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Neighborhoods and health: Development and validation of an experimental manipulation of neighborhood characteristics in a virtual reality environment


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Introduction

- Neighborhood disadvantage is an independent predictor of health through material/psychosocial mechanisms.
- Causal inferences can be limited due to conceptual and methodological challenges.
- Neighborhood disadvantage is hypothesized to influence health by inducing stress reactivity and negative emotion.
- Effects of acute exposure may depend on prior socioeconomic status (SES), resulting in habituation or sensitization.

Project goals:
1. Develop and validate an experimental model, in virtual reality (VR), of neighborhood disadvantage and affluence to examine causal influences on emotion, behavior, cognition, and physiology.
2. Test the hypothesis that neighborhood disadvantage elicits differences in emotion and stress reactivity, and that this is moderated by childhood SES.

Methods

- 68 participants in Zürich, Switzerland: 50% Female, 22.7 years old (SD = 2.6), from 19 different countries
- Education level: 39.7% graduate students/masters level, 58.8% undergraduate student/bachelors level
- Parental education: 64.7% had at least one parent with a college degree or higher
- Measures:
  - Neighborhood perceptions: Systematic Social Observation (SSO) – iTour
  - Emotion: Self-Assessment Manikin (SAM; Affect, Arousal) and specific emotions (e.g., fear, happiness)
  - Stress reactivity: Blood pressure (BP; 3 minute intervals) and skin conductance level (SCL; continuous)
- Covariates examined: Video game use, gender, age, education, parent education and motion sickness

Procedure

- Questionnaire 1 + Jogged training + Maze + Nature video + City + Baseline + Task + Questionnaire 2

Results: Emotional Responses

- Neighborhood disadvantage elicits significantly different emotional responses
- Higher levels of compassion

Results: Physiological Reactivity

- No main effects of neighborhood type on Systolic BP (SBP), Diastolic BP (DBP), skin conductance level (SCL), or non-specific skin conductance responses (nSCR)
- SCL analyses focus on first 5 minutes (SCL exhibits recovery prior to task completion)
- Significant interactions between parental education and SBP, SCL and nSCR (all ps < 0.02)

Results: Neighborhood Perceptions

- Neighborhood type elicits significant differences in perception of neighborhood characteristics:

Summary

- Using VR to model neighborhood conditions is technically and conceptually feasible.
- Neighborhoods are perceived as distinct and reflective of disadvantage and affluence, varying in congruence with observations of neighborhoods differing in SES.
- Neighborhood disadvantage elicits more negative and less positive emotions.
- Compassion is also increased when participants are exposed to greater disadvantage.
- There are no main effects of neighborhood type on physiological reactivity.
- The influence of neighborhood type depends on childhood SES, even in an advantaged sample.
- This interaction is system-specific: Evidence for both habituation (SCL) and sensitization (BP).

References

3. Caughy, O’Campo, & Patterson, 2001; Jones, Pobey, & Sastry, 2011; Odgers, Caspi, Batey, Sampson, & Moffitt, 2012; Sampson & Raudenbush, 1999; Schuch et al, 2014