

Independent Study
Dissertation Proposal

Details of Proposal	
Proposal Title	Prevalence of Gluteal Dysfunction and Effectiveness of Gluteal Strengthening or Activation in Women With Non-Specific Chronic Low Back Pain: A Systematic Review
Summary purpose of the investigation	
The aim of this systematic review is to identify parallel findings, disagreements and inconsistencies in the current state of the literature with regards to the prevalence of gluteal dysfunction (amnesia, weakness and other pathomechanics) in women with non-specific chronic low back pain as well as the effectiveness of physical training focusing on activating and/or strengthening the gluteus muscles on treating non-specific chronic low back pain in women. The hope is to determine which female populations, if any, would most likely benefit from gluteal exercises as a means to treat non-specific chronic low back pain. Ultimately, the main objective is to be able to provide evidence-based guidelines for practice to physical trainers and health practitioners as well as proposing future areas of research.	
Introduction and Supporting literature	

According to Freburger et al. (2009), the prevalence of Chronic Low Back Pain (CLBP) is on the rise and in the UK alone, it is estimated that around 10 million people experience CLBP (Briggs et al., 2011).

When the aetiology of LBP is unknown, which is the case for 85% of people affected (Deyo, Rainville and Kent, 1992), it is classed as non-specific, however, in the majority of cases, it is poor diagnostic procedures and limited understanding of the mechanisms leading to LBP that result in the classification of the condition as non-specific (Deyo and Phillips, 1996, McGill, 2016): in the absence of a clearly identifiable traumatic incident, health professionals generally fail to establish the cause of the pain and therefore the most appropriate treatment methods and many patients resort to the use of analgesics (Chou, Qaseem and Snow, 2007).

Although the majority of acute non-specific LBP incidents seem to resolve themselves without considerable intervention (Pengel, Herbert, Maher and Refshauge, 2003), the ones that fail to improve then become classified as chronic, usually when no improvement can be observed after a 3-month period (Meucci, Fassa and Faria, 2015). However, no standard definition of CLBP had been adopted yet, resulting in heterogeneity across studies and therefore leading to confusion when attempting to compare scientific studies (Deyo et al., 2014).

Interestingly, women are consistently found to have greater prevalence of CLBP (Meucci, Fassa and Faria, 2015) and some hypotheses have been formulated to explain this phenomenon: the strain of pregnancy on the musculo-skeletal system, activities related to child care, particularly lifting and carrying children, but also certain physiological attributes such as reduced muscle mass and bone density (Hoy et al., 2012). Currently, physical exercise therapy in general is perceived as effective in treating CLBP (Bronfort et al., 2011) but little information on the type, duration or intensity of exercise for specific patients is available and therefore no “gold standard” of care has been established (Koes, Tulder and Lin, 2010).

Kankaanpää et al. (1998) examined the relationship between back and hip extensor muscle endurance in CLBP patients and found that gluteus maximus fatigability was greater in subjects suffering from CLBP compared to controls. As the gluteus maximus is the strongest and largest muscle in humans and because research has demonstrated its essential role as a spine and pelvis stabiliser (Snijders, Vleeming and Stoeckart, 1993), it appears that a programme aimed at strengthening the gluteal

muscles in CLBP might lead to improvement in functionality and pain levels in patients. Additionally, as women suffering from CLBP were found by Amabil, Bolte and Richter (2017) to have greater atrophy in their gluteus maximus than controls, although it is unclear whether this was a cause or a consequence of CLBP, it is a population that could potentially benefit from an intervention aimed primarily at strengthening the gluteus muscles.

Methodology

Search strategy

An initial search will be performed in November 2017 and will include the terms “*low back pain*”, *women*, *gluteus* and *gluteal*, across the following databases: Pubmed, Google Scholar, SportDiscus, Cochrane and Web of Science. Different combinations of those terms such as “low back pain” AND women, “low back pain” AND glut* and women AND glut* will be used and the titles provided by the search results will be screened for relevance. Subsequently, any duplicates will be removed.

An additional search will be conducted in February 2018 to identify any potential article of interest that might have been published since the initial search.

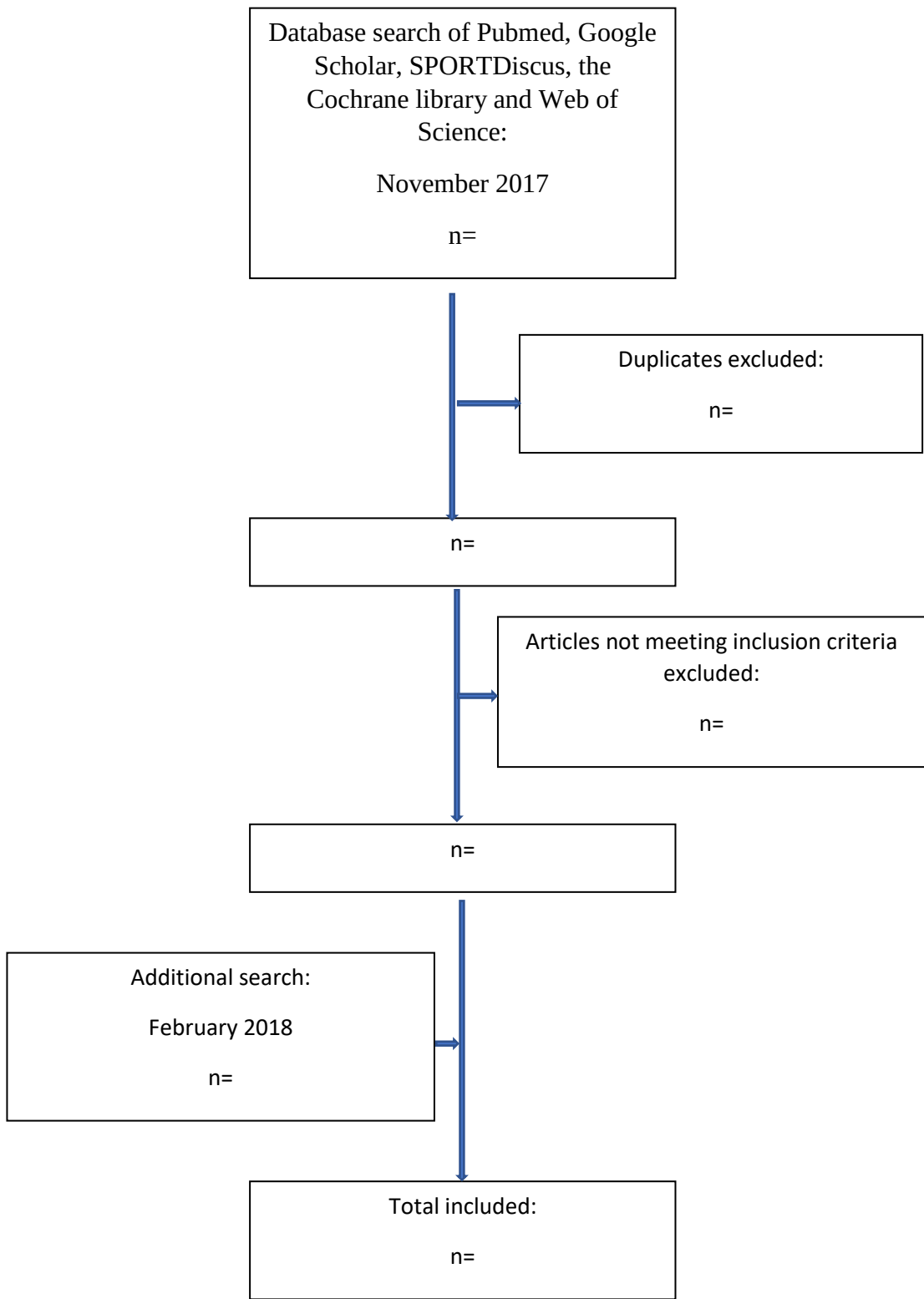
Selection criteria

For the purpose of this research project, only articles relating to healthy women (no obesity, musculoskeletal conditions, or health-related issues other than low back pain) will be selected. Research on pregnant women will also be disregarded.

With regards to determining the prevalence of gluteal dysfunction in women suffering from non-specific chronic low back pain, studies evaluating gluteal muscle activity and characteristics in that population will be given priority. As for the effectiveness of physical treatment of non-specific chronic low back pain and in line with the recommendations set in Evidence-Based Practice in Exercise Science (Amonette, English and Kraemer, 2016), studies will be ranked as follows: Randomised Controlled Trials (RCT) with rich body of data at the top of the hierarchy, followed by RCTs with small body of data, then non-randomised trials and observational

studies, and finally panel consensus judgment. Studies presenting lower levels of evidence as per this hierarchical classification will only be included in the event of insufficient numbers of high quality studies.

A flowchart of the systematic search and article inclusion will be provided as follows:



Data collection

The focus of this systematic review will be on collecting data relating to the populations studied, the parameters measured and the authors' findings.

Data Analysis

Nature of data

As the data collected will consist of attributes of the populations studied, variables evaluated and conclusions from the authors of the studies, it will be qualitative in nature.

Analysis

A thematic analysis will be performed on the articles meeting the selection criteria in order to identify common topics and potential opposing findings.

Each article will additionally be assessed for quality using the Downs and Black checklist (1998) (Appendix 1), a tool considered reliable and valid for measuring the quality of health-related scientific studies (Hootman et al., 2011). It comprises of 27 questions divided into 5 sections: "study quality", "external validity", "study bias", "confounding and selection bias" and "power of the study". For each applicable question answered with a yes, the article will score one point, therefore resulting in a grade between 0 and 27.

The results of this analysis will be summarised and presented in a table format as follows:

Author(s)	Date	Study	Methods	Findings	Downs and Black score

Ultimately, a critical evaluation of the evidence gathered will be compiled in order to determine whether gluteal dysfunction is in fact highly associated with women who suffer from non-specific chronic low back pain and if gluteal strengthening and activation exercises are an effective treatment for females suffering from recurring low back pain.

The overall quality of the evidence gathered throughout the systematic review will be assessed by calculating the median Downs and Black score of the studies, therefore providing an indication of the overall strength of the proposed study.

Proposed timetable

November:

The initial search described in the methodology section of this proposal will be carried out, titles will be screened for relevance, duplicates excluded and the methods sections of each remaining study will be examined to determine whether they meet the inclusion criteria.

December:

The remaining studies will be divided into 2 sub-groups: one will consist of studies relating to the prevalence of gluteal dysfunction and the other will consist of interventions consisting of gluteal strengthening and/or activating.

Quality assessment based on the Downs and Brown checklist will be carried out for each study and a quality hierarchy will be established.

January:

Relevant data as described previously will be collected and presented in table form.

February:

An additional search will be performed to identify any potential new publication since the original search was carried out.

The data collected will be critically evaluated.

The methods section of the dissertation will be written.

March:

The results section will be written as well as part of the discussion.

April:

The rest of the discussion will be completed, followed by the conclusion, introduction and abstract.

Word count: 1454

References

Amabile, A., Bolte, J. and Richter, A. (2017) 'Atrophy of gluteus maximus among women with a history of chronic low back pain', *PloS One*12, 7.

Briggs, E., Carr, E. and Whittaker, M. (2011) 'Survey of undergraduate pain curricula for healthcare professionals in the United Kingdom', *European Journal of Pain*, 15(8), pp. 789-795.

Bronfort, G., Maiers, M., Evans, R., Schulz, C., Bracha, Y and Svendsen, K. (2011) 'Supervised exercise, spinal manipulation, and home exercise for chronic low back pain: a randomized clinical trial', *Spine Journal*, 11(7), pp. 585-598.

Chou, R., Qaseem, A. and Snow, V. (2007) 'Diagnosis and Treatment of Low Back Pain: A Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society', *Annals of Internal Medicine*, 147(7), pp. 478-491.

Deyo, R., Dworkin, S., Amtmann, D., Andersson, G., Borenstein, D. and Carragee, E. (2014) 'Report of the NIH Task Force on research standards for chronic low back pain', *Spine*, 39(14), pp. 1128-1143.

Deyo, R. and Phillips, W. (1996) 'Low back pain: a primary care challenge', *Spine*, 21, pp. 2826-2832.

Deyo, R., Rainville, J. and Kent, D. (1992) 'What can the history and physical examination tell us about low back pain?', *Journal of the American Medical Association*, 268(6), pp. 760-765.

Freburger, J., Holmes, G., Agans, R., Jackman, A., Darter, J. and Wallace, A. (2009) 'The rising prevalence of chronic low back pain', *Archives of Internal Medicine*, 169, pp. 251-258.

Hoy, D., Bain, C., Williams, G., March, L., Brooks, P. and Blyth, F. (2012) 'A systematic review of the global prevalence of low back pain', *Arthritis and Rheumatology*, 64(6), pp. 2028-2037.

Kankaanpää, M., Taimela, S., Laaksonen, D., Hanninen, O. and Airaksinen, O. (1998) 'Back and hip extensor fatigability in chronic low back pain patients and controls', *Archives of Physical Medicine Rehabilitation*, 79, pp. 412-417.

Koes, B., Tulder, M. and Lin, C. (2010) 'An updated overview of clinical guidelines for the management of non-specific low back pain in primary care', *European Spine Journal*, 19, pp. 2075-2094.

McGill, S. (2016) *Low back disorders: evidence-based prevention and rehabilitation*. 3rd edn. Leeds: Human Kinetics.

Meucci, R., Fassa, A. and Faria, N. (2015) 'Prevalence of chronic low back pain: systematic review', *Revista de Saude Publica*, 49(73).

Pengel, L., Herbert, D., Maher, C. and Refshauge, K. (2003) 'Acute low back pain: systematic review of its prognosis', *British Medical Journal*, 327, p. 323.

Snijders, C., Vleeming, A. and Stoeckart, R. (1993) 'Transfer of lumbosacral load to iliac bones and legs', *Clinical Biomechanics*, 8, pp. 285-294.

Appendices

Appendix 1: Downs and Black checklist (from Downs and Black, 1998)

Appendix

Checklist for measuring study quality

Reporting

1. Is the hypothesis/aim/objective of the study clearly described?

yes	1
no	0

2. Are the main outcomes to be measured clearly described in the Introduction or Methods section?

If the main outcomes are first mentioned in the Results section, the question should be answered no.

yes	1
no	0

3. Are the characteristics of the patients included in the study clearly described?

In cohort studies and trials, inclusion and/or exclusion criteria should be given. In case-control studies, a case-definition and the source for controls should be given.

yes	1
no	0

4. Are the interventions of interest clearly described?

Treatments and placebo (where relevant) that are to be compared should be clearly described.

yes	1
no	0

5. Are the distributions of principal confounders in each group of subjects to be compared clearly described?

A list of principal confounders is provided.

yes	2
partially	1
no	0

6. Are the main findings of the study clearly described?

Simple outcome data (including denominators and numerators) should be reported for all major findings so that the reader can check the major analyses and conclusions. (This question does not cover statistical tests which are considered below).

yes	1
no	0

7. Does the study provide estimates of the random variability in the data for the main outcomes?

In non normally distributed data the inter-quartile range of results should be reported. In normally distributed data the standard error, standard deviation or confidence intervals should be reported. If the distribution of the data is not described, it must be assumed that the estimates used were appropriate and the question should be answered yes.

yes	1
no	0

8. Have all important adverse events that may be a consequence of the intervention been reported?

This should be answered yes if the study demonstrates that there was a comprehensive attempt to measure adverse events. (A list of possible adverse events is provided).

yes	1
no	0

9. Have the characteristics of patients lost to follow-up been described?

This should be answered yes where there were no losses to follow-up or where losses to follow-up were so small that findings would be unaffected by their inclusion. This should be answered no where a study does not report the number of patients lost to follow-up.

yes	1
no	0

10. Have actual probability values been reported (e.g. 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?

yes	1
no	0

External validity

All the following criteria attempt to address the representativeness of the findings of the study and whether they may be generalised to the population from which the study subjects were derived.

11. Were the subjects asked to participate in the study representative of the entire population from which they were recruited?

The study must identify the source population for patients and describe how the patients were selected. Patients would be representative if they comprised the entire source population, an unselected sample of consecutive patients, or a random sample. Random sampling is only feasible where a list of all members of the relevant

population exists. Where a study does not report the proportion of the source population from which the patients are derived, the question should be answered as unable to determine.

yes	1
no	0
unable to determine	0

12. *Were those subjects who were prepared to participate representative of the entire population from which they were recruited?*

The proportion of those asked who agreed should be stated. Validation that the sample was representative would include demonstrating that the distribution of the main confounding factors was the same in the study sample and the source population.

yes	1
no	0
unable to determine	0

13. *Were the staff, places, and facilities where the patients were treated, representative of the treatment the majority of patients receive?*

For the question to be answered yes the study should demonstrate that the intervention was representative of that in use in the source population. The question should be answered no if, for example, the intervention was undertaken in a specialist centre unrepresentative of the hospitals most of the source population would attend.

yes	1
no	0
unable to determine	0

Internal validity - bias

14. *Was an attempt made to blind study subjects to the intervention they have received?*

For studies where the patients would have no way of knowing which intervention they received, this should be answered yes.

yes	1
no	0
unable to determine	0

15. *Was an attempt made to blind those measuring the main outcomes of the intervention?*

yes	1
no	0
unable to determine	0

16. *If any of the results of the study were based on "data dredging", was this made clear?*

Any analyses that had not been planned at the outset of the study should be clearly indicated. If no retrospective unplanned subgroup analyses were reported, then answer yes.

yes	1
no	0
unable to determine	0

17. *In trials and cohort studies, do the analyses adjust for different lengths of follow-up of patients, or in case-control studies, is the time period between the intervention and outcome the same for cases and controls?*

Where follow-up was the same for all study patients the answer should be yes. If different lengths of follow-up were adjusted for by, for example, survival analysis the answer should be yes. Studies where differences in follow-up are ignored should be answered no.

yes	1
no	0
unable to determine	0

18. *Were the statistical tests used to assess the main outcomes appropriate?*

The statistical techniques used must be appropriate to the data. For example non-parametric methods should be used for small sample sizes. Where little statistical analysis has been undertaken but where there is no evidence of bias, the question should be answered yes. If the distribution of the data (normal or not) is not described it must be assumed that the estimates used were appropriate and the question should be answered yes.

yes	1
no	0
unable to determine	0

19. *Was compliance with the intervention/s reliable?*

Where there was non compliance with the allocated treatment or where there was contamination of one group, the question should be answered no. For studies where the effect of any misclassification was likely to bias any association to the null, the question should be answered yes.

yes	1
no	0
unable to determine	0

20. *Were the main outcome measures used accurate (valid and reliable)?*

For studies where the outcome measures are clearly described, the question should be answered yes. For studies which refer to other work or that demonstrates the outcome measures are accurate, the question should be answered as yes.

yes	1
no	0
unable to determine	0

Internal validity - confounding (selection bias)

21. Were the patients in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited from the same population?

For example, patients for all comparison groups should be selected from the same hospital. The question should be answered unable to determine for cohort and case-control studies where there is no information concerning the source of patients included in the study.

yes	1
no	0
unable to determine	0

22. Were study subjects in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited over the same period of time?

For a study which does not specify the time period over which patients were recruited, the question should be answered as unable to determine.

yes	1
no	0
unable to determine	0

23. Were study subjects randomised to intervention groups?

Studies which state that subjects were randomised should be answered yes except where method of randomisation would not ensure random allocation. For example alternate allocation would score no because it is predictable.

yes	1
no	0
unable to determine	0

24. Was the randomised intervention assignment concealed from both patients and health care staff until recruitment was complete and irrevocable?

All non-randomised studies should be answered no. If assignment was concealed from patients but not from staff, it should be answered no.

yes	1
no	0
unable to determine	0

25. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn?

This question should be answered no for trials if: the main conclusions of the study were based on analyses of treatment rather than intention to treat; the distribution of known confounders in the different treatment groups was not described; or the distribution of known confounders differed between the treatment groups but was not taken into account in the analyses. In non-randomised studies if the effect of the main confounders was not investigated or confounding was demonstrated but no adjustment was made in the final analyses the question should be answered as no.

yes	1
no	0
unable to determine	0

26. Were losses of patients to follow-up taken into account?

If the numbers of patients lost to follow-up are not reported, the question should be answered as unable to determine. If the proportion lost to follow-up was too small to affect the main findings, the question should be answered yes.

yes	1
no	0
unable to determine	0

Power

27. Did the study have sufficient power to detect a clinically important effect where the probability value for a difference being due to chance is less than 5%?

Sample sizes have been calculated to detect a difference of x% and y%.

	Size of smallest intervention group	
A	$<n_1$	0
B	$n_1 - n_2$	1
C	$n_1 - n_4$	2
D	$n_1 - n_6$	3
E	$n_1 - n_8$	4
F	$n_8 +$	5