

# Dimensions of Natural Restorative Outcomes: Developing a Brief Scale for Park Research in Texas

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## Abstract

Perceived “restorative outcomes” may mediate the effects of exposure to nature on mental wellbeing. To investigate the dimensions of these outcomes and how they may be reliably, validly and briefly measured in research on state park visits in Texas, we conducted an online survey of 112 social network members in Texas. Duration of recent visits to “natural green space” and of active recreation was measured, and two items gauged each of five dimensions of restorative outcome. Factor analysis found they loaded in a single factor and a brief scale composed of items with the highest factor loading for each dimension demonstrated excellent reliability (0.88). Scores were highest ( $p < 0.003$ ) among those reporting visits exceeding two hours and highly associated with duration of active recreation ( $p < 0.003$ ), providing strong evidence of validity and supporting the use of this brief scale to measure outcomes of state park visitation in Texas.

## Introduction

Visits to natural green space have long been thought to improve mental well-being and visits to parks with green space may be seen by urban residents as a restorative experience Staats et al. [1]. Recent, large-scale research in Finland shows that the effects of visits to natural spaces on mental well-being there is mediated through restorative outcomes Korpela et al. [2]. The measurements of restorative outcomes in this and other studies Korpela & Ylen [3]; Staats et al. [4]; Hartig et al. [5] include several dimensions: physical and mental stress reduction and increased vitality. Other research shows that restorative outcomes may include mood elevation Logan & Selhub [6] and a feeling of connection with nature Zhang et al. [7]. In preparation for research on the influence of visits to green space, including state parks, in Texas we constructed a scale containing these five potential dimensions of restorative outcome and assessed its reliability and validity in discriminating outcomes varying durations of visits to green space and active recreation in them.

## Methods

An online survey instrument was created to measure duration of recent visits to “natural green space” and of active recreation in them. Response options were <1 hour, 1-2 hours, 3-4 hours, >5 hours for overall duration, and <15 minutes, 15-30 minutes, 30-60 minutes, 1-2 hours, 2-4 and >4 hours for active recreation (walking, hiking, running, biking, swimming, climbing).

Dimensions of natural restorative outcome were measured with two items for each of five dimensions, with respondents asked to rate ten statements about their experience on a scale of 0 for “not at all” to 10 “totally.” Physical stress reduction: *Relaxed me, calmed me down*, Mental stress reduction: *Cleared my mind, forgot my worries*, Mood elevation: *Made me happy, improved my mood*, Natural connection: *Connected with nature, had spiritual feelings*, Vitality enhancement: *Recharged my energy, made me feel more alive*. Additional questions asked about age, gender, race and ethnicity. Participants were recruited via social media posts by the authors of this report.

Data were analyzed using SPSS to describe the participants, confirm factor structure for dimensions of restorative experience, examine the reliability of an abbreviated scale with the five items loading most highly on each factor, and test its validity by examining how scores vary according to the duration of the visit and the time reported in active recreation.

## Results

Survey responses were obtained from 112 people: 63% female, median age group 28-29, 61% “White, 8% African American, 13% Asian, 18% other or more than one, 31% (of any preceding group) Latino. A visit to a natural green space within the past month was reported by 94% and the durations were < 1 hour: 10%, 1-2 hours: 45%, 3-4 hours: 25%, >5 hours: 20%. Active recreation durations were <15 minutes: 11%, 15-30

minutes: 13%, 30-60 minutes: 32%, 1-2 hours: 18%, 2-4 hours: 18%, > 4 hours: 8%. The types of active recreation reported (more than one could be selected) were: Walking: 32%, hiking: 19%, running: 11%, biking: 7%, climbing: 25%, swimming: 11%, paddling: 4%, fishing: 12%.

For the ten items measuring five dimensions of restorative outcome, principal axis factor analysis with oblique direct rotation found they all loaded on a single factor with an eigenvalue of 6.6. In each pair of items for the five dimensions, the items with the highest factor loadings were used to form a shorter DRNO scale, with reliability coefficient 0.88.

Brief scale scores were calculated by summing the values of each item, then dividing by ten, with a possible range of 0-10 and a mean of 8.2 (SD=1.0). The mean (SD) scores for the five items were: Relaxed: 7.4 (2.3), cleared mind: 7.4 (2.2), made happy: 8.2 (1.9), connected with nature: 6.6 (2.9), recharged energy: 8.8 (2.6). Scores were not significantly associated with demographic factors.

Duration of visits to natural green space was significantly associated with DRNO scale scores, with a sharp divergence between visits of less or more than three hours: 7.8 vs. 8.9,  $p < 0.003$  (2 sided test,  $t = 3.0$ ,  $df = 111$ ). For duration of active recreation there was a highly significant trend toward higher DRNO scale scores across three intervals <30 minutes: 7.4, 30 minutes to 2 hours: 8.3; > 2 hours 9.2 ( $p < 0.003$ ,  $F = 6.1$ ,  $df = 2$ , 109).

## Conclusion

These data confirm that a five-dimensional natural restorative outcome scale composed of five items measuring physical stress

reduction; mental stress reduction, mood elevation, natural connection and vitality enhancement can provide a reliable brief measurement with validity confirmed by its highly significant relationship with duration of visits to natural green space and of active recreation there. However, our conclusions are limited by a small sample size and findings may from this convenience sample may not be generalizable. To gather data to enable more firm conclusions about the reliability and validity of our measurement of restorative outcomes, we plan to use it larger scale studies of visitors to state parks in Texas.

## References

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