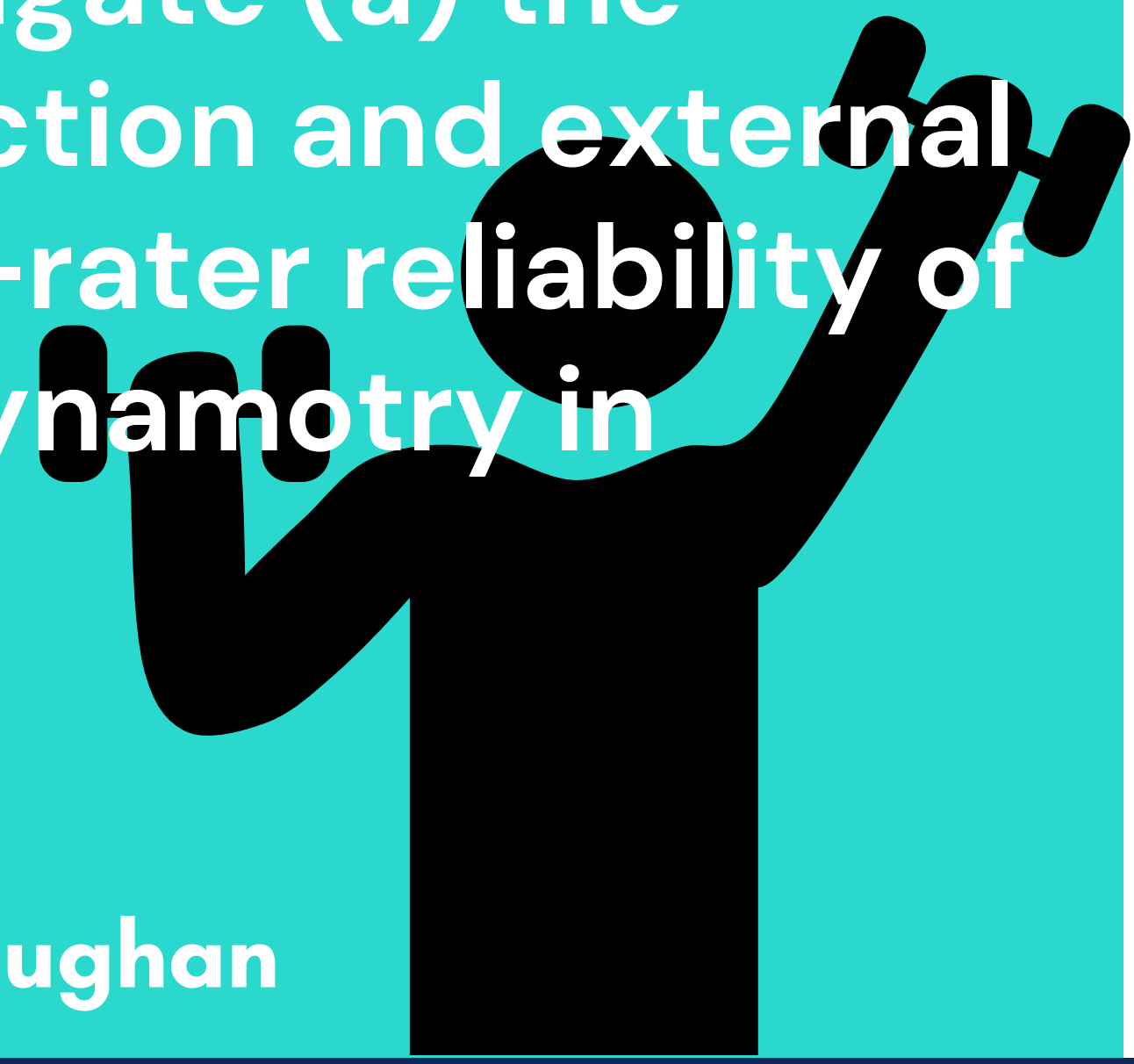


The Shoulder Strength Testing Out of Pain (SSTOP) Trial

Randomised Controlled Trial involving people with rotator cuff-related shoulder pain (RCRSP) aiming to investigate (a) the relationship between pain-free shoulder abduction and external rotation force and pain and disability, (b) Inter-rater reliability of pain-free force testing at the shoulder using dynamometry in RCRSP, (2024).



T.Cook., J. Lewis., L. Emmett ., A. Monkton., B. Hale., and H. Vaughan

Why is Rotator cuff-related shoulder pain (RCRSP) an important research area?
Shoulder pain is the third most common type of musculoskeletal (MSK) disorder for which people seek medical care. It is estimated that roughly 70% of all shoulder pain can be accounted for as rotator cuff-related shoulder pain (RCRSP).

What is Rotator Cuff related shoulder pain?
RCRSP is an umbrella term that encompasses a spectrum of shoulder conditions including the subacromial soft tissues. As is the case with many MSK disorders it can become persistent meaning it can last beyond 3 months and thus, lead to significant disability. Despite its prevalence there is ongoing uncertainty regarding the cause and source of symptoms.

Are there any other factors to consider?
Multiple factors are likely to lead to reduced force output at the shoulder including, but not limited to, muscular disuse atrophy, pain inhibition, kinesophobia (fear of movement) and low pain self-efficacy . It is not clear from the current body of research whether one or more of these or other factors appear to be more significant in populations of people with RCRSP.

Introduction

Previous research suggests one of the key constants with RCRSP is thought to be a lack of force production of the shoulder muscles. As a result, RCRSP is often managed with 'Exercise therapy' using resistance training aimed at improving shoulder strength. This appears to be the cornerstone of non-surgical management of RCRSP.

Accurately measuring force output is therefore deemed to be useful because it may help guide treatment adherence and progression. Currently, there is no widely adopted practical way of measuring force output at the shoulder in a clinical setting.

Research investigating the association between force output and RCRSP has reported conflicting results. Studies that do find an association, report a reduction in force output in shoulder abduction and external rotation. This may suggest that these muscles are potential drivers of symptoms and targets for treatment.

Objectives

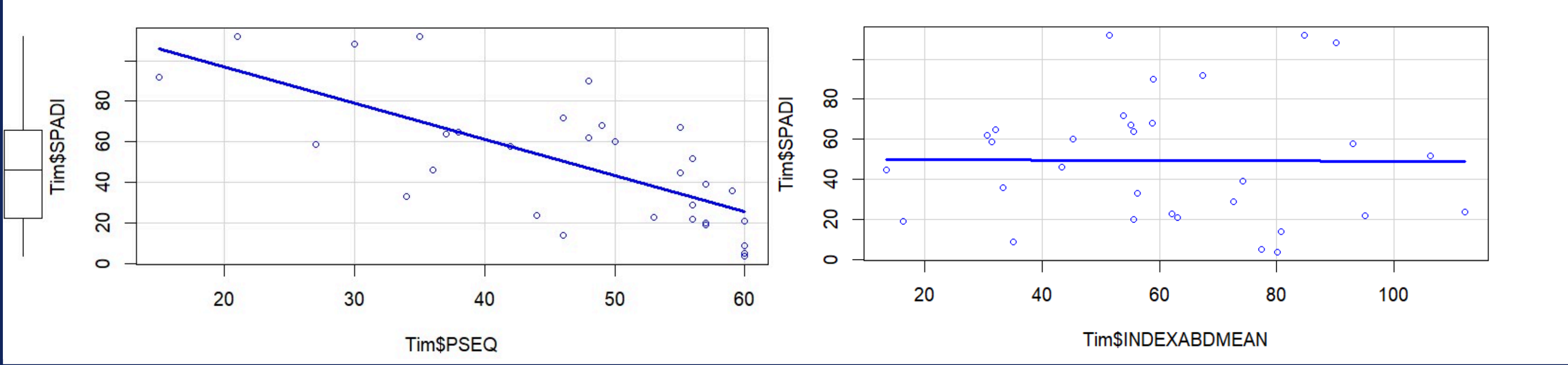
- Is pain-free force testing using this method a reliable test?
- Do reductions in pain-free force correlate with severity of pain and disability? If so, to what degree?
- Does pain-free shoulder abduction and external rotation force testing using a fixed portable dynamometer in people with RCRSP correlate with levels of kinesophobia, pain self-efficacy and pain catastrophising.
- Is improving force output necessary for some patients with RCRSP but not others?

Methodology

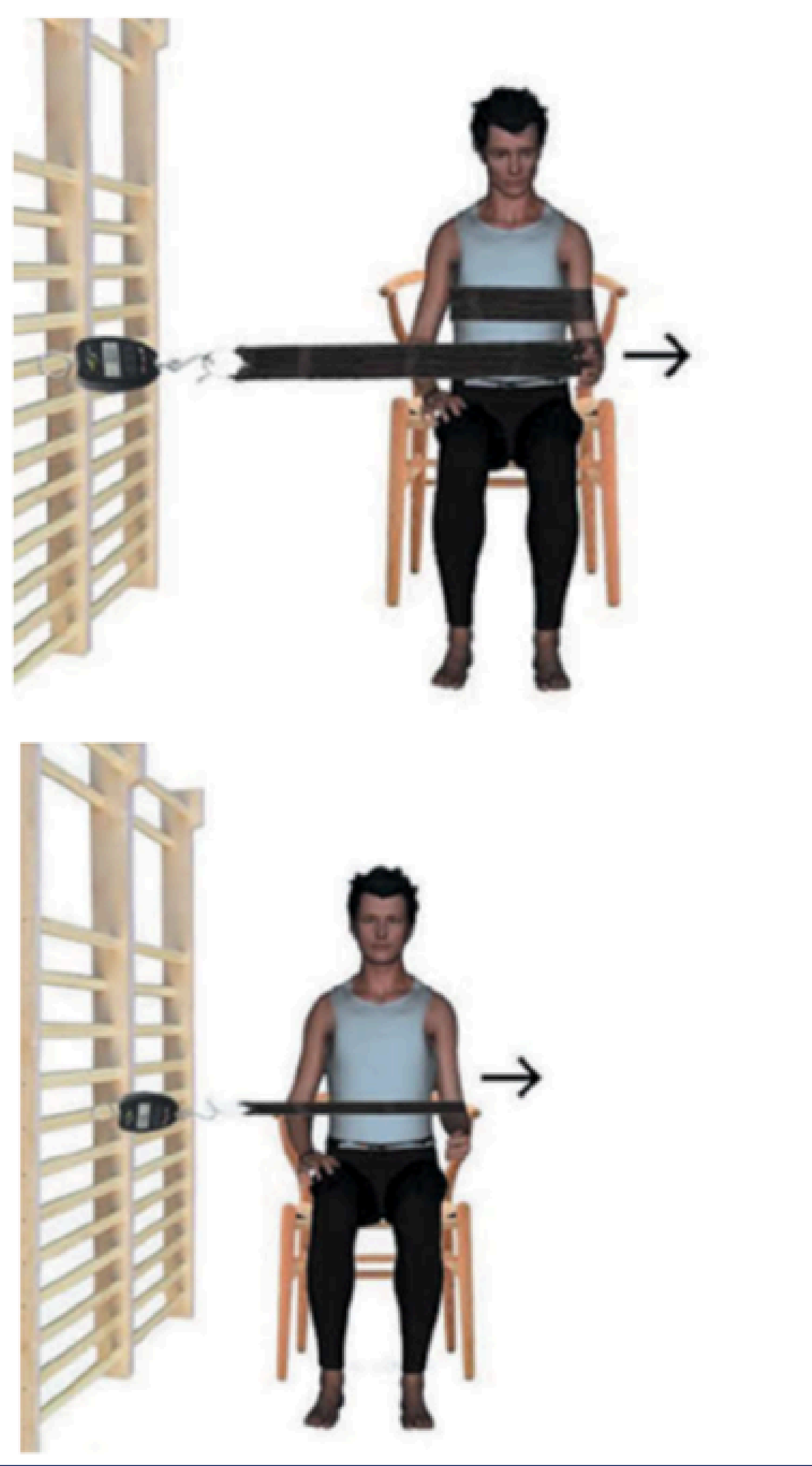
- Randomised cross-over study
- 2 Physiotherapists measuring pain-free force
- >30 participants (adults)
- Data analysis to establish reliability
- Correlational analysis to determine relationship between force and pain and disability

Analysis

- **Inter-rater reliability** of our testing demonstrated similar variations in measuring to previous research in this area.
- Reliability analysis of the data when using Limits of Agreement (LOA) ranges between +/- 26 - 61 Newtons. Equilivent to a **6.1 kg difference** between testers.
- It is difficult to establish whether this is a clinically meaningful variation in measurement – so caution should be taken in interpreting this reliability.
- **Correlations of force output measurements to assessment metrics** - when looking at individual data – all but one strength Index demonstrates a weak correlation with shoulder pain and disability (SPADI).
- **Only** the Strength Index for External Rotation (taken as mean average) for one researcher has a moderate correlation to SPADI. Suggesting this form of testing has limited clinical use in predicting shoulder pain and disability.
- Comparative to Strength Indexes, **Pain self-efficacy** appears to have a **stronger correlation** (moderate) to pain and shoulder disability (SPADI).
- Data is shown to be normally distributed accross all the testing measures.



Illustrations demonstate mesuring procedure



Impacts

What are the impacts for Research, Clinicians and the Public/Patient groups?

Outputs and impact

- Peer reviewed publication (in progress)
 - SCFT research conference
 - Inservice and lecturing
 - Social media
 - Involvement of Physio staff and students
 - Informing future exercise trial (PhD)
 - A new narrative...
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Conclusion

- **Reliability** - Inter-rater reliability is mostly consistent between the two researchers. However, this should be interpreted with caution as there is no previous research on what is deemed a minimally clinically important difference.
- RCRSP patients' strength output comparing the painful shoulder to the non painful shoulder (index) displays minimal correlation to shoulder disability and pain.
- Comparison of abduction force with SPADI scores shows minimal correlation with shoulder pain and disability (SPADI) in RCRSP.
- Comparison of force output of shoulder external rotation force with SPADI scores has shown, at best, moderate correlation with shoulder disability and shoulder pain in RCRSP - Suggesting this form of testing may have limited clinical use in predicting levels of shoulder pain and disability.
- RCRSP and disability has a much greater correlation with pain self efficacy scores than it does with testing force output of external rotation or abduction movements.