Feasibility of the virtual reality optokinetic stimulation training for chronic stroke patients with unilateral spatial neglect

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Introduction

Neglect

Unilateral spatial neglect is a debilitating neuropsychological syndrome common in right-hemisphere stroke patients[1,2]. It is characterized by failure to attend, orient, or respond to the side contralateral to the brain lesion.

Traditional Treatments

Lack direct, objective feedback and the context which patients live in, making it difficult to translate effects into functioning in daily life[1-4].

Virtual Reality
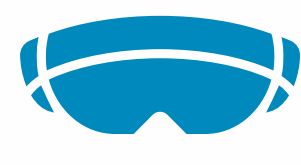
Immersive virtual reality may overcome these shortcomings by providing:

- precise experimental control
- direct, objective feedback

This allows patients to adapt their behaviour[1].

Aims

Research Questions

1) Feasibility
Investigate the feasibility of the novel VR programme as a training for patients with neglect

2) Rehabilitation
Investigate the contribution of the novel VR programme to the rehabilitation of patients with neglect
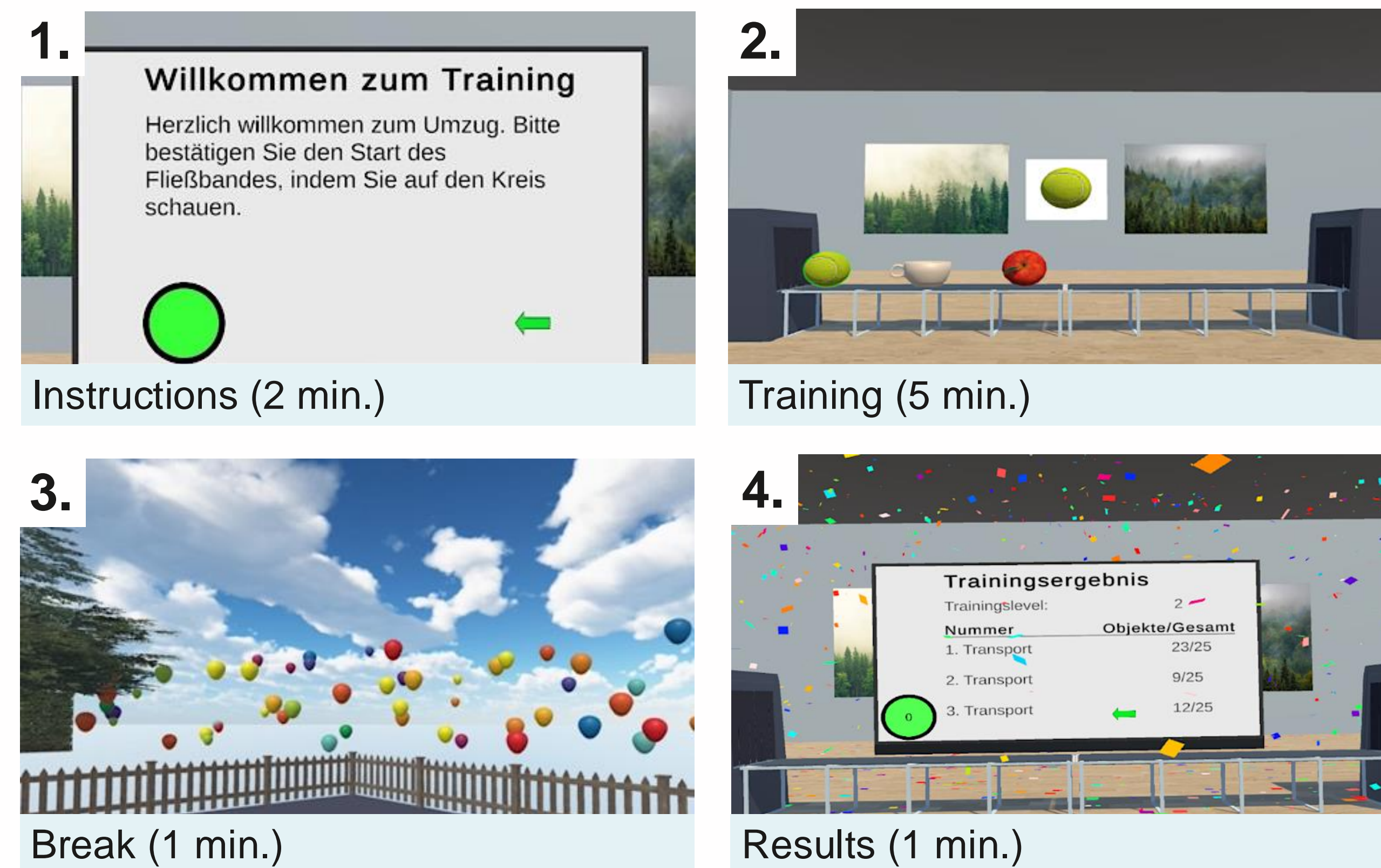
VR Programme

Materials

HTC Vive Pro Eye

Integrated Eye Tracking

VR Training
- 5 Levels
- 3 Transports per Level
- 10 Training Sessions

SCAN ME

1. Willkommen zum Training
Herzlich willkommen zum Umzug. Bitte bestätigen Sie den Start des Fließbandes, indem Sie auf den Kreis schauen.
Instructions (2 min.)

2. Training (5 min.)

3. Break (1 min.)

4. Trainingsergebnis
Results (1 min.)

Sample

Patients with left Neglect (N = 12)	
Age (years)	56.92 ± 11.35
Female/Male	5 / 7
Glasses	11 (91%)
Months since stroke	11.25 ± 6.70

Other neurological deficits	n (%)
Ataxia	1 (8.33)
Apraxia	0 (0)
Hemianopia	7 (58.33)
Hemiparesis	11 (91.67)

Results

1 Usability

Total score (1: strongly disagree - 5: strongly agree)

2 Cybersickness

Time of measurement

3 Provided Assistance

Kopf gerade
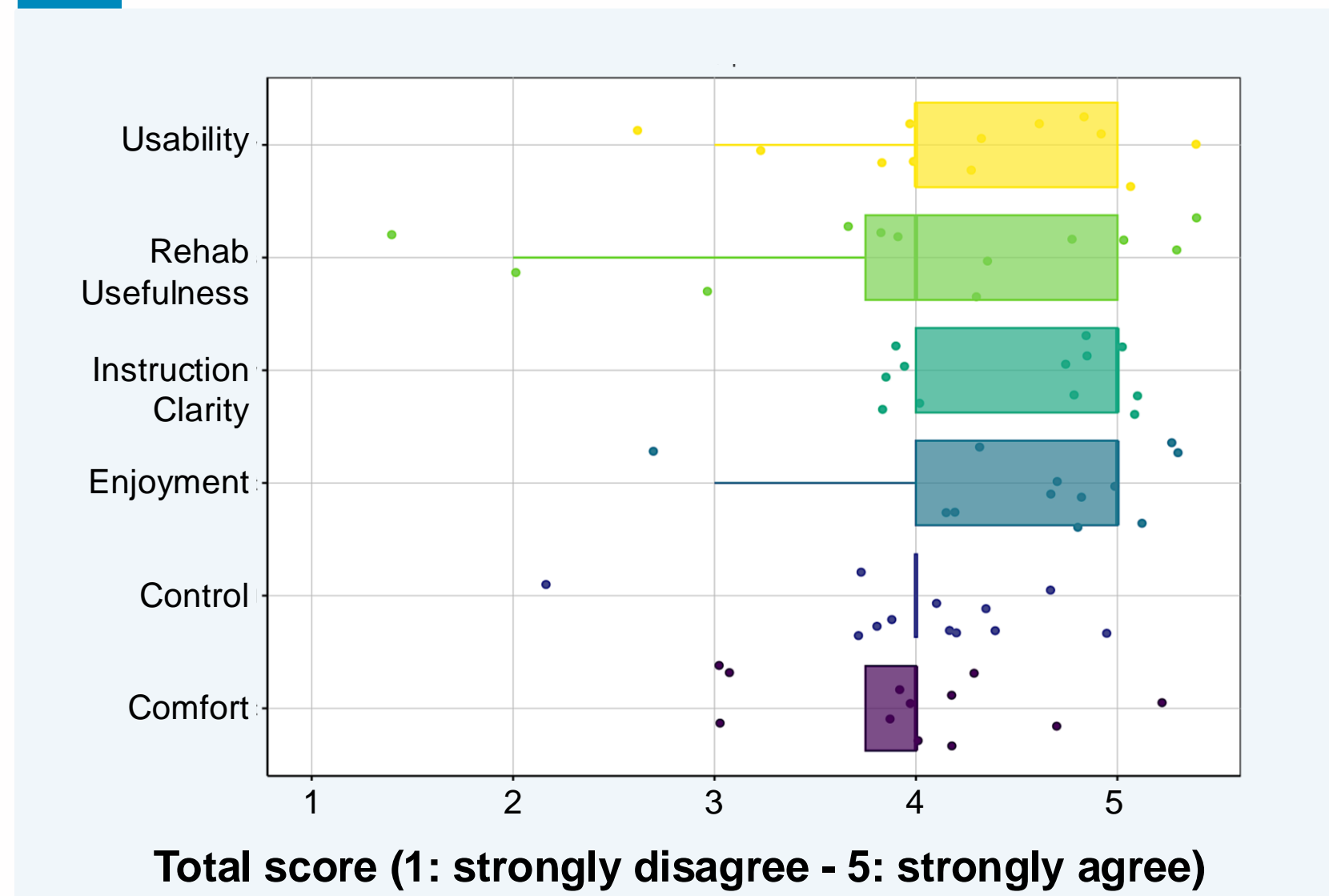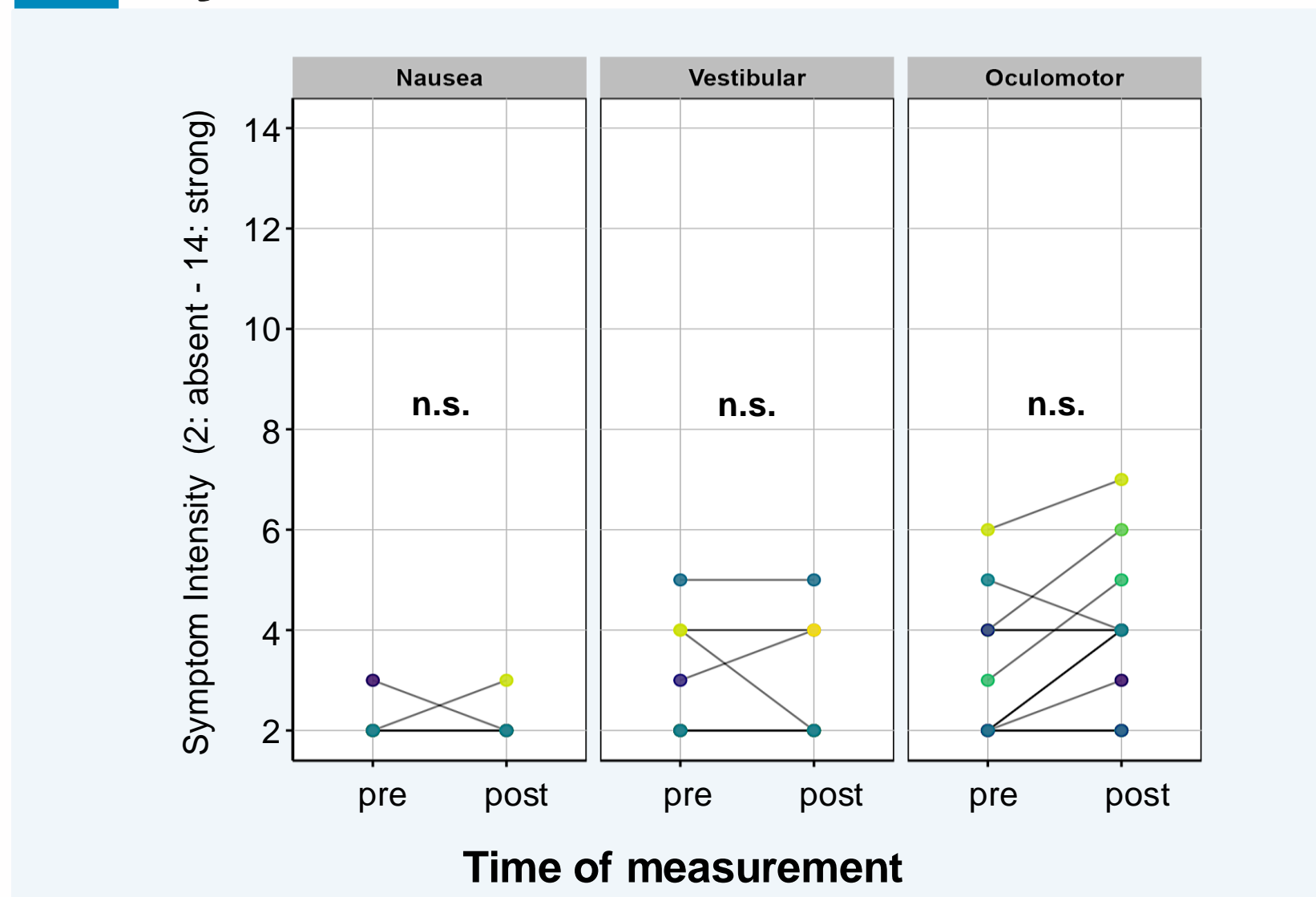
Number of Assistance
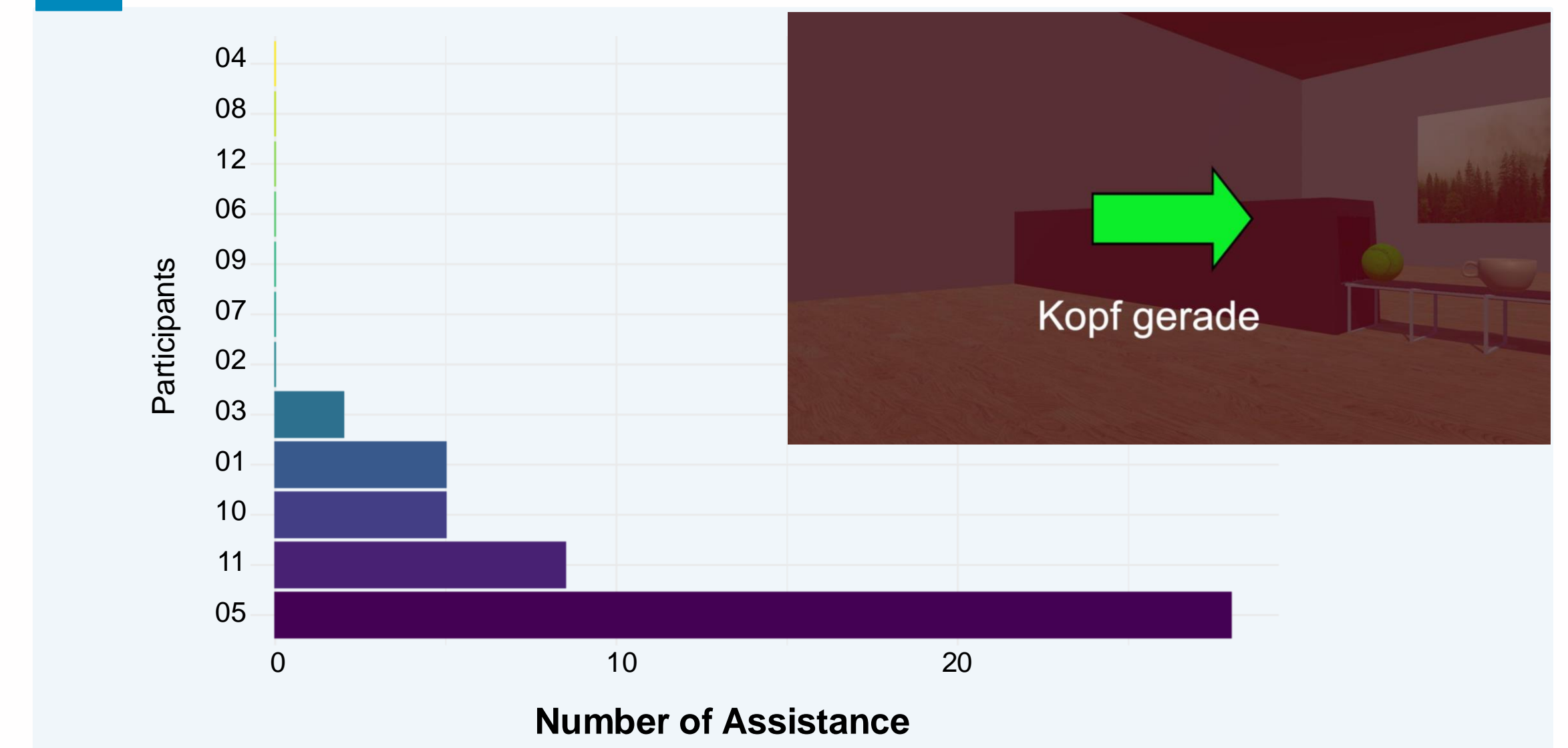
4 & 5 Likeability & Deficit Awareness

Distribution of responses (%)

Response: Strongly Disagree / Disagree / Neither Agree nor Disagree / Agree / Strongly Agree

6 Task Performance

LMM (R^2 = .61)

Main effects (ANOVA)
Level
$F(4,162) = 4.11$, $p < .005$

Transport
$F(2, 162) = 3.77$, $p < .05$

Transport No.: 1, 2, 3
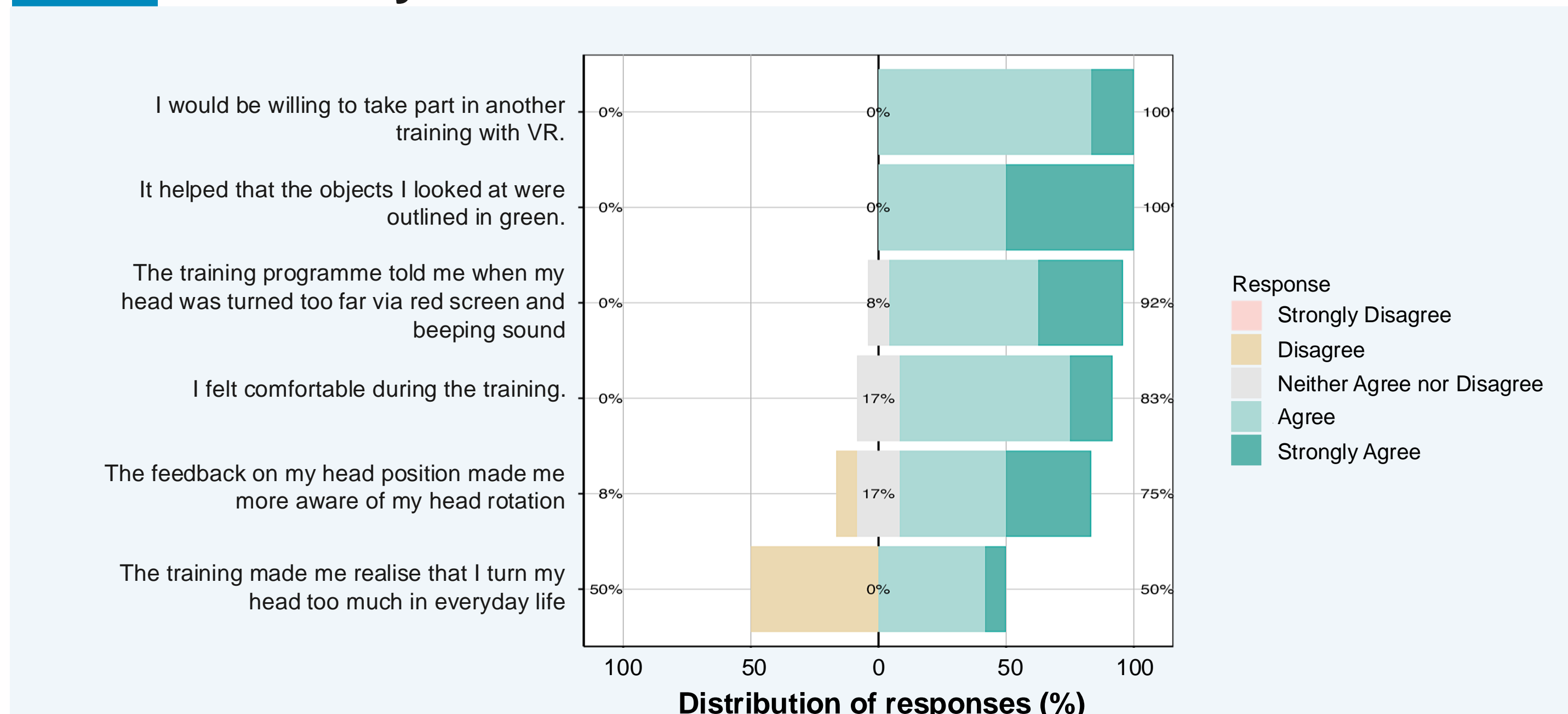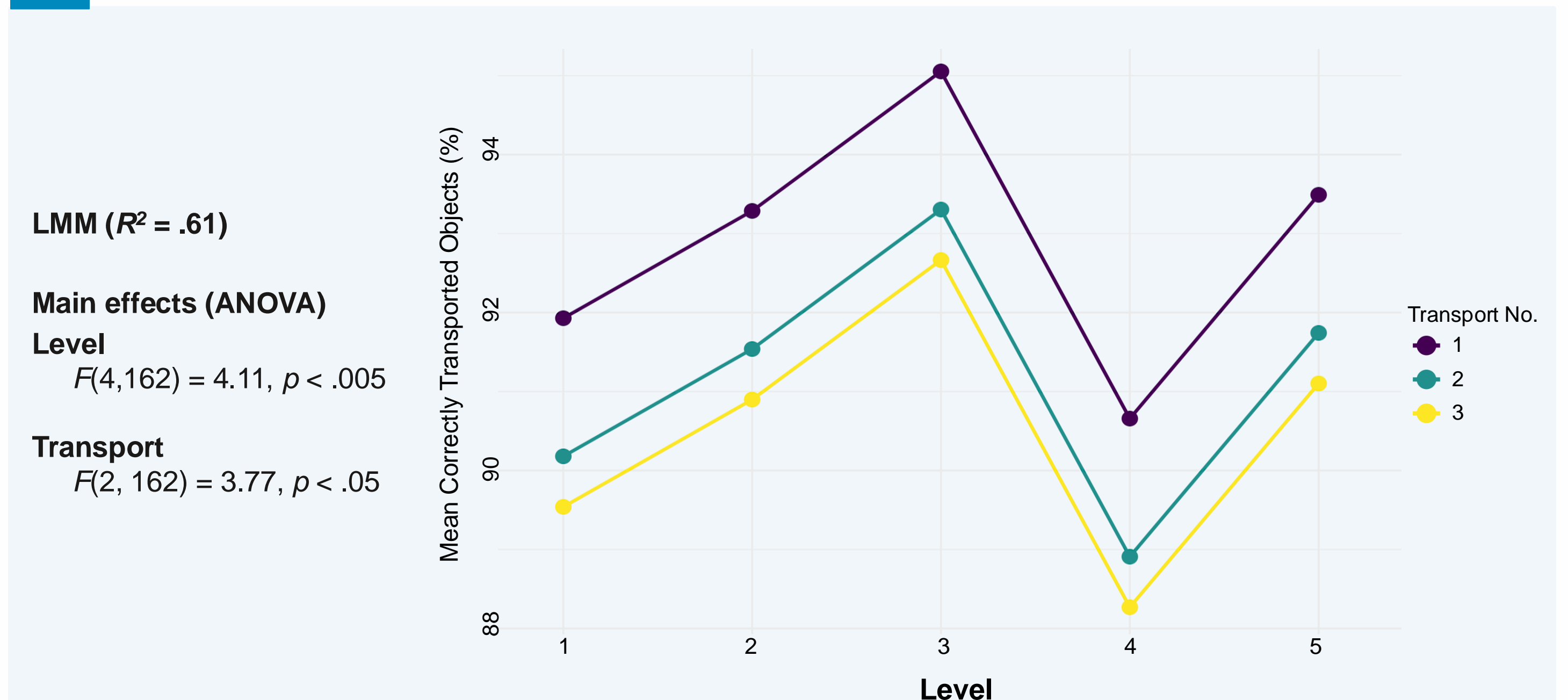
Discussion

Study Limitations

The study had a small sample and no control group. Performance decrease in Level 4 suggests including a training step between increase in difficulty may be beneficial. Training effects may be confounded through integration into clinic's programme.

Conclusion

The programme was highly accepted and enjoyed by participants. Rehabilitation outcomes suggest positive effects of training combined with interindividual variability amongst patients. The study supports the effective combination of traditional treatment approaches in immersive VR for the rehabilitation of patients with neglect.

References:

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