

International, 77-01(E), 1-190. Retrieved from <http://adsabs.harvard.edu/abs/2015PhDT.....52F>

Olivos, P., & Aragonés, J. I. (2011). Psychometric Properties of the Environmental Identity Scale. *Psychology*, 2(1), 65-74. doi: 10.1174/217119711794394653

Olivos, P., Aragonés, J. I., & Amérigo, M. (2011). The connectedness with nature scale and its relationship with environmental beliefs and identity. *International Journal of Hispanic Psychology*, 4(1), 5-19. Retrieved from <https://www.researchgate.net/>

Prévot, A. C., Clayton, S., & Mathevet, R. (2018). The relationship of childhood upbringing and university degree program to environmental identity: Experience in nature matters. *Environmental Education Research*, 24(2), 263-279.

Schultz, P. W. (2002). Inclusion with nature: The psychology of human-nature relations. In: P. Schmuck & W. P. Schultz (Eds.), *Psychology of sustainable development*. Boston, MA: Springer. doi: 10.1007/978-1-4615-0995-0_4

Van der Werff, E., Steg, L., & Keizer, K. (2014). I Am What I Am, by Looking Past the Present: The Influence of Biospheric Values and Past Behavior on Environmental Self-Identity. *Environment and Behavior*, 46(5), 626–657. doi: 10.1177/0013916512475209

15.4 Pro-environmental behaviour

Project Name: CONNECTING Nature (Grant Agreement no. 730222)

Author/s and affiliations: Adina Dumitru¹, Catalina Young², Irina Macsinga²

¹ University of A Coruña, Spain

² West University of Timisoara, Romania

Pro-environmental behaviour	Knowledge and Social Capacity Building
<p>Description and justification</p>	<p>Pro-environmental behavior (PEB) represents another dimension of interest in the evaluation of NBS' impact and foreseeable sustainability. Narrowly defined as "behavior which has a significant impact on the environment" (Krajhanzl, 2010, p. 252), PEB has been central to both theoretical and empirical endeavors aimed at shedding light on the factors that foster accountability in relation with nature. Evidently, the behavior addressed in PEB can be encountered in various unintentional forms (e.g., purchase of soya products). Moreover, environmental theory employs a variety of terms to capture different nuances of the pro-environmental manifestation, like "ecological behavior" (Kaiser, 1998), "sustainable behavior" (Tapia-Fonllem, Coral-Verdugo, Fraijo-Sing, & Duron-Ramos, 2013), "environment-protective behavior", "environment-</p>

preserving behavior”, “environmentally responsible behavior” (Krajhanzl, 2010). For instance, Tapia-Fonllem et al. (2013) emphasize that “although sustainable behavior is, in practical terms, synonymous with pro-environmental behavior, the latter has been used to emphasize efforts to protect the natural environment, while the former specifies actions aimed at protecting *both* the natural and the human (social) environments” (p. 712).

Pro-environmental behavior has been investigated in relation with numerous other variables pertinent to NBS research, such as environmental stewardship (Dresner, Handelman, Steven Braun, & Rollwagen-Bollens, 2014; Whitburn, Milfont, & Linklater, 2018), place attachment (Ramkissoon, Weiler, & Smith, 2012; Takahashi & Selfa, 2015), connectedness to nature (Whitburn et al, 2018), environmental identity (Brick, Sherman, & Kim, 2017; Brick & Lai, 2018), or education (Kudryavtsev, Krasny, & Stedman, 2012; Meyer, 2015).

Whitburn et al. (2018) explored the relationship between pro-environmental behaviors and personal relationship with nature in a quasi-experimental research with 423 participants from 20 neighborhoods varying with respect to their vegetation. The authors measured past PEB as participants’ active involvement in a tree-planting action and reported results that indicate a strong association between connectedness to nature and engagement in PEB. Moreover, participants’ involvement in tree-planting and the level of neighborhood greenness explained 46% of the variance in PEB, where connectedness to nature, environmental attitudes, and use of nature for psychological restoration acted as mediators.

Dresner et al. (2014) surveyed and interviewed 172 adults participating in 18 urban volunteer events in area parks across Portland, Oregon between February and June 2012. Based on the annual frequency of participation in such events, the stewards were differentiated as first-time volunteers, mid-level volunteers (3-10 events/year), and frequent volunteers (>10 events/year). Pro-environmental behavior, environmental identity, and civic engagement were positively correlated with the frequency of volunteer participation in park area events, with frequent volunteers scoring the highest degree of attention to environmental issues, environmental identity, and self-reported pro-environmental behaviors (Dresner et al., 2014).

Brick et al. (2017) built on the significance of identity signalling (i.e., the visibility of our behaviour to others) and its

	<p>role in shaping our social identity to propose that “the most important identity for expressing and signalling pro-environmental behavior is identifying with environmentalists” (p. 227) and showed that <i>environmentalist identity</i> predicts pro-environmental behavior more strongly for self-reported high-visibility behaviors than even political orientation. Brick and Lay (2018) replicated this finding and reported that explicit identity strongly and uniquely predicted pro-environmental behaviors and policy preferences.</p>
<p>Definition</p>	<p>Pro-environmental behavior is such behavior which is generally (or according to knowledge of environmental science) judged in the context of the considered society as a protective way of environmental behavior or a tribute to the healthy environment (Krajhanzl, 2010, p. 252).</p> <p>Larson, Stedman, Cooper, and Decker (2015, p. 113) summarized the theoretical evidence for PEB’s multidimensionality:</p> <ul style="list-style-type: none"> • Some behaviors are inherently more difficult to carry out than others, and participation levels are influenced by a wide array of social and structural factors. • Participation in PEB is influenced by both hedonic, gain, and normative goals and intent. These drastically different motives not only result in different rates of behavioral expression; they may also affect the ways in which people perceive actions and their environmental impacts. • PEB varies substantially when it comes to type of impacts (e.g., direct vs. indirect), and scope of influence or specificity (e.g., local to global)
<p>Strengths and weaknesses</p>	<p>+ indicator of participation, pro-activeness and tenacity in the pursuit of environmentally responsible goals</p> <p>-self-reported measures are susceptible to the effects of social desirability on respondents’ answers</p> <p>-complex, multidimensional construct, highly dependent on social and cultural variables making it difficult to effectively measure the full range of potential pro-environmental behaviors in a single study (Larson et al., 2015)</p> <p>-generalizable PEB measurement scales based on behaviors that transcend place/location may not capture the reality of implemented actions playing a role in local environmental quality (Larson et al., 2015); <i>Local land stewardship activities</i> (i.e., efforts to physically enhance local environments) may represent a particularly relevant component of PEB when “place” matters (Larson et al., 2015, p. 114).</p>

<p>Measurement procedure (P) and tool (T)</p>	<ul style="list-style-type: none"> ☒ <i>Quantitative P: Scale inventory/Questionnaire (survey procedure, paper-and-pencil administration, computer-based administration)</i> <ul style="list-style-type: none"> ○ T: <i>Pro-environmental Behavior (Brick and Lay, 2018)</i> – 6 items adapted from the Recurring Environmental Behavior Scale (Brick et al., 2017) measuring the self-reported frequency of PEB assessed on a 5-point Likert scale - 1 (never), 3 (sometimes), 5(always) ○ T: <i>Recurring Environmental Behavior Scale</i> (Brick et al., 2017) – 21 items measuring the self-reported frequency of PEB assessed on a 5-point Likert scale - 1 (never), 3 (sometimes), 5(always) ○ T: <i>General Ecological Behaviour Scale</i> (Kaiser, Wolfing, & Fuhrer, 1999) – established as a Rasch-scale that assesses behavior by considering the tendency to behave ecologically and the difficulties in carrying out the behaviors, which depend on influences beyond people’s actual behavior control; consists of 38 items representing different types of ecological behavior and some nonenvironmental, prosocial behaviors as well; a yes/no response format for these items is used. Negatively formulated items are reversed in coding. ☒ <i>Qualitative P:</i> <ul style="list-style-type: none"> ▪ <i>Qualitative methodologies can be used in mixed-methods research designs to explore the dimensions of PEB, as defined by community members (i.e., participant-driven approach, Larson et al., 2015)</i> ○ T: case study methodology – structured interviews, case study analysis, phenomenological analysis ○ T: participatory data collections methods, such as collaborative participatory data collection,
<p>Scale of measurement</p>	<ul style="list-style-type: none"> ▪ <i>Pro-environmental Behavior (Brick and Lay, 2018)</i> – 6 items 1 (never), 3 (sometimes), 5(always) <ol style="list-style-type: none"> 1. When you visit the grocery store, how often do you use reusable bags? 2. How often do you conserve water when showering, cleaning clothes, washing dishes, watering plants, or during other activities? 3. How often do you discuss environmental topics, either in person or with online posts (Facebook, Twitter, etc.)?

4. When you buy clothing, how often is it from environmentally friendly brands?
5. How often do you engage in political action or activism related to protecting the environment?
6. How often do you educate yourself about the environment?

- *Recurring Environmental Behavior Scale* (Brick et al., 2017) – 21 items

1 (never), 3 (sometimes), 5(always)

1. When you visit the grocery store, how often do you use reusable bags?
2. How often do you walk, bicycle, carpool, or take public transportation instead of driving a vehicle by yourself?
3. How often do you drive slower than 60mph on the highway?
4. How often do you go on personal (non-business) air travel?
5. How often do you compost your household food garbage?
6. How often do you eat meat?
7. How often do you eat dairy products such as milk, cheese, eggs, or yogurt?
8. How often do you eat organic food?
9. How often do you eat local food (produced within 100 miles)?
10. How often do you eat from a home vegetable garden (during the growing season)?
11. How often do you turn your personal electronics off or in low-power mode when not in use?
12. When you buy light bulbs, how often do you buy high efficiency compact fluorescent (CFL) or LED bulbs?
13. How often do you act to conserve water, when showering, cleaning clothes, dishes, watering plants, or other uses?
14. How often do you use aerosol products?
15. When you are in PUBLIC, how often do you sort trash into the recycling?
16. When you are in PRIVATE, how often do you sort trash into the recycling?
17. How often do you discuss environmental topics, either in person or with online posts (Facebook, Twitter, etc.)?
18. When you buy clothing, how often is it from environmentally friendly brands?
19. How often do you carry a reusable water bottle?
20. How often do you engage in political action or activism related to protecting the environment?

21. How often do you educate yourself about the environment?

- *General Ecological Behaviour Scale* (Kaiser, Wolfing, & Fuhrer, 1999) – 38 items

YES/NO

Prosocial behaviour items:

1. Sometimes I give change to panhandlers.
2. From time to time I contribute money to charity.
3. If an elderly or disabled person enters a crowded bus or subway, I offer him or her my seat.
4. If I were an employer I would consider hiring a person previously convicted of a crime.
5. In fast food restaurants, I usually leave the tray on the table.*
6. If a friend or relative had to stay in hospital for a week or two for minor surgery _e.g., appendix, broken leg., I would visit him or her.
7. Sometimes I ride public transportation without paying a fare.*
8. I would feel uncomfortable if Turks lived in the apartment next door.*

Ecological behaviour items:

1. I put dead batteries in the garbage.*
2. After meals, I dispose of leftovers in the toilet.*
3. I bring unused medicine back to the pharmacy.
4. I collect and recycle used paper.
5. I bring empty bottles to a recycling bin.
6. I prefer to shower rather than to take a bath.
7. In the winter, I keep the heat on so that I do not have to wear a sweater.*
8. I wait until I have a full load before doing my laundry.
9. In the winter, I leave the windows open for long periods of time to let in fresh air.*
10. I wash dirty clothes without prewashing.
11. I use fabric softener with my laundry.*
12. I use an oven-cleaning spray to clean my oven.*
13. If there are insects in my apartment I kill them with a chemical insecticide.*
14. I use a chemical air freshener in my bathroom.*
15. I use chemical toilet cleaners.*
16. I use a cleaner made especially for bathrooms rather than an all-purpose cleaner.*

	<p>17. I use phosphate-free laundry detergent.</p> <p>18. Sometimes I buy beverages in cans.*</p> <p>19. In supermarkets, I usually buy fruits and vegetables from the open bins.*</p> <p>20. If I am offered a plastic bag in a store I will always take it.*</p> <p>21. For shopping, I prefer paper bags to plastic ones.</p> <p>22. I usually buy milk in returnable bottles.</p> <p>23. I often talk with friends about problems related to the environment.</p> <p>24. I am a member of an environmental organization.</p> <p>25. In the past, I have pointed out to someone his or her unecological behaviour.</p> <p>26. I sometimes contribute financially to environmental organizations.</p> <p>27. I do not know whether I may use leaded gas in my automobile.*</p> <p>28. Usually I do not drive my automobile in the city.</p> <p>29. I usually drive on freeways at speeds under 100 k.p.h. _62.5 m.p.h..</p> <p>30. When possible in nearby areas waround 30 km, _18.75 miles.x, I use public transportation or ride a bike.</p> <p>* <i>Negatively formulated items.</i></p>
Data source	
Required data	<ul style="list-style-type: none"> ✓ Essential: NBS characteristics for each city/site, more specifically objectives (long-term) and challenges ✓ Desirable: evaluations of <i>“local land stewardship activities”</i> (Larson et al., 2015), i.e., <i>conservation-oriented actions that improve the ecological features of the neighborhood/city (e.g., tree planting) – actions specific to each NBS</i>
Data input type	Quantitative (quantitative and qualitative, if participatory data collection methods are opted for)
Data collection frequency	Aligned with NBS implementation and timing of targeted objectives
Level of expertise required	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Methodology and data analysis requires high expertise in psycho-social research <input checked="" type="checkbox"/> Quantitative data collection requires no expertise <input checked="" type="checkbox"/> Qualitative data collection (case study, for example) requires high expertise in psycho-social research <ul style="list-style-type: none"> ○ Basic training needed if participatory data collection is opted for
Synergies with other indicators	P1 Type of interaction with NBS

	<p>P2 Frequency of interaction with NBS</p> <p>P3 Duration of interaction with NBS</p> <p>P4 Perceived Quality of Green Spaces</p> <p>HW 12 Restoration-Recreation: Enhanced physical activity and meaningful leisure</p> <p>SC6 Place attachment (Sense of Place): Place Identity</p> <p>SC10 Environmental Education Opportunities</p> <p>SC11.1 Positive environmental attitudes motivated by contact with NBS</p> <p>SC11.2 Environmental Identity</p>
Connection with SDGs	<p>Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture</p> <p>Goal 3. Ensure healthy lives and promote well-being for all at all ages</p> <p>Goal 6. Ensure availability and sustainable management of water and sanitation for all</p> <p>Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all</p> <p>Goal 10. Reduce inequality within and among countries</p> <p>Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable</p> <p>Goal 12. Ensure sustainable consumption and production patterns</p> <p>Goal 13. Take urgent action to combat climate change and its impacts</p> <p>Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</p> <p>Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</p>
Opportunities for participatory data collection	<p>Participatory methods can be used in mixed-methods research designs to explore the dimensions of PEB, as defined by community members (i.e., participant-driven approach, Larson et al., 2015)</p>
Additional information	
References	<p>Brick, C., Sherman, D. K., & Kim, H. S. (2017). "Green to be seen" and "brown to keep down": Visibility moderates the effect of identity on pro-environmental behavior. <i>Journal of Environmental Psychology</i>, 51, 226-238. doi: 10.1016/j.jenvp.2017.04.004</p> <p>Brick, C., & Lai, C. K. (2018). Explicit (but not implicit) environmentalist identity predicts pro-environmental behavior</p>

- and policy preferences. *Journal of Environmental Psychology*, 58, 8-17. doi: 10.1016/j.jenvp.2018.07.003
- Kaiser, F. G. (1998). A general measure of ecological behavior 1. *Journal of Applied Social Psychology*, 28(5), 395-422.
- Kaiser, F. G. (1996). Environmental attitude and ecological behavior. *Journal of Environmental Psychology*, 19, 1-19. Retrieved from <https://pdfs.semanticscholar.org/e83f/34516e1e3bbc079904cb77bb74d6a52e7ca8.pdf>
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?. *Environmental education research*, 8(3), 239-260. doi: 10.1080/13504620220145401
- Krajhanzl, J. (2010). Environmental and proenvironmental behavior. *School and Health*, 21(1), 251-274. Retrieved from https://www.researchgate.net/profile/Jan_Krajhanzl/publication/265508352_Environmental_and_Pro-environmental_Behavior/links/54106d600cf2f2b29a410a78/Environmental-and-Pro-environmental-Behavior.pdf
- Kudryavtsev, A., Krasny, M. E., & Stedman, R. C. (2012). The impact of environmental education on sense of place among urban youth. *Ecosphere*, 3(4), 1-15. doi: 10.1890/ES11-00318.1
- Larson, L. R., Stedman, R. C., Cooper, C. B., & Decker, D. J. (2015). Understanding the multi-dimensional structure of pro-environmental behavior. *Journal of Environmental Psychology*, 43, 112-124. doi: 10.1016/j.jenvp.2015.06.004
- Meyer, A. (2015). Does education increase pro-environmental behavior? Evidence from Europe. *Ecological economics*, 116, 108-121. Retrieved from https://epublications.marquette.edu/cgi/viewcontent.cgi?article=1530&context=econ_fac
- Ramkissoon, H., Weiler, B., & Smith, L. D. G. (2012). Place attachment and pro-environmental behaviour in national parks: The development of a conceptual framework. *Journal of Sustainable Tourism*, 20(2), 257-276. doi: 10.1080/09669582.2011.602194
- Takahashi, B., & Selfa, T. (2015). Predictors of pro-environmental behavior in rural American communities. *Environment and Behavior*, 47(8), 856-876. doi: 10.1177/0013916514521208
- Tapia-Fonllem, C., Corral-Verdugo, V., Fraijo-Sing, B., & Durón-Ramos, M. F. (2013). Assessing sustainable behavior and its correlates: A measure of pro-ecological, frugal, altruistic and equitable actions. *Sustainability*, 5(2), 711-723. doi: 10.3390/su5020711
- Whitburn, J., Linklater, W. L., & Milfont, T. L. (2019). 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. *Environment and Behavior*, 51(7), 787-810. doi: 10.1177/0013916517751009
- Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency

across diverse pro-environmental behaviours. *Journal of environmental psychology*, 30(3), 305-314. doi: 10.1016/j.jenvp.2010.01.003