

# Sense of agency is influenced by fatigue: new evidence from sensory attenuation

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**AIM:** The sense of agency is the feeling of control over actions and their consequences. This fundamental component of bodily self-awareness can be affected by fatigue, namely the feeling of overwhelming tiredness and exhaustion associated with voluntary actions. Yet, the mechanisms underlying the relationship between fatigue and agency are unclear. An emerging model [1] suggests that fatigue might impair the feeling of control over bodily actions by interfering with sensory attenuation (SA), a perceptual phenomenon whereby sensory inputs evoked by self-generated actions are less intense than externally-generated sensory input. The current study aims at providing behavioral evidence to the proposed model by investigating the impact of long-lasting and acute fatigue on SA. **MATERIAL AND METHOD:** To measure SA, we used the force matching task (FMT)[2] in which healthy participants ( $n = 25$ ) were presented with three target forces (1N, 2N, 3N) on the left index finger. Participants were required to match the target forces either by directly pressing with the right index finger on the left index finger (direct condition), or by operating an external device that pressed on their finger (indirect condition). In the direct condition, participants usually overestimate the target force as a consequence of SA [3]. The experiment consisted of two separate sessions, in which participants underwent the FMT. To investigate the effect of acute fatigue on SA, in one of two sessions, participants performed a fatiguing task (i.e., sustained maximal contractions with a handgrip) prior to the FMT. The Fatigue Severity Scale (FSS) was used to measure the level of long-lasting fatigue (i.e., perceived fatigue over the past two weeks). **RESULTS:** SA was computed as the ratio between matched and target force (ratio  $> 1$ , overestimation of the target force). As expected, participants significantly overestimated the target force in the direct compared to the indirect condition. This result was not affected by experimentally induced acute fatigue. Interestingly, participants with high FSS score had less SA compared to those with low FSS score, hinting at an effect of long-lasting fatigue. **DISCUSSION:** Our main findings suggest that long-lasting fatigue might affect SA, thus undermining the individuals' ability to distinguish between self- and externally-generated stimuli. **CONCLUSION:** The current study gathered new insights on the impact of fatigue on the sense of agency, by showing that long-lasting but not acutely induced experimental fatigue interferes with sensory attenuation.

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