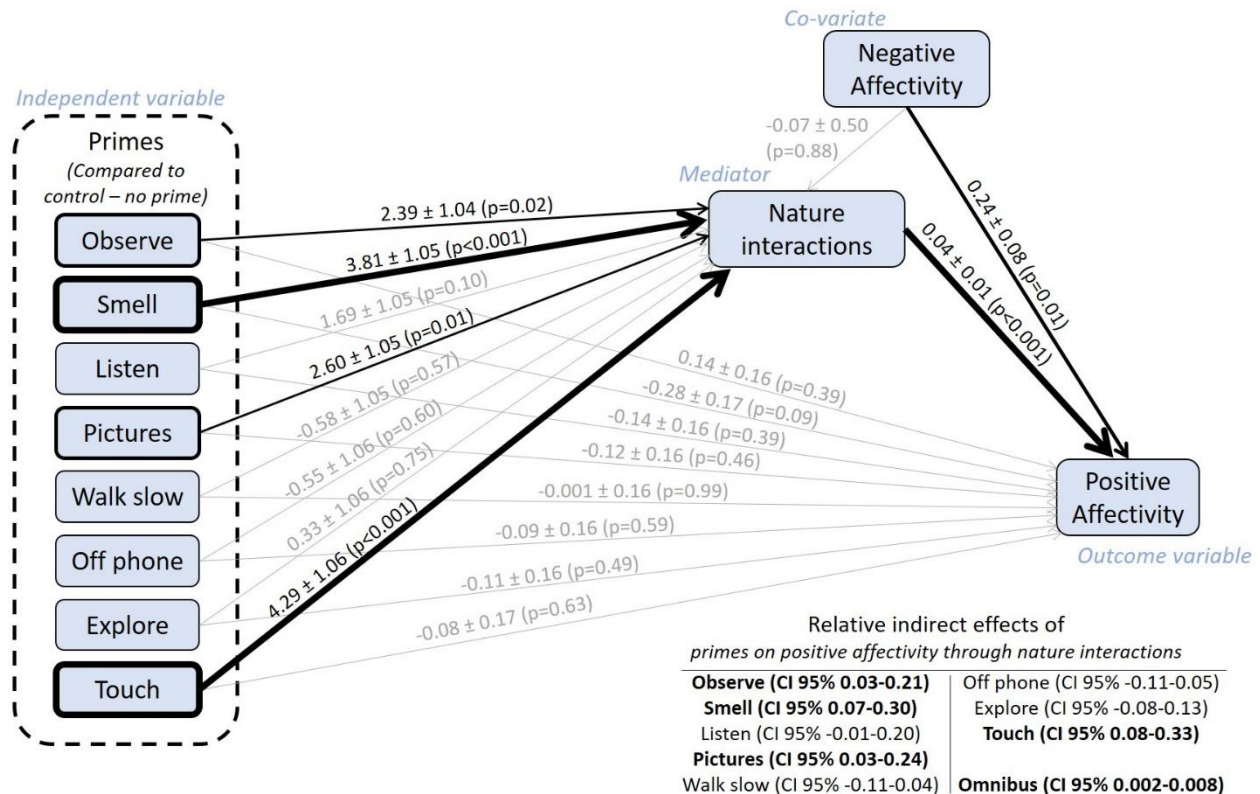
<b>Groups with prime</b>	<b>Observe wildlife</b>	<b>Smell flowers</b>	<b>Listen to sounds</b>	<b>Take pictures</b>	<b>Walk more slowly</b>	<b>Turn off your phone</b>	<b>Explore more areas</b>	<b>Touch natural elements</b>
<b>N</b>	34	34	34	34	34	33	33	33
<b>Model</b>	GLM Poisson	GLM Poisson	GLM Gaussian	GLM Poisson	GLM Gaussian	GLM binomial	GLM Poisson	GLM Poisson
<b>Estimate</b>	0.41	0.63	0.97	1.35	0.04	-2.76	0.48	0.99
<b>SE</b>	0.16	0.18	0.31	0.16	0.13	0.70	0.10	0.14
<b>p-value</b>	0.01	<0.001	0.01	<0.001	0.78	<0.001	<0.001	<0.001

We found large differences in the number of NI reported between the different experimental groups (ANOVA;  $F(8, 294) = 6.12$ ,  $p < 0.001$ ;  $R^2 = 0.11$ ; Fig. 5). Post-hoc multiple comparisons (Table S2 in appendix 1) revealed that participants primed with high psychological distance ('walk slower', 'explore more areas' and 'turn off the phone') reported on average a similar number of NI as control group participants. Participants primed with low psychological distance ('observe wildlife', 'smell flowers', 'take pictures', and 'touch natural elements') reported on average a higher number of NI compared to the control group participants. Participants primed with 'listen to sounds' reported a higher number of NI compared to the control group participants, but lower than that of other low psychological distance primes (Fig. 5).



**Figure 5:** Mean number ( $\pm$ standard error) of nature interactions per experimental group (control in black, low number of nature interactions in orange, intermediate in grey, and high number of nature interactions in green). Main differences identified using ANOVA and Fisher’s Least Significant Different (LSD) post-hoc comparisons are shown with letters: a similar letter illustrates no difference, two different letters mean differences between groups (e.g., control group’s mean, *letter a*, is different from mean of touch natural elements’ group, *letter c*, but is not different from listen to sounds’ group mean, *letters ab*).

Multicategorical mediation analysis of the effect of the primes on NI and positive affectivity revealed a direct effect of NI on positive affectivity (Fig. 6;  $F(10, 292) = 3.98, p < 0.001, R^2 = 0.12$ ). There were no direct effects of any of the primes on positive affectivity ( $F(8, 292) = 1.00, p = 0.43, R^2 = 0.02$ ). We found relative indirect effects for four of the five primes of closeness to nature (low psychological distance; Fig. 6) on positive affect through NI. No other indirect effect of the other primes on positive affectivity, through NI, were found (Fig.6).



**Figure 6:** Multicategorical mediation analysis of the direct and indirect effects through nature interactions of eight different primes (compared to the control group) on positive affectivity, controlling for the potential effect of negative affectivity. Estimates, standard errors and p-values are provided. Arrows indicates direct effects, grey arrows indicate effects with  $p > 0.05$ , black arrows effects with  $p < 0.05$ , and the thickness of the black arrows demonstrates the strength of the effect. Bold values of relative indirect effects highlight those for which 95% confidence interval did not include zero.

### Study 3

#### Testing the two primes in real-life settings

We first checked whether there were differences in respondents' characteristics between the two types of days (Saturday or Passover holiday). We found no difference in term of type of group (alone, family, friends or other;  $\text{chisq} = 5.06$ ,  $\text{df} = 3$ ,  $p = 0.16$ ), first time visitors ( $\text{chisq} = 1.83$ ,  $\text{df} = 1$ ,  $p = 0.17$ ) and nature relatedness ( $0.09 \pm 0.06$ ,  $p = 0.11$ ). Saturday visitors were slightly older than those during Passover holidays ( $2.29 \pm 0.86$ ,  $p = 0.007$ ).

Before analyzing the effects of the conditions (control, smell, touch and butterfly activity), we compared visitors' nature behaviors between sampling days. This revealed strong differences between the first sampling day and all others (ANOVA;  $\text{Chisq} = 30.96$ ,  $\text{df} = 8$ ,  $p < 0.001$ ; Post-hoc Tukey test: only the first day

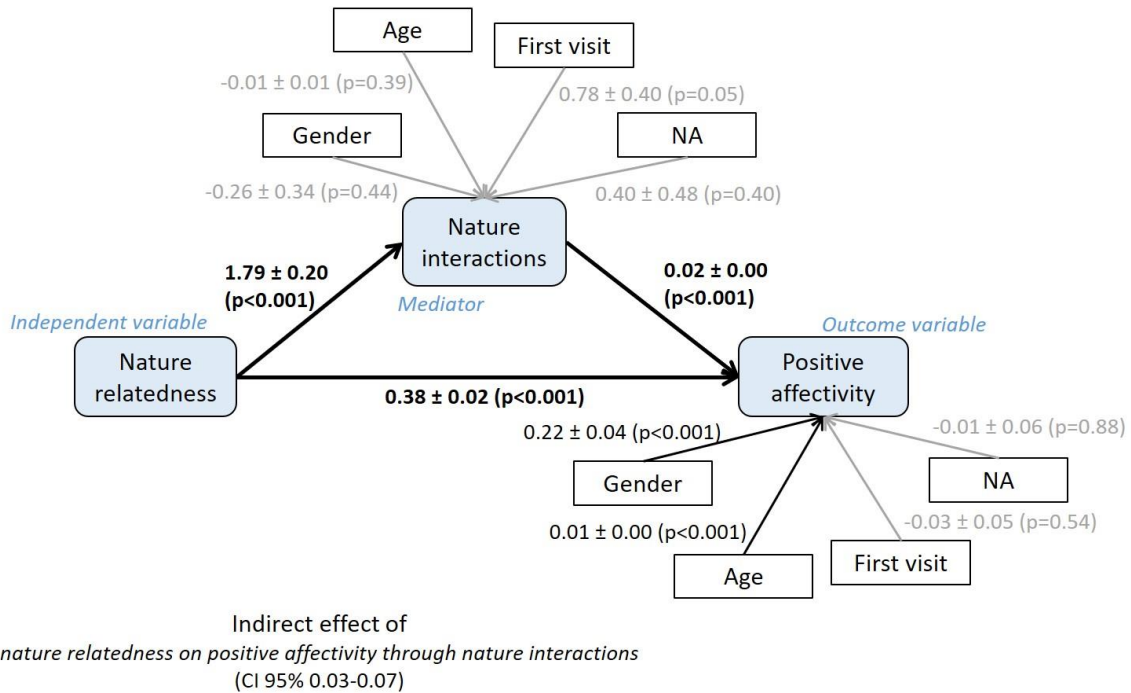
was different from others). We thus considered the first day as an outlier and removed it for subsequent analyses. There was no difference in visitors' nature behaviors between days (ANOVA,  $\text{chisq}=0.42$ ,  $\text{df}=7$ ,  $p=0.42$ ), conditions (ANOVA,  $\text{chisq}=1.05$ ,  $\text{df}=3$ ,  $p=0.78$ ), or type of day (Saturday vs. Pessah; ANOVA,  $\text{chisq}=1.69$ ,  $\text{df}=1$ ,  $p=0.19$ ; Table 7). We found that positive affect differed between sampling days (ANOVA,  $\text{chisq}=15.64$ ,  $\text{df}=7$ ,  $p=0.02$ ), but the difference was found between one of the two butterfly days (higher positive affect reported), and 2 other days. Only 65 (6.7%) survey respondents noticed and remembered the sign.

We also explored which variables could potentially impact the amount of nature interactions, and the positive affect participants reported, using generalized linear models with negative binomial or linear distributions, respectively (Table 7). At this point, because we did not identify any differences between conditions, we considered the whole dataset and disregarded the condition variable. We found that nature relatedness was significantly positively associated with age; also, it was positively associated with nature interactions, but this positive link decreased for older participants. Respondents who visited the botanical garden and the park and those who visited only the park reported more nature interactions than those who visited only the botanical garden (ANOVA;  $\text{chisq} = 16.95$ ,  $\text{df}=2$ ,  $p<0.001$ ). Visitors surveyed on Saturdays reported significantly higher positive affect than those surveyed during Passover. Nature relatedness was positively associated with positive affect. Finally, respondents who visited R.H. on their own reported higher positive affect than those visiting with their family or friends. Whether they were first time visitors or not did not affect the amount of nature interactions and positive affect of visitors.

Table 7: Summary statistics of the models explaining nature interactions and positive affect. Significant values are in bold characters.

		Nature interactions			Positive affect		
		Negative binomial model			Linear model		
		<i>Estimate</i>	<i>SE</i>	<i>p-value</i>	<i>Estimate</i>	<i>SE</i>	<i>p-value</i>
Intercept		2.52	0.23	<0.001	3.05	0.53	<0.001
Type day	Pessah (reference)	-	-	-	-	-	-
	Saturday	0.02	0.02	0.24	<b>-0.15</b>	<b>0.05</b>	<b>0.004</b>
Nature relatedness		<b>0.12</b>	<b>0.01</b>	<b>&lt;0.001</b>	<b>0.45</b>	<b>0.03</b>	<b>&lt;0.001</b>
Place visited	Both (reference)	-	-	-	-	-	-
	Memorial garden	<b>-0.12</b>	<b>0.03</b>	<b>&lt;0.001</b>	-0.07	0.06	0.31
	Park	-0.03	0.02	0.16	0.003	0.06	0.95
Age		<b>0.13</b>	<b>0.05</b>	<b>0.02</b>	-0.04	0.12	0.7
Group	Alone (reference)	-	-	-	-	-	-
	Family	-0.15	0.23	0.51	<b>-1.36</b>	<b>0.52</b>	<b>0.009</b>
	Friends	-0.28	0.23	0.23	<b>-1.36</b>	<b>0.53</b>	<b>0.01</b>
	Others	-0.03	0.4	0.92	-1.52	0.9	0.09
First visit	No (reference)	-	-	-	-	-	-
	yes	-0.03	0.02	0.28	0.04	0.06	0.49
Nature relatedness : age		<b>-0.04</b>	<b>0.01</b>	<b>0.004</b>	0.04	0.03	0.16

We found a direct relationship between NR and NI ( $R^2 = 0.09$ ; Fig. 7), while there was no relationship between NI and any of the control variables. Then, the mediation model ( $R^2 = 0.30$ ; Fig. 7) revealed direct relationships between NI and positive affect measured by positive affectivity and between NR and positive affectivity. Age and gender were also related to positive affectivity. More importantly, we found an indirect relationship between NR and positive affectivity, via NI (Fig. 7). We found similar results for the three other mediation models (Fig. S3-S5 in appendix 1).



**Figure 7:** Mediation analysis (N=867) exploring the direct and indirect effects through nature interactions of nature relatedness on positive affectivity, controlling for demographics. NA stands for negative affectivity. Estimates and standard errors are provided, as well as p-values. Black arrows indicate direct effects with p-value <0.05, grey arrows indicate direct effects with p-value >0.05. R<sup>2</sup> of the full mediation model = 0.30.

## DISCUSSION

Nature experiences provide a wide range of psychological, physiological, and social benefits and can also influence the way people value nature and commit to protect it (Keniger et al., 2013). The extinction of experience that threatens the delivery of those benefits is, therefore, a rising concern for both humans and biodiversity conservation (Soga and Gaston, 2016). Understanding and promoting opportunities to experience nature are some of the means suggested to address this challenge (Soga et al., 2015). **With a series of studies in Ramat Hanadiv nature reserve, we (1) built applied knowledge on visitors' motivations and drivers of their behaviors, (2) built general knowledge on the relationship between nature interactions and well-being, and (3) tested for the first time how to promote nature interactions and, in turn, well-being.** We showed the general importance of nature relatedness, or psychological distance to nature, for overall motivation to visit the nature reserve, understanding of its values, attachment people develop towards the nature reserve; we also showed that nature relatedness is positively related to the extent to which people interact with nature and to the well-being benefits gained

from this interaction. Subsequently, we demonstrated with an experiment in controlled conditions, that by using priming, we can overcome individual differences in nature relatedness and increase nature interactions and well-being outcomes. However, the stimuli we designed, which prime nature relatedness by reducing the psychological distance from nature, did not work in the field experiment. More research remains necessary to identify the proper stimuli that can potentially be used in campaigns or interventions that enhance meaningful experiences of nature and help mitigate the consequences of the extinction of experience.

**Visitors were more driven to Ramat Hanadiv by learning, relaxing or to lesser extent thrilling motives than social ones**, which is consistent with the values of Ramat Hanadiv on education, community and sustainability, as well as its vision to “...connect more people to the natural environment and create sustainable relationship between the two”. Considering these results, efforts could potentially be directed towards providing more educational materials (e.g., guided activities or printed media), and/or relaxing opportunities (e.g., installing more benches, picnic tables or increasing sunbathing areas). While **living nearby Ramat Hanadiv seemed to promote particularly visitors’ understanding of Ramat Hanadiv values and attachment towards the nature reserve**, visitors living farther from Ramat Hanadiv tended to perceive it more as a nature reserve and interacted more with nature during their visit. Different strategies may therefore be used depending on visitors’ profile. For instance, designing advertisement campaigns in the surrounding neighborhoods that emphasize nature interactions in Ramat Hanadiv, or promote sense of being away (Pals et al., 2009), to switch visitors perception of Ramat Hanadiv as an urban park toward its perception as a nature reserve. In contrast, an advertisement campaign targeting people living farther could emphasize Ramat Hanadiv vision to “...connect more people to the natural environment and create sustainable relationship between the two”, and promote sense of belonging to the place (Hausmann et al., 2016). **Importantly, all our results from study 1 showed the importance of nature relatedness, on visitors’ motivations to visit the reserve, understanding of its values, and nature activities during the visit.** This suggests that important efforts should be spent on bringing people closer to nature and enhancing their nature relatedness.

Some argue that increasing time spent in nature positively affects health and well-being outcomes (Cox et al., 2017a; Shanahan et al., 2016, 2015). Further, others suggest that conscious interactions with nature are crucial for the experience to be meaningful and translate into health, well-being, and conservation benefits (Colléony et al., 2019; Duvall, 2011). To date, studies have focused on how different environmental features influence benefits (excluding what individuals do within those environments) and



found inconsistent results (Pett et al., 2016). Our study explored the effect of personal factors on the experience and showed that the restorative benefits people retrieve from experiencing a natural environment do not only depend on the dose and features of the setting, but also on how this person chooses to interact with such environment. Many studies of the relationship between nature relatedness, experience of nature, and outcomes, alternatively defined nature relatedness as a dependent (e.g., Cox et al. 2017a), independent (e.g., Colléony et al. 2017) or mediating variable (e.g., Whitburn et al. 2018). This is mostly due to the bidirectional relationship between nature relatedness and experiences of nature (Soga and Gaston, 2016). Here, we show that **nature relatedness affects the number of interactions with the natural environment, and that these nature interactions, in turn, positively influences the well-being outcomes**. Thus, identifying means to prime nature relatedness can be effective for improving individual well-being and biodiversity conservation.

Psychology theories and methods are growingly used in environmental research and were shown to be highly effective in influencing people's behaviors (reviewed by Byerly et al. 2018). Applying such theories and methods to conservation research can be useful for bringing people closer to nature. While previous studies explored potential ways to promote nature relatedness (e.g., Cox & Gaston 2016), we translated it into its psychological meaning, psychological distance from nature. Psychological distance was successfully primed in many studies and was shown to influence behavior (e.g., Williams & Bargh 2008). Thus, we primed the psychological distance from nature, specifically, spatial distance from nature, to influence nature interactions. Four of the five primes of closeness (small psychological distance) indeed increased nature interactions and well-being, and the effects of touching and smelling, that rely on contacts or near contacts with natural elements, were particularly high compared to the other two. Indeed, an object has to be within one's reach to be touched, it may be farther away to be smelled, and it can be still farther away to be heard or seen (Trope and Liberman, 2010). This supports our suggestion that increasing nature relatedness, that is, reducing the psychological distance from nature, affects nature interactions and well-being outcomes (Fig. 1). The benefits and the usefulness of both a theory and a method from psychology for bringing people closer to nature are multifold, as priming psychological distance from nature involves the use of subtle and non-invasive stimuli and is not target-specific. This means that it has the potential to be applied to large audiences, in diverse contexts, at relatively low cost, although further research is needed to provide empirical evidence.

The results of this study highlight the importance of looking at how people interact with nature for restoring or enhancing health and well-being. However, since this is the first time nature relatedness was

primed, one should be cautious with any generalization of the results before further replications of our study are conducted in other cultural, environmental or climate contexts. One of limitation of our study is that it relies on self-reports of nature interactions and well-being, which can be subject to self-desirability biases for instance. Future studies may overcome this limitation by using additional independent measures for nature interactions (e.g., behavioral observations) or well-being (e.g., physiological sensors) to objectively assess potential changes. It is now necessary to replicate and upscale this study's results to larger audiences, to test the effects of the different primes in real-life settings, since the stimuli we designed, using large signs at the entrance of nature reserves, inviting visitors to enjoy the smells during their visit, did not prove to be efficient.

#### *General conservation implications*

Overall, our results suggest that encouraging people to spend time in nature may not be enough, and promoting meaningful experiences of nature is warranted. Efforts should be made to reduce the psychological distance from nature, for instance by planting flowers at hip or chest height (e.g., in elevated pots, or green walls) instead of at ground level. Planting aromatic or other edible plants in public spaces will provide people more opportunities to smell or taste natural elements. Touch and smell have been found to produce detailed, long-lasting memories (Hutmacher and Kuhbandner, 2018; Willander and Larsson, 2006), which suggests that these primes may be particularly valuable for children when building their emotional connection with the natural world (Chawla, 1988).

Urban or national parks often have entrance signs listing several bans, thus reminding the public to keep distant from natural elements. In this study, the 'turn off the phone' prime was the only one in the 'do not' format, and slightly decreased the extent to which participants interacted with nature, in comparison to the control group. We, therefore, argue that prohibiting behaviors may be counterproductive while promoting nature interactions that visitors may not be even aware they could or are allowed to do would be much more valuable. This result also suggests that banning technologies might not be an adequate solution for the extinction of experience problem, but rather that we should use technology as means to increase people's involvement and interest while in nature (e.g., taking pictures, sharing them on social media, using species identification apps; Clayton et al. 2017).

Although beneficial for well-being, promoting nature interactions can come at some cost for biodiversity. We checked in our experiment in the Technion whether people increasingly picked flowers, and we found evidence for this for those who were primed to smell and touch; in other words, people who were asked to smell flowers or touch natural elements reported more picking flowers than did people from other

groups (Chi-square test:  $\chi^2(8) = 21.58$ ,  $p = 0.005$ ). However, a recent study of urban foraging (gathering wild plants in cities) found that over-harvesting was not evident, and stewardship of urban biodiversity is common among foragers (Landor-Yamagata et al., 2018). Nevertheless, disturbance can take other forms, like increased trampling on flower beds, or disturbing wildlife by more actively looking for it, and we acknowledge the potential downside effects of increasing nature interactions for conservation. We thus need to make sure to promote behaviors that are the least harmful to biodiversity, especially in those areas that are designated for nature conservation. There is a sharp debate on the trade-offs that occur between ensuring individual and societal well-being and conserving biodiversity (e.g., Adams et al. 2004). It is therefore important to carefully identify the right balance between encouraging nature interactions and conserving biodiversity. One way to achieve this is to increase nature interactions in specific areas to spatially limit the potentially deleterious effects of increasing those behaviors on biodiversity while providing people with meaningful experiences of nature. Finally, promoting explicit attention to, and interactions with biodiversity could increase people's affinity for more ecologically complex greenspaces, and ultimately reconcile conservation and well-being objectives (Clayton et al., 2017).

## REFERENCES

- Adams, W.M., Aveling, R., Brockington, D., Dickson, B., Elliott, J., Hutton, J., Roe, D., Vira, B., Wolmer, W., 2004. Biodiversity Conservation and the Eradication of Poverty. *Science* 306, 1146–1149. <https://doi.org/10.1126/science.1097920>
- Bargh, J.A., Chen, M., Burrows, L., 1996. Automaticity of social behavior: direct effects of trait construct and stereotype-activation on action. *J. Pers. Soc. Psychol.* 71, 230–244. <https://doi.org/10.1037/0022-3514.71.2.230>
- Byerly, H., Balmford, A., Ferraro, P.J., Hammond, W., Palchak, E., Polasky, S., Ricketts, T.H., Schwartz, A.J., Fisher, B., 2018. Nudging pro-environmental behavior: Evidence and opportunities. *Front. Ecol. Environ.* 16, 159–168. <https://doi.org/10.1002/fee.1777>
- Cardinale, B.J., Duffy, J.E., Gonzalez, A., Hooper, D.U., Perrings, C., Venail, P., Narwani, A., Mace, G.M., Tilman, D., Wardle, D.A., Kinzig, A.P., Daily, G.C., Loreau, M., Grace, J.B., Larigauderie, A., Srivastava, D.S., Naeem, S., 2012. Biodiversity loss and its impact on humanity. *Nature* 486, 59–67. <https://doi.org/10.1038/nature11148>
- Chawla, L., 1988. Children's concern for the natural environment. *Child. Environ. Q.* 5, 13–20.
- Clayton, S., 2019. Psychology and climate change. *Curr. Biol.* 29, R992–R995. <https://doi.org/10.1016/j.cub.2019.07.017>
- Clayton, S., Colléony, A., Conversy, P., Maclouf, E., Martin, L., Torres, A.-C., Truong, M.-X., Prévot, A.-C., 2017. Transformation of experience: Toward a new relationship with nature. *Conserv. Lett.* 10, 645–651. <https://doi.org/10.1111/conl.12337>
- Colléony, A., Prévot, A.-C., Saint Jalme, M., Clayton, S., 2017. What kind of landscape management can counteract the extinction of experience? *Landsc. Urban Plan.* 159, 23–31. <https://doi.org/10.1016/j.landurbplan.2016.11.010>

- Colléony, A., White, R., Shwartz, A., 2019. The influence of spending time outside on experience of nature and environmental attitudes. *Landsc. Urban Plan.* 187, 96–104. <https://doi.org/10.1016/j.landurbplan.2019.03.010>
- Cox, D.T.C., Gaston, K.J., 2016. Urban Bird Feeding: Connecting People with Nature. *PLOS ONE* 11, e0158717. <https://doi.org/10.1371/journal.pone.0158717>
- Cox, D.T.C., Shanahan, D. F., Hudson, H., Fuller, R., Anderson, K., Hancock, S., Gaston, K., Cox, D.T.C., Shanahan, Danielle F., Hudson, H.L., Fuller, R.A., Anderson, K., Hancock, S., Gaston, K.J., 2017a. Doses of Nearby Nature Simultaneously Associated with Multiple Health Benefits. *Int. J. Environ. Res. Public Health* 14, 172. <https://doi.org/10.3390/ijerph14020172>
- Cox, D.T.C., Shanahan, D.F., Hudson, H.L., Plummer, K.E., Siriwardena, G.M., Fuller, R.A., Anderson, K., Hancock, S., Gaston, K.J., 2017b. Doses of Neighborhood Nature: The Benefits for Mental Health of Living with Nature. *BioScience* 67, 147–155. <https://doi.org/10.1093/biosci/biw173>
- Duvall, J., 2011. Enhancing the benefits of outdoor walking with cognitive engagement strategies. *J. Environ. Psychol.* 31, 27–35. <https://doi.org/10.1016/j.jenvp.2010.09.003>
- Fuller, R.A., Irvine, K.N., Devine-Wright, P., Warren, P.H., Gaston, K.J., 2007. Psychological benefits of greenspace increase with biodiversity. *Biol. Lett.* 3, 390–394. <https://doi.org/10.1098/rsbl.2007.0149>
- Galinsky, A.D., Gruenfeld, D.H., Magee, J.C., 2003. From Power to Action. *J. Pers. Soc. Psychol.* 85, 453–466. <https://doi.org/10.1037/0022-3514.85.3.453>
- Gaston, K.J., Soga, M., Duffy, J.P., Garrett, J.K., Gaston, S., Cox, D.T.C., 2018. Personalised Ecology. *Trends Ecol. Evol.* 33, 916–925. <https://doi.org/10.1016/j.tree.2018.09.012>
- Hartig, T., Evans, G.W., Jamner, L.D., Davis, D.S., Gärling, T., 2003. Tracking restoration in natural and urban field settings. *J. Environ. Psychol., Restorative Environments* 23, 109–123. [https://doi.org/10.1016/S0272-4944\(02\)00109-3](https://doi.org/10.1016/S0272-4944(02)00109-3)
- Hausmann, A., Slotow, R., Burns, J.K., Minin, E.D., 2016. The ecosystem service of sense of place: benefits for human well-being and biodiversity conservation. *Environ. Conserv.* 43, 117–127. <https://doi.org/10.1017/S0376892915000314>
- Hayes, A.F., 2012. PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper].
- Hughes, J., Rogerson, M., Barton, J., Bragg, R., 2019. Age and connection to nature: when is engagement critical? *Front. Ecol. Environ.* 0. <https://doi.org/10.1002/fee.2035>
- Hutmacher, F., Kuhbandner, C., 2018. Long-Term Memory for Haptically Explored Objects: Fidelity, Durability, Incidental Encoding, and Cross-Modal Transfer. *Psychol. Sci.* 29, 2031–2038. <https://doi.org/10.1177/0956797618803644>
- IPBES, 2019. Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES global assessment). IPBES.
- Keniger, L.E., Gaston, K.J., Irvine, K.N., Fuller, R.A., 2013. What are the Benefits of Interacting with Nature? *Int. J. Environ. Res. Public Health* 10, 913–935. <https://doi.org/10.3390/ijerph10030913>
- Landor-Yamagata, J.L., Kowarik, I., Fischer, L.K., 2018. Urban Foraging in Berlin: People, Plants and Practices within the Metropolitan Green Infrastructure. *Sustainability* 10, 1873. <https://doi.org/10.3390/su10061873>
- Levontin, L., Ein-Gar, D., Lee, A.Y., 2015. Acts of emptying promote self-focus: A perceived resource deficiency perspective. *J. Consum. Psychol.* 25, 257–267. <https://doi.org/10.1016/j.jcps.2014.08.001>
- Lin, B.B., Fuller, R.A., Bush, R., Gaston, K.J., Shanahan, D.F., 2014. Opportunity or Orientation? Who Uses Urban Parks and Why. *PLOS ONE* 9, e87422. <https://doi.org/10.1371/journal.pone.0087422>

- Molden, D.C., 2014. Understanding Priming Effects in Social Psychology: What is “Social Priming” and How does it Occur? *Soc. Cogn.* 32, 1–11. <https://doi.org/10.1521/soco.2014.32.suppl.1>
- Nisbet, E.K., Zelenski, J.M., 2013. The NR-6: a new brief measure of nature relatedness. *Front. Psychol.* 4. <https://doi.org/10.3389/fpsyg.2013.00813>
- Pals, R., Steg, L., Siero, F.W., van der Zee, K.I., 2009. Development of the PRCQ: A measure of perceived restorative characteristics of zoo attractions. *J. Environ. Psychol.* 29, 441–449. <https://doi.org/10.1016/j.jenvp.2009.08.005>
- Pett, T.J., Shwartz, A., Irvine, K.N., Dallimer, M., Davies, Z.G., 2016. Unpacking the People–Biodiversity Paradox: A Conceptual Framework. *BioScience* biw036. <https://doi.org/10.1093/biosci/biw036>
- Preacher, K.J., Hayes, A.F., 2008. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav. Res. Methods* 40, 879–891. <https://doi.org/10.3758/BRM.40.3.879>
- Pyle, R.M., 1978. The extinction of experience. *Horticulture* 64–67.
- Reddy, S.M.W., Montambault, J., Masuda, Y.J., Keenan, E., Butler, W., Fisher, J.R.B., Asah, S.T., Gneezy, A., 2017. Advancing Conservation by Understanding and Influencing Human Behavior. *Conserv. Lett.* 10, 248–256. <https://doi.org/10.1111/conl.12252>
- Schultz, P.W., 2001. THE STRUCTURE OF ENVIRONMENTAL CONCERN: CONCERN FOR SELF, OTHER PEOPLE, AND THE BIOSPHERE. *J. Environ. Psychol.* 21, 327–339. <https://doi.org/10.1006/jevp.2001.0227>
- Shanahan, D.F., Bush, R., Gaston, K.J., Lin, B.B., Dean, J., Barber, E., Fuller, R.A., 2016. Health Benefits from Nature Experiences Depend on Dose. *Sci. Rep.* 6, 28551. <https://doi.org/10.1038/srep28551>
- Shanahan, D.F., Fuller, R.A., Bush, R., Lin, B.B., Gaston, K.J., 2015. The Health Benefits of Urban Nature: How Much Do We Need? *BioScience* biv032. <https://doi.org/10.1093/biosci/biv032>
- Soga, M., Akasaka, M., 2019. Multiple landscape-management and social-policy approaches are essential to mitigate the extinction of experience. *Landsc. Urban Plan.* 191, 103634. <https://doi.org/10.1016/j.landurbplan.2019.103634>
- Soga, M., Gaston, K.J., 2016. Extinction of experience: the loss of human–nature interactions. *Front. Ecol. Environ.* 14, 94–101. <https://doi.org/10.1002/fee.1225>
- Soga, M., Yamaura, Y., Aikoh, T., Shoji, Y., Kubo, T., Gaston, K.J., 2015. Reducing the extinction of experience: Association between urban form and recreational use of public greenspace. *Landsc. Urban Plan.* 143, 69–75. <https://doi.org/10.1016/j.landurbplan.2015.06.003>
- Tate, K., Stewart, A.J., Daly, M., 2014. Influencing green behaviour through environmental goal priming: The mediating role of automatic evaluation. *J. Environ. Psychol.* 38, 225–232. <https://doi.org/10.1016/j.jenvp.2014.02.004>
- Trope, Y., Liberman, N., 2010. Construal-Level Theory of Psychological Distance. *Psychol. Rev.* 117, 440–463. <https://doi.org/10.1037/a0018963>
- Trope, Y., Liberman, N., Wakslak, C., 2007. Construal Levels and Psychological Distance: Effects on Representation, Prediction, Evaluation, and Behavior. *J. Consum. Psychol. Off. J. Soc. Consum. Psychol.* 17, 83–95. [https://doi.org/10.1016/S1057-7408\(07\)70013-X](https://doi.org/10.1016/S1057-7408(07)70013-X)
- Watson, D., Clark, L.A., Tellegen, A., 1988. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J. Pers. Soc. Psychol.* 54, 1063–1070. <https://doi.org/10.1037//0022-3514.54.6.1063>
- Whitburn, J., Linklater, W.L., Milfont, T.L., 2018. Exposure to Urban Nature and Tree Planting Are Related to Pro-Environmental Behavior via Connection to Nature, the Use of Nature for Psychological Restoration, and Environmental Attitudes. *Environ. Behav.* 0013916517751009. <https://doi.org/10.1177/0013916517751009>
- Willander, J., Larsson, M., 2006. Smell your way back to childhood: Autobiographical odor memory. *Psychon. Bull. Rev.* 13, 240–244. <https://doi.org/10.3758/BF03193837>

Williams, L.E., Bargh, J.A., 2008. Keeping one's distance: the influence of spatial distance cues on affect and evaluation. *Psychol. Sci.* 19, 302–308. <https://doi.org/10.1111/j.1467-9280.2008.02084.x>

## APPENDIX 1

Table S1: Sample size, temperature during experiment, age, urbanization during childhood (from 1 – large city to 3 – village), current urbanization (from 1 – large city to 3 – village), nature relatedness (from 1 – low to 5 – high), gender, incentives, and time of experiment, per group. Statistical differences between groups were assessed with ANOVAs or chi-square tests.

	Groups									ANOVAs		Chi-square tests	
	Control	Observe wildlife	Smell flowers	Listen to sounds	Take pictures	Walk more slowly	Turn off your phone	Explore more areas	Touch natural elements	F value	p-value	$\chi^2$	P-value
<b>N</b>	34	34	34	34	34	34	33	33	33				
<b>Temperature (mean <math>\pm</math> SD)</b>	24.47 $\pm$ 4.33	25.02 $\pm$ 4.40	25.14 $\pm$ 4.25	25.47 $\pm$ 3.90	25.44 $\pm$ 3.93	25.02 $\pm$ 4.16	24.51 $\pm$ 3.93	24.30 $\pm$ 4.01	24.69 $\pm$ 4.02	0.35	0.94		
<b>Age (mean <math>\pm</math> SD)</b>	25.05 $\pm$ 2.81	26.12 $\pm$ 4.05	25.14 $\pm$ 2.82	25.61 $\pm$ 2.91	26.50 $\pm$ 3.54	25.35 $\pm$ 2.82	24.90 $\pm$ 3.49	26.24 $\pm$ 4.69	25.96 $\pm$ 5.53	0.79	0.60		
<b>Urbanization during childhood (mean <math>\pm</math> SD)</b>	2.05 $\pm$ 0.85	1.88 $\pm$ 0.80	1.82 $\pm$ 0.83	1.82 $\pm$ 0.86	2.02 $\pm$ 0.79	1.76 $\pm$ 0.74	1.87 $\pm$ 0.78	1.66 $\pm$ 0.85	1.81 $\pm$ 0.84	0.74	0.64		
<b>Current urbanization (mean <math>\pm</math> SD)</b>	1.38 $\pm$ 0.65	1.64 $\pm$ 0.69	1.52 $\pm$ 0.78	1.38 $\pm$ 0.60	1.50 $\pm$ 0.78	1.32 $\pm$ 0.58	1.54 $\pm$ 0.71	1.36 $\pm$ 0.60	1.30 $\pm$ 0.52	1.04	0.40		
<b>Nature relatedness (mean <math>\pm</math> SD)</b>	3.52 $\pm$ 0.77	3.56 $\pm$ 0.82	3.26 $\pm$ 0.83	3.71 $\pm$ 0.79	3.53 $\pm$ 0.87	3.48 $\pm$ 0.77	3.29 $\pm$ 0.94	3.38 $\pm$ 0.83	3.44 $\pm$ 0.65	0.99	0.43		
<b>Gender (Male/female)</b>	16/18	20/14	16/18	16/18	19/15	17/17	16/17	18/15	20/13			3.11	0.92
<b>Incentives (30NIS/50NIS/academic credit/volunteer)</b>	24/0/9/1	23/2/9/0	23/2/9/0	24/1/8/1	25/2/7/0	22/1/11/0	26/1/6/0	22/1/10/0	20/1/12/0			14.03	0.94
<b>Time of experiment (AM/PM)</b>	19/15	14/20	13/21	11/23	11/23	9/25	8/25	12/21	15/18			11.05	0.19

Table S2: Fisher’s Least Significant Difference post-hoc comparisons of the number of nature interactions between the different experimental groups. Mean differences ± standard errors (p-values) are displayed. Values in bold show values with a p-value <0.05.

	Control	Observe wildlife	Smell flowers	Listen to sounds	Take pictures	Walk slower	Turn off the phone	Explore more areas	Touch natural elements
Control	1	<b>-2.41±1.05</b> (p=0.02)	<b>-3.82±1.05</b> (p<0.001)	-1.70±1.05 (p=0.10)	<b>-2.61±1.05</b> (p=0.01)	0.58±1.05 (p=0.57)	0.54±1.05 (p=0.60)	-0.33±1.05 (p=0.75)	<b>-4.30±1.05</b> (p<0.001)
Observe wildlife		1	-1.41±1.05 (p=0.18)	0.70±1.05 (p=0.50)	-0.20±1.05 (p=0.84)	<b>3.00±1.05</b> (p=0.005)	<b>2.95±1.05</b> (p=0.006)	<b>2.07±1.05</b> (p=0.05)	-1.89±1.05 (p=0.07)
Smell flowers			1	<b>2.11±1.05</b> (p=0.04)	1.20±1.05 (p=0.25)	<b>4.41±1.05</b> (p<0.001)	<b>4.36±1.05</b> (p<0.001)	<b>3.48±1.05</b> (p=0.001)	-0.48±1.05 (p=0.65)
Listen to sounds				1	-0.91±1.05 (p=0.38)	<b>2.29±1.05</b> (p=0.03)	<b>2.24±1.05</b> (p=0.03)	1.37±1.05 (p=0.19)	<b>-2.59±1.05</b> (p=0.01)
Take pictures					1	<b>3.20±1.05</b> (p=0.003)	<b>3.16±1.05</b> (p=0.003)	<b>2.28±1.05</b> (p=0.03)	-1.68±1.05 (p=0.11)
Walk slower						1	-0.04±1.05 (p=0.96)	-0.92±1.05 (p=0.38)	<b>-4.89±1.05</b> (p<0.001)
Turn off the phone							1	-0.87±1.06 (p=0.41)	<b>-4.84±1.06</b> (p<0.001)
Explore more areas								1	<b>-3.96±1.06</b> (p<0.001)
Touch natural elements									1



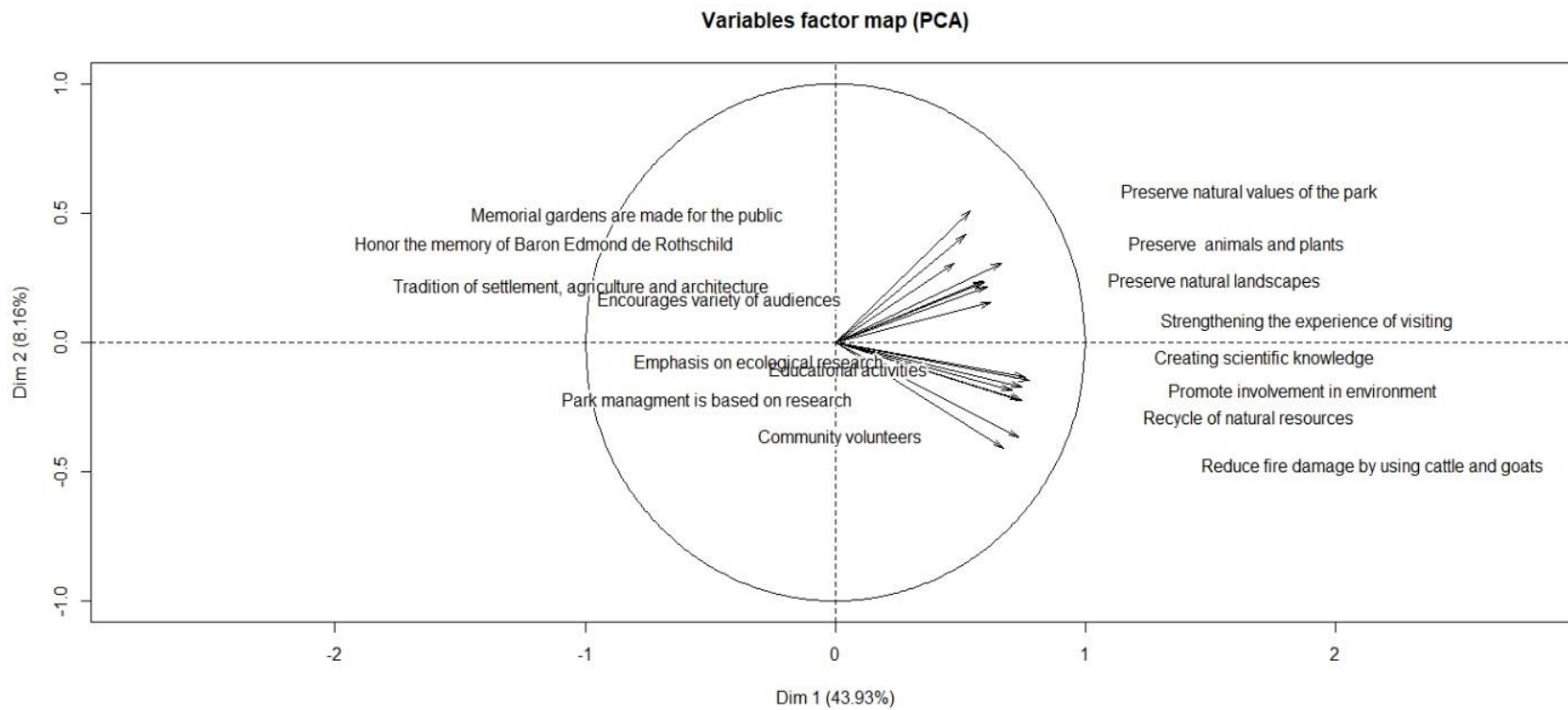


Figure S1: Factor analysis of intake of values of Ramat Hanadiv.

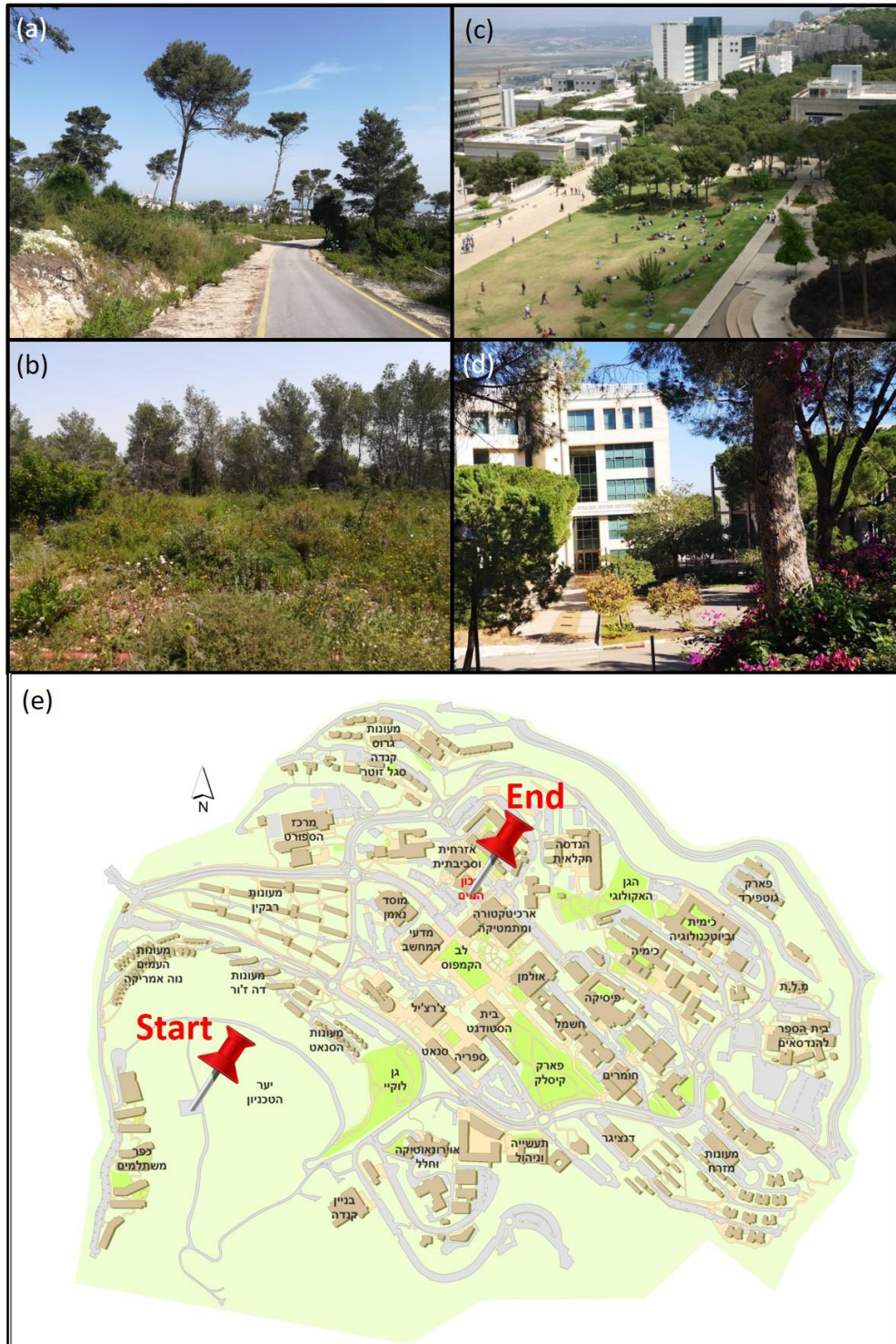


Figure S2: Controlled experiment was done on the campus of the Technion – Israel Institute of Technology, which comprises a forest (a-b), managed lawns (c) and an ecological garden (d). (e) Map of the campus that was provided to participants: we drove them to the highest point of the campus (Start point in the map), the forest, and they were asked to return to the lab (End point in map) after a minimum of 30 minutes spent outdoor in the campus. Credit pictures c and d: Technion.

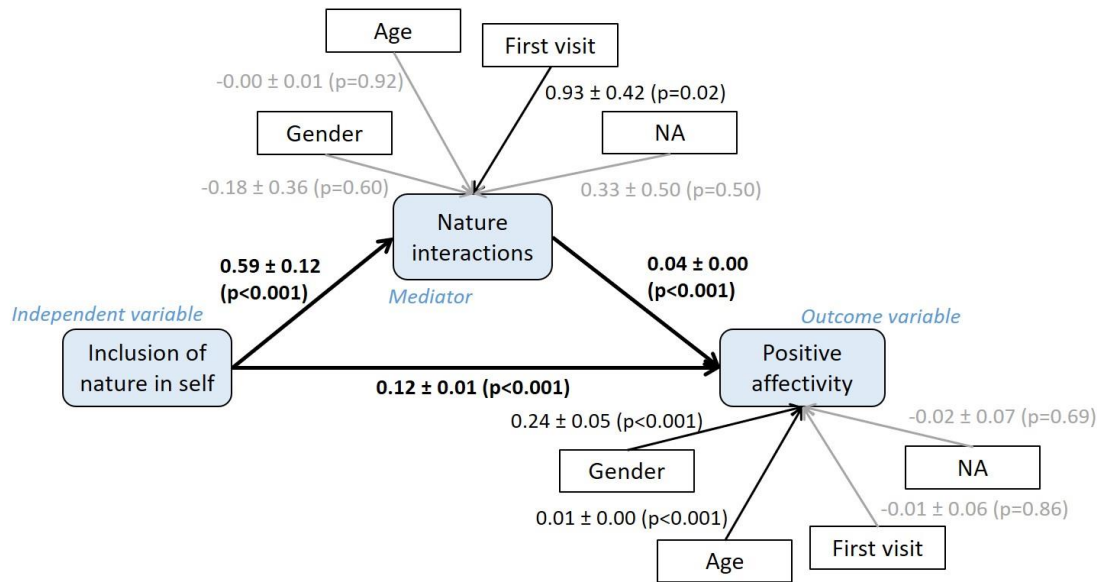


Figure S3: Mediation analysis (N=858) exploring the direct and indirect effects through nature interactions of inclusion of nature in self on positive affectivity, controlling for demographics. Estimates, standard errors, and p-values are provided. Black arrows indicate direct effects with p-value < 0.05, grey arrows indicate direct effects with p-value > 0.05. R<sup>2</sup> of the full mediation model = 0.20; indirect effect of inclusion of nature in self on positive affectivity via nature interactions: CI95% [0.01-0.03].

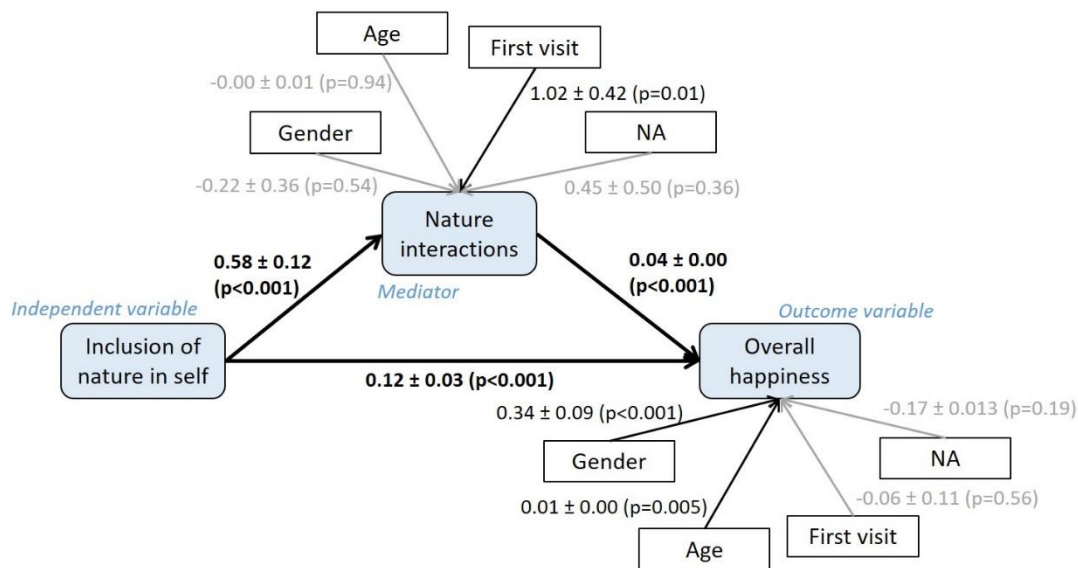


Figure S4: Mediation analysis (N=845) exploring the direct and indirect effects through nature interactions of inclusion of nature in self on overall happiness, controlling for demographics. Estimates, standard errors and p-values are provided. Black arrows indicate direct effects with p-value < 0.05, grey arrows indicate direct effects with p-value > 0.05. R<sup>2</sup> of the full mediation model = 0.07; indirect effect of inclusion of nature in self on overall happiness via nature interactions: CI95% [0.01-0.04].

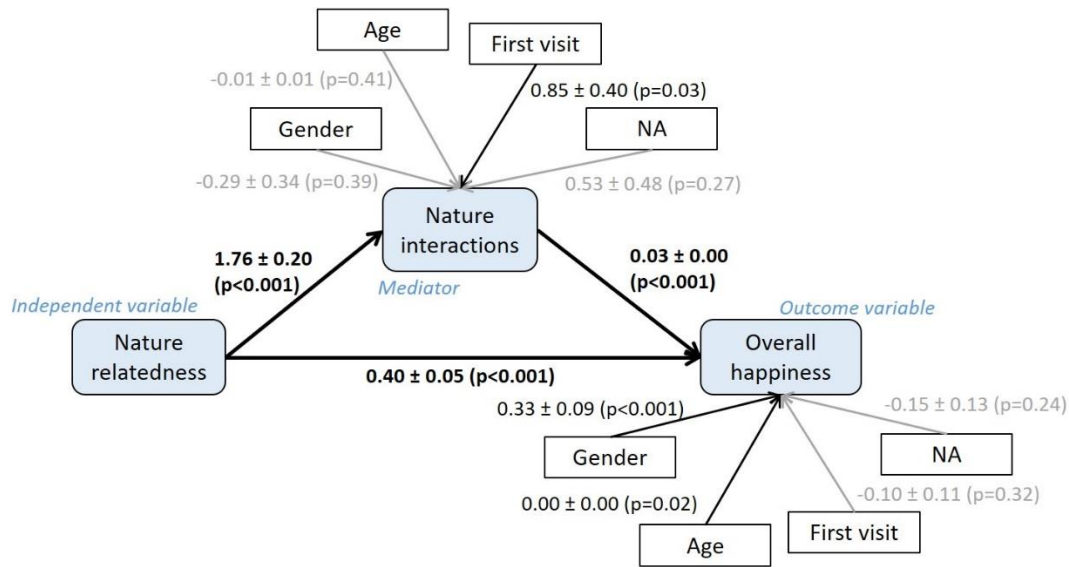


Figure S5: Mediation analysis (N=852) exploring the direct and indirect effects through nature interactions of nature relatedness on overall happiness, controlling for demographics. Estimates, standard errors and p-values are provided. Black arrows indicate direct effects with p-value < 0.05, grey arrows indicate direct effects with p-value > 0.05. R<sup>2</sup> of the full mediation model = 0.11; indirect effect of nature relatedness on overall happiness via nature interactions: CI95% [0.02-0.10].

## APPENDIX 2 – Survey study 1

---

### טופס הסכמה מדעת

משתתף יקר,

הנך מוזמן לקחת חלק בשאלון המאפיין את חווית הביקור שלך ברמת הנדיב. השאלון הינו אנונימי. המידע יהיה מאוחסן בקובץ מוגן ויהיה נגיש אך ורק לחוקרים. לא קיים סיכון כלשהו במילוי השאלון, אין תשובות נכונות או שגויות. מטרת המחקר היא לעמוד ולאפיין את חווית הביקור שלכם. המידע ישמש אך ורק למטרות מחקר.

מילוי השאלון לוקח בממוצע כ- 5 דקות. לאחר מילוי השאלון תזכה בשי צנוע בחנות המידע ברמת הנדיב.

מילוי השאלון הוא מתוך רצונך האישי. במידה ותחליט לענות עליו אתה רשאי לפרוש בכל זמן. במידה ויש לך שאלות נוספות אודות הפרויקט או במידה וקיימת בעיה כלשהי, אתה רשאי לפנות לחוקרים הראשיים אסף שוורץ ודניאל בשן ([shwartz@technion.ac.il](mailto:shwartz@technion.ac.il); [bashan@campus.technion.ac.il](mailto:bashan@campus.technion.ac.il)) במידה ואתה בוחר למלא את השאלון, הנך מאשר שאתה מעל גיל 18, האינפורמציה הכתובה למעלה ברורה ומובנת לך ושאתה משתתף במילוי שאלון זה מתוך רצונך האישי.

במידה ובחרת למלא שאלון זה, אנא חתום למטה

שם: \_\_\_\_\_ חתימה: \_\_\_\_\_

תאריך: \_\_\_\_\_

\*השאלון מנוסח בלשון זכר אך פונה לגברים ונשים כאחד.

חשוב מאוד				לא חשוב כלל	1. אנא ציין לגבי כל היגד מהי החשיבות שלו לסיבת ביקורך ברמת הנדיב
5	4	3	2	1	לחקור מקומות חדשים
5	4	3	2	1	ללכת למקומות שחברים לא ביקרו
5	4	3	2	1	לבלות וליהנות
5	4	3	2	1	לחפש ריגושים
5	4	3	2	1	להרגיש שייכות במקום שאינו הבית
5	4	3	2	1	להירגע ממתחי היום יום
5	4	3	2	1	לפגוש אנשים בעלי עניין דומה
5	4	3	2	1	לחוות בדידות
5	4	3	2	1	לברוח מהעומס בעבודה
5	4	3	2	1	להיות יחד כמשפחה
5	4	3	2	1	ללמוד דברים חדשים, לצבור ידע
5	4	3	2	1	חוסר הצורך למהר
5	4	3	2	1	לחלוק מקומות מוכרים עם אחרים
5	4	3	2	1	לטייל באתרים היסטוריים
5	4	3	2	1	רגיעה הרחק מהשגרה
5	4	3	2	1	הרגשת בטחון, אפילו אם מטיילים לבד
5	4	3	2	1	לעשות דברים מלהיבים
5	4	3	2	1	להיות פעיל גופנית
5	4	3	2	1	להתרענן

2. היכן היית ממוקם את רמת הנדיב על הסקאלה שבין שמורת טבע לפארק טבע עירוני, כמו פארק הירקון?

פארק טבע עירוני



שמורת טבע

3. אנא ציין כמה שמח אתה מרגיש כעת? הקף את המספר המשקף את הרגשתך.

לא שמח כלל



שמח מאוד

4. לדעתך, מהם הערכים או העקרונות לפיהם פועלת רמת הנדיב?

---



---



---

מסכים מאוד				לא מסכים כלל	5. באיזו מידה אתה מסכים עם ההיגדים הבאים לגבי פארק הטבע רמת הנדיב
5	4	3	2	1	אחת המטרות של רמת הנדיב היא לשמור ולטפח את ערכי הטבע בפארק
5	4	3	2	1	רמת הנדיב מטפחת מסורת של התיישבות, חקלאות ואדריכלות
5	4	3	2	1	רמת הנדיב פועלת לשמירה על מגוון עשיר של בעלי חיים וצמחים
5	4	3	2	1	רמת הנדיב פועלת להנצחת זכרו ומורשתו של הברון אדמונד דה-רוטשילד
5	4	3	2	1	טיפוח גני הזיכרון ברמת הנדיב נעשה לרווחת הציבור והנאתו
5	4	3	2	1	רמת הנדיב משקיעה ביצירת ידע מדעי ופועלת להפצתו
5	4	3	2	1	פארק הטבע ברמת הנדיב מנוהל על בסיס ידע ממחקרים המתבצעים בו
5	4	3	2	1	בפארק הטבע רמת הנדיב פועלים לשמור על נופים טבעיים
5	4	3	2	1	רמת הנדיב עושה שימוש חוזר במשאבים, למשל יצירת קומפוסט מגזם
5	4	3	2	1	רמת הנדיב מעודדת ביקור של מגוון קהלים
5	4	3	2	1	רמת הנדיב פועלת לקידום מעורבותה של הקהילה הקרובה בפעילויות סביבתיות-קהילתיות
5	4	3	2	1	ברמת הנדיב משקיעים בהעצמת חוויית הביקור במקום
5	4	3	2	1	בפארק הטבע מתקיימות פעילויות חינוכיות השמות דגש על חיזוק הקשר בין אדם וסביבה
5	4	3	2	1	פארק הטבע מהווה מרחב למידה בדגש חקר אקולוגי וקיימות לאוכלוסיות שונות
5	4	3	2	1	רמת הנדיב משלבת מתנדבים מהקהילה הקרובה בפעילות השוטפת
5	4	3	2	1	רמת הנדיב עושה שימוש באמצעים כמו רעיית בקר ועיזים להקטנת נזקי שריפות

מסכים מאוד				לא מסכים כלל	6. אנא דרג באיזו מידה אתה מסכים עם ההיגדים הכלליים הבאים
5	4	3	2	1	המיקום האידיאלי לחופשה בעיניי הוא אזור טבעי ומרוחק
5	4	3	2	1	אני תמיד חושב איך פעולותיי משפיעות על הסביבה
5	4	3	2	1	החיבור שלי לטבע ולסביבה מהווה חלק מהרוחניות שלי
5	4	3	2	1	אני מבחין בחיות בר בכל מקום בו אני נמצא
5	4	3	2	1	הקשר שלי לטבע מהווה חלק חשוב ממי שאני
5	4	3	2	1	אני מרגיש מאד מחובר לכל היצורים החיים ולכדור הארץ

לפניך מספר שאלות, אנא הקף את התשובה הנכונה. היכן שלא ניתן לסמן אנא רשום את התשובה

7. מין: זכר / נקבה

8. שנת לידה: \_\_\_\_\_

9. מצב משפחתי: נשוי/אה / רווק/ה / אחר \_\_\_\_\_ מספר ילדים \_\_\_\_\_

10. ההכנסה הממוצעת החודשית נטו למשק בית בישראל היא כ-15,400 ₪. כיצד את/ה מעריך/ה את הכנסת משק הבית שלך? אנא הקף את התשובה המתאימה. המספר 5 מציין את ההכנסה הממוצעת למשפחה.

הכנסה ממוצעת 15,400 ש"ח

מתחת לממוצע



מעל הממוצע

11. מהי רמת ההשכלה שלך?: יסודית/ תיכונית/ תעודת מקצוע/ תואר ראשון/ תואר שני ומעלה

12. האם את/ה מתגורר/ה בקרבת מקום? כן / לא

13. היכן בילית את מרבית ילדותך? (גילאים 4-16)? עיר גדולה/ עיר בינונית או קטנה / יישוב קהילתי, כפר, מושב או קיבוץ

14. היכן אתה מתגורר כיום? עיר גדולה/ עיר בינונית או קטנה / יישוב קהילתי, כפר, מושב או קיבוץ

נבקש ממך לצרף כתובת אימייל לצורך יצירת קשר למילוי שאלון קצר לאחר כחודש

כתובת מייל ליצירת קשר: \_\_\_\_\_





## טופס הסכמה מדעת

משתתף יקר,

הנך מוזמן לקחת חלק בשאלון המאפיין את חווית הביקור שלך ברמת הנדיב. השאלון הינו אנונימי. המידע יהיה מאוחסן בקובץ מוגן ויהיה נגיש אך ורק לחוקרים. לא קיים סיכון כלשהו במילוי השאלון, אין תשובות נכונות או שגויות. מטרת המחקר היא לעמוד ולאפיין את חווית הביקור שלכם. המידע ישמש אך ורק למטרות מחקר.

מילוי השאלון לוקח בממוצע כ-10 דקות. לאחר מילוי השאלון תזכה בשי צנוע בחנות המידע ברמת הנדיב.

מילוי השאלון הוא מתוך רצונך האישי. במידה ותחליט לענות עליו אתה רשאי לפרוש בכל זמן. במידה ויש לך שאלות נוספות אודות הפרויקט או במידה וקיימת בעיה כלשהי, אתה רשאי לפנות לחוקרים הראשיים אסף שוורץ ודניאל בשן ([shwartz@technion.ac.il](mailto:shwartz@technion.ac.il); [bashan@campus.technion.ac.il](mailto:bashan@campus.technion.ac.il)) במידה ואתה בוחר למלא את השאלון, הנך מאשר שאתה מעל גיל 18, האינפורמציה הכתובה למעלה ברורה ומובנת לך ושאתה משתתף במילוי שאלון זה מתוך רצונך האישי.

במידה ובחרת למלא שאלון זה, אנא חתום למטה

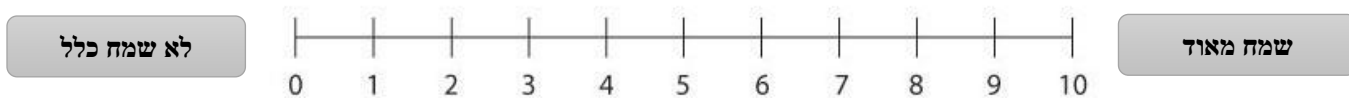
שם: \_\_\_\_\_ חתימה: \_\_\_\_\_

תאריך: \_\_\_\_\_

\*השאלון מנוסח בלשון זכר אך פונה לגברים ונשים כאחד.

מסכים מאוד				לא מסכים כלל	1. אנא דרג באיזו מידה אתה מסכים עם ההיגדים הכלליים הבאים
5	4	3	2	1	המיקום האידיאלי לחופשה בעיניי הוא אזור טבעי ומרוחק
5	4	3	2	1	אני תמיד חושב איך פעולתי משפיעות על הסביבה
5	4	3	2	1	החיבור שלי לטבע ולסביבה מהווה חלק מהרוחניות שלי
5	4	3	2	1	אני מבחין בחיות בר בכל מקום בו אני נמצא
5	4	3	2	1	הקשר שלי לטבע מהווה חלק חשוב ממי שאני
5	4	3	2	1	אני מרגיש מאד מחובר לכל היצורים החיים ולכדור הארץ

2. אנא ציין כמה שמח אתם מרגיש כעת? הקיף את המספר המשקף את הרגשתך.



3. לדעתך, מהם הערכים או העקרונות לפיהם פועלת רמת הנדיב?

---



---



---



---

4. היכן היית ממוקם את רמת הנדיב על הסקאלה שבין שמורת טבע לפארק טבע עירוני, כמו פארק הירקון?



מסכים מאוד				לא מסכים כלל	5. באיזו מידה אתה מסכים עם ההיגדים הבאים לגבי פארק הטבע רמת הנדיב
5	4	3	2	1	אחת המטרות של רמת הנדיב היא לשמור ולטפח את ערכי הטבע בפארק
5	4	3	2	1	רמת הנדיב מטפחת מסורת של התיישבות, חקלאות ואדריכלות
5	4	3	2	1	רמת הנדיב פועלת לשמירה על מגוון עשיר של בעלי חיים וצמחים
5	4	3	2	1	רמת הנדיב פועלת להנצחת זכרו ומורשתו של הברון אדמונד דה-רוטשילד
5	4	3	2	1	טיפוח גני הזיכרון ברמת הנדיב נעשה לרווחת הציבור והנאתו
5	4	3	2	1	רמת הנדיב משקיעה ביצירת ידע מדעי ופועלת להפצתו
5	4	3	2	1	פארק הטבע ברמת הנדיב מנוהל על בסיס ידע ממחקרים המתבצעים בו
5	4	3	2	1	בפארק הטבע רמת הנדיב פועלים לשמור על נופים טבעיים
5	4	3	2	1	רמת הנדיב עושה שימוש חוזר במשאבים, למשל יצירת קומפוסט מגזם
5	4	3	2	1	רמת הנדיב מעודדת ביקור של מגוון קהלים
5	4	3	2	1	רמת הנדיב פועלת לקידום מעורבותה של הקהילה הקרובה בפעילויות סביבתיות-קהילתיות
5	4	3	2	1	ברמת הנדיב משקיעים בהעצמת חוויית הביקור במקום
5	4	3	2	1	בפארק הטבע מתקיימות פעילויות חינוכיות השמות דגש על חיזוק הקשר בין אדם וסביבה
5	4	3	2	1	פארק הטבע מהווה מרחב למידה בדגש חקר אקולוגי וקיימות לאוכלוסיות שונות
5	4	3	2	1	רמת הנדיב משלבת מתנדבים מהקהילה הקרובה בפעילות השוטפת
5	4	3	2	1	רמת הנדיב עושה שימוש באמצעים כמו רעיית בקר ועיזים להקטנת נזקי שריפות

6. אנא ציין שלושה מקומות שבהם ביקרת במהלך השעות שלך ברמת הנדיב (ניתן להיעזר במפה). אנא מלא כמה זמן ביקרת בכל מקום וסמן באיזו מידה היית רוצה לחזור ולבקר בהם?

מקומות	זמן ביקור (דקות)	רצון לחזור לבקר במקום שוב				
		כלל לא			במידה רבה מאוד	
1.		1	2	3	4	5
2.		1	2	3	4	5
3.		1	2	3	4	5

לאורך כל הביקור				כלל לא	7. לפניך מספר פעילויות, אנא סמן בכל פעילות, באיזו מידה ביצעת אותה במהלך ביקורך ברמת הנדיב
5	4	3	2	1	לצלם תמונות של טבע
5	4	3	2	1	לגעת באלמנטים של טבע (בע"ח, צמחים, סלעים וקרקע, מים...)
5	4	3	2	1	להקשיב לקולות הטבע (רוח, גשם, ציוץ ציפורים, בע"ח אחרים...)
5	4	3	2	1	להריח פרחים
5	4	3	2	1	לקטוף פרחים
5	4	3	2	1	להתבונן בנופים
5	4	3	2	1	לצפות בחיות
5	4	3	2	1	להסתכל על פרחים
5	4	3	2	1	זיהוי מיני צמחים ובעלי חיים

### 8. אנא סמן האם במהלך הביקור שלך ברמת הנדיב:

לא	כן	ראית תן	לא	כן	נגעת בקרקע	לא	כן	ראית ציפור
לא	כן	הרחת עצי אורן	לא	כן	נגעת במים	לא	כן	הרחת אשפה
לא	כן	הרחת את הים	לא	כן	נגעת בסלע	לא	כן	הרחת את הקרקע
לא	כן	נגעת בעשבים	לא	כן	נגעת בפרח	לא	כן	ראית חזיר בר
לא	כן	ראית צפרדע	לא	כן	שמעת חתול או כלב	לא	כן	קראת שלטי מידע חינוכיים
לא	כן	הרחת פרחים	לא	כן	השתתפת באירוע מקומי	לא	כן	שמעת קולות של חיות בר
לא	כן	שמעת את הים	לא	כן	הרחת דשא	לא	כן	רכבת על אופניים
לא	כן	הרחת זיהום רכבים	לא	כן	צילמת אנשים	לא	כן	ראית לטאה
לא	כן	צילמת פרחים	לא	כן	ראית חתול	לא	כן	זיהית צמחים
לא	כן	יצאת לטיול לרגלי	לא	כן	נגעת במתכת	לא	כן	הרחת צמחי תבלין
לא	כן	שמעת קולות חרקים	לא	כן	בילית עם חברים או משפחה	לא	כן	צילמת מבנים
לא	כן	צילמת עצים	לא	כן	צילמת את עצמך (סלפי)	לא	כן	שמעת מכונות
לא	כן	קטפת פרחים	לא	כן	עקבת אחר בעלי חיים	לא	כן	יצאת לריצה
לא	כן	שמעת קרקור צפרדע	לא	כן	נגעת בעלים	לא	כן	צילמת נוף
לא	כן	שמעת ציוץ ציפורים	לא	כן	צילמת חיות	לא	כן	אספת עלים או אבנים
לא	כן	עשית פיקניק	לא	כן	שמעת זרימת מים	לא	כן	ראית קיפוד
לא	כן	ראית דבורה	לא	כן	צילמת תמונות תקריב של חרקים	לא	כן	שמת לב לפרטים הקטנים
לא	כן	צילמת את השמיים	לא	כן	נגעת בעץ	לא	כן	ראית חיפושית
			לא	כן	ראית פרפר	לא	כן	נגעת בבעלי חיים
						לא	כן	שוטטת/התהלכת לאט

מסכים מאוד				לא מסכים כלל	9. אנה ציין באיזו מידה אתה מסכים עם כל היגד לגבי ביקורך ברמת הנדיב
5	4	3	2	1	אני נהנה מהשהות ברמת הנדיב
5	4	3	2	1	אני מרגיש שמחה כאשר אני ברמת הנדיב
5	4	3	2	1	אני מתכוון לחזור ולבקר ברמת הנדיב
5	4	3	2	1	בהשוואה לפארקים אחרים, לרמת הנדיב יש יתרונות רבים
5	4	3	2	1	רמת הנדיב ידוע כמקום שכיף לבקר בו
5	4	3	2	1	אני אוהב את רמת הנדיב
5	4	3	2	1	כשאני מגיע לבקר ברמת הנדיב, הראש שלי מתנקה ממחשבות
5	4	3	2	1	השהות ברמת הנדיב גורמת לי להרגיש מחובר יותר לטבע
5	4	3	2	1	<b>אני לא</b> מרוצה מרמת הנדיב
5	4	3	2	1	קל לי לחשוב על עניינים אישיים כשאני מבקר ברמת הנדיב
5	4	3	2	1	אני מקבל פרספקטיבה על החיים כשאני מגיע לרמת הנדיב
5	4	3	2	1	קשה לי להתרכז בפעילויות מורכבות לאחר הביקור ברמת הנדיב

לפניך מספר שאלות, אנה הקף את התשובה הנכונה. היכן שלא ניתן לסמן אנה רשום את התשובה

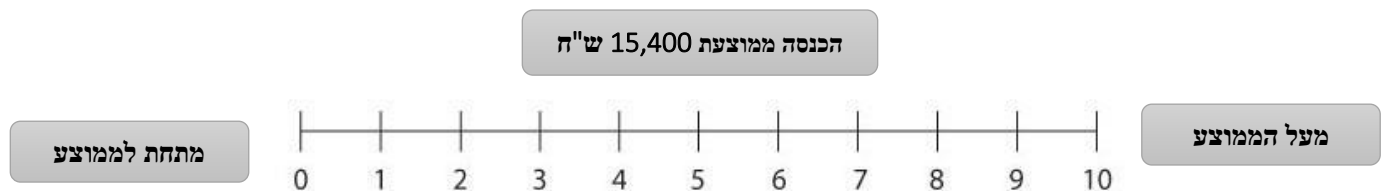
10. מין: זכר / נקבה

11. שנת לידה: \_\_\_\_\_

12. מצב משפחתי: נשוי/אה / רווק/ה / אחר \_\_\_\_\_ מספר ילדים \_\_\_\_\_

13. ההכנסה הממוצעת החודשית נטו למשק בית בישראל היא כ-15,400 ₪. כיצד אתה/מערך/ה את הכנסת משק הבית שלך? אנה

הקף את התשובה המתאימה. המספר 5 מציין את ההכנסה הממוצעת למשפחה.



14. מהי רמת ההשכלה שלך?: יסודית/ תיכונית/ תעודת מקצוע/ תואר ראשון/ תואר שני ומעלה

15. האם אתה/מתגורר/ה בקרבת מקום? כן / לא

16. היכן בילית את מרבית ילדותך? (גילאים 4-16)? עיר גדולה/ עיר בינונית או קטנה / יישוב קהילתי, כפר, מושב או קיבוץ

17. היכן אתה מתגורר כיום? עיר גדולה/ עיר בינונית או קטנה / יישוב קהילתי, כפר, מושב או קיבוץ

נבקש ממך לצרף כתובת אימייל לצורך יצירת קשר למילוי שאלון קצר לאחר כחודש

כתובת מייל ליצירת קשר: \_\_\_\_\_

### Instructions

#### 1. Control

Please spend the next 30 minutes or more waking outside around the Technion. You are free to do whatever you want, and we only ask you not to enter any building, and to come back to the lab (location specified in the map) afterward to complete a survey.

#### 2. Observe wildlife

...During those 30 minutes, please observe wildlife (e.g. birds, butterflies, insects, and other wild animals).

#### 3. Smell flowers.

...During those 30 minutes, please look for and smell flowers.

#### 4. Listen to sounds

...During those 30 minutes, please listen to the sounds around you.

#### 5. Take pictures

...During those 30 minutes, please use your smartphone to take pictures when you see something that grabs your attention in nature.

#### 6. Walk more slowly

...During those 30 minutes, please walk more slowly than you usually do.

#### 7. Turn off your phone

...During those 30 minutes, please turn off your phone completely or put it on flight mode.

#### 8. Explore more areas.

...During those 30 minutes, please visit as many different areas as possible.

#### 9. Touch natural elements

...During those 30 minutes, please touch different natural elements.

Campus map (given to all participants)



Participant number:	Date:
---------------------	-------

**“Explore the Technion” survey**

**1. Please indicate to what extent you feel this way right now, from 1 (Very slightly or not at all) to 5 (Extremely). Please tick the right box for each line.**

	1 - Very Slightly or Not at All	2	3	4	5 - Extremely
<b>Interested</b>					
<b>Distressed</b>					
<b>Excited</b>					
<b>Upset</b>					
<b>Strong</b>					
<b>Guilty</b>					
<b>Scared</b>					
<b>Hostile</b>					
<b>Enthusiastic</b>					
<b>Proud</b>					
<b>Irritable</b>					
<b>Alert</b>					
<b>Ashamed</b>					
<b>Inspired</b>					
<b>Nervous</b>					
<b>Determined</b>					
<b>Attentive</b>					
<b>Jittery</b>					
<b>Active</b>					



<b>Afraid</b>					
<b>Happy</b>					

**2. When walking in the Technion, did you (*Items are randomized in the survey*)**

no	yes	Hear any dog barking Hear any cat mewling	no	yes	Smell any flower	no	yes	See any bird(s)
no	yes	Hear water	no	yes	Smell the sea	no	yes	See any cat(s)
no	yes	Hear any locust(s)	no	yes	Smell spices/aromatics	no	yes	See any butterfly(ies)
no	yes	Hear frog croaking	no	yes	Smell soil	no	yes	See any wild boar(s)
no	yes	Hear any car	no	yes	Smell pine tree	no	yes	See any jackal(s)
no	yes	Hear any bird singing	no	yes	Smell lawn	no	yes	See any hedgehog(s)
no	yes	Hear the sea	no	yes	Smell car pollution	no	yes	See any frog(s)
no	yes	Hear any wild animal	no	yes	Smell trash	no	yes	See any lizard(s)
						no	yes	See any bee(s)
no	yes	Touch any tree(s)	no	yes	Take pictures of flowers	no	yes	See any beetles
no	yes	Touch any flower(s)	no	yes	Take pictures of animals			
no	yes	Touch any animal(s)	no	yes	Take pictures of landscapes			
no	yes	Touch grass	no	yes	Take close-up pictures of insects			
no	yes	Touch water	no	yes	Take pictures of people			
no	yes	Touch leaves	no	yes	Take pictures of trees			
no	yes	Touch the soil	no	yes	Take selfies			
no	yes	Touch a rock	no	yes	Take a picture of building			
no	yes	Touch metal	no	yes	Take pictures of the sky			
no	yes	Pick a flower						

**3. Approximately, for how many minutes during your walk did you use your phone to do things 4 other than to take pictures?**

Scale (0 – 60 min)

**4. How many different areas did you visit?.....**

5. For each of the following, please rate the extent to which you agree with the statement, from 1 (Strongly disagree) to 5 (Strongly agree). Please respond as you feel, rather than how you think “most people” feel.

	1 - Strongly Disagree	2	3	4	5 - Strongly Agree
My connection to nature and the environment is part of my spirituality					
My relationship with nature is an important part of who I am					
I feel very connected to all living things and the earth					
I always think about how my actions affect the environment					
My ideal vacation spot would be a remote, wilderness area					
I take notice of wildlife wherever I am					

6. Are you: Male / Female / Other

7. What is your year of birth?

8. Where do you live? Large city / Medium-size or small city / Settlement, Village, Moshav or Kibbutz

9. Where did you live during your childhood (6-12 years old)? Country\_\_\_\_\_

Large city / Medium-size or small city / Settlement, Village, Moshav or Kibbutz

Do you have any comment?

.....  
 .....  
 .....  
 ....

**THANK YOU FOR YOUR PARTICIPATION!**

## APPENDIX 4 – Survey study 3

### 1. During your visit, did you (*Items are randomized in the survey*)

no	yes	Hear any dog barking Hear any cat mewling	no	yes	Smell any flower	no	yes	See any bird(s)
no	yes	Hear water	no	yes	Smell the sea	no	yes	See any cat(s)
no	yes	Hear any locust(s)	no	yes	Smell spices/aromatics	no	yes	See any butterfly(ies)
no	yes	Hear frog croaking	no	yes	Smell soil	no	yes	See any wild boar(s)
no	yes	Hear any car	no	yes	Smell pine tree	no	yes	See any jackal(s)
no	yes	Hear any bird singing	no	yes	Smell lawn	no	yes	See any hedgehog(s)
no	yes	Hear the sea	no	yes	Smell car pollution	no	yes	See any frog(s)
no	yes	Hear any wild animal	no	yes	Smell trash	no	yes	See any lizard(s)
						no	yes	See any bee(s)
no	yes	Touch any tree(s)	no	yes	Take pictures of flowers	no	yes	See any beetles
no	yes	Touch any flower(s)	no	yes	Take pictures of animals			
no	yes	Touch any animal(s)	no	yes	Take pictures of landscapes			
no	yes	Touch grass	no	yes	Take close-up pictures of insects			
no	yes	Touch water	no	yes	Take pictures of people			
no	yes	Touch leaves	no	yes	Take pictures of trees			
no	yes	Touch the soil	no	yes	Take selfies			
no	yes	Touch a rock	no	yes	Take a picture of building			
no	yes	Touch metal	no	yes	Take pictures of the sky			
no	yes	Pick a flower						

### 2. Is it your first visit to Ramat Hanadiv nature reserve? Yes / No

### 3. Did you visit the following places?

Nature reserve	Botanical garden
----------------	------------------

### 4. Who did you come with today?

Alone	With family	With friends
-------	-------------	--------------

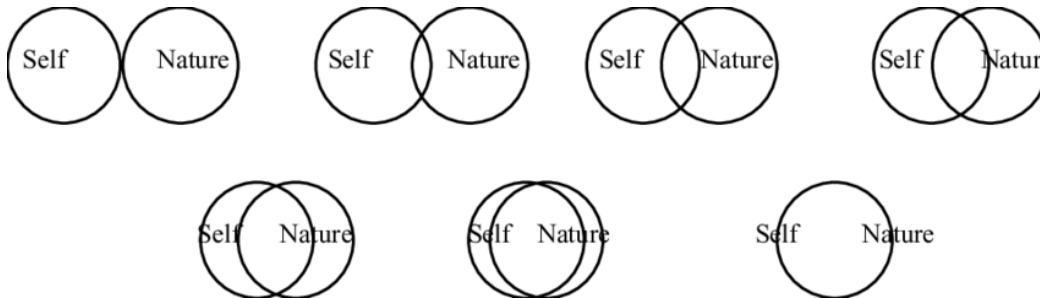
5. Please indicate to what extent you feel this way right now, from 1 (Very slightly or not at all) to 5 (Extremely). Please tick the right box for each line.

	1 - Very Slightly or Not at All	2	3	4	5 - Extremely
Interested					
Distressed					
Excited					
Upset					
Strong					
Guilty					
Scared					
Hostile					
Enthusiastic					
Proud					
Irritable					
Alert					
Ashamed					
Inspired					
Nervous					
Determined					
Attentive					
Jittery					
Active					
Afraid					
Happy					

6. For each of the following, please rate the extent to which you agree with the statement, from 1 (Strongly disagree) to 5 (Strongly agree). Please respond as you feel, rather than how you think “most people” feel.

	1 - Strongly Disagree	2	3	4	5 - Strongly Agree
My connection to nature and the environment is part of my spirituality					
My relationship with nature is an important part of who I am					
I feel very connected to all living things and the earth					
I always think about how my actions affect the environment					
My ideal vacation spot would be a remote, wilderness area					
I take notice of wildlife wherever I am					

7. Please circle the picture below which best describes your relationship with the natural environment. How interconnected are you with nature?



8. In general, how happy are you today?

Not at all										Very much
1	2	3	4	5	6	7	8	9	10	

9. Are you?

A man / A woman / Other

10. What is your year of birth?

11. Where do you currently live? Big city/Medium sized city/Kibbutz or moshav

12. Where did you spend your childhood (6-12 years old)? Big city/Medium sized city/Kibbutz or moshav

13. Do you remember what the large sign at the entrance said?.....

**Thank you very much for your participation!**