

BACKGROUND

- “**Embodiment**” in Virtual Reality (VR) is when people take **bodily ownership** of virtual limbs through a first-person point of view^{1,2}
- **360° Spherical Video-based Virtual Reality (SVVR)** can create a sense of embodiment in users^{3,4,5}
- Previous research exploring interventions that facilitate **embodiment** demonstrate **pain-reducing** effects^{6,7,8}

PURPOSE

Evaluate analgesic effects of 360° SVVR embodiment-inducing videos in adults with hand osteoarthritis.

METHODS

PRE-POST DESIGN (n=10)

Pre-Intervention

- Numeric Rating Scale (NRS)⁹
- Purdue Pegboard Test (PPT)¹⁰
- Immersive Tendency Questionnaire (ITQ)¹¹



~5-mins 360° SVVR

Post-Intervention

- Numeric Rating Scale (NRS)
- Purdue Pegboard Test (PPT)
- Embodiment Questionnaire (EQ)¹²
- Igroup Presence Questionnaire (IPQ)¹³
- Virtual Reality Sickness Questionnaire (VRSQ)¹⁴

Analysis Method:

Nonparametric Wilcoxon signed-rank test for significance and effect size *r* (small 0.10-0.29; moderate 0.30-0.49; large ≥ 0.50)

SINGLE-SUBJECT ABA DESIGN (n=2)

Stage A1: Baseline (7 Days)

(NRS): Morning, Afternoon, Evening for each day

Stage B: Intervention (7 Days)



~5-mins SVVR intervention each morning with continued NRS at Morning, Afternoon, and Evening each day

Stage A2: Withdrawal of Intervention (7 Days)

(NRS): Morning, Afternoon, Evening for each day

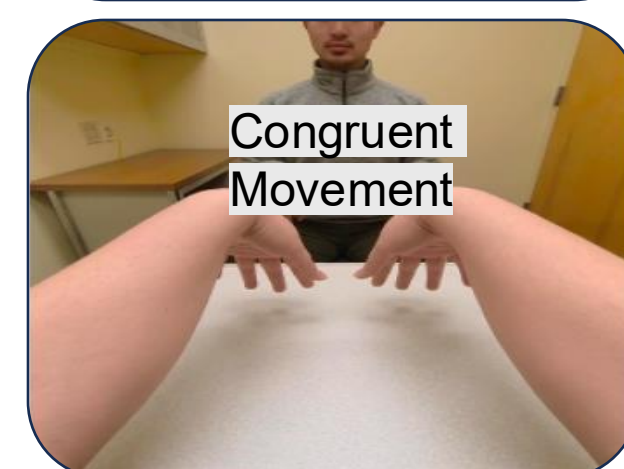
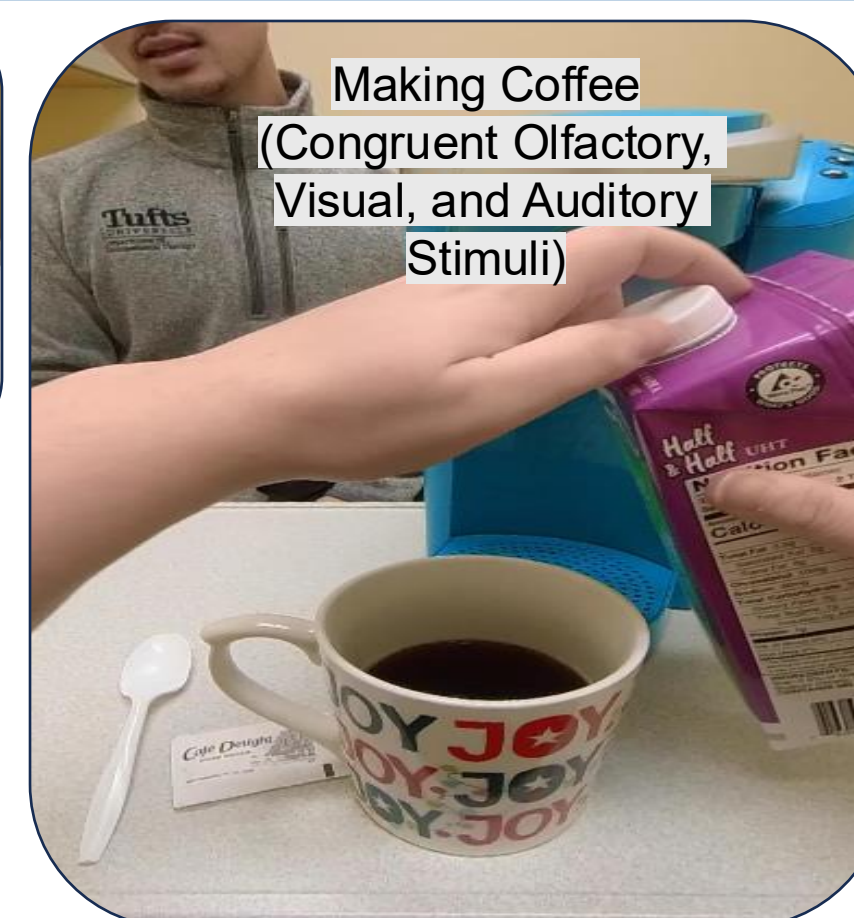
Analysis Method:

Visual analysis using the Mean and Median trend lines (& stability envelopes), with Tau to determine the significance (effect sizes) between A-B-A stages.

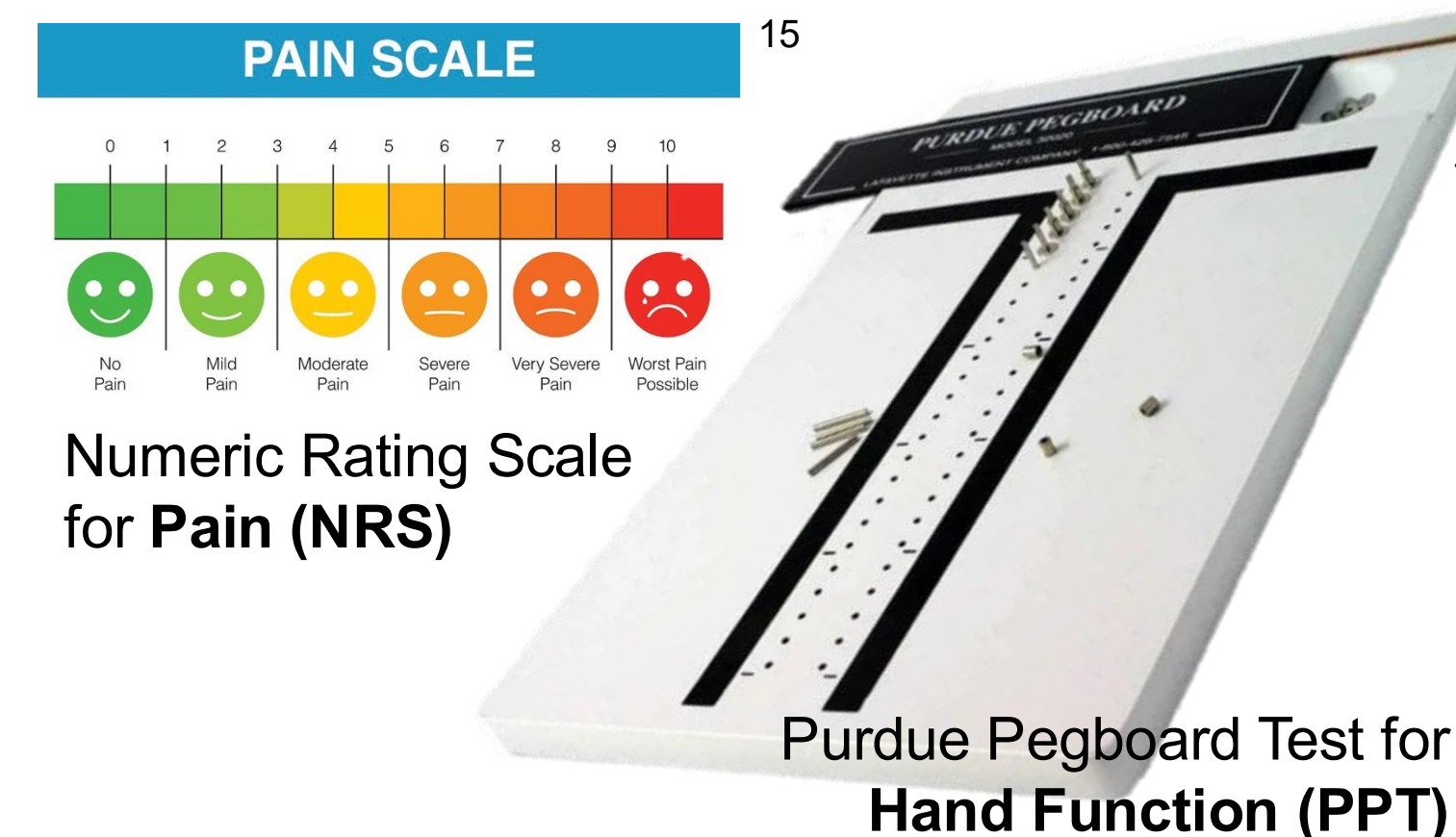
*recruited from
Pre-Post Arm*

Inclusion for both
studies: Pain
average 4+ within
the past week

360° SVVR VIDEOS

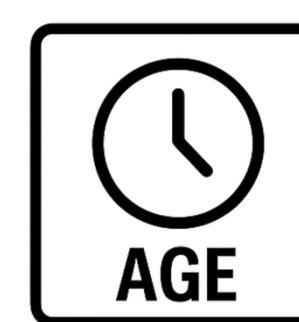


NRS & PPT

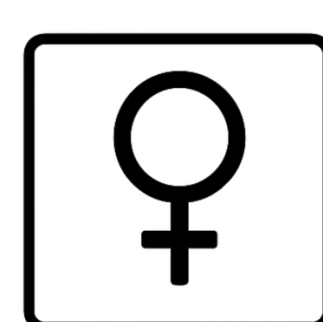


RESULTS

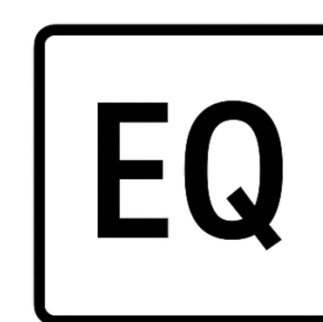
PRE-POST STUDY (n=10)



64.0 yrs
(12.3)



10 Females
(100%)

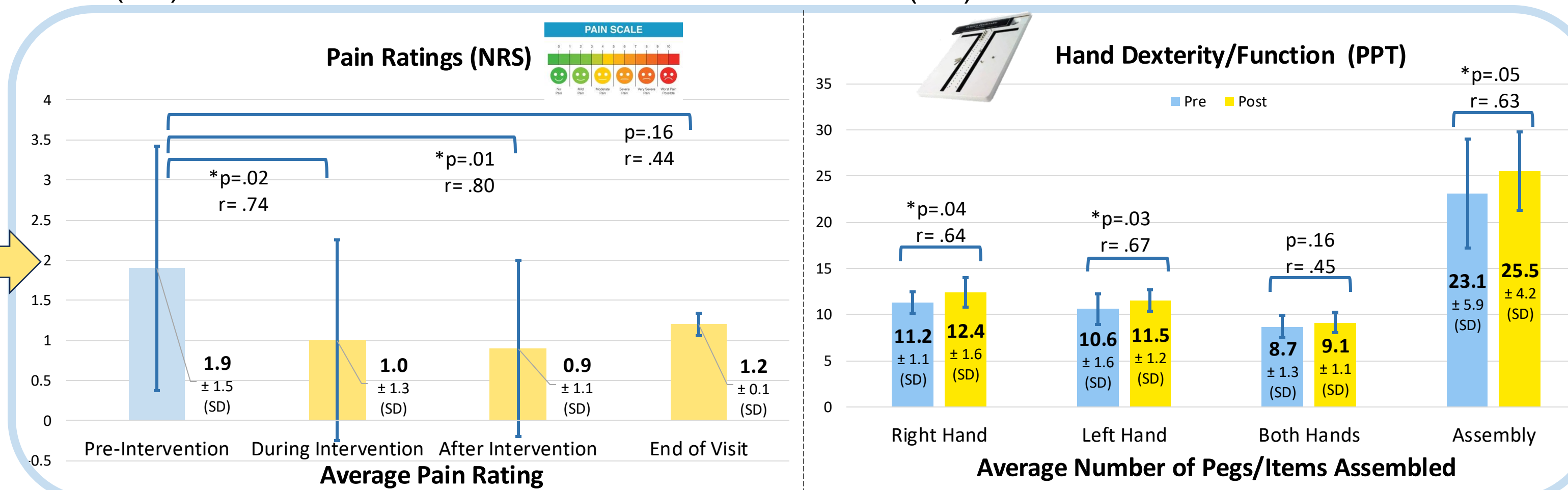


3.7
(1.1)

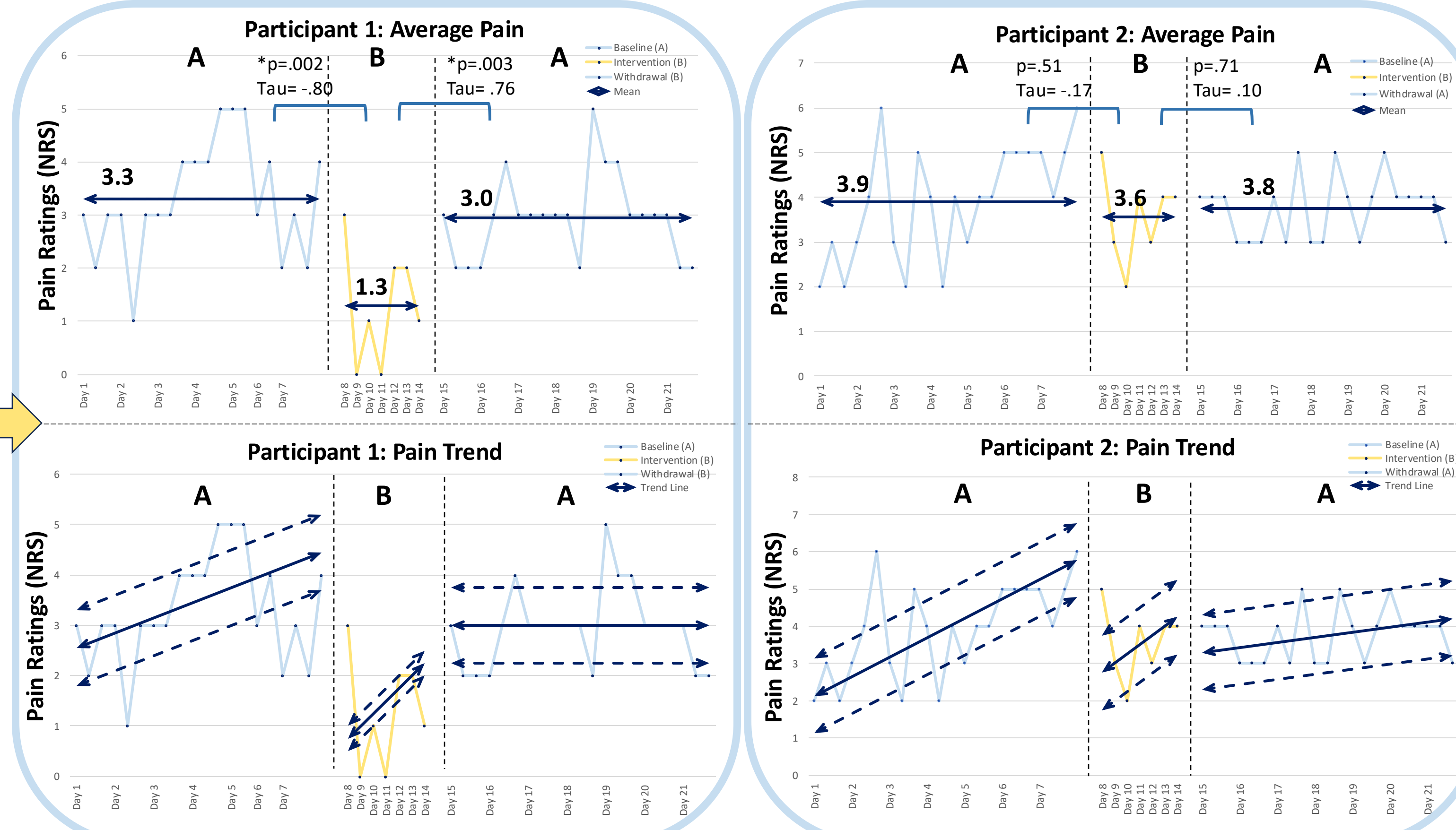


4.1
(0.7)

Mean (SD): Measured on a 1-7 Likert scale



SINGLE-SUBJECT STUDY (n=2)



RESULTS (CONT.)

PRE-POST STUDY (n=10)

- **Pain significantly decreased** *during* ($p = .02$) and *after* SVVR intervention ($p = .01$) with a large effect ($r = .74$; $r = .80$)
- No significant changes at the *end of visit* ($p = .16$)
- **Hand Function significantly increased** after SVVR for right/left hand & assembly tasks ($p \leq .05$)
- Participants were moderately embodied ($\bar{x} = 3.7$) and present ($\bar{x} = 4.1$) from the SVVR

SINGLE-SUBJECT STUDY (n=2)

- **Participant 1 showed statistically significant reduced pain** with SVVR intervention ($p = .002$)
- **Participant 2 showed no significant change** ($p = .51$)—demonstrating individual variability

DISCUSSION

KEY FINDINGS

360° SVVR may provide temporary pain relief in hand osteoarthritis—more studies with larger sample sizes are needed to better understand **SVVR embodiment** effects with this population

RESEARCH RECOMMENDATIONS

- Explore optimal “SVVR dosage” for pain reduction through embodiment
- Larger sample sizes needed to support generalizability

SVVR DESIGN IMPROVEMENTS

- Extend 360° SVVR to 8-10 minutes for better immersion & embodiment
- Use predictable movements & handedness-specific videos
- Introduce light touch and olfactory sensations early in SVVR to enhance embodiment

ACKNOWLEDGEMENTS

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REFERENCES

