Author’s response to reviews

Title: Effectiveness of internet-delivered education and home exercise supported by behaviour change SMS on pain and function for people with knee osteoarthritis: A randomised controlled trial protocol.

Authors:

Rachel Nelligan (rachel.nelligan@unimelb.edu.au)

Rana Hinman (ranash@unimelb.edu.au)

Jessica Kasza (jessica.kasza@monash.edu)

Kim Bennell (k.bennell@unimelb.edu.au)

Version: 1 Date: 12 Jun 2019

Author’s response to reviews:

11th June 2019

Dear BMC Musculoskeletal Disorders Editorial Office,

Re: BMSD-D-19-00447 Manuscript revisions

Thank you very much for the opportunity to revise and resubmit our manuscript for further consideration for publication in BMC Musculoskeletal Disorders. In the following pages, we have outlined our responses to the comments of the review team and listed lines numbers to indicate where changes were made to the manuscript. We have also highlighted the modifications made within the manuscript.

We hope that you find our revised manuscript satisfactory.

Yours sincerely,

Rachel Nelligan

On behalf of the authors

Reviewer reports:
Martin Behrens (Reviewer 1): General comments:

The present study protocol deals with the effect of SMS support to an online-based physical activity and strengthening exercise program vs. the same exercise prescription without SMS support. It is thought that SMS support would increase adherence to the program and therefore improve subjective outcome measures to a greater extent that the exercise program without SMS support.

We know the global adaptations in different subsystems of the human body to different interventions (strength training, endurance training, balance training etc.). However, knowledge about the benefits of physical activity for different musculoskeletal disorders does often not translate into practical realization. Therefore, increasing adherence to exercise programs is of great interest with the aim to promote lifelong physical activity in mind. Thus, the following study protocol is of interest. However, there are some minor issues that should be clarified before this manuscript can be considered for publication (see specific comments).

Specific comments:

1. Title

The title is very bulky. I would suggest to shorten the title but I have no good idea. Maybe you have one.

Please check if you mean osteoarthritis or osteoarthrosis. The introduction indicates that you mean the latter one. This is of particular interest because there is a long discussion about the appropriate use of these terms. Please check this aspect for the whole manuscript.

Thank you for your suggestion, we have simplified the title.

Regarding the use of terms osteoarthritis or osteoarthrosis, our use of osteoarthritis throughout the manuscript is intentional. The study background refers to osteoarthritis literature with the population of interest being individuals with a clinical diagnosis of knee osteoarthritis, as recommended (NICE 2014). Osteoarthritis is also the term used by the Osteoarthritis Research Society International and not osteoarthrosis.


2. Background

l37: With regard to the appropriate use of the terms osteoarthritis and osteoarthrosis, please give a short definition of the joint disorder you mean here.
Osteoarthritis and osteoarthrosis are two terms that have been used for the same joint disorder. As outlined above, osteoarthritis is the term that is now most consistently used internationally. We have provided a short definition of OA being a chronic joint condition that affects the entire joint, with low grade inflammation typically present. We have also added greater detail relating to the clinical diagnosis of osteoarthritis (Line 37-41).

138: Please delete the dot before "(2, 3)"

Dot removed. Line 40

165: Do you mean arthritis or arthrosis. Please check this aspect in the whole manuscript.

As it is used here, the term ‘arthritis’ reflects what is written verbatim in the referenced manuscript which reports findings of a study that involves participants with ‘self-reported arthritis of any type’. (Wilcox, McClenaghan et al. 2015)

As explained above our use of osteoarthritis though out the manuscript is intentional. The term now used by international osteoarthritis bodies is arthritis/osteoarthritis because it is now recognised that inflammation plays a key role in osteoarthritis.


190: Please insert a space character between the reference (36) and "and".

Line 93

3. Methods

1149-153: I have seen that you provide a sample size calculation elsewhere. However, a small hint, that a sample size calculation was done, could be inserted here.

Text added Line 151

1226-228: What is the rationale behind the number of repetitions the number of sets and the frequency of training? Which rest interval will you recommend between sets and exercises? What is the focus of the exercise prescription, e.g. hypertrophy, muscle coordination, muscle activation, multi-modal etc. Please give more (physiological) justifications for the chosen exercise characteristics.

We selected the exercise protocol for this study to match exercise protocols in our previous research which were found to be effective in reducing pain and improving function in the knee osteoarthritis population. The program was developed to be in accordance with ACSM resistance
training guidelines for muscle strengthening in middle aged and older adults (Garber, Blissmer et al. 2011). We have recommended a 2-minute rest interval between sets.

We have chosen to use protocols previously found to be beneficial and safe in the osteoarthritis population as our aim is to assess the delivery method of exercise, as opposed to the potential physiological mechanisms of action of exercise. As we state in our discussion “This study will provide insight into the effectiveness of digital technologies to prescribe and promote adherence to exercises that are effective in the knee OA population when delivered by a physiotherapist, without health professional input”

We have added text within the methods to justify our use of protocol, exercise focus and rest breaks between sets. Lines 223-227 and 231-234.


l262: Please insert a space character between numbers and operators and do this in the whole manuscript.

Completed throughout

l277-289: Will nutritional information also be provided on the respective home page? Do you control for nutritional changes? This might have impact on your results since nutritional interventions have been shown to alter the extent of inflammation, pain etc.

We do not provide nutritional information on either the intervention or control website and we are not controlling for or capturing data related to nutritional changes.

l297: Please use "sex" instead of "gender"

Changed in text (line 305) and table 2

l319: doubling "quality of life"

Duplication deleted

4. Discussion

Why do you expect a better outcome regarding your primary and secondary endpoints due to SMS support? Do you think that an increased adherence in terms of more exercise sessions per week translate into increased adaptive responses?
Please provide more information regarding the effect of your training intervention (number of repetitions, sets, rest interval, additional loading etc.) on potential physiological and psychological adaptations and how these could translate in a superior outcome in your self-reported assessments.

In this trial, only the intervention group receive an exercise program. Hence, we expect a better outcome because the comparison group are not doing prescribed exercise and there is clear evidence from a meta-analysis of 44 clinical trials that exercise has benefits for both pain and function in knee OA (Fransen, McConnell et al. 2015). However, the mechanisms underpinning these positive effects are not fully understood and may include improvements in upper leg strength and proprioception and decrease in extension impairments (Runhaar, Luijsterburg et al. 2015) together with improvements in psychological status. In this study we are only evaluating if digitally delivered and supported exercise can have a positive effect on pain and function and will not be investigating underlying mechanisms. Given this and the fact that this is a trial protocol, we believe it is beyond the scope of the protocol to include more discussion that we have provided.


Paul Jarle Mork, PhD (Reviewer 2): BMSD-D-19-00447

General comment:

This manuscript is a protocol for a randomised controlled trial (RCT). The RCT will investigate the effectiveness of an internet-delivered combined intervention (education, physical activity guidance and a 24-week strengthening exercise program supported by short message service) versus internet-delivered education alone in people with knee osteoarthritis (OA). Overall, the manuscript is well-written and clear, but the authors may consider clarifying some issues.

Major points

1. Previous similar RCTs referred to in the introduction have only found a short-term effect or now effect. I would recommend that you include (at least) a follow-up at 12 months to facilitate comparison with previous similar studies.

Thank you for this feedback. We had also discussed including a 12-month follow-up, but for several reasons, deemed that this was not feasible. First, the study forms part of a student’s
doctoral thesis and as such timelines and funding do not permit a 12-month follow-up. Second, as the study commenced in 27th July 2018, 100 participants have already completed the study at the 24-week timepoint, making an amendment to study duration not feasible.

2. The authors claim that the 24-week program is 'evidence-based' (p. 6, line 101). I suggest that you provide more details (from reference 41) to underpin the claim that the program is evidence-based.

We have removed the term ‘evidence-based’ as the exercise program has not been evaluated when delivered digitally. As described in the manuscript the exercises used in the program “have been found to reduce pain and improve physical function in people with knee OA when prescribed by a physiotherapist, remotely using video conferencing (Bennell, Nelligan et al. 2017).”


3. The description of the intervention is not entirely clear, i.e., the description of 'My Knee Education' is not consistent for the intervention group (p. 11) and the control group (p. 14). Will the control group have access to 'My Knee Education' and nothing more?

We have changed the text to clarify this. Line 286-290

4. Is the SMS linked to the webpage, i.e., is the SMS conditioned/timed by the activity on the webpage? Is there any tailoring of the intervention?

The SMS program is referred to in the website, however they are not linked. The automated SMS program is triggered by the study co-ordinator at the time of participant enrolment, not by website interaction. The SMS program is tailored to include a participant’s name, this has been added to the manuscript.

Text has been added within the manuscript. Lines: 261-263.

The SMS program is also tailored based on participant responses to certain messages as described in the manuscript Lines: 274-279

Relating to website, it is not tailored to each participant. All participants receive the same standardised website. However, the website includes instructions to assist participants tailor the strength-based exercise programs provided in ‘My Knee Strength’ (Lines 232-243) and includes guidance for participants to make their own physical activity plan in ‘My Knee Activity’ (Lines 247-249)
5. Can users progress without reporting back via SMS? If yes, they may adhere to the exercise program but not to the reporting via SMS.

Participants can use the website without interacting with the SMS program. Exercise adherence will be captured by questionnaires at the 24-week timepoint not via SMS reporting.

6. The description of the sample size calculation is very sparse. You plan to report two primary outcomes. What outcome was used for the calculation? What is the difference you expect between the intervention and control group? Will you use a mixed-model ANCOVA? A drop-out rate of 15% may seem low. How did you estimate this number?

We have re-written our sample size calculation to provide more detail. Lines: 398-411.

Mixed model ANCOVA will not be used since the outcomes are only measured at one follow-up time point, 24 weeks.

15% loss to follow up was selected as it aligns with our previous randomised controlled trials in the osteoarthritis population. For example, 90% follow up of primaries at 3 months (Bennell, Nelligan et al. 2017) and 85% follow up at 6 months (Bennell, Campbell et al. 2017).

Please also note that we have provided greater detail regarding the physical function primary outcome. We had initially stated to be measuring physical function using the Knee Injury and Osteoarthritis Outcome Score (KOOS), unintentionally omitting that we were extracting the Physical Function subscale of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) from the KOOS, which contains the WOMAC questions (Roos, Roos et al. 1998). We became aware of this omission when providing greater detail for our sample size calculation. (Lines 314-317).


7. I suggest that the authors also consider reporting the RCT according to the CONSORT-EHEALTH guidelines (see paper by Eysenbach and co-workers: "CONSORT-EHEALTH:
Improving and Standardizing Evaluation Reports of Web-based and Mobile Health Interventions’).

Thank you for this suggestion. We will also report the RCT manuscript according to CONSORT-EHEALTH guidelines. The relevant reference has been added to Line 148.

Minor points

1. P. 4, line 38. Remove period before reference

   Period removed

2. P. 4, line 39. Abbreviation 'OA' already introduced in line 37

   Thank you for querying this. We have used ‘Osteoarthritis’ here intentionally, to avoid using an abbreviation at the start of a sentence.

3. P. 6, line 90, space after reference 36

   Space has been removed.

4. P. 6, line 108, COM-B not defined (and not included in list of abbreviations)

   Thank you for identifying this. We have modified text and included a description under abbreviations. Lines 110-111 and 460.

5. P. 12, line 49, period before 'and'

   Period removed.