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Trunk stabilization in chronic low-back pain

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Thesis summary

Improving the understanding of trunk stabilization in healthy subjects and low-back pain patients may contribute to improved diagnostics and better treatment for chronic low-back pain. In **Chapter 2**, a systematical review was performed on low-back pain perturbation studies. Longer delays in muscular activity were found in low-back pain, but no other indications on increased stiffness were shown. Methodological shortcomings in many of the included studies made it difficult to draw firm conclusions from this review. For example, the observed delay in muscular response could also result from differences in baseline EMG, used to calculate these onsets. However, these were not reported.

In **Chapter 3**, a systematical review was performed on methods to assess trunk stabilization. Many perturbation methods were found, however, only a limited selection of articles described methods that can be recommended when tested on construct validity (intrinsic and reflexive contributions to trunk control can be measured simultaneously and the trunk is studied in isolation). None of these methods, however, were evaluated on other clinimetric properties such as reliability. One of the recommended methods, developed by our research team, was tested on test-retest reliability in **Chapter 4**. We aimed to investigate the between-day reliability of both admittance and reflex gains in healthy subjects and low back pain patients. The results showed that trunk stabilization can be measured reliably.

The same method was used to assess the effects of age and sex on trunk motor control in **Chapter 5**. Admittance decreased with age and was lower in females than males. These results on healthy subjects imply that age and sex differences should be considered when assessing the relationship between low-back pain and trunk motor control.

In **Chapter 6**, the difference in low-back stabilization and underlying mechanisms between low-back pain patients and healthy controls were assessed. No differences were found in reflex delays. Low-back pain patients showed lower admittance, mainly due to higher position-, velocity- and acceleration feedback gains. These differences were associated with more negative pain-related cognitions, such as fear of pain and pain catastrophizing. We interpret these changes as reflecting protective behavior.