

Comparing Perceived Restorativeness in Natural and Urban Environment: A Meta-Analysis

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Abstract : A growing body of empirical research from different areas of inquiry suggests that brief contact with natural environment restore mental resources. The Attention Restoration Theory (ART) is the widespread used and empirical founded theory developed to explain why exposure to nature helps people to recovery cognitive resources. It assumes that contact with nature allows people to free (and then recovery) voluntary attention resources and thus allows them to recover from a cognitive fatigue situation. However, it was suggested that some people could have more cognitive benefit after exposure to urban environment. The objective of this study is to report the results of a meta-analysis on studies (peer-reviewed articles) comparing the restorativeness (the quality to be restorative) perceived in natural environments than those perceived in urban environments. This meta-analysis intended to estimate how much nature environments (forests, parks, boulevards) are perceived to be more restorativeness than urban ones (i.e., the magnitude of the perceived restorativeness' difference). Moreover, given the methodological difference between study, it studied the potential role of moderator variables as participants (student or other), instrument used (Perceived Restorativeness Scale or other), and procedure (in laboratory or in situ). PsycINFO, PsycARTICLES, Scopus, SpringerLINK, Web of Science online database were used to identify all peer-review articles on restorativeness published to date ($k = 167$). Reference sections of obtained papers were examined for additional studies. Only 22 independent studies (with a total of 1371 participants) met inclusion criteria (direct exposure to environment, comparison between one outdoor environment with natural element and one without natural element, and restorativeness measured by self-report scale) and were included in meta-analysis. To estimate the average effect size, a random effect model (Restricted Maximum-likelihood estimator) was used because the studies included in the meta-analysis were conducted independently and using different methods in different populations, so no common effect-size was expected. The presence of publication bias was checked using trim and fill approach. Univariate moderator analysis (mixed effect model) were run to determine whether the variable coded moderated the perceived restorativeness difference. Results show that natural environments are perceived to be more restorativeness than urban environments, confirming from an empirical point of view what is now considered a knowledge gained in environmental psychology. The relevant information emerging from this study is the magnitude of the estimated average effect size, which is particularly high ($d = 1.99$) compared to those that are commonly observed in psychology. Significant heterogeneity between study was found ($Q(19) = 503.16, p < 0.001$;) and studies' variability was very high ($I^2[C.I.] = 96.97\% [94.61 - 98.62]$). Subsequent univariate moderator analyses were not significant. Methodological difference (participants, instrument, and procedure) did not explain variability between study. Other methodological difference (e.g., research design, environment's characteristics, light's condition) could explain this variability between study. In the mine while, studies' variability could be not due to methodological difference but to individual difference (age, gender, education level) and characteristics (connection to nature, environmental attitude). Further moderator analysis are working in progress.

Keywords : meta-analysis, natural environments, perceived restorativeness, urban environments

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