Author’s response to reviews

Title: Neuromuscular exercise reduces low back pain intensity and improves physical functioning in nursing duties among female healthcare workers; secondary analysis of a randomised controlled trial

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Author’s response to reviews:

Point-to-point response letter to revised manuscript

We wish to thank the Reviewer 1 for his precise comments, which help to improve the manuscript. In this response letter, we have picked only those comments or complaints of the Reviewer 1, which require more detailed explanation or inserts to the manuscript (highlighted in yellow colour in the manuscript).

Reviewer 1:

“After rereading my comment, I understand the confusion. I was unable to adequately present my concerns regarding the rationale of the study. My concerns are that the assumption that impairments in postural and/or movement control are causes or risk factors for LBP or persistence of LBP are based on findings from cross-sectional studies. In the abstract of the 2015 study by Babiolakais and colleagues cited by the authors it is even stated that "It is unclear whether poor lumbopelvic control is causal or adaptive in RInj nurses and may require further investigation." (reference 14) References 20 through 24 are indeed all cross-sectional and as a result do not provide information on impairments in postural and/or movement control as a cause for LBP or persistence of LBP. It is as likely that the impairments found are adaptive and way for patients with LBP to move with as little pain as possible. Similarly, the associations between low physical fitness and LBP could be due to the decreased activity levels in patients with LBP because of the pain. Furthermore, line 85 (Spinal stability… back health.) references the 2003
work of Punjabi based on similar assumptions. Although the use of reference 29 is justified, I cannot find this in reference 30. Reference 30 only mentions "One factor that has been proposed as important in the genesis and persistence of nonspecific LBP is stability and control of the spine.", which was referenced from the same 2003 paper from Punjabi.

While it is true that the references for the intervention are reviews and RCTs, the rationale for the intervention is based on inferences of causality from data from cross-sectional studies. "Patients with LBP show differences in spinal movement (control) compared to healthy controls, therefore reducing or removing these differences reduces LBP."

Unsurprisingly, after more than 20 years of research on movement control exercises, and to a lesser extent Pilates exercises, as a treatment for LBP the most recent Cochrane reviews on both interventions conclude that there is no conclusive evidence of superiority over any other form of exercise, which is supported by the literature referenced by the authors.”

Our response:

We have added following texts to the manuscript, Background -section:

As insertion to the paragraph which deals with movement control impairments and LBP, we added a sentence : “LBP tends to affect and change motor behavior [1]” (page 4, row 73). To the end of that paragraph we added: “However, it is still unclear whether poor lumbopelvic control is a cause for LBP or a consequence of it. Evidence on the effects of movement control exercise interventions on pain intensity is only small to moderate [2, 3] (page 5, rows 80-82)

Also a sentence considering LBP and poor physical fitness has been added to page 5, rows 85-87: “Evidence about those associations is still partly conflicting with respect to revealing whether physical inactivity and deconditioning cause LBP or, alternatively, LBP leads to decreased physical activity and deconditioning [4]”

People with LBP move differently than healthy controls (and those findings are from cross-sectional studies). At present we do not know exactly, why it is so. Theories rely on avoidance of pain, deficiencies in proprioception, central processes, central re-organization or motor output, or poor fitness, which causes early tiredness and thus affects motor control. Research on movement control exercises among people with non-chronic (sub-acute or recurrent) LBP is still scarce (compared to studies conducted among people with chronic LBP), and that is the rationale for our study. We explain that on Background section, page 4, rows 67-69, and page 5, rows 99-101.

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Previous discussion: Reviewer 1: “Following this line of reasoning and the findings from Foster and colleagues, one would expect the contents of a treatment strategy for people with acute LBP
to contain advice to remain active and education, with the addition of exercise therapy and
cognitive behavioural therapy for people with persistent LBP. (Foster et al., 2018)"

We are very aware of the fact that advice to remain active is recommended in acute LBP, and it
was included in back care counselling intervention in a 4-arm setting of the NURSE RCT. To
avoid any contamination with the counselling, all advice considering life style was avoided in the
NME intervention.

Reviewer 1's response: “Based on the author's response I would recommend the addition of a
modified version of the last sentence to the description of the NME intervention.”

A sentence “To avoid any contamination with back care counselling intervention (in the original
4-arm setting of the NURSE RCT), the instructors were advised to follow the standardised
exercise programme, and to avoid other kind of counselling (like physical activity and other
lifestyle)” was added to the section considering the Exercise intervention (page 10; rows 208-
211).

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Reviewer 1:

“…when the authors write in the background that there is currently no evidence of superiority of
pilates or movement control exercises over other forms of exercise they raise the expectation that
the current trial will attempt to demonstrate the superiority”

Our response:

We wish that with those explanations that we added to the manuscript, the Reviewer will accept,
that we do not attempt to demonstrate the superiority of our NME program. We honestly wanted
to study the effects of that program among a FEMALE group with NON-CHRONIC LBP and
physically heavy work. Previously the exercise interventions based on the same biomechanical
principles than the current study, have been conducted among MALE participants with chronic
LBP and physically heavy work in railroads [5] and for young conscripts in defence army forces
[6](primary prevention study).

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Reviewer 1:

“Based on the response by the authors, I understand their work adds to the literature on the
treatment of healthcare workers. As the work duties of healthcare workers puts them at higher
risk of LBP and developing persistent LBP (because of both the physical and mental stress of the work), they are as a group most likely different from the general population. Highlighting this difference between healthcare workers with LBP a group and patients from the general population might improve the rationale”.

Our response: We tried to follow the reviewer’s advice to highlight the difference between healthcare workers and general population, but that felt somehow of repeating what we had already written in the manuscript. In the Background -session (page 3, rows 380-383) we discuss the high risk of LBP among healthcare workers due to physically strenuous work, and in the Discussion -part we discuss musculoskeletal loading during movements (both at work and while exercising, pages 17-18, rows 365-383). And finally, in the Discussion (pages 17-18; rows 410-415) we describe our study sample: “… of a sample who had non-chronic low back troubles and were at risk for chronic pain due to physically burdensome work” when we discus generally the risks of leaving the nursing profession.

Reviewer 1:

“I recommend adding the importance of tailoring exercise recommendations to the preferences of the patient to improve adherence. Pilates- and or yoga-type NME can be recommended to those who are interested in them to improve adherence”

Our response:

This has been written out to the Discussion -part, page 19; rows 406-409: “In general, the NME programme used in the present study was feasible and the biomechanical principles can be modified into other kind of exercise training. This NME program can be recommended specially for those who are interested in Pilates- or yoga-type NME, but the exercises can be tailored according to patient’s preferences to improve exercise adherence.”


3. Luomajoki HA, Bonet Beltran MB, Careddu S, Bauer CM: Effectiveness of movement control exercise on patients with non-specific low back pain and movement control

