

# Subjective Comfort and Emotional Effects of On-body Compression

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## Introduction

The sensation of touch is an important facet in haptic communication and carries huge emotional significance [1-3]. Much research in haptics has focused on taps and vibrations, but compression has been understudied. One type of compression therapeutically administered to improve circulation, decrease anxiety, and promote feelings of calmness is known as deep touch pressure (DTP) [1-4]. DTP is used to treat sensory processing disorder (SPD), attention deficit hyperactive disorder (ADHD), or autism spectrum disorder (ASD). Conventionally, DTP is administered via (1) passive compressive garments that are non-controllable and difficult to don/doff, or (2) pneumatically inflated garments that are limited in mobility and portability. The overarching motivation is to develop active garments that are able to provide necessary DTP on the body. This study seeks to understand the subjective comfort and emotional effects when compression is applied to the upper body (torso, chest, and shoulder areas).

## Results: Phase 1 Garment Design

**Phase 1:** Design of test garment to study effects of compression on the body

**Phase 2:** Pilot test to understand reactions to compression on the body

**Phase 3:** Development of active garment to provide remote stimulation



Figure 1: Hook-and- Loop strap test garment (front, side, and back). The graded hook-and-loop straps are anchored on the shoulders and are free to move



Figure 2: The red straps correspond to the outer shoulder strap, blue straps correspond to the inner shoulder strap, and green straps for torso straps. Test Conditions: (a) Straight, (b) One-side crossed, (c) Two-sides crossed, and (d) Mixed.

## Results: Phase 2 Pilot Study

### (a) Subjective Comfort

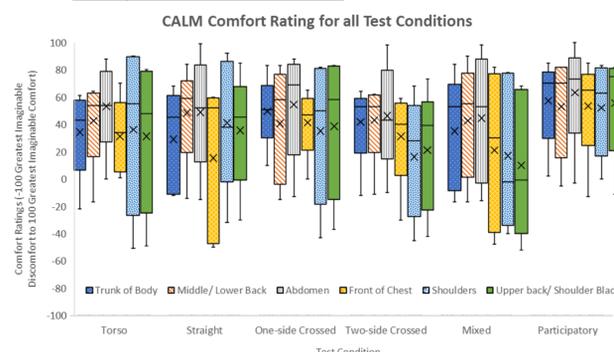


Figure 3: CALM Comfort Rating Results of comfort: trunk of body, middle / lower back, abdomen, front of chest, shoulders and upper back / shoulder blade.

### (b) Emotional Effects

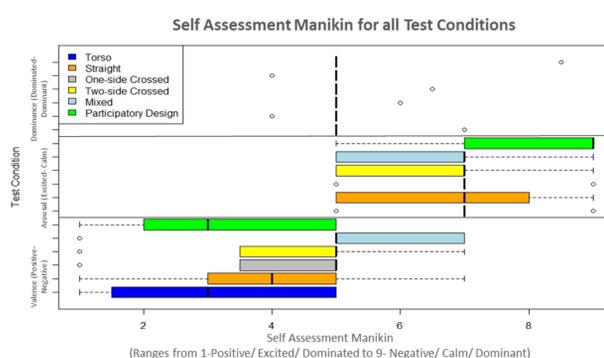


Figure 4: SAM Emotional Rating Results (dominance, arousal and valence).

### (c) Direction of Compression Preference

Participant ID	Front	Back
S01	Two-side crossed	Straight
S02	Straight	Straight
S03	Two Side Crossed	Two Side Crossed
S04	Straight	Straight
S05	Two Side Crossed (lower anchor)	Two side Crossed (lower anchor)

## Results: Phase 3 Design Implications

### i. Garment Comfort

- Balance between compliant and stiff fabric (pressure vs. comfort)
- Smoother transition on garment edge
- Flexible fabric to allow joint movement
- Incorporate compression sleeves
- Separate designs for men and women

### ii. Pressure Administration

- More stiffness on the back, lower spine, and sides should be incorporated
- Should not prevent normal breathing

### ii. Emotional Effects

- 3/5 of participants reported no perceived changes in mood
- Distribution is similar to a hug, but lacking warmth
- Fabric stiffness interferes with realism

## Future Work

- Phase 3: Develop active garment to provide remote stimulation
- Integrate automated, computer-mediated actuator system into garment
- Determine actual pressures applied
- Establish thresholds of pressure perception, duration of wear, and optimal intensity of pressure

## Acknowledgements

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## References

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