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AN INCONGRUENT ANSWER TO THE SENSORIMOTOR INCONGRUENCE THEORY IN PEOPLE WITH NON-SPECIFIC MUSCULOSKELETAL PAIN

SANNEKE DON

Friday, May 17th 2019 at 18:00

Room Auditorium 3, campus Jette

Please confirm your presence before May 10th to Sanneke.Don@vub.be

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ABSTRACT OF THE RESEARCH

Musculoskeletal pain (MSP) is a highly prevalent, complex and burdensome disorder. MSP can have an immense impact, especially when pain becomes chronic. Up to know, underlying mechanisms of chronic MSP are not well understood. To increase the overall understanding and the effectiveness of current treatment strategies of MSP, it is imperative that possible underlying mechanisms are studied.

Sensorimotor incongruence (SMI) could be a contributor to ongoing pain in people with MSP. SMI is defined as an internal mismatch within the sensorimotor system. This mismatch originates between predicted motor output and actual sensory feedback coming for the periphery. Like the onset of nausea during motion sickness (when visual and vestibular information is discordant), pain might be the result of a constant mismatch (as a result of maladaptive neuroplasticity) between the prediction of motor output and afferent sensory input during movement. Pain is suggested to function as a warning signal for incongruence.

The idea of SMI was supported by earlier empirical studies that showed the occurrence of all sorts of sensations – such as pain, discomfort, perceived temperature or weight changes and feelings of peculiarity – when people with MSP and healthy individuals perform movements in an artificial environment of SMI. In this environment of artificial SMI (this is called experimental SMI), a conflict between vision, proprioception and motor intention is created by placing a mirror between one’s limbs while asking the participant to move the limbs asymmetrically. These bimanual coordination experiments test the assumption that an exacerbation of existing pain and other symptoms in people with pain due to SMI will be triggered by exposure to a sensorimotor mismatch.

The aim of the present doctoral thesis was to further investigate the relationship between SMI and pain. To do so, 1) we conducted a systematic review that investigated the relationship between experimental SMI and pain or sensory disturbances in people with MSP and healthy individuals. Furthermore, three experimental studies were conducted: 2) to investigate the effects of a visual feedback experiment of the neck and the bimanual coordination experiment on sensory disturbances and pain in people with chronic whiplash-associated disorder (WAD), 3) to investigate the effects of a visual feedback experiment of the back on sensory disturbances and pain in people with chronic low back pain (CLBP) and 4) to investigate the effects of a visual feedback experiment of the back on sensory disturbances and pain in people with acute low back pain (ALBP). The visual feedback experiments created experimental SMI by distorting real-time images (in a third-person-perspective) of the own neck or lower back during movement.

In these experiments, incongruent visual feedback during movement was compared to congruent visual feedback during movement. According to the SMI-hypothesis, incongruent visual feedback would significantly trigger more pain (or sensory disturbances).

The studies of this doctoral thesis demonstrated that:

1) experimental SMI triggered significantly more and a higher intensity of sensory disturbances compared to the control conditions (moving with usual visual feedback of the arms) in people with MSP, but no conclusions regarding pain could be made. In healthy individuals, experimental SMI rarely triggers pain, and if pain was reported, intensity ratings were very low.

2) incongruent visual feedback of the neck during neck movement (experimental SMI) caused most sensory disturbances but did not affect pain in people with chronic WAD. The increase of reported sensory disturbances was only present during the provision of incongruent visual feedback of the neck and not during incongruent visual feedback of the arms. This effect was not present in the healthy control group.

3) experimental SMI does not trigger significantly higher or more sensory disturbances and pain in people with CLBP and healthy individuals.

4) experimental SMI does not trigger significantly higher or more sensory disturbances and pain in people with ALBP and healthy individuals.

In summary, these results do not support the SMI hypothesis idea that SMI might play a role in the generation of sensory disturbances or pain in people with MSP since experimental SMI did not trigger or increase pain in both people with MSP and healthy individuals. These novel findings contribute to understanding the concept of SMI and the relationship between the visual and motor domain.

CURRICULUM VITAE

Sanneke Don started her PhD on sensorimotor incongruence and visual feedback at the Vrije Universiteit Brussel in 2014. She is a member of the Pain in Motion research group and combined her PhD-work with her work as a physiotherapist. As a physiotherapist, she works in a primary care setting and mainly sees people with chronic pain. Sanneke teaches manual therapy and sports physiotherapy students at the University of Applied sciences in Rotterdam and provides courses for physiotherapists. She presented her work on several international congresses and authored and co-authored seven peer reviewed papers. Furthermore, she received the ‘2017 JOSPT Excellence in Research Award’ by the Journal of Orthopaedic & Sports Physical Therapy for the second paper of her PhD.