Institution:
Southampton Solent University

Unit of Assessment:
26: Sport and Exercise Sciences, Leisure and Tourism

Title of case study:
Using an approach to Strength and conditioning to provide public benefit in those with Chronic Low Back Pain (CLBP).

1. Summary of the impact (indicative maximum 100 words)

The sport and exercise science team at Southampton Solent began its work only in 2007, with little or no previous scholarly history. The new team focussed on the area of strength and conditioning within the area of sport, exercise and health. The overarching approach to strength and conditioning training methodology defined in the work of Fisher et al (2011) is momentary muscular fatigue (MMF) whereby training is undertaken to maximal exertion. Using MMF the research team have demonstrated public benefit, and thus interim impact, through improving performance within client groups suffering from chronic low back pain (CLBP). Thus, we hope to show interim impact and reach using this methodological approach improving performance in those with CLBP.

2. Underpinning research (indicative maximum 500 words)

During the past thirty or so years, the popularity of strength training has increased enormously. However the relationship between strength training and chronic lower back pain has remained ambiguous, without clear guidance on appropriateness or application. The research team through their scholarly activity have attempted to address the issue of confusion through quality research and develop a strategic approach to training with groups who suffer from CLBP.

Momentary Muscular Failure (MMF) and Chronic Lower Back Pain

The paper by Fisher et al (2012) challenges many of the approaches to conventional strength training building on previous work undertaken by Smith and Bruce-Low in 2004. The use of training to momentary muscular fatigue enhances training efficiency as well as strength gains and is the salient point covered in this article. Conditioning the muscles of the lower back (erector spinae and multifidus) using MMF, through specific lumbar extension exercise (as highlighted through the work of Fisher et al, 2011; Fisher et al, 2012; Bruce-Low et al, 2012; Smith et al, 2011; Steele et al, 2013; Steele et al, 2013a and Steele et al, 2013b) halts deconditioning of these muscles which in turn reduced the risk for low back injury and pain (Steele et al, 2013b).

Chronic Low Back Pain (CLBP)

As low back pain is one of the leading causes of work absenteeism around the world and is therefore considered a major international problem with escalating costs in the billions of pounds (£10.6 billion in 1998 which has only escalated since). In the UK, up to 50 million working days are lost each year as a result of individuals suffering from lower back pain, with 20 % (1 in 5) of the UK reporting back pain to their general practitioner (Bruce-Low et al, 2012). Therefore, a greater understanding of how to implement interventions to reduce CLBP would be extremely valuable socially and financially.

Therefore, using the training intervention of MMF, this research has potential for huge impact for helping to reduce one of the world's leading causes of absenteeism. It is the claim of this research group that this research has both reach and interim impact.

Positions held during research period

Bruce-Low – Associate Professor Southampton Solent University
Fisher – Senior Lecturer Southampton Solent University
Steele – Associate Lecturer Southampton Solent University

Smith – Senior Lecturer Manchester Metropolitan University

3. References to the research (indicative maximum of six references)

1. Fisher J, Steele J, Bruce-Low S, and Smith D (2011). Evidence-based resistance training recommendations. *Medicina Sportiva*: 15 (3): 147-162. 10.2478/v10036-011-0025-x
2. Fisher J, Bruce-Low S, Smith D. (2012). A Randomized Trial to consider the effect of Romanian deadlift exercise on the development of lumbar extension strength. *Physical Therapy in Sport*, August, 1-7. 10.1016/j.ptsp.2012.04.001
3. Bruce-Low S, Smith D, Burnet S, Fisher J, Bissell G, Webster L. (2012). One lumbar extension training session per week is sufficient for optimal strength gains and reductions in low back pain in chronic participants. *Ergonomics*: 55 (4), 500-7. http://dx.doi.org/10.1080/00140139.2011.644329
4. Steele J, Bruce-Low S, Smith D, Jessop D, Osbourne N (2013). A Randomised Controlled Trial of Limited Range of Motion Lumbar Extension Exercise in Chronic Low Back Pain. *Spine*. 10.1097/BRS.0b013e318291b526
5. Steele J, Bruce-Low S, Smith D (2013a). Clinical use of Specific Exercise for the Lumbar Extensors in Chronic Low Back Pain. *Clinical Journal of Pain*.
6. Steele J, Bruce-Low S, Smith D (2013b). A review of the specificity of exercises designed for conditioning the lumbar extensors. *British Journal of Sport Medicine*.
7. Smith D & Bruce-Low S. (2004) Strength training methods and the work of Arthur Jones. *Journal of Exercise Physiology online*. 7 (6): 52-68.
8. Smith D, Bissell G, Bruce-Low S, Wright C (2011). The effect of lumbar extension training with and without pelvic stabilization on lumbar strength and low back pain. *Journal of Back and Musculoskeletal Rehabilitation*, 24, 1-9.

Articles 1, 2, 7 and 8 are well cited in the literature suggesting impact within the academic field. Articles 3, 4, 5 and 6 are published in well-respected journals known for their rigorous peer review process suggesting the quality of the articles is high.

4. Details of the impact (indicative maximum 750 words)

The manner in which the MMF strength training is undertaken is key and the research from this group has shown that our work has interim impact. Using this strength training approach, we believe this research has interim impact for those with chronic low back pain and would argue has high impact for those practitioners within the field of sport, exercise and fitness working with those with CLBP across the world.

Chronic Low Back Pain and Strength Training

The approaches of the research team have also influenced their approach to strength training for chronic low back pain (CLBP). With CLBP currently costing the world's economy billions of pounds through loss of workforce in the form of absenteeism, this is most certainly an area that is important to address. The team have shown that the use of isolated lumbar extension exercise has huge impact for the manner in which CLBP can be treated in the future. The results have not only shown statistically significant changes but also minimally clinical important changes for pain reduction which is the bench mark requirement for impact within the health care setting. This will have impact for the manner in which practitioners deal with those with chronic low back pain in relation to how they either rehabilitate or try to prevent low back pain with prehabilitation. This is of particular importance considering the method suggested by the research team is to isolate the muscles of the low back whilst training where the majority of the world's training and rehabilitation

professionals prefer to not isolate when exercising. Furthermore, this evidence shows that exercising the lumbar extensor musculature specifically once a week to momentary muscular failure, through restricting concurrent pelvic movement, even in a limited range of movement can alleviate the symptoms of chronic low back pain (CLBP). This research has potential for high interim impact for helping to reduce the world's leading cause of absenteeism. Thus, this method of exercise training does indeed have high interim impact, as it is novel and successful.

5. Sources to corroborate the impact (indicative maximum of 10 references)

- Monthly Prescribing Reference - 11-07-13
  Research from James Steele on chronic lower back pain featured in Pharmaceuticals, demonstrating the reach to practitioners Reference bitly.com/1buvEvh
- Exercise is good for back pain: BBC Radio clip including patient testimony on SSU work
  http://www.bbc.co.uk/programmes/p01dy1fr

Researcher User Testimonials:

Anglo European College of Chiropractic corroborate the claim that SSU research has changed the way that patients with lower back pain are treated through prescribed exercise