Institution: University of Abertay Dundee

Unit of Assessment: 26 – Sports and Exercise Sciences, Leisure and Tourism

Title of case study: High intensity training

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

High intensity training: Impact can be evidenced on multiple levels ranging from adding to the public debate on exercise duration and providing information to the sports industry. This includes publication of the findings/applied recommendations of this research in lay magazines (e.g. Men's Health), books (e.g. The High Intensity Workout Dundee University Press 2012) and television shows (e.g. Horizon). In addition, the research has informed coaches (ice hockey and rugby union) and people working in the fitness industry (personnel trainers), and has contributed to the debate on exercise for health (Scottish Government).

2. Underpinning research (indicative maximum 500 words)

The research findings underpinning the impact discussed arise from a programme of research initiated at Heriot Watt University and continued at Abertay University by Babraj, where he is a lecturer. The work examined the use of high intensity training to improve both health and endurance capacity. High intensity training involves repeated bouts of supramaximal effort, with each bout lasting no longer than 30 seconds.

Exercise is known to be a powerful regulator of human carbohydrate metabolism. However, adherence to exercise is low in the general population, with lack of time cited as a major barrier to exercise adherence. The initial research by Babraj et al was carried out to determine whether low volume, high intensity training could elicit similar improvements in insulin sensitivity to those seen with more traditional, higher volume, lower intensity training regimes. The research demonstrated that HIT markedly improved insulin sensitivity in a sedentary population as assessed by an oral glucose tolerance test. This was the first major study to demonstrate the metabolic health benefits of high intensity exercise. Building on this study, the research into HIT has focused on the minimum amount of training required to elicit performance and health improvements. Subsequent research has utilised different protocols that reduce the duration or number of sprints being performed (2011, 2012). These papers show similar improvements in health outcomes and improvements in aerobic fitness to those associated with longer duration sprints. This has changed our understanding of the required exercise duration for health benefits and is potentially very significant in relation to public health and for development of endurance capacity in athletes.

These are major findings and have re-opened the debate on the intensity and duration of exercise needed to promote good health and fitness. In light of the review currently taking place into exercise advice in Scotland, this research is extremely timely. The initial research has been extended to consider different populations. One of the most important of these, given the changing demographics in the UK and the potential costs of ill health in the elderly, is the older population. Determining that lower volume training can significantly improve cardio-metabolic health within an older population is therefore extremely important. The reduction in total exercise time required, approximately 10 minutes total time for each training session, with just 1 minute of actual exercise can clearly address one of the main barriers to adherence, that of real or perceived lack of time. This lack of time is also an important factor in performance sport, albeit for different reasons. The

research undertaken so far has also demonstrated performance enhancement in competitive athletes, achieved in a very time efficient manner.

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

i. Jakeman J, Adamson S, Babraj J. Extremely short duration high-intensity training substantially improves endurance performance in triathletes. Appl Physiol Nutr Metab. 2012 Oct;37(5):976-81

ii. Metcalfe RS, Babraj JA, Fawkner SG, Vollaard NB.Towards the minimal amount of exercise for improving metabolic health: beneficial effects of reduced-exertion high-intensity interval training. Eur J Appl Physiol. 2012 Jul;112(7):2767-75 (listed in REF2).

iii. Babraj JA, Vollaard NBJ, Keast C, Guppy FM, Cottrell G, Timmons JA. Extremely short duration high intensity interval training substantially improves insulin action in young healthy males. BMC Endocrine Disorders 2009, 9:3 (listed in REF2).

iv. Jakeman, J.R., Lorimer, R., Babraj, J.A. Comparison of uphill sprint training to cycle sprint training. 17th Annual ECSS-Congress, Bruges 2012 Abstract id: 1807

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

As well as being recognised and highly cited within academic literature, the research into high intensity exercise is also having a verifiable impact on perceptions of exercise. The work has promoted debate into what is the required intensity of exercise to promote good health and to improve fitness within the general population and within the fitness industry. The research carried out since 2010 began to have a measurable impact throughout 2011 and into 2012, building on the earlier impact of the high intensity training research carried out by Babraj at Heriot Watt University and published in 2009. Building on this research further articles have been published on the role of high intensity training in promoting cardio-metabolic health and improvements in endurance capacity and lactate metabolism.

The research has been widely disseminated and has led to one meeting and two laboratory visits from the Scottish Minister for Sport and Commonwealth Games, as well as two meetings with Dr Andrew Murray who is leading the Scottish Government review of exercise and health. The findings have also been covered nationally in the UK on the BBC Horizon programme (broadcast 28th February 2012) watched by an estimated 2.9 million people (http://www.barb.co.uk/report/weekly-top-programmes-overview?) (1). Building directly on the Horizon programme, Dr Babraj was approached by Dundee University Press to write a lay book on the topic of high intensity training which was published in October 2012 (2). The book sold 1000 copies in the first 2 months of publication. This work has also been widely disseminated within the local population with three Café Science presentations being given by staff between 2011 and 2012 (total attendance approximately 140 people, 3).Meetings with the Royal Bank of Scotland (total attendance approximately 100 people), Gloucester Rugby Club (individual meetings with Head of Sports Medicine, Head of Strength and Conditioning plus other coaches) have also provided further opportunities for dissemination of this work. The research on high intensity training has also been further disseminated to a wider audience via general magazine articles as well as articles in specialist sports magazines; e.g. the research has featured in Healthy magazine (4, readership 130,000), Marie Claire (5, readership 250,785), Men's Health (6, readership 218,368) and Women's Fitness (7, readership 36,022). This type of dissemination is making more people aware and promoting debate amongst general public and exercise practitioners that exercise

sessions do not need to last hours but can be done in 10 minutes with remarkable benefits for fitness and health.

The dissemination carried out to date has had a direct impact locally and wider afield. Locally people who have attended a Café Science presentation have been keen to take part in the training and have contacted staff asking for a trial. One coach states “We have been instituting some HIT so far this season and the guys really enjoy it. We’ve noticed good results with players displaying better performance so far.”(8). Likewise a former professional rugby player, male fitness model and personal trainer tried out high intensity training after reading the book and states "I heard about the research through reading the book. The HIT test was initially very tough but was surprised at the improvements I made every session and after 5 session a total of 20mins of exercise I was astonished at the results to my overall health and fitness and it was a real rush as well as being slightly addictive. Since doing the sessions I have used the basic theory with a couple of my clients who also could not believe the gains they made in their overall fitness and well being" (9). Following the meeting at Gloucester Rugby Club they have now incorporated high intensity training into their rehabilitation programme for players returning from injury. Their strength and conditioning coach staid “Following the meeting with Dr Babraj we have used both high intensity interval sessions… and found the 10x6secs was the best session for us… and I am keen to use them further with the guys.” (10).

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

1 http://www.bbc.co.uk/programmes/b01cywtq

2 High Intensity Workout. http://www.amazon.co.uk/High-Intensity-Workout-Fitness-Health/dp/1845861477/ref=sr_1_1?s=books&ie=UTF8&qid=1346078752&sr=1-1

3 http://www.cafesciencedundee.co.uk/?tag=john-babraj

4 http://www.healthy-magazine.co.uk/fitness/most-asked-fitness-questions

5 http://www.marieclaire.co.uk/lifestyle/lifestyle-galleries/35964/7/7-new-health-tactics-that-really-work.html#index=1&slider=off

6 Men’s Health December 2012

7 Women’s Fitness issue 108 December 2012

8 Head Coach Sonderjyske Ishockey A/s

9 Personal Trainer (London)

10 Strength & Conditioning Coach Gloucester Rugby Union Football Club