



## Design, Development, and Testing of a Virtual Relaxation Environment to Reduce Stress in Teens (RESeT)

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### Project Overview

Phase 1: Iteratively design and build three evidence-based MBI components into a virtual reality environment. Guided by the Human-Centered Design (HCD) process, we co-designed RESeT using three components of MBI: thought disposal, controlled breathing, and awareness building. During this phase we also evaluated RESeT acceptability, usability, and VR immersion. These activities informed final design of RESeT.

Phase 2: Evaluate the feasibility, satisfaction, and preliminary efficacy of RESeT on mood, stress, and depression. We evaluated stakeholder feasibility using validated questionnaires and staff interviews. Satisfaction and usability were evaluated via exit surveys and validated acceptability questionnaires. Preliminary efficacy was evaluated using pre/post intervention measurements of perceived stress, mindfulness, and depression.

### Population/Sample

Community adolescents ages 14-18.

Phase 1: 8 design sessions with ~70 teens.

Phase 2: 48 teens participated in a 3-week, at-home trial of RESeT.

### Key Findings

#### Of the community teens we screened for depression (n=94)

No depression	38 (40.4%)
Mild depression	35 (37.2%)
Moderate depression	14 (14.9%)
Moderately severe depression	6 (6.4%)
Severe depression	1 (1.1%)

#### For RESeT Participants (n=47)

System Usability Rating (Mean = 74.87, SD = 11.61)
Intervention Usability Rating (Mean = 76.92, SD = 11.70)
Acceptability (Mean = 15.67, SD = 3.70)
Feasibility (Mean = 15.9, SD = 2.95)
Appropriateness (Mean = 15.23, SD = 2.99)

The VR environment significantly reduced momentary stress and increased momentary mood. VR had no detected change on post-depression/PSS or cognitive fusion.

#### Qualitative Findings:

- Most teens liked using the VR, but frequent users wanted more interactions and more customization.
- Some teens felt the VR wasn't interesting enough to pull them away from other media/opportunities.
- After using RESeT, most teens felt that using the VR at school might be uncomfortable/awkward.
- Several teens suggested that the school or public library would be the most appropriate place to make the VR headsets accessible to teens.
- Those who said they would continue to use RESeT said they'd use it in times of extreme stress or as a relaxation tool.

- Some teens suggested the tool was incredibly therapeutic by giving them a break from school and media and offering time to reflect on their emotions or experiences.

## Measures used

### Pre/Post/Follow-up:

- Depression ([PHQ-9](#))
- Perceived Stress (PSS)
- Cognitive Fusion (CFS)
- Mindfulness (MAAS)

### Usability battery via REDCap:

- [Acceptability \(AIM\)](#) [Feasibility \(FIM\)](#) [Intervention Appropriateness \(IAM\)](#) [Intervention Usability Scale \(IUS - reset-specific\)](#) [System Usability Scale \(SUS-VR usability\)](#) [User Burden Scale \(USB\)](#)

### VR Sessions Battery (pre/post) –

- Momentary Stress (VAS 0-100) –
- Positive/Negative Affect (Momentary PNAS)
- Comfort (Likert)

### Within Day (EMA):

- Sadness (VAS 0-100)
- Stress (VAS 0-100)

### Exit Interview:

- Experience (Qual)
- Effect (Qual)
- Study Feedback (Qual)
- Future Use/If at school (Likert)

## Methods

Within and across the study sample, we conducted a longitudinal (3-week) feasibility trial of the at-home, self-administered RESeT. Pre, post and follow-up comparison of depression, stress, and mindfulness were completed. In addition, we collected ecological momentary assessment capturing within-day mood and stress. Lastly, momentary effects of VR using participant-initiated logs capturing the PNAS, stress levels, and comfort post-VR were collected.

## Next steps

Building on our evidence indicating the ease of self-administration, strong usability, and preliminary efficacy of RESeT, we propose leveraging our partnership with the Seattle Public Library to scale RESeT as a library-based installation and resource. The purpose of this PHI Pilot Project is to test and refine the implementation of RESeT.

We will use a mixed-methods, community-centered multilevel design to achieve the following specific aims:

1. Explore the feasibility of implementation of the RESeT project in three Seattle public libraries. Library staff will complete quantitative and qualitative data collection.
2. Measure engagement with and usage of the RESeT environment as a library-based installation. Library teen visits and VR headset data (pre/post mood, stress) will capture teen usage of the library installation.
3. Determine the longitudinal effect of RESeT on teens who check out a library VR headset and enroll in the RESeT home study. Preliminary effect sizes will be reported on the primary (perceived stress) and secondary outcomes (anxiety, depression, mindfulness; VR experience; implementation outcomes).

## Recommended readings

Björling, E. A., Sonney, J., Rodriguez, S., Carr, N., Zade, H., & Moon, S. H. (2022). [Exploring the Effect of a Nature-based Virtual Reality Environment on Stress in Adolescents](#). *Front. Virtual Real.* 3: 831026. doi: 10.3389/frvir.

Sonney J, Björling EA, Rodriguez S, Carr N. Pivoting to "No Contact": [A Protocol for Conducting a Virtual Reality Relaxation Home Study for Teens Amidst the COVID-19 Pandemic](#). *J Pediatr Health Care.* 2021 Sep-Oct;35(5):552-558. doi: 10.1016/j.pedhc.2021.01.002. Epub 2021 Mar 24. PMID: 33773861.