

Children's preferences for less diverse greenspaces do not disprove biophilia

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Hand et al. (1) make a most useful contribution to the debate on the role of urban greenspaces in providing well-being benefits for children. Their discussion of the increasing disconnection between people and nature as a result of urbanization is valuable in a context of a non-sustainable humanity. However, we challenge their claim that "Children's use of different urban habitats and their selection of habitats based on relative use and availability did not conform to the biophilia hypothesis" (1).

Children were recruited into the study from fifth and sixth grade classes (ages 9–11 y) (1). Because pre-conceptions about nature may evolve very early (2), children in the study could already have been socialized in ways that may have altered their innate biophilic behaviors. Research on public perception of the urban environment shows that the preferred format of "green" varies from one individual to the next based on cultural experience, knowledge, sense of self, and desire for security (3). In general, people who live in cities dislike disorderly greenspaces, dislike many species of wild animals, perceive parks with high tree density as unsafe (4), and consider manicured yards a status symbol (5). This means that comprehensively managed greenspaces are perceived, for cultural reasons, as better than more natural spaces.

Social criteria, including accessibility, penetrability, safety, privacy, and comfort, are more positively evaluated than wilderness (6). Thus, the preference of children for their gardens or tame yards instead of more natural places (1) is not evidence against the biophilia hypothesis, but may be just a reflection of their own culture.

Evidence of biophilia has been found in children younger than 2 y (7), but children's innate inclination to appreciate many forms of wild nature can flourish only if it's adequately stimulated. For example, young children (3–7 y) have a natural curiosity and affinity for animals (8), but if this innate attraction is not given opportunities to develop, an aversion to many animals can develop (9, 10). We agree with the authors' (1) conclusion that their "findings do not support the biophilia hypothesis," but we think that they did not really test the hypothesis, because cultural influences represented an uncontrolled factor in their study. Children's preferences for tamer, less biodiverse greenspaces could be, and likely are, driven by cultural conditioning. Given the urgency to conserve biodiversity, further research is warranted to encourage children's innate biophilia and to help develop it in a way that leads them to appreciate the natural world.

- 1 Hand KL, et al. (2017) The importance of urban gardens in supporting children's biophilia. *Proc Natl Acad Sci USA* 114:274–279.
- 2 Hilliard LJ, Liben LS (2010) Differing levels of gender salience in preschool classrooms: Effects on children's gender attitudes and intergroup bias. *Child Dev* 81:1787–1798.
- 3 Hunter MCR, Hunter MD (2008) Designing for conservation of insects in the built environment. *Insect Conserv Divers* 1:189–196.
- 4 Wilson WG (2011) *Constructed Climates: A Primer on Urban Environments* (Univ of Chicago Press, Chicago).
- 5 Robbins P, Sharp JT (2003) Producing and consuming chemicals: The moral economy of the American lawn. *Econ Geogr* 79:425–451.
- 6 Rall EL, Haase D (2011) Creative intervention in a dynamic city: A sustainability assessment of an interim use strategy for brownfields in Leipzig, Germany. *Landsc Urban Plan* 100:189–201.
- 7 Moore RC, Marcus CC (2008) Healthy planet, healthy children: Designing nature into the daily spaces for childhood. *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life*, eds Kellert SR, Heerwagen J, Mador M (Wiley, Hoboken, NJ), pp 153–203.
- 8 Desouza JMS, Czerniak CM (2002) Social behaviors and gender differences among preschoolers: Implications for science activities. *J Res Child Educ* 16:175–188.
- 9 Cohen S, Horm-Wingerg D (1993) Children and the environment: Ecological awareness among preschool children. *Environ Behav* 25:103–120.
- 10 Dutcher DD, Finley JC, Luloff AE, Johnson JB (2007) Connectivity with nature as a measure of environmental values. *Environ Behav* 39:474–493.

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