

Global Health Day

Walking Green II. Lessons Learned from Repeated Measures Experiments of Green Exercise

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Although the effects of one-off forest walks on psychological and physiological measures are well documented in the US and beyond, evidence of persistent changes in response to long-term interventions is needed to document improved health outcomes. In order to ascertain the effectiveness of WHO recommended physical activity as well as build long-term health outcomes we conducted an IRB approved (NU STU00201604) repeated measures cross-over design study to evaluate the feasibility of a protocol for a longitudinal study. Participants ($n = 38$; 53% women; age 22.9 ± 0.75 yr.) were assigned to walk initially on either the Forest path or Roadside taking 3 50-minute walks over the course of 5 days. One week after completing the first series of walks, they began a second series in the alternate location. Participants were compensated for their time monetarily for their time in the study, up to \$207.00. We previously reported on the results of the first walk in each location. Here, we examine the effects of multiple walks in each location to assess the potential for experimental burden to influence the results.

Psychological assessments (positive and negative affect, state anxiety, and perceived stress) were made before and after the first and third walks in each location. Impact of a walk on psychological measures was operationalized as the difference between post- versus pre-walk score. Mixed model linear regression with panel specification was used to evaluate the main effects of Location, the number of walks taken in each location (Walk Number), and the order in which participants experienced the two locations (Series) and their interactions. Although the effect of Location was statistically significant only for Positive Affect (change in PA, cPA) ($p = 0.007$, LSM; 95% CI: Forest 2.2; 0.70, 3.67; Roadside -0.62; -2.08, 0.84), Forest walks lead to greater improvements than did Roadside walks in Negative Affect (cNA) and State Anxiety (cSA). Perceived stress (cPS) showed little change following Forest walks (LSM; 95% CI: 0.03; -0.76, 0.82), but a small increase following Roadside walks (LSM; 95% CI: 0.70; -0.07, 1.48) (Forest vs Roadside, $p = 0.21$). Walk Number had no significant effect on cPA, cNA, or cSA ($p > 0.30$ for all). Walk Number exerted a significant effect on cPS ($p < 0.001$) with participants recording increased PS after the third walk (LSM; 95% CI; First walk -1.40; -2.48, -0.31; Third walk +1.46; 0.38, 2.55). There were no significant interaction effects for any combination of Location, Walk Number, or Series for any measure. In conclusion, Forest walks yield larger improvements in measures of psychological health, especially positive affect, than Roadside walks, but the effects may be attenuated when participants are asked to take multiple walks in a single week.

The results of this study carry implications for global researchers and clinical studies moving forward. With the WHO recommending 150 minutes of moderate activity per week, our study has revealed several key psychological aspects that global researchers should be aware of when designing and conducting future studies.

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