Dressing for Success: The Impact of Clothing on Somatosensory Processing

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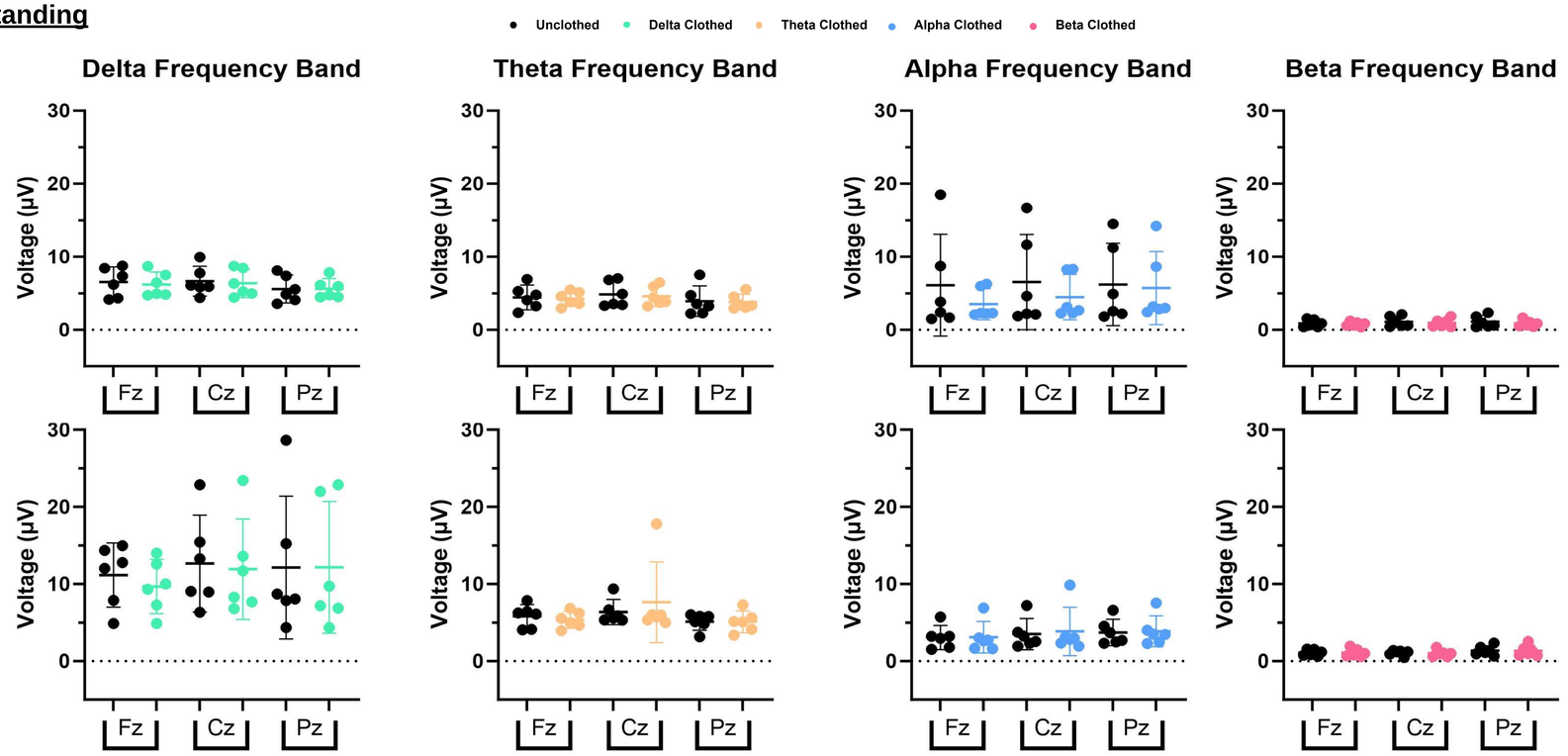
INTRODUCTION

- The central nervous system (CNS) processes sensory information to provide us with the ability to move.
- Increasing sensory cues to the CNS via cutaneous mechanoreceptor stimulation from clothing may improve movement control and reflex activity.
- It was previously shown that compressive articles of clothing can alter spinal pathway excitability irrespective of the task involved or task input by enhancing the sensory information detected via proprioceptive modulation of presynaptic inhibition of group Ia afferents (Barss et al.,2018).
- Limited research has investigated the effects of non-compressive “functional” clothing on CNS neurophysiological responses during locomotive or exercise conditions.
- Addressing this gap will expand the understanding of the influence of clothing on sensory feedback and the use of electroencephalographic (EEG) techniques in optimizing ergonomic and athletic contexts.
- **Research Question:**
- Will there be a difference in EEG signal amplitudes across different frequency bands during standing and walking tasks between minimal and functional clothing conditions?

METHODS

- Six healthy, physically active individuals (22.83 ± 2.40 years) performed standing and self-paced walking tasks for two coverage conditions: unclothed (shorts + shirtless/sports bra) and clothed (long-sleeve quarter-zip shirt and long pants).
- EEG data were recorded using a 32-electrode (Ag/AgCl) system.
- Data were processed using MATLAB-EEG pre-processing tools and EEGLAB; specifically, EEG frequency bands (delta (0.1-3 Hz), theta (3-8 Hz), alpha (8-12 Hz), beta (13-30 Hz)) were analyzed.
- Channels of interest were Fz, Cz and Pz.

Standing



Errors bars represent the mean with a 95% Confidence Interval

RESULTS

- Topographical maps suggested differences between unclothed and clothed conditions.
- Multiple comparisons using paired t-tests were computed to provide a detailed overview of EEG activity across various frequency bands and channels during the standing and walking task.
- Categorical scatterplots were used to illustrate results by channel (Fz, Cz, Pz) and frequency band (delta, theta, alpha, beta).
- No statistically significant differences were observed between the unclothed and clothed conditions across all frequency bands for each channel of interest during both tasks for a Bonferroni-corrected α-value of 0.00417.

CONCLUSIONS

- Despite expectations, no significant differences in neural activity were observed across frequency bands amidst varied clothing conditions during standing and walking tasks.
- Factors such as sensory gating and task dynamics likely influence sensory processing and motor responses.
- **Future Research:** Would conducting further studies with a focus on populations with sensory sensitivities (such as individuals on the autism spectrum) over a longitudinal time frame and differing clothing compositions and designs produce significant neurophysiological results? Beyond EEG, would other neuroimaging techniques provide insights into sensory activity due to changes in clothing?

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