

Virtual social touch on embodied avatars in patients with Fibromyalgia

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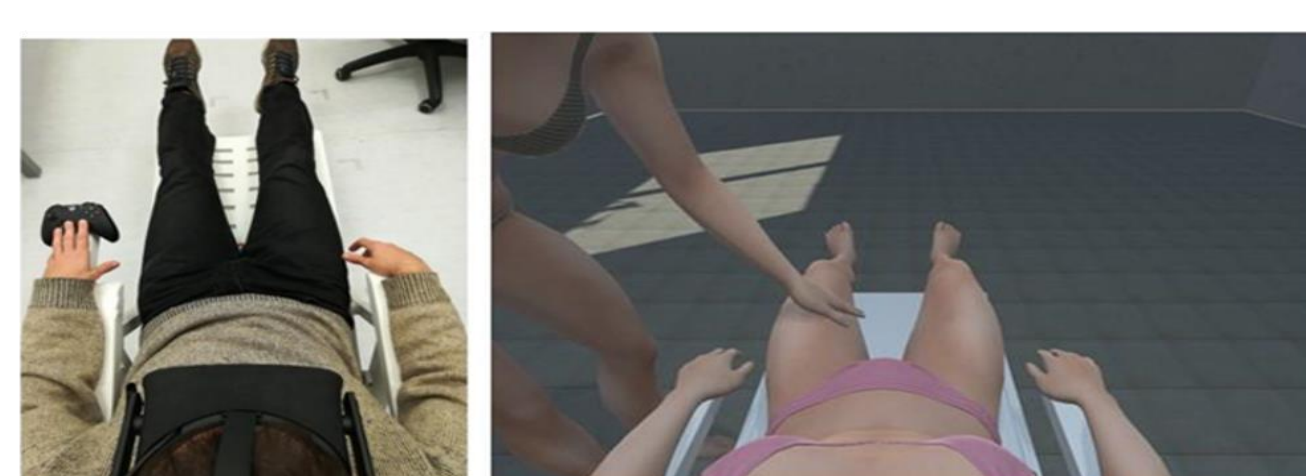
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Introduction

- Fibromyalgia (FM) is a syndrome characterized by chronic widespread pain.
- Among all the aspects of quality of life impaired by FM, social functioning is one of the most affected.
- Considering that social touch represents one of the preferred channels to establish and maintain personal relationships, we investigated how 'vicarious' social touch is perceived in FM, using Virtual Reality (VR), combined with physiological recordings.

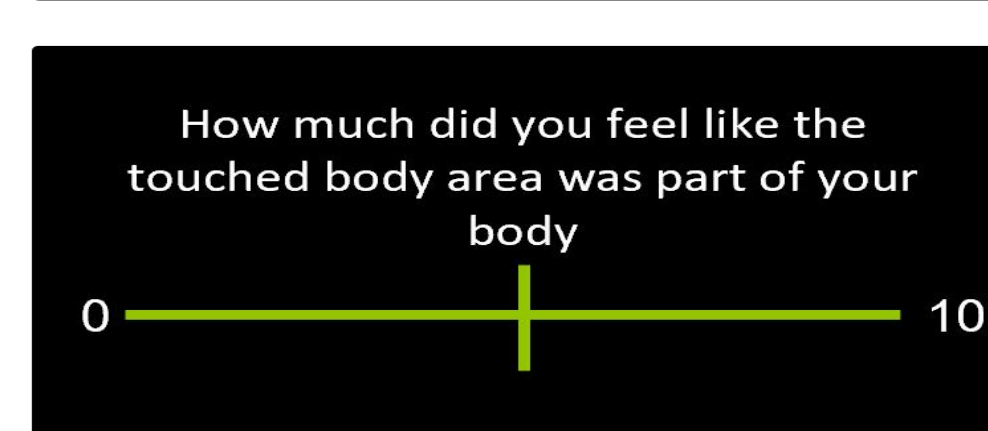
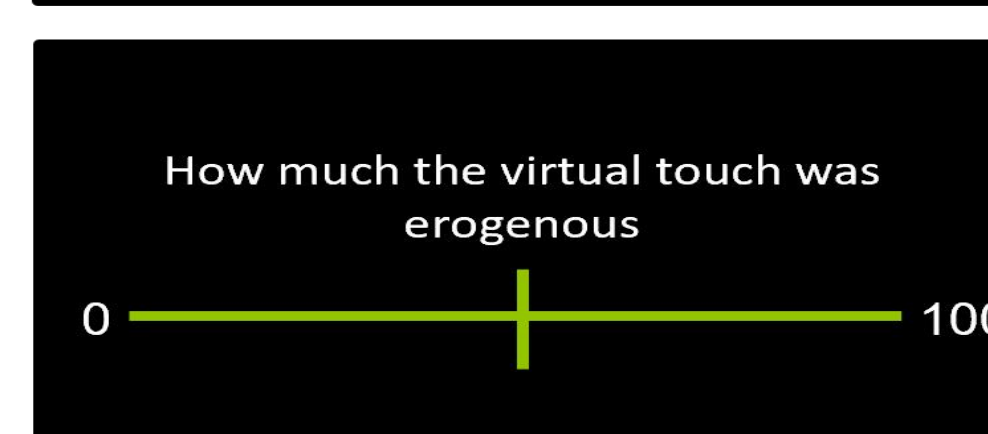
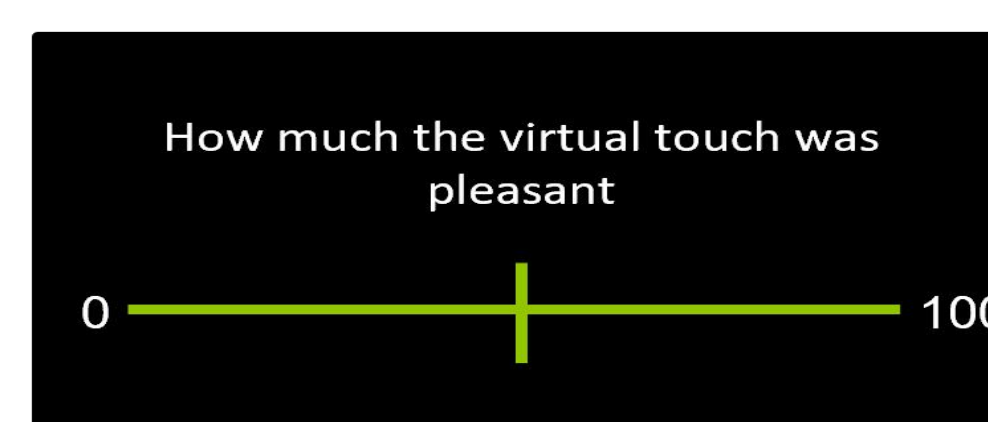
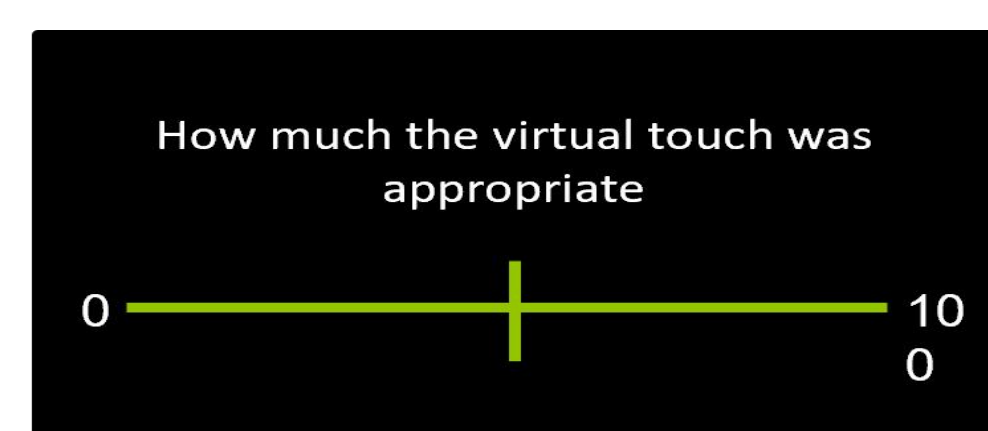
Methods

- 19 Fibromyalgia patients (FM) (age: 47,10 ± 10,38; education: 14,05 ± 5,93; Fibromyalgia Impact Questionnaire Revised (FIQR): 60,34 [37,17-76,83]; FIQR_Symptoms: 31,87 [18,5 - 44,5]) and 13 healthy controls (HC) (age 48,61 ± 9,80; education: 13,08 ± 3,45) were recruited.
- Through a head mounted display (Oculus), participants were presented with a VR scenario showing a female avatar in 1PP in underwear matching their real position.
- 24 virtual touches (3cm/sec) were delivered by another female avatar on 6 different body parts, categorized in previous studies ¹⁻² as neutral (knee and foot), social (head and hands), and intimate (breast and pelvis).
- Participants were asked to rate the perceived appropriateness, pleasantness, erogeneity, and ownership for the touched body part evoked by each virtual stimulus, using 0-100 Visual Analogue Scales (VAS).
- Skin Conductance Response (SCR) and Heart Rate (HR) were recorded during each trial and analyzed considering the time window of 6 seconds following the onset of the virtual touch.



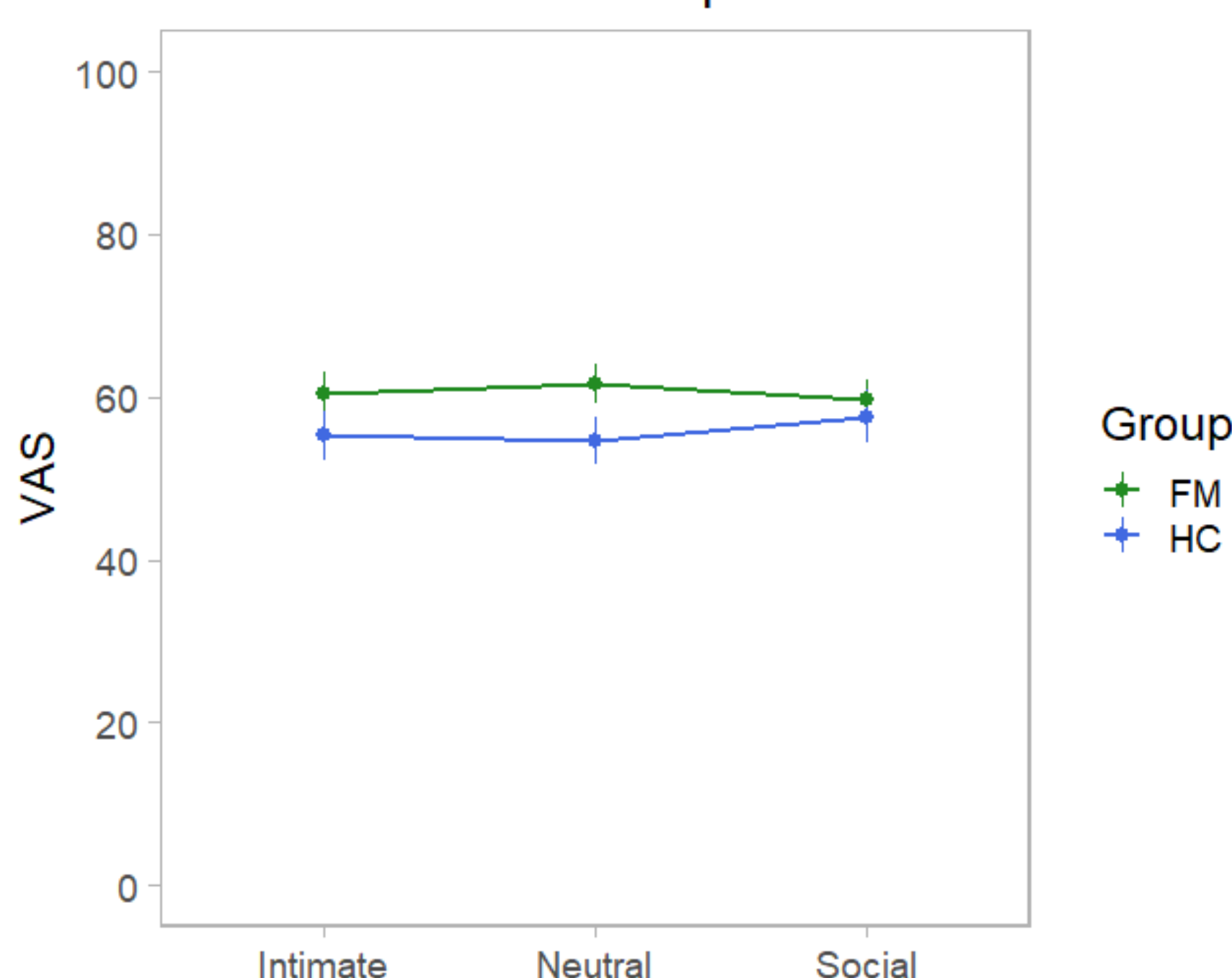
SIDE

	LEFT (x2)	RIGHT (x2)
NEUTRAL	Foot Knee	Foot Knee
SOCIAL	Head Hand	Head Hand
INTIMATE	Genitals Breast	Genitals Breast



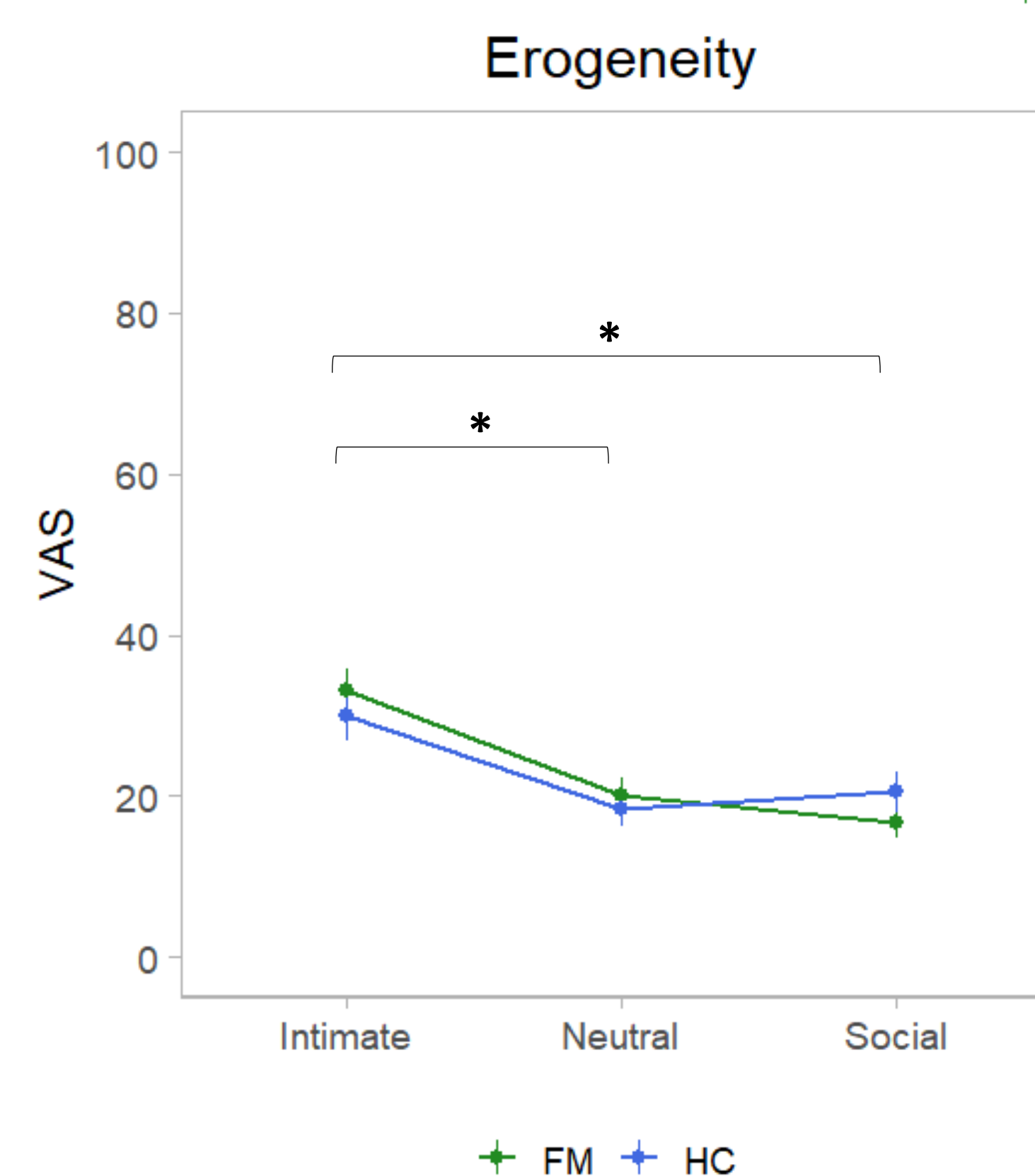
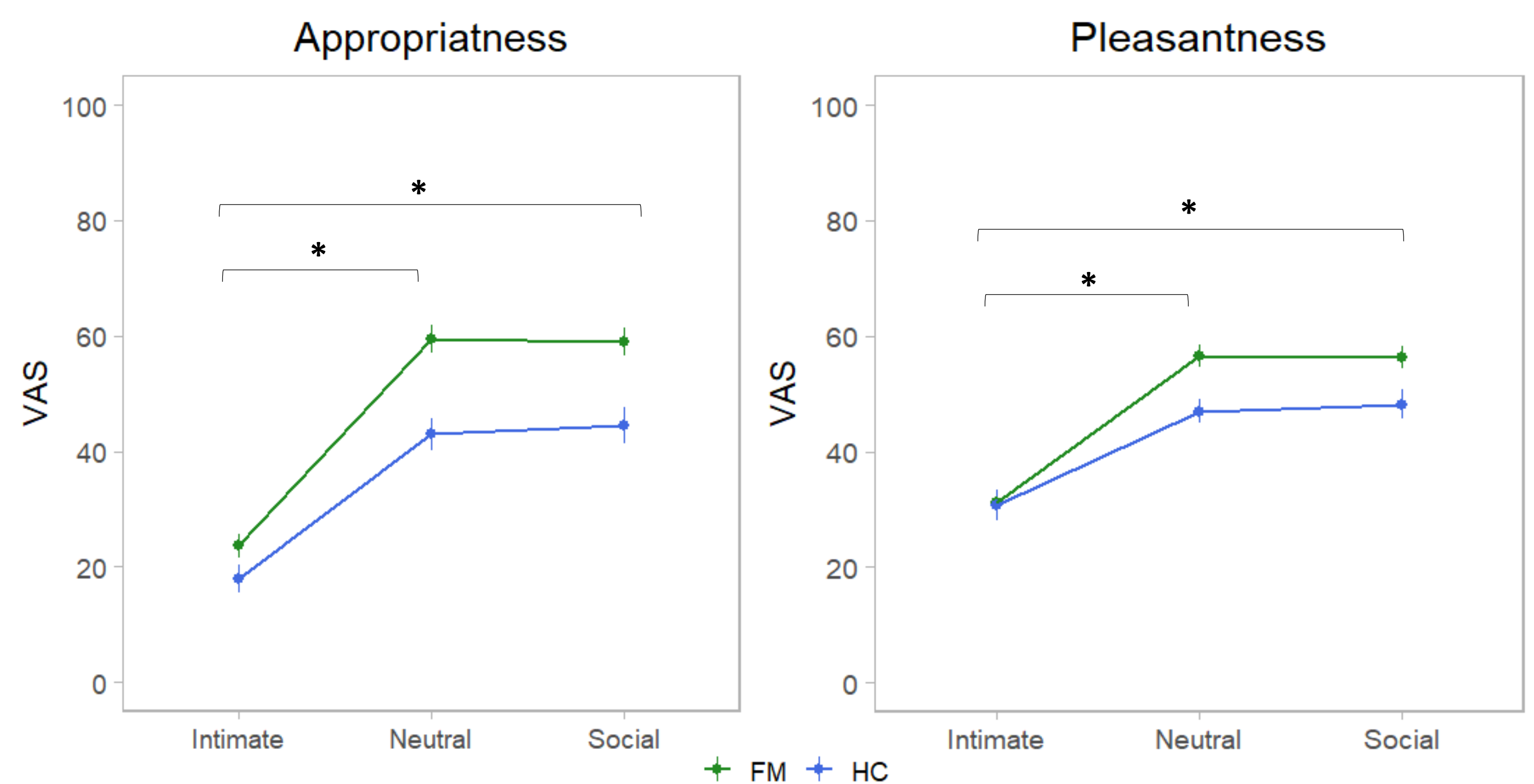
Results

Ownership



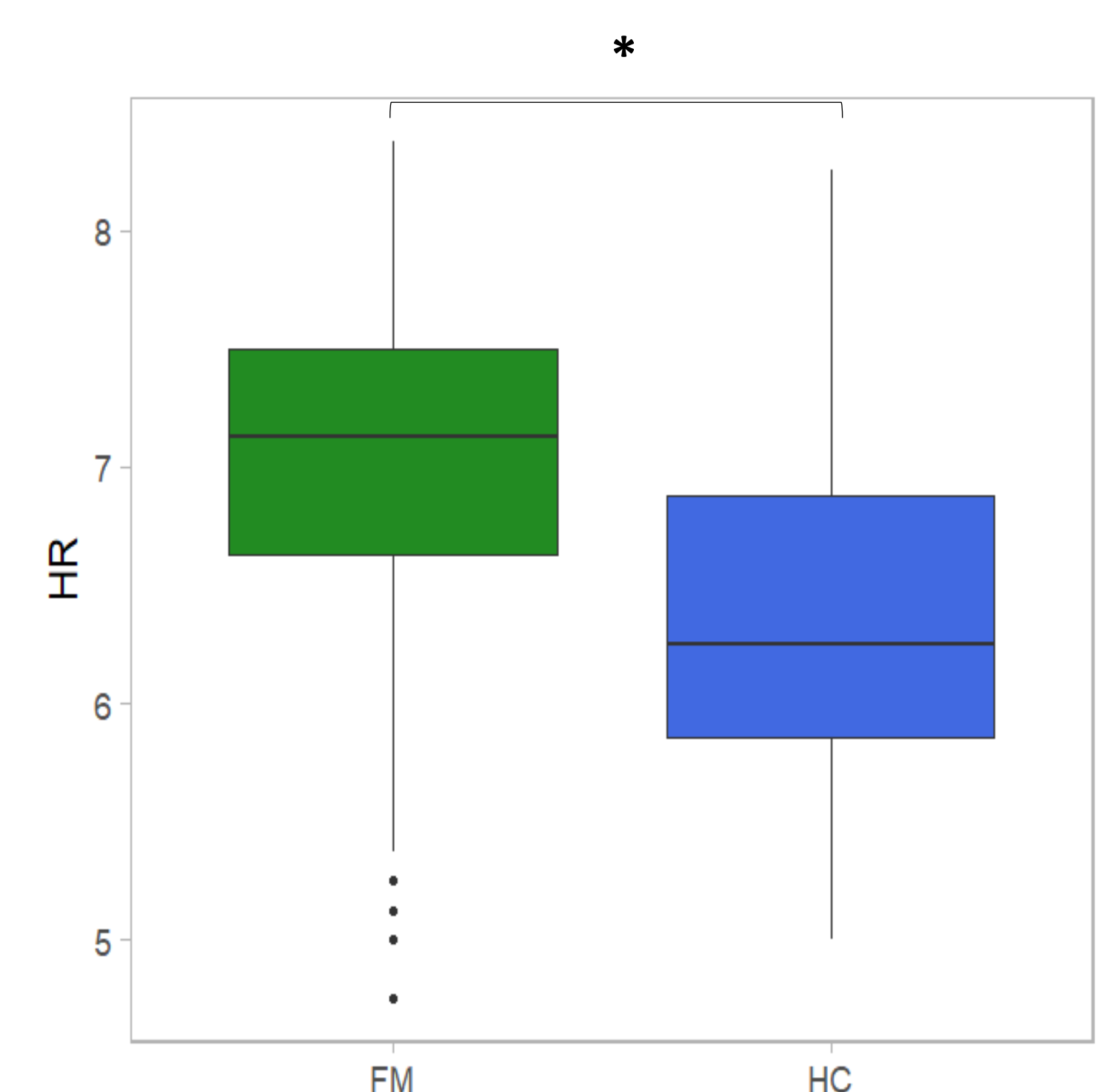
- Ownership ratings did not differ between groups, showing a similar pattern of embodiment for the virtual body in both FM and HC.

- The analysis showed that the virtual touch delivered on the Intimate area was perceived as less appropriate ($p < .001$), less pleasant ($p < .001$) but more erogenous ($p = .023$) as compared to the social and neutral once in both groups.



- Although no differences between groups were found in appropriateness, pleasantness, and erogeneity ratings, the correlation between the symptom's domain of FIQR (FIQR_Symptoms) and the overall subjective responsiveness was significant ($r = .33$).

- No effects of Group neither of Area were found for SCR.
- A main effect of group was found for HR, showing an overall higher HR in FM as compared to HC ($p = .04$).



Discussion

- Ownership ratings did not differ between groups, showing a similar pattern of embodiment for the virtual body in both FM and HC.
- Preliminary results suggest that although the qualitative evaluation of touch did not vary between the two groups, FM patients' ratings are higher than controls and this increase is correlated with the severity of symptoms.
- The hypothesis of anhedonia to gentle touch ³ in FM is not confirmed, at least for virtual touches.
- Increased physiological response in terms of HR (not SRC) is recorded in FM.
- These results might be relevant when considering touch and VR as a therapeutic practice for FM.

References

- 1 Fusaro, M., Lisi, M. P., Tieri, G., & Aglioti, S. M. (2021). *Scientific reports*, 11(1), 2221
- 2 Mello, M., Fusaro, M., Tieri, G., Aglioti, S.M. (2021). *Quarterly journal of experimental psychology*, 75(3), 461-474.
- 3 Boehme, R., van Ettinger-Veenstra, H., Olausson, H., Gerdle, B., & Nagi, S. S. (2020). *Brain sciences*, 10(5), 306.

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