

Individuals' concerns associated with facial Neuromuscular Electrical Stimulation (NMES)



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Introduction:

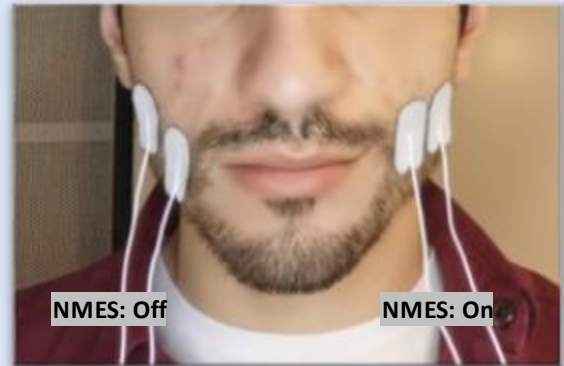
- Facial NMES consists in inducing motor action potentials in facial muscles by injecting a current through the skin. It was shown to affect mood, e.g., by activating the smile muscles, and modulate proprioceptive facial feedback accordingly (Kapadia et al., 2019; Yen-Chin et al., 2017; Zariffa et al., 2014).
- Depending on its parameters, facial NMES carries certain risks, and naïve volunteers may apprehend receiving facial NMES, as the application of electricity over the face feels intuitively dangerous.
- We explored if willingness to receive facial NMES differs by prior knowledge of NMES, gender, and personality differences.

Methods:

- 201 participants (100 men, mean $M = 27.57$, $SD = 7.62$)
- Rated at 2 time points their **likelihood of taking part (LOTP)** in a hypothetical study using facial NMES :
 - **LOTP1** based on minimal prior knowledge
 - **LOTP2** after receiving more detailed information about the technique and its potential risks
- reported **theoretical** and **practical** knowledge of NMES, rated on a Likert scale their concerns about 3 types of risks (burns, pain, and loss of muscle control (**LoC**), and responded to two open question asking what concerns they would have toward the prospect of receiving facial NMES
- 5 questionnaires assessing **risk taking** (DOSPERT), not worrying about pain (subscale of **MAIA**), **body image** (BICI), need for affect (NFA **approach** and **avoidance**), and personality (**openness** and **neuroticism**)
- Data was analysed with a mixed-ANOVA, correlations and multiple linear regressions.

Results:

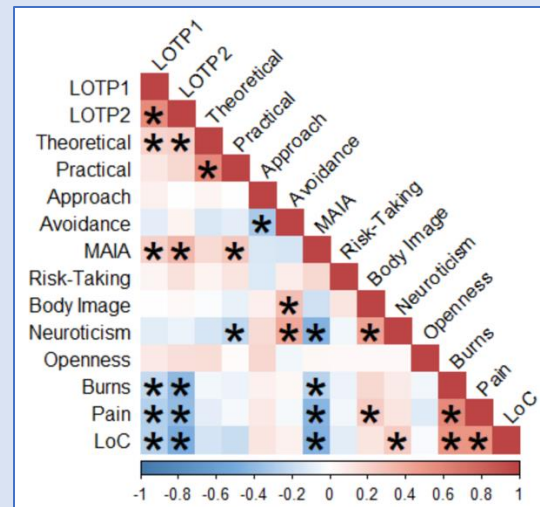
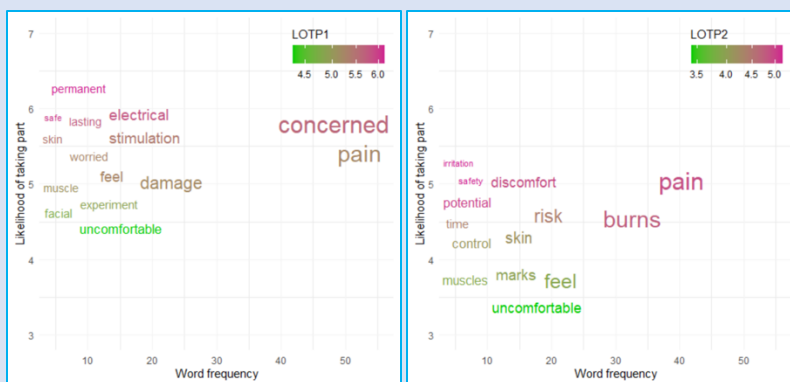
- Providing information about NMES and its risks reduced participants' LOTP ($F(1, 199) = 12.69$, $p = .015$), which was for LOTP1 ($M = 5.18$, $SD = 1.57$) than LOTP2 ($M = 4.80$, $SD = 1.70$).
- Greater LOTP1 and LOTP2 were associated with having more prior knowledge about NMES ($t(198) = 3.03$ and 3.29 , $p = .023$ and $.001$), and with less worry about pain ($t(198) = 2.30$, $p = .023$ and $.037$).
- LOTP2 was negatively predicted by concern for burns ($\beta = -.14$, $t(195) = -2.34$, $p = .020$) and concern for loss of muscle control ($\beta = -.27$, $t(195) = -4.03$, $p < .001$)
- Concerns (for pain, burns, and LoC) did not differ by gender (all $ps > .05$).



Example of facial NMES, with electrodes over the Zygomaticus major muscle. When the current is delivered (ON) the muscle is activated and pulls the lip corner.

Conclusions:

- Describing the risks associated with facial NMES reduced willingness to participate, however only slightly.
- To increase participants' LOTP, researchers should address specific concerns, e.g., risks of burns, by explaining the safety procedures and by educating participants about the technique.
- Participants' fears may be reduced by demonstrating the technique outside of the face (e.g., limbs) beforehand.



Correlation matrix of all variables, alpha adjusted using Bonferroni correction, * $p < .004$

References:

- Kapadia, et al. (2019). *BioMedical Engineering OnLine*, 18(1), 109.
- Yen-Chin, et al. (2017). *Proceedings of the Eleventh International Conference on Tangible, Embedded, and Embodied Interaction*, 579–582.
- Zariffa, et al. (2014). *Neuromodulation: Technology at the Neural Interface*, 17(1), 85–92.