

Impact of Bluetooth Haptics Device Distraction on Mechanical Pain Thresholds

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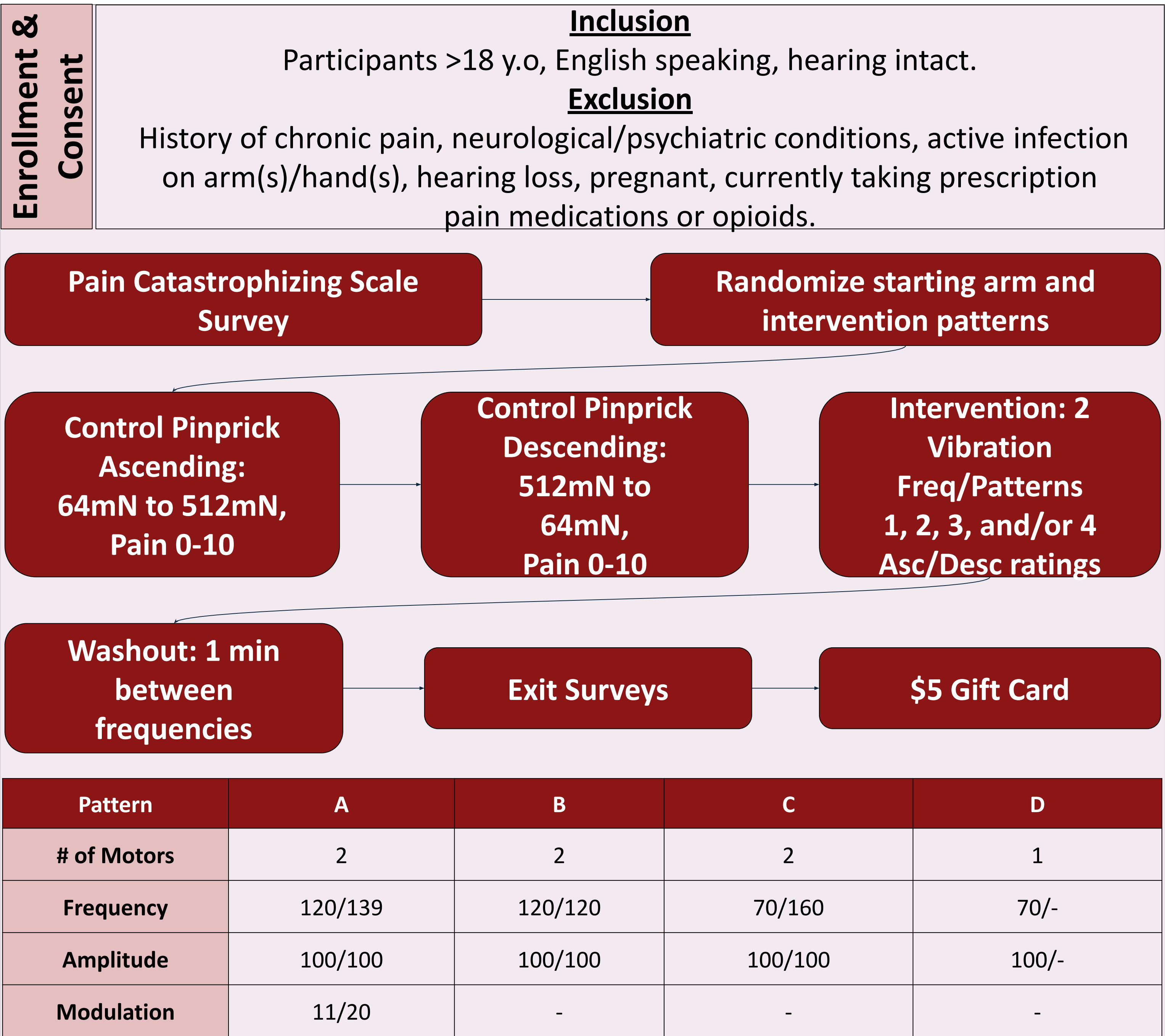
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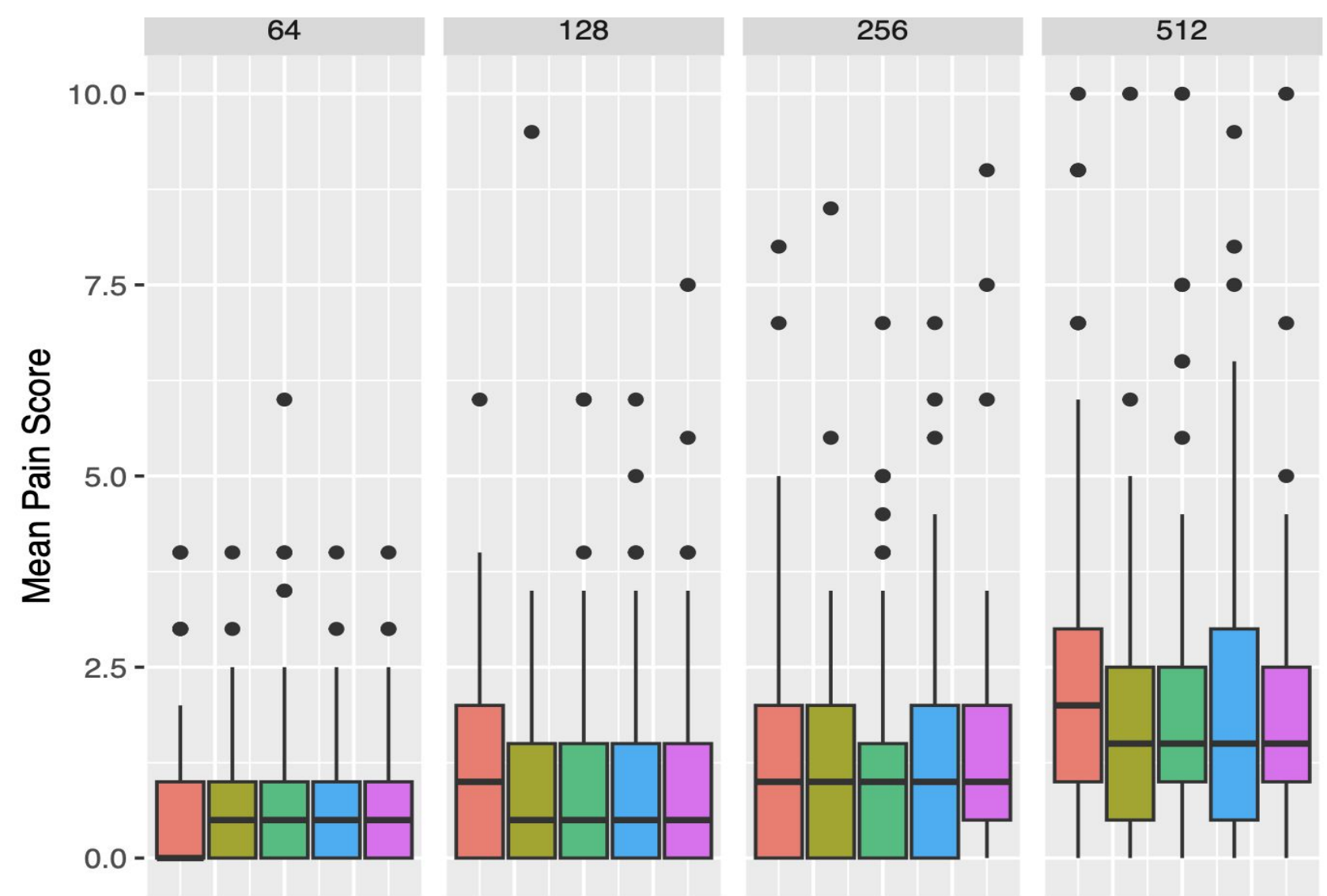
Background

- Needle-related** medical procedures are common worldwide.¹
- However, **fear of needles causes extreme stress** that can lead to **avoidance** of healthcare settings and **non-compliance** of needle-related treatments.²
- This study uses a **Bluetooth Haptic Device (BHD)**, made by the Stanford Chariot Program, to **modulate pain** simulated from weighted **“PinPrick” stimulators** via high-frequency vibrations.³

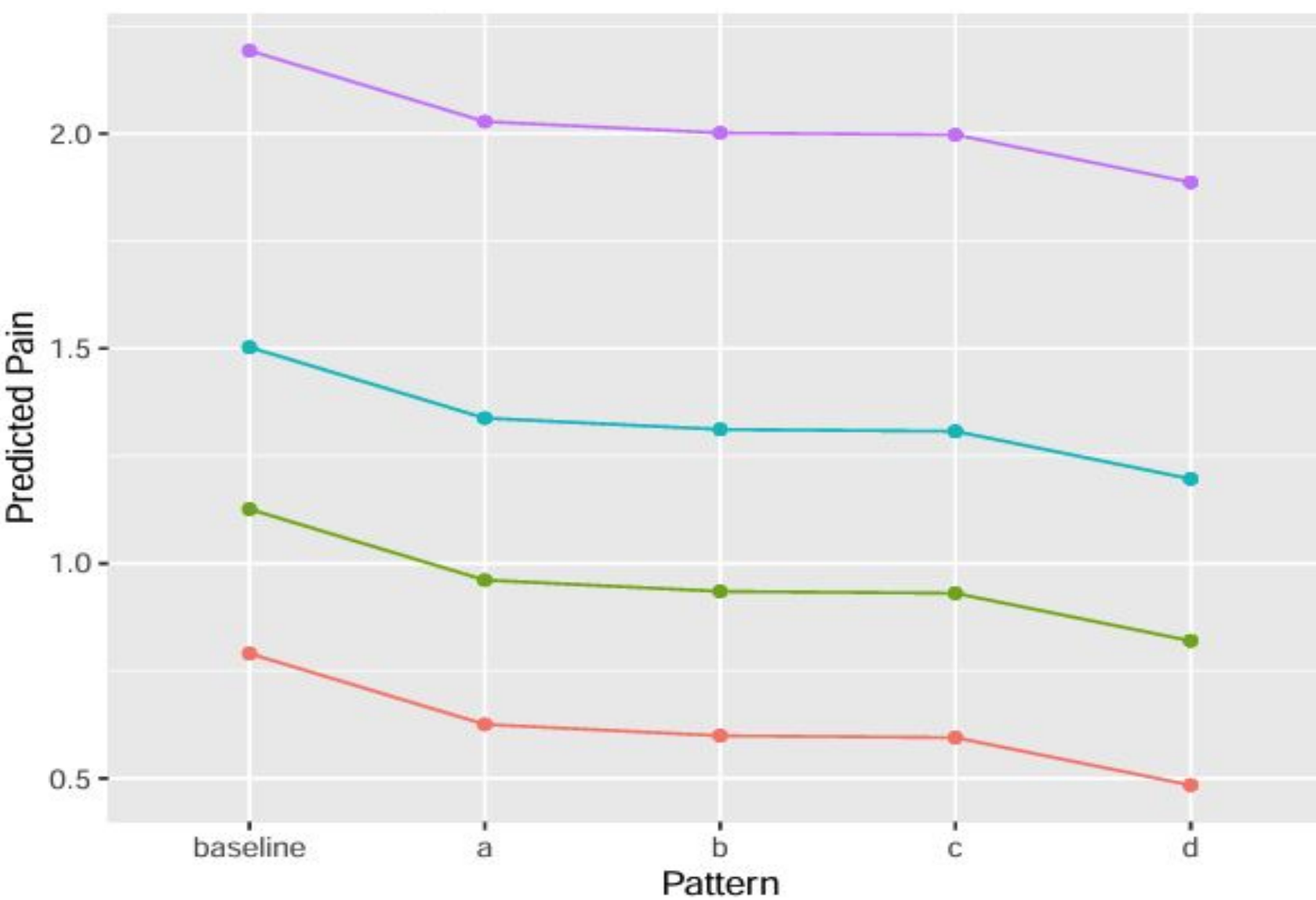
Methods



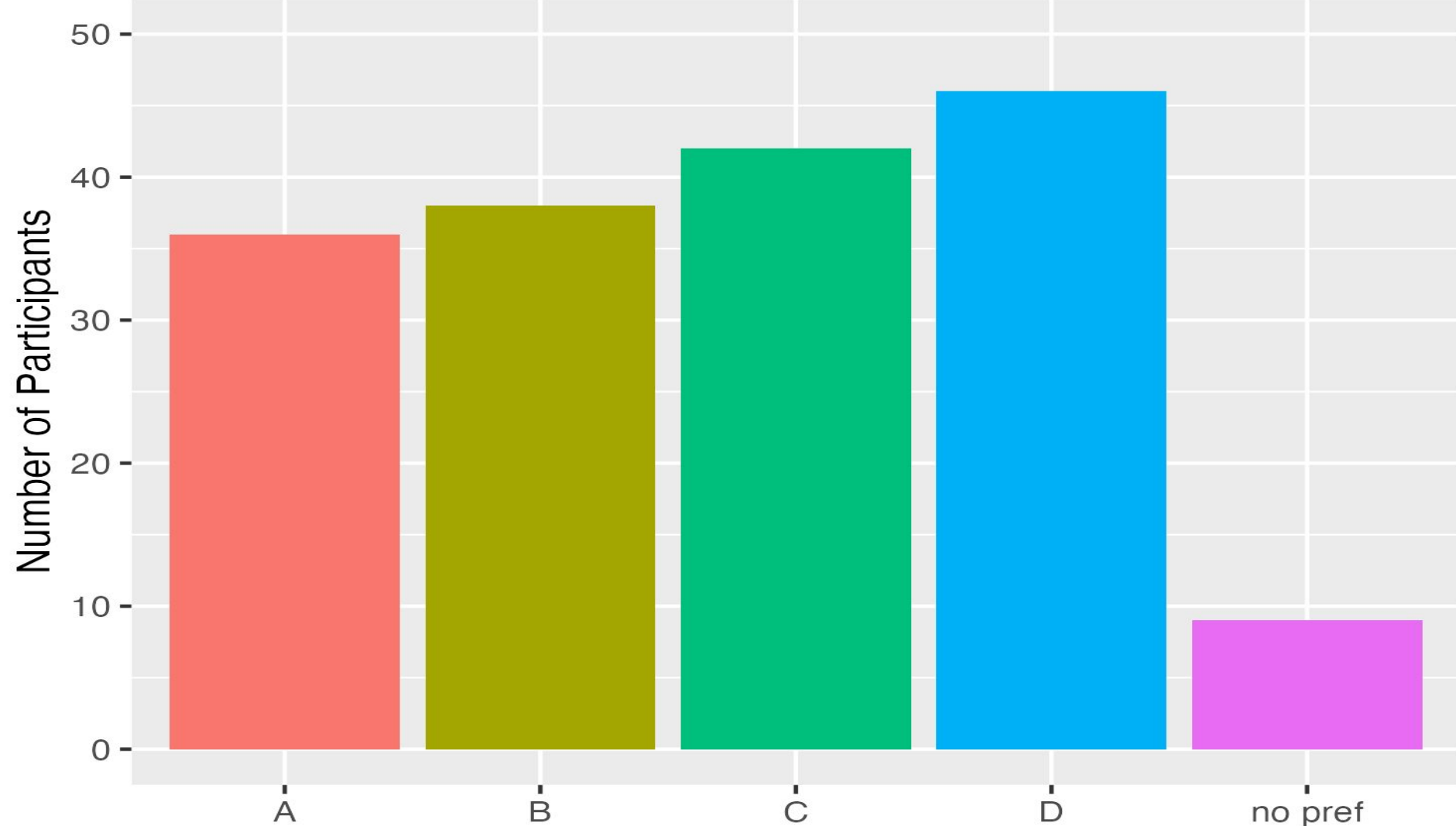
Figures



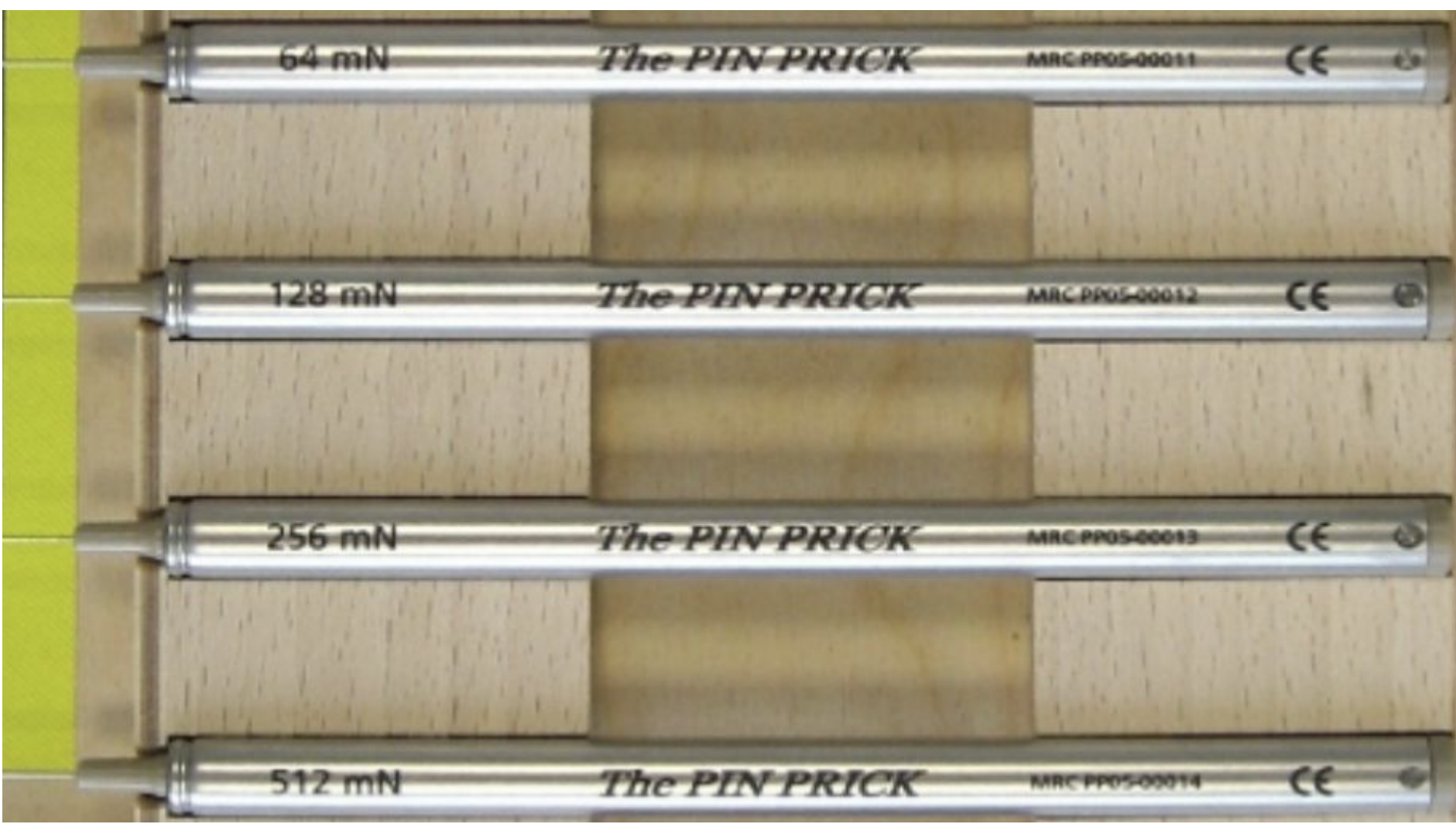
(Above) Figure 1: Average reported pain scores by pattern and weight of PinPrick.



(Above) Figure 3: Predicted pain by pattern.



(Above) Figure 2: Preferred BHD frequency.



(Above) Figure 4: Weighted PinPrick stimulators (top to bottom: 64mN, 128mN, 256mN, 512mN).

Pattern	A	B	C	D
Reported Pain vs. Baseline (adjusted by PCS, Age and Medication)	-0.16 [-0.05:-0.28] {p<0.001}	-0.19 [-0.08:-0.30] {p<0.001}	-0.19 [-0.08:-0.31] {p<0.001}	-0.31 [-0.20:-0.42] {p<0.001}

Table 1: Mechanical pain sensitivity compared to baseline threshold, adjusted for individual pain tolerance (PCS), pain medication in the past 24 hours, and age.



Figure 5: Bluetooth Haptic Device (BHD)

Results

- Sample Size: 199**
- Race:** 35% White; 38% Hispanic; 20% Asian; 3% Black; 3% Other
- Average Age:** 40.2 years old
- Pattern Randomization:** A = 99; B = 102; C = 98; D = 99
- Increase in reported pain** as the needle pressure increases.
- All** vibration patterns resulted in **less perceived pain** compared to baseline.
- Participants **preferred pattern D**, reporting 0.31 pain units lower compared to baseline (p<0.001).

Discussion

Why is this important?	Needle-related procedures are common and stressful for many patients worldwide. - Haptic devices can help modulate pain during vascular access procedures, but limited research has been done to determine the best vibrational pattern.
Limitations & Future Directions	- Pain is subjective and complex. Single site recruitment, so future studies can expand to other institutions.
Conclusions	- Patients had lower pain sensitivities and higher pain thresholds when exposed to all BHD vibration patterns. - Future studies will focus on incorporating haptic patterns with other non-pharmacologic pain modulating modalities.

References

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