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Validity and reliability of RPE as a measure of intensity during isometric wall squat exercise

John W. D. Lea, Jamie M. O'Driscoll, Damian A. Coleman & Jonathan D. Wiles

Corresponding author
Jonathan D. Wiles
Canterbury Christ Church University, North Holmes Road, Canterbury, CT1 1QU, United Kingdom

Handling editor:
Michal Heger
Department of Pharmaceutics, Utrecht University, the Netherlands
Department of Pharmaceutics, Jiaxing University Medical College, Zhejiang, China

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Dear Mr Lea,

Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision.

For your guidance, reviewers' comments are appended below.

If you decide to revise the work, please submit a list of changes or a rebuttal against each point which is being raised when you submit the revised manuscript. Also, please ensure that the track changes function is switched on when implementing the revisions. This enables the reviewers to rapidly verify all changes made.

Your revision is due by Feb 25, 2021.

To submit a revision, go to https://www.editorialmanager.com/jctres/ and log in as an Author. You will see a menu item call Submission Needing Revision. You will find your submission record there.

Yours sincerely

Michal Heger
Editor-in-Chief
Journal of Clinical and Translational Research

Reviewers' comments:

Reviewer #1: This article provides a unique perspective on RPE and isometric wall squats with an attempt to quantify validity and reliability of the tasks. Unfortunately, the manuscripts attempts to classify validity fall short given the lack of a sufficient comparison and/or classification of validity. The manuscript provides no rationale for the type of validity measured nor specifies why this is important. For example, if you are assessing concurrent validity it should be a specific measure compared to another similar tool/technique or outcome. This manuscript fails to adequately categorize this information along with lacking a sufficient scientific rationale/approach for why this study was conduct. It is highly recommended that the scientific hypotheses be significantly strengthened along with a specific category for the validity alongside physiological theory/rationale.
Specific comments:
Abstract - states that continuous monitoring of BP took place, yet the methods section contradicts this finding.
Introduction - P5, L36 - I feel the at home-ability of this assessment should be focused on within the scientific rationale. However, caution should be considered when making relationship based statements as you are not comparing this modality to other exercise modalities etc.
Methods - statistical analysis should be cleared denoted/separated by which type validity and/or reliability you are analyzing. The general statements on the statistical approach is appreciated but it could be strengthened by clear statements regarding how each aspect of the study was analyzed.
Methods - participants were considered physically inactive while the prior research in this area used semi-active and/or recreationally active individuals. BP and HR measures will be influenced by these classifications, thus it is important to consider and either include a secondary group or physically active individuals.
Methods - it is unclear why the last 5s of the 2-min wall squat were measured. Providing a defendable rational is highly recommended.
Results - p-values are commonly reported at (p-values) comparative to the upper case version. I recommend you address this along with adding specific f-values as appropriate.
Results - from the data presented about the reliability on P11, Table 2, why were only certain angles analyzed compared to others? This speaks to the exploratory nature of the manuscript and should be sufficiently justified.

Reviewer #2: Excellent study on evaluating whether RPE is correlated with vital signs, such as MAP and HR. The only limitation really is that the sample size is rather small (n = 29) and conducted in only young adult males. I understand that including females and older males and females would have entailed using them as separate groups (they cannot be combined with other subjects); but, at least, the sample size should be larger.
Mention this limitation in the Discussion.

Finally, In Materials and Methods > Participants, first line: substitute "body weight" for "body

mass".

Reviewer #3: Abstract
- Background and Aims
Line 8: In this study, intensity was only altered by changing workload (i.e., the angle of the knee) and not time under tension (i.e., length of contraction), therefore only a change in workload should be noted.
Line 7 to 9: What is the difference between "assessing the validity and reliability of RPE as a measure of IE intensity (workload x time under tension)" and "examine the ability of RPE to discern between different isometric wall squat intensities." This aim seems repetitive.
- Methods
Line 10: More detail about the exercise protocol should be included: What was the duration of each test? What was the duration of the rest periods between tests? Did the 8 tests make up one session of training? Each participant only completed one session of training?
- Results
Line 14: It may be beneficial to briefly state what workload is/how it is measured (i.e., the angle of the knee) so this is clear to the reader in the abstract.
- Conclusion
The conclusion should be specific to the aim. RPE may be used to measure wall squat intensity when knee angles are changed by 10 degrees. This study did not show that RPE is comparable to other ways of prescribing intensity.

Introduction
Line 8: Consider including the follow systemic reviews and meta-analyses as references.
- Carlson DJ, Dieberg G, Hess NC, Millar PJ, Smart NA. Isometric exercise training for blood pressure management: A systematic review and meta-analysis. Mayo Clin Proc. 2014;89(3):327-34.
- Inder JD, Carlson DJ, Dieberg G, McFarlane JR, Hess NC, Smart NA. Isometric exercise training for blood pressure management: A systematic review and meta-analysis to optimize benefit. Hypertens Res. 2016 Feb;39(2):88-94.
- Smart NA, Way D, Carlson D, Millar P, McGowan C, Swaine I, Baross A, Howden R, Ritti-Dias R, Wiles J, Cornelissen V, Gordon B, Taylor R, Bleile B. Effects of isometric resistance training on resting blood pressure: Individual participant data meta-analysis. J Hypertens. 2019 0ct;37(10):1927-38.
Line 16 and 17: Be specific - you are referring to the need of expensive equipment and consuming testing protocols to assign and monitor intensity? Also, before "interventions" insert "IE" so the topic of discussion is clear.
Line 18: Are you referring to more accessible modes of prescribing intensity? Also, the end of this sentence should be the end of the paragraph, and provide a transition to the start of the next paragraph.
Line 19 to Please specify if HR and BP increase or decrease with increases or decreases in degree changes, similar to what you did in the next sentence to express the impact of changing time under tension. Additionally, how were joint angles measured or prescribed? Is truly an easy method of prescribing IE at home if individuals need a tool to measure joint angles?

With the sentence beforehand, "Consequently, more accessible modes of IE that could be implemented in the home have been explored", it reads that you are suggesting this is an appropriate home-based method to prescribe intensity.
Line 24 to 26: More detail is needed to explain how intensity was derived and subsequently prescribed to complete training at home. This should be stated to make it clear if it is a feasible approach to prescribing home-based training.
Line 26: New paragraph should start with "Rating of perceived exertion (RPE)…"
Line 29: Should read "Isometric handgrip training", not "isometric hand gripping"; working is awkward

Overall comments for the introduction:
- There is no background information in the introduction to explain what the IES is, how it was developed, what form of exercise and exercise protocol it was developed for, or if its validity and reliability have been confirmed. How does it relate to the BORG scales? Why was the IES used instead of a BORG scale? Has this research been published as a manuscript, or only presented as an abstract at a conference (as cited)?
- The second aim, are you trying to determine if RPE can discern isometric wall squat workloads at a 10-degree resolution to replace this form of measuring intensity? This aim needs to be made clearer. Additionally, when the 10-degree resolution method of prescribing intensity is noted previously in the introduction, the connection of that information to the purpose of this study is not clear.
- Since there is not much research to date investigating the use of RPE to prescribe IE intensity, this should be emphasized in the introduction as it promotes the importance of this area of research that this study has addressed.

Materials and Methods
- Participants
Line 8: What type of exercise is being referred to when it is noted that participants are physically inactive?
- Study Design
Line 17 and 18: Why were the angles 135, 115, and 95 degrees completed twice and not the others?
Line 20: How many participants performed more than one session in a day? Did this commonly occur?
Line 21: Were they instructed to or verified to be wearing appropriate footwear, as this may impede their ability to hold the wall squat?

Procedures
- Familiarization
Line 29 and 30: Was this a separate lab visit? Or was this completed before each testing session?
- Resting Measures
Line 34: What were the anatomical landmarks for placing the blood pressure cuff?
Line 37: When BP is stated here, do you mean SBP, DBP, and MAP? If BP is going to be referred to as SBP, DBP, and MAP throughout the document then this should be clarified at first mention.
Line 38 and 39: If the supine measures were used to determine resting (i.e., baseline) BP, why were seated measures completed?
- The Isometric Wall Squat Exercise Protocol
Line 41: Insert HR and BP before measures

Line 42: How was randomization of the knee joint angles determined?
Line 45 to 49: So if this exercise is to be performed at home, how will the use of this equipment to determine joint angle be overcome? This is why in the introduction it needs to be made clearer what the aims of the study are, and the literature to support the research needs to be presented more logically. Is an aim to show that RPE can be used instead of measuring joint angle?
Line 50: What is a spirit level?
Line 53: Why was 2 minutes the max allocated time? Is it assumed that everyone would fatigue by this point? What if individuals did not fatigue by this point? Did all participants perform a max wall squat at the start of the session to understand the baseline starting point for all?
- Ratings of Perceived Exertion
Line 26: This research has not been published in a manuscript, but is found in an abstract (i.e., poster) presented at a conference. Please refer to previous comments regarding the use of the scale (e.g., why was the BORG scale not used?)

Data Analysis
Line 25: As noted before, state previously what BP is, in other words, it is made up of SBP, DBP and MAP. State this once so in future mention the reader understands all the measurements that were completed OR name all specific measures.

Results
- Resting Measures
To confirm, were these measures taken from the seated or supine procedure?
- Exercising Measures
Line 11 and 12: What is meant by calculated as average of all time points? Is this what is being represented in Figure 3? Mean and peak results are not clearly explained to understand how they were calculated for each measure.
Line 17: Use the same terms that are used in the next sentence to be consistent; "consecutive squatting workloads" instead of "each increase in squatting workload" and "time points" instead of "consecutive time points". Add something to specify that the time points are within each 2-minute contraction.
Line 17: "Blood pressure" should be BP. Please check the proper use of abbreviations throughout the document.
- Figure 3
There needs to be more of a description of what this figure is showing. Is this the average measure (e.g, HR, RPE, etc) across all participants at a certain time within the 2-minute contraction? Additionally, indicate where significant differences are for the varying angles. Indicate where significant differences are with * or another symbol then define in the figure description.
The legend for the angles also needs to be labelled to indicate what each degree represents (i.e., they are all knee joint angles)
- Table 1
Indicate where significant differences are with * or another symbol then define in a table description.
- Figure 4
There needs to be more of a description of what this figure is showing. Is this the average measure (e.g, HR, RPE, etc) across all participants at a certain angle within the 2-minute contraction? Additionally, indicate where significant differences are for the varying angles. Indicate where significant differences are with * or another symbol then define in the figure

description.
- Reliability of exercise measures
Line 1: For this new section, indicate in brackets what the exercise variables are.

Discussion
Line 17: Use consistent terminology for handgrip
Line 20: Please explain what was shown by Goldring et al., (14), and how this directly relates to the results on this study.
Line 19 to 22: What is meant by this? This section needs to be explained. It is unclear what the importance is.
Line 24: What is ICC? Repeated more than once in this paragraph.
Overall: So, what do the findings about RPE from this study show? That the ratings increase with an increase in workload and time under tension (as expected), but what does this mean when it comes to prescribing wall squats at home? Will individuals be prescribed to work at a certain intensity to accomplish a related knee angle? Or what are the implications of these findings? The last paragraph of the discussion does a good job explaining next steps, but the discussion does not end with a clear explanation of what the findings from this study add to the literature and the relation of these findings to the next proposed steps (in the last paragraph). Please explain this more clearly so the importance of your findings is emphasized and connected to the "next steps".

Reviewer #4: GENERAL COMMENTS
The introduction section in the abstract can be shortened to one, maybe two, sentences so as to add a little bit more detail in the Methods section. For instance, the results indicated an increase in RPE at consecutive time points, so it would be helpful if the time points were described in the Methods.

SPECIFIC COMMENTS
Introduction
No comments here, very well written and presented.

Materials and Methods
Study design: Please indicate the reference angle (i.e., 180 deg = full knee extension).
It's not clear if the 8 separate occasions represent different days. The 4 hour separation

indicates that participants could have attended multiple sessions in one day.

Procedures, Familiarisation
At the end of the sentence, suggest changing "….the use of RPE." , to "….the use of the RPE scale."

Data Analysis
First sentence: Re-word reference to SPSS……first letter should be upper case.
Third sentence: Place "Time" in the parentheses to start with lowercase ("time")

Results
Reliability of exercise measures
In the third sentence, the ICC acronym should be used since it was defined earlier.
The r value is not typically used to represent the ICC (it's reserved for the Pearson correlation coefficient). The values should just be presented as ICC.
Have the authors computed the associated SEM's for the ICC values?

Authors' response

Reviewer Comments:

We would like to thank the reviewers for their constructive comments and for taking the time to help us to improve our work. We hope we have addressed all comments satisfactorily (please see detailed responses below).

Reviewer 1
This article provides a unique perspective on RPE and isometric wall squats with an attempt to quantify validity and reliability of the tasks. Unfortunately, the manuscript's attempts to classify validity fall short given the lack of a sufficient comparison and/or classification of validity. The manuscript provides no rationale for the type of validity measured nor specifies why this is important. For example, if you are assessing concurrent validity it should be a specific measure compared to another similar tool/technique or outcome. This manuscript fails to adequately categorize this information along with lacking a sufficient scientific rationale/approach for why this study was conduct. It is highly recommended that the scientific hypotheses be significantly strengthened along with a specific category for the validity alongside physiological theory/rationale.

- Thank you for your valuable feedback and additional guidance provided.
- Classification and rationale for the type of validity used has been added to the introduction
(Pg 4, Lines 44 – 47 and Pg 5, Lines 14-15).
- Increased rationale of the need for this study has also been integrated throughout the introduction (Pg 4-5)
- Research hypotheses were deliberately omitted since we felt these are implicit in the study aims, however we would be happy to add these if the reviewer feels this would enhance the quality of our manuscript.

Abstract
states that continuous monitoring of BP took place, yet the methods section contradicts this finding.

- HR and BP were monitored continuously, with values calculated for each 30-second period for comparison. Clarification of this has been added to the abstract (Pg 3, Lines 13-16) and the Materials and Methods section (Pg 7, Lines 10-13).

Introduction

P5, L36 - I feel the at home-ability of this assessment should be focused on within the scientific rationale. However, caution should be considered when making relationship-based statements as you are not comparing this modality to other exercise modalities etc.

- A statement has been added to make it clear that this research is one of the steps leading towards the possible implementation of home-based intervention using RPE, although we are aware that this is not specifically what is being tested in this study (Pg 5, Lines 6-9).

Methods

Statistical analysis should be cleared denoted/separated by which type validity and/or reliability you are analyzing. The general statements on the statistical approach is appreciated but it could be strengthened by clear statements regarding how each aspect of the study was analyzed.

- We have now split the data analysis section into clear statements based upon which aspect of the study is being analysed. Each statement outlines the statistics conducted to answer a specific research question (Pg 8, Data Analysis).

Participants were considered physically inactive while the prior research in this area used semi-active and/or recreationally active individuals. BP and HR measures will be influenced by these classifications; thus, it is important to consider and either include a secondary group or physically active individuals.

- Please accept our apologies, this categorization was reported in error based on some pilot work we have been recently conducting. In line with previous research, including Goldring et al. (2014), physically active individuals were used for this study. This error has been corrected and values for participant activity have been added (Pg 6, Lines 6-7).

It is unclear why the last 5s of the 2-min wall squat were measured. Providing a defendable rational is highly recommended.

- Results for the last 5 seconds of each 30-second period were calculated to comply with the methodology used by Goldring et al. (2014) in the development of the wall squat protocol. Reference added to the methods section (Pg 7, Lines 11-13).

Results

p-values are commonly reported at (p-values) comparative to the upper-case version. I recommend you address this along with adding specific f-values as appropriate.

- P-values changed to lower-case ‘p’ throughout.
- F-values and Chi-square values have now been added for main difference tests (Pg 9, Paragraph 2).

From the data presented about the reliability on P11, Table 2, why were only certain angles analyzed compared to others? This speaks to the exploratory nature of the manuscript and should be sufficiently justified.

- Reliability measurements were limited to 3 workloads to reduce the burden on the participants and therefore the attrition rate. A discussion of this point has been added to the discussion to justify this in the context of the paper being exploratory in nature (Pg 12, Lines 29-34).

Reviewer 2

Excellent study on evaluating whether RPE is correlated with vital signs, such as MAP and HR. The only limitation really is that the sample size is rather small (n = 29) and conducted in only young adult males. I understand that including females and older males and females would have entailed using them as separate groups (they cannot be combined with other

subjects); but, at least, the sample size should be larger. Mention this limitation in the Discussion.
- Thank you for your time and positive feedback to help improve the quality of our manuscript
- An *a priori* sample size calculation was conducted for this study, revealing a minimum sample size requirement of n = 24 – 29 for the primary analyses to be fully powered. A statement explaining this calculation has now been added to the 'Participants' section in 'Materials and Methods' (Pg 6, Lines 11-15)
- A limitation statement regarding the sample used has been added to the discussion (Pg 12, Lines 35-40).

Methods
Participants, first line: substitute "body weight" for "body mass".
- 'body mass' changed to 'body weight' (Pg 6, Line 4).

Reviewer 3
Abstract
- *Background and Aims*
Line 8: In this study, intensity was only altered by changing workload (i.e., the angle of the knee) and not time under tension (i.e., length of contraction), therefore only a change in workload should be noted.
-Thank you for your comprehensive feedback to help improve our work.
- We have now changed this as suggested to read 'workload' only (Pg 3, Line 7).
Line 7 to 9: What is the difference between "assessing the validity and reliability of RPE as a measure of IE intensity (workload x time under tension)" and "examine the ability of RPE to discern between different isometric wall squat intensities." This aim seems repetitive.
- The first aim was to assess the validity of RPE using correlations to workload. The second aim was to assess the 'resolution' at which RPE can decern different knee joint angles, and to compare that to the 10-degree resolution that Goldring et al (2014) showed for HR and BP. The second aim has been re-worded to make this distinction clear (Pg 3, Lines 7-9).
- *Methods*
Line 10: More detail about the exercise protocol should be included: What was the duration of each test? What was the duration of the rest periods between tests? Did the 8 tests make up one session of training? Each participant only completed one session of training?
- The following details have now been added to elucidate the exercise protocol:
- Each participant completed 8 separate training sessions, each session consisted of a single 2-minute squat tests.
- Methods expanded to include more details on the protocols used (including number of sessions, duration of squat test and rest period between sessions) and the data collection/analysis for this study (Pg 3, Abstract, Methods).
- *Results*
Line 14: It may be beneficial to briefly state what workload is/how it is measured (i.e., the angle of the knee) so this is clear to the reader in the abstract.
- This information has now been added to the 'methods' section of the Abstract (Pg 3, Line 12).
- *Conclusion*
The conclusion should be specific to the aim. RPE may be used to measure wall squat intensity when knee angles are changed by 10 degrees. This study did not show that RPE is comparable to other ways of prescribing intensity.

- The conclusion has now been amended to match the stated aims of testing validity, reliability, and the resolution of RPE (Pg 3, Lines 23-24).

Introduction

Line 8: Consider including the follow systemic reviews and meta-analyses as references.

- Carlson DJ, Dieberg G, Hess NC, Millar PJ, Smart NA. Isometric exercise training for blood pressure management: A systematic review and meta-analysis. Mayo Clin Proc. 2014;89(3):327-34.

- Inder JD, Carlson DJ, Dieberg G, McFarlane JR, Hess NC, Smart NA. Isometric exercise training for blood pressure management: A systematic review and meta-analysis to optimize benefit. Hypertens Res. 2016;39(2):88-94.

- Smart NA, Way D, Carlson D, Millar P, McGowan C, Swaine I, Baross A, Howden R, Ritti-Dias R, Wiles J, Cornelissen V, Gordon B, Taylor R, Bleile B. Effects of isometric resistance training on resting blood pressure: Individual participant data meta-analysis. J Hypertens. 2019;37(10):1927-38.

- Thank you for this guidance. These reviews have now been added to support the introduction as suggested (Pg 4, lines 7-8).

Line 16 and 17: Be specific - you are referring to the need of expensive equipment and consuming testing protocols to assign and monitor intensity?

- Equipment such as EMG, isokinetic dynamometer and handgrip dynamometer, are currently listed in the previous sentence. The next sentence has now been modified to read 'as listed previously' to specifically link the two sentences (Pg 4, Lines 12-14).

Also, before "interventions" insert "IE" so the topic of discussion is clear.

- 'IE' has now been inserted (Pg 4, line 15).

Line 18: Are you referring to more accessible modes of prescribing intensity? Also, the end of this sentence should be the end of the paragraph, and provide a transition to the start of the next paragraph.

- The more accessible 'implementation' refers to both prescription and training session protocols that require less expensive equipment to conduct.
- The paragraph has now been separated as recommended (Page 4, Paragraphs 2 and 3)

Line 19 to Please specify if HR and BP increase or decrease with increases or decreases in degree changes, similar to what you did in the next sentence to express the impact of changing time under tension.

- This has now been changed as recommended to show that significant increases in HR and BP were seen with 10-degree decreases in knee angle (Pg 4, Line 19).

Additionally, how were joint angles measured or prescribed? Is truly an easy method of prescribing IE at home if individuals need a tool to measure joint angles? With the sentence beforehand, "Consequently, more accessible modes of IE that could be implemented in the home have been explored", it reads that you are suggesting this is an appropriate home-based method to prescribe intensity.

- Prescription for the isometric wall squat is currently conducted in the laboratory, with the subsequent training conducted in the home. Information on the current wall squat intensity prescription protocol has been added for clarity (Pg 4, Lines 21-24).

Line 24 to 26: More detail is needed to explain how intensity was derived and subsequently prescribed to complete training at home. This should be stated to make it clear if it is a feasible approach to prescribing home-based training.

- More details on the currently used wall squat intensity prescription protocol have been added (Pg 4, Lines 22-24).

Line 26: New paragraph should start with "Rating of perceived exertion (RPE)…"

- Paragraph separated as recommended (Pg 4, Lines 31 and 32 - Paragraphs 3 and 4).

Line 29: Should read "Isometric handgrip training", not "isometric hand gripping"; wording is awkward
- This has now been reworded to 'Isometric handgrip training' (Pg 4, Line 35).
Overall comments for the introduction:
- There is no background information in the introduction to explain what the IES is, how it was developed, what form of exercise and exercise protocol it was developed for, or if its validity and reliability have been confirmed. How does it relate to the BORG scales? Why was the IES used instead of a BORG scale? Has this research been published as a manuscript, or only presented as an abstract at a conference (as cited)?
- This information has now been added, along with the published reference (Pg 5, Lines 1-4).
- Lea JWD, O'Driscoll JM, Coleman DA, Wiles JD. Validity and reliability of the 'Isometric Exercise Scale' (IES) for measuring ratings of perceived exertion during continuous isometric exercise. *Scientific Reports.* (In Press).
- The second aim, are you trying to determine if RPE can discern isometric wall squat workloads at a 10-degree resolution to replace this form of measuring intensity? This aim needs to be made clearer. Additionally, when the 10-degree resolution method of prescribing intensity is noted previously in the introduction, the connection of that information to the purpose of this study is not clear.
- The introduction has now been expanded and modified to provide greater context to the second aim (Pg 4 and 5).
- A brief explanation to contextualise reference to the 10-degree resolution has also been added (Pg 4, Lines 17-24).
- Since there is not much research to date investigating the use of RPE to prescribe IE intensity, this should be emphasized in the introduction as it promotes the importance of this area of research that this study has addressed.
- The lack of previous research in this area to emphasize the importance of our work has been added to the introduction (Pg 4, Lines 40-41).
Materials and Methods
- *Participants*
Line 8: What type of exercise is being referred to when it is noted that participants are physically inactive?
- Examples pf common exercises have now been added to the Methods section for clarity (Pg 6, Line 8-9).
- *Study Design*
Line 17 and 18: Why were the angles 135, 115, and 95 degrees completed twice and not the others?
Line 20: How many participants performed more than one session in a day? Did this commonly occur?
- To reduce the number of testing sessions, and consequently potential attrition, only 3 of the knee joint angles were repeated. This limitation has been added to the discussion section (Pg 12, Lines 29-34).
- All participants performed the three reliability sessions (Pg 6, Lines 17-21).
Line 21: Were they instructed to or verified to be wearing appropriate footwear, as this may impede their ability to hold the wall squat?
- For ease, participants were encouraged to complete all sessions barefoot or to use the same non-slip sports footwear for all sessions. This information has been added to the methods section for clarity (Pg 7, Lines 5-6).
Procedures
- *Familiarization*

Line 29 and 30: Was this a separate lab visit? Or was this completed before each testing session?

- The familiarisation was a separate session. This has been added to the methods for clarity (Pg 6, Lines 31-32).

- *Resting Measures*

Line 34: What were the anatomical landmarks for placing the blood pressure cuff?

- These anatomical details have now been added to the methods section (Pg 6, Lines 35-36).

Line 37: When BP is stated here, do you mean SBP, DBP, and MAP? If BP is going to be referred to as SBP, DBP, and MAP throughout the document then this should be clarified at first mention.

- This information has now been added for clarity (Pg 6, Line 39).

Line 38 and 39: If the supine measures were used to determine resting (i.e., baseline) BP, why were seated measures completed?

- Seated BP measurements were used to classify the participants' BP status (e.g. normotensive, prehypertensive etc.), while the more controlled supine measurements were used to examine the reliability of the resting HR and BP measurements between sessions. This has now been clarified in the methods section (Pg 6, Lines 37 and 41) and the results (Pg 9, Lines 3-8).

- *The Isometric Wall Squat Exercise Protocol*

Line 42: How was randomization of the knee joint angles determined?

- Session order was randomised using the Microsoft Excel's RAND function. This detail was not added to the manuscript as this process was not unique to this study.

Line 45 to 49: So, if this exercise is to be performed at home, how will the use of this equipment to determine joint angle be overcome? This is why in the introduction it needs to be made clearer what the aims of the study are, and the literature to support the research needs to be presented more logically. Is an aim to show that RPE can be used instead of measuring joint angle?

- These points have now been added to the introduction (Pg 4) and the discussion sections (Pg 12, Lines 41-48) to make the aims of the study clearer.

Line 50: What is a spirit level?

- A spirit level (bubble level, or simply a level) is an instrument designed to indicate whether a surface is horizontal or vertical. In this case, it was fitted to the goniometer measuring knee angle and was used to ensure the lower leg was kept vertical.

- The spirit level is shown in Figure 1. An extra reference to figure 1 was added (Pg 7, line 4) and extra description has been added to Figure 1 title (Page 7, figure 1 title).

Line 53: Why was 2 minutes the max allocated time? Is it assumed that everyone would fatigue by this point? What if individuals did not fatigue by this point? Did all participants perform a max wall squat at the start of the session to understand the baseline starting point for all?

- This methodology replicated the protocols used by Goldring et al (2014). The current isometric wall squat intervention for BP reduction utilises 4 x 2-minute contractions separated by 2-minute rest periods. Therefore, this 2-minute test allowed us to assess whether RPE was accurate enough to distinguish workloads within a single 2-minute contraction. This is important to know before RPE can be considered as a viable method to prescribe wall squat exercise intensity (Pg 4, Lines 17-31).

- *Ratings of Perceived Exertion*

Line 26: This research has not been published in a manuscript, but is found in an abstract (i.e., poster) presented at a conference. Please refer to previous comments regarding the use of the scale (e.g., why was the BORG scale not used?)

- Information on the previous validation study has been added to the introduction (Pg 5, Lines 1-4). In that study the IES showed better reliability that the Borg CR-10 scale and equal validity, so the IES was used in this subsequent study.
- Lea JWD, O'Driscoll JM, Coleman DA, Wiles JD. Validity and reliability of the 'Isometric Exercise Scale' (IES) for measuring ratings of perceived exertion during continuous isometric exercise. *Scientific Reports.* (In Press).

Data Analysis

Line 25: As noted before, state previously what BP is, in other words, it is made up of SBP, DBP and MAP. State this once so in future mention the reader understands all the measurements that were completed OR name all specific measures.

- This has now been defined as suggested in the methods sections (Pg 6, Line 39)

Results

- *Resting Measures*

To confirm, were these measures taken from the seated or supine procedure?

- Originally, only the supine resting measurements were presented here, with seated measurements used to classify BP status in the methods section. To make the results section clearer, seated results have been added to this section and the supine measurements have been indicated as such (Pg 9, Lines 3-8).

- *Exercising Measures*

Line 11 and 12: What is meant by calculated as average of all time points? Is this what is being represented in Figure 3? Mean and peak results are not clearly explained to understand how they were calculated for each measure.

- Mean results are the average of all measurements taken during the 2-minute period. This has now been clarified in the Methods (Pg 7, Lines 10-13) and Results sections (Pg 9, Lines 10-11).

Line 17: Use the same terms that are used in the next sentence to be consistent; "consecutive squatting workloads" instead of "each increase in squatting workload" and "time points" instead of "consecutive time points". Add something to specify that the time points are within each 2-minute contraction.

- The phrase 'consecutive squatting workload' is now used consistently (Pg 9, Lines 16-18).

Line 17: "Blood pressure" should be BP. Please check the proper use of abbreviations throughout the document.

- This has now been corrected to 'BP' (Pg 9, Line 17).

- *Figure 3*

*There needs to be more of a description of what this figure is showing. Is this the average measure (e.g, HR, RPE, etc) across all participants at a certain time within the 2-minute contraction? Additionally, indicate where significant differences are for the varying angles. Indicate where significant differences are with * or another symbol then define in the figure description.*

The legend for the angles also needs to be labelled to indicate what each degree represents (i.e., they are all knee joint angles)

- The figure description has now been expanded as advised and a significance symbol added (Pg 9).

- *Table 1*

*Indicate where significant differences are with * or another symbol then define in a table description.*

- Asterisks have now been added to indicate significant differences as suggested (Pg 10).

- *Figure 4*
*There needs to be more of a description of what this figure is showing. Is this the average measure (e.g, HR, RPE, etc) across all participants at a certain angle within the 2-minute contraction? Additionally, indicate where significant differences are for the varying angles. Indicate where significant differences are with * or another symbol then define in the figure description.*
- This figure description has now been expanded as advised and significance symbol added (Pg 10).
- *Reliability of exercise measures*
Line 1: For this new section, indicate in brackets what the exercise variables are.
- Variables have now been added in brackets (Pg 11, Line 6).

Discussion

Line 17: Use consistent terminology for handgrip
- The term 'handgrip' has now been used throughout the manuscript.
Line 20: Please explain what was shown by Goldring et al., (14), and how this directly relates to the results on this study.
- The discussion section has been expanded to further explain the findings of Goldring and to discuss how this relates to the finding of the current study (Pg 12, Paragraphs 2 and 5).
Line 19 to 22: What is meant by this? This section needs to be explained. It is unclear what the importance is.
- The discussion section has been amended to further explain the importance of each finding (Pg 12).
Line 24: What is ICC? Repeated more than once in this paragraph.
- ICC is Intraclass correlation Coefficient, used to measure between session reliability. This abbreviation is initially defined in the data analysis section (Pg 8, Line 27).
Overall: So, what do the findings about RPE from this study show? That the ratings increase with an increase in workload and time under tension (as expected), but what does this mean when it comes to prescribing wall squats at home? Will individuals be prescribed to work at a certain intensity to accomplish a related knee angle? Or what are the implications of these findings? The last paragraph of the discussion does a good job explaining next steps, but the discussion does not end with a clear explanation of what the findings from this study add to the literature and the relation of these findings to the next proposed steps (in the last paragraph). Please explain this more clearly so the importance of your findings is emphasized and connected to the "next steps".
- This study has shown that RPE can discern isometric workload with the same resolution as HR and BP. Therefore, future research can explore the use of RPE to replace HR in the prescription of isometric wall squat training.
- As suggested, the discussion has been expanded to explain the implications and proposed next steps of this research (Pg 12-13, Discussion and Conclusion).

Reviewer 4

Thank you for taking the time to review our manuscript and for providing constructive feedback that helps to improve the quality of our work.

Abstract

The introduction section can be shortened to one, maybe two, sentences so as to add a little bit more detail in the Methods section. For instance, the results indicated an increase in RPE at consecutive time points, so it would be helpful if the time points were described in the Methods.
- The abstract methods have now been expanded to include the calculation of results for the consecutive time-points and the comparisons made (Pg 3, Lines 13-18).

Introduction
No comments here, very well written and presented.
- Many thanks for this feedback.
Materials and Methods
Study design: Please indicate the reference angle (i.e., 180 deg = full knee extension).
- The reference angle has now been added (Pg 6, Lines 19-20).
It's not clear if the 8 separate occasions represent different days. The 5-hour separation indicates that participants could have attended multiple sessions in one day.
- Clarification and justification for the 5-hour minimum rest period has now been added (Pg 6, Lines 24-26).
Procedures, Familiarisation
At the end of the sentence, suggest changing "....the use of RPE." , to "....the use of the RPE scale."
- The wording has now been changed accordingly (Pg 6, Line 32).
Data Analysis
First sentence: Re-word reference to SPSS……first letter should be upper case.
- This has now been reworded to read 'SPSS' (Pg 8, Line 8).
Third sentence: Place "Time" in the parentheses to start with lowercase ("time")
- This has been changed as suggested (Pg 8, Line 20).
Results
Reliability of exercise measures
In the third sentence, the ICC acronym should be used since it was defined earlier.
- This has changed to 'ICC' (Pg 11, Line 8).
The r value is not typically used to represent the ICC (it's reserved for the Pearson correlation coefficient). The values should just be presented as ICC.
- This has now been changed as advised (Pg 11, Lines 9-11).
Have the authors computed the associated SEM's for the ICC values?
- Thank you for pointing out this omission, the SEM's have now been added to the reliability section of the results (Pg 11, Line 9-11).

2nd Editorial decision
28-Feb-2021

Ref.: Ms. No. JCTRes-D-20-00151R1
Validity and reliability of RPE as a measure of intensity during isometric wall squat exercise
Journal of Clinical and Translational Research

Dear authors,

I am pleased to inform you that your manuscript has been accepted for publication in the Journal of Clinical and Translational Research.

You will receive the proofs of your article shortly, which we kindly ask you to thoroughly review for any errors.

Thank you for submitting your work to JCTR.

Kindest regards,

Michal Heger

Editor-in-Chief
Journal of Clinical and Translational Research

Comments from the editors and reviewers: