Examiner Suggestion / Correction	Page	Corrections explained	What it looks like in the document now
(supervisor correction: supervisors names should not appear on the front page of the document)	Front page	Supervisors names removed	The Ability of Physiotherapists and Physiotherapy Students to Evaluate and Classify Lumbar Movement Control by using Lumbo-Pelvic Movement Control Tests Student: Mrs Cornelia Huysamen A dissertation submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg in fulfilment of the requirements for the degree of Master of Science in Physiotherapy. Johannesburg 2016
(supervisor correction: title changed to Associate Professor)	iii	Title correction	I would like to thank my supervisors Associate Professor Olivier and Mrs Naidoo for all their input and guidance during my research study; I really appreciate all your on-going help and support.
The 'introduction' section of the abstract currently only reflects the overarching aim of the project. My suggestion is that some of the objectives related to the project are added to support the information that is reflected in the results section of the abstract.	X, paragraph 1, line 8 - 16	The following objectives added: • To establish which tests physiotherapists use in the assessment of lumbo-pelvic movement control • To establish the ability of qualified physiotherapists and physiotherapy students to evaluate videos of patients with NSLBP performing six lumbo-pelvic movement control tests and three general tests and rank them as correct or incorrect • To establish the ability of qualified physiotherapists and physiotherapy students to make	This study also intended to establish which tests physiotherapists use in the assessment of lumbo-pelvic movement control; to establish the ability of qualified physiotherapists and physiotherapy students to evaluate videos of patients with NSLBP performing six lumbo-pelvic movement control tests and three general tests and rank them as correct or incorrect; to establish the ability of qualified physiotherapists and physiotherapy students to make an overall classification as flexion pattern or extension pattern; and to compare the ability of evaluation and classification in relation to level of experience of qualified physiotherapists and physiotherapy students.

		an overall classification as flexion pattern or extension pattern • To compare the ability of evaluation and classification in relation to level of experience of qualified physiotherapists and physiotherapy students	
The following should be added to the methodology section: **sampling method, source of the participants** and statistical analysis used when analysing the data.	X, paragraph 2, line 3-7	Source of participants included. One sentence removed to avoid repetition of information. Sampling method found on p x, last three lines and p xi first line.	Individuals with NSLBP were recruited from two private out-patient physiotherapy practices in Johannesburg for the video recording. Qualified physiotherapists attending courses, meetings, staff training and other physiotherapy gatherings around Gauteng were invited to participate, and the physiotherapy students were approached through the physiotherapy departments at three universities in Gauteng. The qualified physiotherapists completed the first part of the self-administered questionnaire prior to a short information session. Thereafter the rest of the questionnaire was completed by the participants (qualified physiotherapists and physiotherapy students) while they observed videos of individuals with NSLBP with flexion or extension patterns.
The following should be added to the methodology section: sampling method, source of the participants and **statistical analysis** used when analysing the data.	Xi, line 2-5	Statistical analysis was added. Data analysis was done through STATA after it was captured into Microsoft-Excel. Means, standard deviations, percentages and the Fisher‟s exact test were used for the calculations.	Data was entered into a Microsoft-Excel spread sheet for data cleaning and coding purposes. Therafter the STATA Data Analysis and Statistical Software (release 12; Texas, USA) program was used for data analysis. Means, standard deviations, percentages and the Fisher‟s exact test was used.
'..no statistically significant difference between the observations made for the individual tests by the …' Add the specific p-value found with the analysis to make it more scientific.	Xi, paragraph 2, line 6-9	P-value added. Sentence chanced from no statistically significant differences to few statistically significant differences.	There were very few statistically significant differences between the observations made for the individual tests by the qualified physiotherapists and the physiotherapy students (p-value≤0.05).

‘ A statistically significant difference was found in only three out of the 24 videos….., p≤0.001 and p≤0.003 respectively.’ Add the 3rd value to this sentence to make it complete.	Xi, paragraph 2, line 10 and 11	P value added and corrected. The p value was not between p≤0.001 and p≤0.003, they were p=0.001, p= 0.007 and p=0.033 respectively.	A statistically significant difference was found in only three out of 24 videos for both the qualified physiotherapists and physiotherapy students (p=0.001, p= 0.007 and p=0.033) respectively.
Correct/ Update the regression analysis findings related to objective 4 in the abstract when this is corrected in Chapter 4: Results.	Xi, paragraph 2, line 11-14	Odds ratio value interpretation: OR=1 indicates no chance of getting assessment wrong OR>1 indicates a chance of getting the assessment wrong OR<1 less likely chance of getting the assessment wrong The physiotherapy students’ odds of getting the assessment wrong were 0.57 in relation to the qualified physiotherapists. This is less than 1 which means that they have a less likely chance of getting the assessment wrong.	For the overall classification of flexion or extension patterns the physiotherapy students’ odds of getting the assessment wrong were only 0.57 in relation to the qualified physiotherapists (p=0.078, 95% confidence interval).
When reporting on the odd ratio e.g .0.57 add the 95 % CI and the p-value related to this funding to make it more scientific.	Xi, paragraph 2, line 13 second last sentence	p-value and 95% confidence interval added	(p=0.078, 95% confidence interval).
I SUGGEST THE ‘discussion’ paragraph of the abstract should be removed as it does not add value to the abstract. The faculty of Health Sciences style Guide for Thesis, Dissertations and Research Report (2016) also states that the abstract should be concise highlighted the most important aspects of the project.	Xi	Discussion paragraph was removed. In the abstract the results is now followed by the conclusion section	**Results** A sample of 93 qualified…….. **Conclusion** Even though the majority of ……..

It could be advisable to list the abbreviations in alphabetical order.	xiii	List of abbreviations changed to alphabetical order.	**List of abbreviations** Active straight leg raise - ASLR Advanced Professional Development Level two- APDL 2 Cumulative Index to Nursing and Allied Health Literature - CINAHL Human Research Ethics Committee - HREC International Federation of Orthopaedic Manipulative Physical Therapy - IFOMPT Lower back pain - LBP Marginally significant - MS Non-specific LBP - NSLBP Non-steroidal anti-inflammatory drugs - NSAID Not significant - NS Odds ratio - OR Passive accessory intervertebral mobilisations - PAIVMS Physiotherapy Evidence Database - PEDro Significant - S
The individual risk factors are listed but I suggest more discussion surrounding these risk factors be included. For example: What about gender? Are females more at risk than males?	P8, paragraph 3, line 8	Females 3x higher prevalence included.	However, the link of heredity to the development of NSLBP remains questionable. Females have three times higher chance of developing back pain than males. They further state that back pain can be associated with operating heavy equipment (Delitto et al. 2012).
Section 10. Reliability and validity In the paragraphs where the Kappa coefficient of studies is reported add the p-values for scientific completeness.	P18, paragraph 3, line 4 and 13 And p19, paragraph 1, line 1	The statistical nature of the kappa coefficient is as such that no p-value is produced. Percentage agreement included.	They found a very high agreement for the assessment of symptoms among the five examiners (k>0.89 and percentage agreement>98%). They categorised patients in five different groups; extension, flexion, rotation, extension-rotation and flexion-rotation. They found an overall agreement of 83% and k=0.75 (Harris-Hayes and Van Dillen 2009).

			Their agreement was very good in their classification of patients (k=0.96 and percentage agreement 97%).
'with' must be 'which'	P 20, paragraph 1 line 10	With changed to which	The interpretation of this is that patients with LBP have poorer control of their lumbo-pelvic movements and, because of this, there might be more movement (for example rotation) in their lumbar spine during their everyday activities and sports which may result in pain (Scholtes et al. 2009).
'meets' must be 'met'	P 22, paragraph 1, line 3	Meets changed to met	A sample of 93 qualified physiotherapists and 96 fourth year physiotherapy students were included in the study, which met the estimated sample size requirement, and accounted for the potential of missing data.
The study was an observation study where contact with participants was made once during which data were collected. Thus the statement regarding 'dropouts' is not relevant and should be removed.	P22, paragraph 1, line 4	Sentence regarding dropouts removed.	Estimated required sample sizes were: n1=88 and n2=88. A sample of 93 qualified physiotherapists and 96 fourth year physiotherapy students were included in the study, which met the estimated sample size requirement, and accounted for the potential of missing data.
Clearly state that the researcher determined that the patients had non-specific lower back pain. Why was 4 videos chosen? Did you have literature supporting the choice of number of videos that was included in the study?	P22, paragraph 2, line 1	New sentence added: "The researcher examined patients with LBP and determined if they had NSLBP." 4 videos were chosen so that the outcome of the overall classification was not guessed. No literature to support the number of videos used.	The researcher examined patients with LBP and determined if they had NSLBP.
Clearly state that the researcher determined that the patients had non-specific lower back pain. **Why was 4 videos chosen?** **Did you have literature supporting the choice of number of videos that was included in the study?**	P22, paragraph 2, line 9 to 12	4 videos were chosen so that the outcome of the overall classification was not guessed. This decision was not based on specific literature.	It was decided to choose four out of the 28 because if only two videos were used and the first one was a flexion pattern for example, the participants would guess that the second video would be an extensor pattern and that would give inaccurate results.

The researcher could maybe just state how the qualified physiotherapists (raters) were approached at the meetings to invite them to participate.	P22, paragraph 4 Qualified physiotherapists (raters), second and third sentence	How the raters were approached was explained	They were approached just before lunch break, tea break or at the end of the course or meeting by telling them briefly what the study was about and how long it takes to participate. The interested physiotherapists could then stay behind to participate.
'are' must be 'were'	P24, first bullet at exclusion criteria	Are changed to were	Exclusion criteria • Physiotherapists who were not familiar with lumbo-pelvic movement control tests
The relevance of age range for inclusion criteria for study participants is not clear. Please explain why this was taken into consideration when recruiting participants for the study.	P24, paragraph 2, line 5	The specific age of the physiotherapist would not have an impact on the results of the study. Any physiotherapist who met the inclusion criteria was allowed to participate and therefor the last bullet regarding age range removed.	Inclusion criteria • Qualified physiotherapists, registered with the Health Professions Council of South Africa (HPCSA) • Qualified physiotherapists involved in the treatment of patients with NSLBP • Male or female
'use' must be 'used'	P25, paragraph 2, line 2	Use changed to used	Part A asked physiotherapists if they were familiar with lumbo-pelvic movement control tests and which tests they used to assess lumbo-pelvic movement control (Appendix A).
'can' must be 'could'	P25, paragraph 3, line 4	Can changed to could	Each lumbo-pelvic movement control tests could be classified as correct or incorrect in order to use this information for the overall classification as flexion or extension pattern (Appendix B and C).
One aim for the pilot study was to determine the time taken by the participants to complete assessments. The results as it pertains to the time assessment is absent from the pilot study feedback. Kindly include this result	P26, paragraph 1, line 12, 13 and 14	Last sentence added to include the time that was determined by the pilot study.	The pilot studies revealed that forty minutes would be enough time to participate in the study.

as a means of answering the aim of the pilot study.			
The methodology was generally clearly described. It could maybe just be stated whether the researcher herself did all the data gathering/documentation: and how much input were given to the participants when they completed the questionnaire/watched the videos**. It could also be meaningful if the procedure of how the videos were made were described – since it could add validity to the methodology.**	P26, last four lines and p27 first 2 lines	Procedure of how the videos were made explained. Two new sentences included: "The researcher explained the test to each individual and thereafter they performed the test while the examiner recorded the test with a video recorder. When the test was performed incorrectly, the recording was unclear or the angle at which the test was recorded was not satisfactory the test was performed and recorded more than once."	The researcher explained the test to each individual and thereafter they performed the test while the examiner recorded the test with a video recorder. When the test was performed incorrectly, the recording was unclear or the angle at which the test was recorded was not satisfactory the test was performed and recorded more than once.
'there off' must be 'thereof'	P27, paragraph 2, line 6	There off changed to thereof	Most experts were contacted numerous times to get their input with regards to the most appropriate videos and their classification thereof.
Video recording and expert panel The student clearly state that she diagnosed individuals in the video recordings as having a flexion or extension pattern. On the next page it is stated that the expert panel evaluated said videos and classified the individual as having flexor or extension pattern. It is not clear whether the expert panel supported the researcher's	P27, paragraph 2, line 7, 8 and 9	Statement included to clarify that the expert panel agreed with the initial classification that the researcher made.	The overall classification (flexion or extension pattern) of the expert panel supported the initial classification of the researcher.

assessment findings. To support the student's reliability as it pertains to her assessment findings it is suggested that's she clearly states whether her findings aligned with that of the expert panel's findings if it was in deed so.			
The methodology was generally clearly described. It could maybe just be stated whether **the researcher herself did all the data gathering/documentation: and how much input were given to the participants when they completed the questionnaire/watched the videos**. It could also be meaningful if the procedure of how the videos were made were described – since it could add validity to the methodology.	P28, second last sentence	New sentence added: "The researcher did all the data collection and no input was given to the participants after the information session while they completed the questionnaire and rated the videos."	The researcher did all the data collection and no input was given to the participants after the information session while they completed the questionnaire and rated the videos.
' There were no dropouts during this study' I suggest remove this sentence as it is not relevant as explained above.	P30, paragraph 2, line 3	The following sentence was removed: "There were no dropouts during this study."	During the cleaning and coding process, missing values, extreme cases and inconsistencies were picked up and handled. Missing data was traced and then captured if available; otherwise the participant was contacted again to assist with the missing data where appropriate.
'However, the results proved an OR of 0.57 (96% confidence interval: 0.305 -1.065)…' Correct the 96% confidence interval to reflect 95% confidence	P38, paragraph 2, line 2	Typo corrected, 95% CI	However, the results proved an OR of 0.57 (95% confidence interval: 0.305-1.065) i.e. the chance of a student getting the overall classification wrong was less than that for qualified, experienced physiotherapists.

interval to align with what was stated in the methodology section under the statistical analysis section in chapter 3.			
'This table revealed that the change of getting the assessment wrong gets bigger with further education' – this interpretation of results is incorrect. I suggest that the student review her interpretation of the study findings stated in table 4 and add the p-values to the table to clarify her statement in the paragraph above that findings were not significant.	P38, last line P39 paragraph 1 line 2 to 7 and table 4 (p39) p-value	Initially the percentage chance of getting the assessment wrong was given. Odds ratio is not expressed as a percentage, therefor all the percentages removed and only odds ratio values used. It can be interpreted that OR=1 indicates no chance of getting assessment wrong OR>1 indicates a chance of getting the assessment wrong OR<1 less likely chance of getting the assessment wrong. The bigger the value, the bigger the chance of the physiotherapist to get the assessment wrong. P38 last line changed to "less likely" as this clarifies the interpretation. Line 2,3,4,5 interpretation explanation of Odds ratio included. This was changed to the Odds ratio value and no percentages used. P-values added to table and percentage risk removed.	OR=1 indicates no chance of getting assessment wrong OR>1 indicates a chance of getting the assessment wrong OR<1 less likely chance of getting the assessment wrong The risk of physiotherapists with less than five years' experience making a wrong decision is only 0.54 fold that for physiotherapists with five years or more experience. The risk of post graduate course, APDL2, or masters degree physiotherapists to make a wrong decision is 1.40, 1.42 and 2.66 fold increased to that for graduate physiotherapists. This table also reflects that the chance of getting the assessment wrong gets bigger with further education.
'shouldn't must be ' should not'	P40, second line	Shouldn't changed to should not	The statistically insignificant results could also indicate that the findings were due to chance and we should not assume that these results are the true representation for all

			qualified physiotherapists and physiotherapy students.
Just state which tests you are referring to	P41, third line from the bottom	Lumbo-pelvic movement control tests were included to clarify which tests	It was surprising to see that even though qualified physiotherapists are familiar with the lumbo-pelvic movement control tests, not many physiotherapists use these tests clinically as part of their assessment for patients with NSLBP.
'Lumbo-pelvic moments control tests are only taught at some SA universities during undergraduate studies'. Add a reference to this statement made.	P41, last sentence and p42 line 1	There is no literature for this statement because the information was obtained from lecturers at the universities. This is now stated in brackets.	Lumbo-pelvic movement control tests are only taught at some South African universities during undergraduate studies (as informed by lecturers at Universities).
'Physiotherapists encounter many challenges not only in implementing research in their daily practice but also to become involved in research (Janssen et al 2015) What are these challenges that they encounter as stated by Janssen et al (2015)?	P42, paragraph2, line 5 and 6	Rephrased to clarify challenges that physiotherapists encounter.	Physiotherapists find it challenging to implement research in their daily practice and also to become involved in research (Janssen et al. 2015).
Add the p-value where the kappa coefficient is stated.	P43, paragraph 1, lline 23	The statistical nature of the kappa coefficient is as such that no p-value is produced. Kappa-coefficient and percentage of agreement stated.	Dankaerts et al. (2006c) found almost perfect agreement (Kappa-coefficient 0.96; %-of-agreement 97%) for the inter-examiner reliability when expert clinicians (12 or more years of experience and extensive training) did the classification of patients with NSLBP.
Add space between 'impairment' and 'and'. Last line of the 1st paragraph add comma after '(2014)'	P 46, line nine from top	Space added between "impairment" and "and"	Luomajoki et al. (2007) conducted a study to determine the reliability of lumbo-pelvic movement control tests but again the physiotherapists who rated the video-recordings were specialists in the field with more than five years' experience in the assessment of motor control impairment, and they received a three day course on movement control dysfunctions (Luomajoki et al. 2007).

Section 4. To compare the ability of evaluation and classification in relation to level of experience of qualified physiotherapists and physiotherapy students. Review and correct this section of the discussion chapter when interpretation of table 4 was implemented in Chapter 4.	P46, paragraph 1,line 15 to 19	Percentages removed and odds ratio values added. Interpretation of table 4 and odds ratio already explained earlier	The chance of getting the assessment wrong when you are an inexperienced physiotherapist with less than five years of clinical experience is only 0.54 fold that for physiotherapists with five years or more experience. (table 4, page 39). The risk of post graduate course, APDL2, or masters degree physiotherapists to make a wrong decision is 1.40, 1.42 and 2.66 fold increased to that for graduate physiotherapists.
Add space between 'impairment' and 'and'. Last line of the 1st paragraph add **comma after '(2014)'**	P46, last line of first paragraph	Comma added after (2014)	This again contradicts the literature of Aasa et al. (2014), Luomajoki et al. (2007) and Dankaerts et al. (2006c), as mentioned before.
'Experience and further qualifications did not impact on the physiotherapists.' Correct this statement following correction of table 4 interpretation in Chapter 4: Results.	p48, paragraph 1, line 1	As earlier explained, a bigger odds ratio value indicates a bigger chance of getting the assessment wrong. The words 'in this specific study' was included to clarify that this is not always the case and one cannot assume that it is always true for other populations or studies.	Experience and further qualifications did not impact on the physiotherapist's ability to correctly classify patients into a flexion pattern or an extension pattern in this specific study.
The fact that all data gathering did not take place on the same day nor in the same venue, could also have introduced bias/contamination.	P48, paragraph 3, limitations, last bullet	Sentence added: Data collection did not take place on the same day or in the same venue. This could have introduced bias or contamination.	6.1. Limitations • Only flexion and extension patterns are included in this study because they are the most common patterns. The lateral shifting and multidirectional patterns need to be tested in further research studies. • Some of the videos were more difficult to classify than others because not all patients present exactly as literature describes. • A sample of convenience was used in Gauteng. This might not be a true representation of all qualified

			physiotherapists and physiotherapy students in South Africa. • Data collection did not take place on the same day or in the same venue. This could have introduced bias or contamination.
It might be beneficial if universities can start introducing undergraduate students to lumbo-pelvic moment control tests' During the current study data were not collected on whether these tests are included in the undergraduate curriculum as it was not an objective of the current study. It is thus not appropriate to assume that these tests are not currently in the curriculum of undergraduate study.	P49, paragraph 2, third bullet	Third bullet removed: • It might be beneficial if universities can start introducing undergraduate students to lumbo-pelvic movement control tests.	6.3 Recommendations for clinical practice • Physiotherapists should receive training on how to use lumbo-pelvic movement control tests clinically as part of their assessment of NSLBP. • Physiotherapist should be taught how to interpret lumbo-pelvic movement control tests so that patients with NSLBP can be classified into subgroups.
Review the following references and ensure all volume/numbers/pages are present	P51, paragraph 7, line 2, 3	Online address included.	Furlan, A., Imamura, M., Dryden, T. & Irvin, E. 2008. Massage for low-back pain. 8 Oct 2008 ed.: The Cochrane Library. [Online]. Available: http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD001929/frame.htm l.
Review the following references and ensure all volume/numbers/pages are present	P51 paragraph 8, line 3, 4	Online address included.	Furlan, A. D., Van Tulder, M. W., Cherkin, D., Tsukayama, H., Lao, L., Koes, B. W. & Berman, B. 2005. Acupuncture and dry-needling for low back pain. Cochrane Database of Systematic Reviews. [Online]. Available: http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD001351/frame.htm

			l.
Review the following references and ensure all volume/numbers/pages are present	P52, paragraph 10, line 2	Page number included	Louw, A., Morris, D. & Grimmer-Somers, K. 2007. The Prevalence of low back pain in Africa: a systematic review. Biomed Central Musculoskeletal Disorders, 8, 105.
Review the following references and ensure all volume/numbers/pages are present	P52, paragraph 11 line 4	Volume and pages included	Luomajoki, H. 2010. Movement Control Impairment as a Sub-group of Non-specific Low Back Pain. Evaluation of Movement Control Test Battery as a Practical Tool in the Diagnosis of Movement Control Impairment and Treatment of this Dysfunction. Dissertation, University of Eastern Finland, 24, 70p.
Review the following references and ensure all volume/numbers/pages are present	P52, paragraph 12 line 2	Page number added	Luomajoki, H., Kool, J., Debruin, E. & Airaksinen, O. 2007. Reliability of movement control tests in the lumbar spine. Biomed Central, 8, 90.
Review the following references and ensure all volume/numbers/pages are present	P 53 paragraph 4, line 2,3,4	Included online address.	Niemisto, L., Kalso Eija, A., Malmivaara, A., Seitsalo, S. & Hurri, H. 2003. Radiofrequency denervation for neck and back pain. Cochrane Database of Systematic Reviews. [Online]. Available: http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD004058/frame.htm l.
Review the following references and ensure all volume/numbers/pages are present	P54, paragraph 5, line 3,4	Included online address.	Staal, J. B., De Bie, R., De Vet Henrica, C. W., Hildebrandt, J. & Nelemans, P. 2008. Injection therapy for subacute and chronic low-back pain. Cochrane Database of Systematic Reviews. [Online]. Available: http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD001824/frame.htm l.
Review the following references and ensure all volume/numbers/pages are present	P54, 3rd line from the bottom	Page included	Wand, B. & O'Connell, N. 2008. Chronic non specific low back pain - sub-groups or a single mechanism? BioMed Central Musculoskeletal Disorders, 9, 11.

Review the following references and ensure all volume/numbers/pages are present	P55, paragraph 2, line4,5	Included online address.	Yousefi-Nooraie, R., Schonstein, E., Heidari, K., Rashidian, A., Pennick, V., Akbari-Kamrani, M., Irani, S., Shakiba, B., Mortaz Hejri, S., Jonaidi, A. R. & Mortaz-Hedjri, S. 2008. Low level laser therapy for nonspecific low-back pain. Cochrane Database of Systematic Reviews. [Online]. Available: http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD005107/frame.htm l.
It would make the script really unique if the video of the recorded movement patterns were included as an addendum electronically.	Electronic copy	Videos included	