

**Cardiff School of Sport**  
**DISSERTATION ASSESSMENT PROFORMA:**  
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UNIVERSITY OF WALES INSTITUTE, CARDIFF

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CARDIFF SCHOOL OF SPORT

DEGREE OF BACHELOR OF SCIENCE

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TITLE

**Effects of an athlete specific lower limb massage versus a pre-determined protocol of lower limb massage on thirty meter sprint running**

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CARDIFF

EFFECTS OF AN ATHLETE  
SPECIFIC LOWER LIMB MASSAGE  
VERSUS A PRE-DETERMINED  
PROTOCOL OF LOWER LIMB  
MASSAGE ON THIRTY METRE  
SPRINT RUNNING

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## **Abstract**

*Background-* Sports massage is used as a therapy for prevention and management of soft tissue injuries. However there is an absence in current literature which suggests the usefulness of sports massage as a pre-performance tool. Although there are a few studies available which look at pre-performance massage on sprint performance, they are lacking, and all of these use a pre-determined protocol of massage rather than an athlete specific massage.

*Aim-* The purpose of this study was to discover whether an athlete specific lower-limb massage would have a positive effect on male rugby and football players' sprint performance when compared to a pre-determined lower-limb massage.

*Method-* 10 male students from Cardiff Metropolitan University agreed to take part in this study. They were randomly split into two groups, where both groups received a 20 minute lower limb massage however one group followed a pre-determined protocol, and the other received a massage specific to what they felt necessary. The clients were in a prone position and received a quick stimulating massage which involved effleurage, tapotement and petrissage. They then did three 30 metre sprint trials from which the mean of their result was noted. 72 hours later the participants switched over and received the opposite massage intervention, and then had their sprint times tested again.

*Results-* A two-way repeated measures analysis of variance test shown that there was no significant difference between a pre-determined massage protocol and an athlete specific massage on sprint performance ( $p>0.05$ ).

*Conclusion-* The findings of this study suggest that there is no difference between an athlete specific massage and a pre-determined massage protocol on sprint performance. Additional research should be made in order to support the use of sports massage as a pre performance tool.

# CHAPTER ONE

# INTRODUCTION

## 1.0 Introduction

Sports massage as a modality within modern day sport, at recreational to elite level, has seen great interest. Benjamin and Lamp (2005) suggest that sports massage has been implemented into training programmes in order to develop them, been used by athletes' pre and post competition to enhance their performance and increase their recovery rate; as well as decrease the risk of injury and encourage rehabilitation. Due to these potential properties of massage, research has been conducted into whether sports massage effects performance, and any findings made are vital to coaches and athletes when considering using massage for enhancing sporting performances. Pre-performance massages have different effects compared to post performance massages, and so different techniques and approaches should be considered with each. Goodwin *et al.* (2007) suggest that massage can be seen to have both stimulating and calming effects on an athlete, therefore, with the right approach made by the masseur, an athlete can receive the best benefits possible pre or post their performance. Kolt *et al.* (2005) suggests that massage creates an increase in muscle compliance, which develops joint range of motion, and decreases stiffness; this can be seen as appropriate to preparing an athlete for their performance.

Current research available on the effects of pre event massage on an athlete's performance is limited, and studies which are available only use a pre-determined protocol of massage, and do not take into account what an athlete may actually feel they need their pre-performance massage to be like. A greater insight into the effects of an athlete specific massage will be more valid than a study which looks at massage which has been pre-determined. This is as within the sporting environment, a pre-performance massage given to an athlete will be in accordance to their needs and their sport's needs.

To help increase the validity of sports massage, more research should be conducted which would suggest the beneficial qualities that it could possibly have on performance and thirty meter sprint times. These results would be of importance for athletes, coaches, sports masseuses, and athletic trainers, who may need to

understand the effects of sports massage on performance in greater detail. If the results show a significant outcome between sports massage and thirty metre sprint times, it will give members of the sports industry a valuable pre performance tool which could be integrated into training programmes and preparation routines.

### *1.1 Aims and objectives*

The aim of this study is to identify whether pre-performance massage will have any beneficial effects on thirty meter sprint sessions. Alongside identifying whether a pre-determined protocol for lower limb massage will be more beneficial to a subject rather than themselves choosing what they would like targeted.

### *1.2 Study rationale*

Sports massage is a widely used therapy for a broad range of sports and its performers, it helps with injury prevention and rehabilitation, and can be implemented into training programmes to help with recovery and has been said to enhance performance. However, due to a lack in relevant literature, the true beneficial effects on an athlete's performance are still questionable (Goodwin *et al.*, 2007). Justification of this project is to further knowledge within the area of sports massage, which compared to many other subjects, is relatively under researched. So that alone means what results are found will add to knowledge of the subject. The author of this project has been involved in sports massage and its use as a pre-performance tool in many ways for the last 3 years, as an athlete and also a practitioner at the Cardiff Blues RFC. So conducting this experiment will give her information that she can pass on to her coaches, team mates and employees.

### *1.3 Main study hypothesis*

H0 – It is hypothesised that there will not be a statistically significant difference between and athlete specific massage protocol and a pre-determined massage protocol on a thirty metre sprint performance (m/s).

H1 – It is hypothesised that the athlete specific massage protocol will significantly increase thirty metre sprint performance compared to a pre-determined massage protocol (m/s).

# CHAPTER TWO

## REVIEW OF

### LITERATURE

## 2.0 Review of literature

Enhancing sporting performance is an area of interest to all who are involved in sport, the coaches, athletes, trainers, specialists and even the fans. It is a subject which has involved much research and debate. Sports massage has been thought of as a means of enhancing sports performance by many; however, research into this area is lacking compared to other methods of performance enhancement, and results that have been found have not been conclusive. Sports massage is widely used as a method in conjunction with a warm up to help prepare an athlete for performance, whether it has its required effects is still relatively under researched. Physical preparation for sport is important in order to reduce the risk of injury and enhance performance; alongside mental preparation which creates a mindset that enables the athlete to constantly perform up to their abilities. Understanding the physical and mental preparation that athletes go through can help when looking at the need and effects of the use of pre-performance massage.

### 2.1 Athlete preparation:

#### 2.1.1 Mental preparation

Mental preparation of an athlete depends on their character, as each athlete may have a different mind-set of what mental preparation helps them perform well. In a study by Cash *et al.* (1996) they found that through asking athletes how they would like to feel before going into a performance or competition that there was a variance of either wanting to feel fired up and excited, or relaxed and laid back. This is important to take into consideration especially with the use of pre performance massage, and certain techniques result in the athlete feeling fired up, and others result in them feeling laid back. Therefore, having an athlete specific massage will be beneficial to how the athlete likes to feel before competition. Whelan and Epkins (1990) suggested that mental preparation strategies are used by athletes and their coaches in order to promote physical arousal, which consequently enhances performance

### 2.1.2 Physical Preparation

There is a large amount of literature which supports the use of physical preparation in sporting activities, including warm up activities and stretching. Cone (2007) put forward that a warm up aids injury prevention, preparation for performance and to develop athleticism and sport performance. Jooste and Khumal (2012) found that participants, who engaged in pre-performance static stretching and a performance specific warm up, achieved an enhancement in their sprinting performance. The use of a warm up before sprint performance was also looked at by Stewart *et al.* (2007) who found that preparation by athletes involving a warm up compared to that without resulted in them having significantly faster 40 metre sprint times. When looking at stretching as a preparation tool, Shehab *et al.* (2006) found that most coaches believe pre-exercise stretching prevents a large amount of injuries. Although a coach's opinion is greatly valued, due to seeing the results themselves, it is still an area which should consider more current research. As it has been shown through much research (Fletcher, 2012; Stewart *et al.*, 2007; Cone, 2007) a physical warm up activity is important as a pre-performance tool, however, whether it is still as valuable when in conjunction with massage is an area which needs to be looked at. Fletcher (2012) did exactly that, and looked at the effect on performance of massage with and without the combination of a warm up and of a warm up alone. They found that there was no significant improvement in performance from the application of massage. However, research surrounding pre-performance massage is narrow so therefore the results of Fletcher's (2012) study are seen to be valuable as they add to current knowledge.

### 2.2 Sports massage

Sports massage is commonly used as a way of enhancing an athlete's performance and has been found to have both stimulating and calming properties, dependant on the massage techniques chosen (Jooste and Khumal, 2012). It has been suggested by Mckechnie *et al.* (2007) that massage is an essential part of preparation in sport, Moraska (2005) supports this by suggesting that the use of sports massage is implemented by coaches, trainers, and sports physiologists as well as the athlete as a method of improving performance

### *2.2.1 Effects of sports massage*

Rodgers (1993) states that the application of sports massage produces a state of readiness in the muscles and tissues through the stimulation of circulation and a generation of copious amounts of new oxygenated blood to the area, this is also known as hyperaemia. These physiological effects of sports massage are greatly supported by research, as Cafarelli and Flint (1992) also talk about the generation of oxygen delivery through increase blood flow from the strokes applied in sports massage. They also go on to suggest that muscle temperature increases and there is a buffer of blood PH levels. Cafarelli and Flint (1992) suggest that through these physiological effects produced by sports massage, performance is enhanced.

Although the claims made by many researchers of the physiological effects of sports massage having a significant effect on performance, many studies looking at the application of this on performance results suggest that there is no significant effect from the use of sports massage. This is an area in need of greater research in order to make findings more valid. Another study supporting the use of sports massage within exercise is one by Rodgers (1993), where application of massage is said to result in the athletes' state of well-being being enhanced. Rodgers (1993) suggests that an increase in general state of well-being will increase the athletes' concentration levels, increase visualization and centering techniques as well as assisting in relaxation of the athlete. All of these findings have proposed a positive effect of massage on the athlete and their performance as a result of the physiological effects that massage has.

### *2.2.2 Sports massage techniques and length*

Within massage there are many techniques, all of which are chosen to produce the certain effects they have on the body, and by the sporting requirements of the athlete. When working with a client it is important to understand that not two athletes will respond to massage in the same way (Cash, 1996); therefore listening to an athlete and taking into account what their needs and wishes are, is imperative if you want to get the best out of a sports massage. This is a valuable point made by Cash (1996) as when looking at all relevant literature for pre-performance massage, the athletes have been seen to only receive a pre-determined protocol and although this

may meet the demands of some athletes not all athletes may wish to receive those techniques or depths. As aforementioned some athletes prefer to prepare for sport with a laid back approach to the performance, so therefore the choice of sports techniques should vary to how an athlete wishes to feel before they participate in sport. Cash (1996) goes on to suggest that when required some athletes need a calming and relaxing massage, which can be achieved through shaking and rocking techniques as opposed to a deep tissue massage. These techniques include body rocking, where the client is subject to a slow gentle whole body rock, and shaking, where a limb is held in suspension and gradually in a slow motion shook upwards and downwards or side to side. In reference to the different techniques which can be used, there are ones such as effleurage, tapotment, compressions and petrissage (McKechnie *et al.*, 2007) all of which have different physiological and psychological effects. Benjamin and Lamp (2005) recommend that a general pre-performance massage will comprise of digital pressure, compression, circular friction, and tapotment, these techniques are the most common ones mentioned in other studies previous to Benjamin and Lamps' (2005) study as well as ones following it, which suggests that these techniques are suitable for pre-performance massage. Cash (1996) has made many suggestions within his study in reference to the techniques and lengths of massage which should be conducted. He states that the closer to competition an athlete is then the more specific to the demands of the sport and athlete the massage should be. In regards to pre-performance massage Cash (1996) proposes that it can be applied anything from two days to two minutes before participation. Cash (1996) also states that massage should not constitute a physical warm up and should be done in conjunction with one. Both Benjamin and Lamp (2005) and Rodgers (1993) when referring to the length of time a pre-performance massage should be, have both suggested a period of no longer than 20 minutes; and Wiktorsson-Moller *et al.* (1983) suggest 6-15 minutes of petrissage in order to relax the athlete. This seems an appropriate amount of time for pre-performance massage as before competition and athlete usually allows themselves a certain amount of time to prepare including warm up, hydration, and time to psych themselves' up; being a period of twenty minutes is ideal as any longer and the athlete may feel that their preparation is being dragged out, or may not have time to fit it in. If the massage was to be any shorter, when you take into account application of oil, correct draping and changing of body positions, it does not leave the masseuse much time to complete

an efficient massage. When looking at a time allowance for the testing procedure of this investigation, 20 minutes would work well. This is as massage is time consuming, therefore finding participants and volunteer masseuses who will free for a period longer than around an hour would be difficult. This hour would include the filling out of forms before and going through the procedure with the participants, their warm up, massage intervention, and three thirty metre sprint tests followed by a cool down. If the massage was any longer you will see this testing time increase and would find it difficult to get participants to be available. However, the aim of relaxing the client should only be if that's what they wish to feel before performance, and due to the fact of this study being very dated, the validity of this time suggestion of petrissage could be argued. In contrast Rodgers (1993) more recently suggest that the pace of pre-performance massage should be upbeat, rhythmic and light in order to stimulate the athlete. Benjamin and Lamp (2005) more recently supported this opinion but also stated that it may be necessary to provide a more soothing and relaxing massage for athletes who tend to be anxious leading up to a performance. The application of oil is an important factor to consider when massaging and there should be an adequate amount applied to the skin, especially for a dynamic massage, in order to reduce irritation or the skin and any possible hair on the athletes' legs (Arazi *et al.*, 2012)

### *2.3 Pre-performance sports massage*

As previously mentioned pre-performance sports massage has long been thought of as a necessary part of preparation in sport (McKechnie *et al.*, 2007). The foremost intentions of pre-performance massage are to allow the athlete to feel eager and ready both psychologically and physically (Tessier, 2005). This mention of a psychological benefit is supported by Benjamin and Lamp (2005) who put forward from their study that pre event massage will give an athlete added psychological support as it decreases anxiety and stress. The effects of massage on performance have been greatly shown by relevant literature not to have a significant effect on performance. This is apparent in a study by Harmer (1991) which looked at stride frequency after massage, which was not shown to significantly increase, but it was also noted that this cannot totally suggest an effect on performance as stride

frequency should be looked at in combination with stride length in order to determine an effect on performance. Goodwin *et al.* (2007) measured pre-performance lower-limb massage on 30 meter sprint running, and found that 15 minutes of pre event massage has no significant effect on the participants' 30 meter sprint time. From reviewing this study, it was evident that the researchers guaranteed good validity during testing, for instance the use of a thermostatically controlled area for testing. This allowed for the results given to have high validity, and although no significant effect was found, meant that the results could not be questioned. However, a limitation of this study would be that previous research is lacking, if it was of a greater level Goodwin *et al.* (2007) may have been able to make more informed choices on his research design. This can be seen with the choice of certain method procedures such as the sham ultrasound, which had other stimulating effects on the athlete when it was not desired too. Goodwin *et al.* (2007) discuss that the protocols of massage chosen should also be based on the individuals needs rather than following a pre-determined protocol, which they feel was a weakness in their study. Following a set protocol will not allow you to understand the athlete's needs, and may ignore any issues which could be improved from an athlete specific massage; this may in turn decrease the participants' performance.

#### *2.4 Post performance massage*

Not only does sports massage have an effect on sporting performance and the possible problems post performance, such as delayed onset muscle soreness (DOMS) Farr *et al.* (2002). The findings of Farr's *et al.* (2002) study were that therapeutic massage can reduce problems associated with DOMS; however, it is not clear still if massage is beneficial towards the treatment of strength and functional debilities. This study by Farr *et al.* (2002) was the first to look at the post-performance therapeutic massage effects on DOMS and muscle function, so the creation of this study will add to knowledge and help assist other researchers when deciding what methods to follow if conducting a similar study. Which as previously mentioned for Goodwin *et al.* (2007) was a slight problem when looking at their method selection. A limitation to this study would be that when performing the massage the masseur only focused on one limb two-hour post walk. This poses a

problem as the athlete may not have been suffering the effects of DOMS or loss of muscle function in this particular limb, and may have been present in the unattended limb. Again this highlights the suggestion that the athlete should have had a say in what massage they felt was necessary, as they could then point out where the tightness is.

### *2.5 Sports massage and sprint performance*

Arabaci (2008) followed a similar plan to Goodwin *et al.* (2007) as the study used a warm up protocol which all participants took part in, and then experienced one of three interventions which were, no massage, massage and placebo ultrasound. However, Arabaci (2008) then went on to not only measure 30 meter sprint times, but many other tests were taken, all of which demonstrated the athletes explosive and high speed capabilities. Another comparison that can be made is that Arabaci (2008) used two masseurs on one participant at the same time, and previous to this the masseurs were made to practice the stroke speed and depth on themselves in order to perfect in together on the participant. This can be a strength to the study as using the same two masseurs for each participants allows for greater inter-practitioner reliability in the test, along with the practicing of techniques beforehand. This is as the techniques within the pre-determined massage could be applied at a similar fashion to each participant, and therefore the techniques should have the same effect on each subject. However, similarly to Arabaci (2008) it was not taken into consideration that the athlete may not need this certain massage protocol which has already been selected for them, and in fact, one specific to what the subject feels is necessary, may have a greater effect on their performance. The results of this study found the massage procedure followed had an adverse effect on vertical jump, speed, and reaction time and a positive effect on sit and reach test results. When looking at what massage is appropriate for sprinting, Cash (1996) proposes that as the sport requires great strength, speed and explosive power the massage should be stimulating, especially in the legs which hold the main muscle groups required to achieve explosive power in sprinting.

## 2.6 Sprint performance and its tests

A recent definition of sprinting by Dwyer and Gabbet (2012) is any movement that reaches or surpasses the sprint threshold velocity for at least one second; as well as any movement with an acceleration that transpires within the highest five per cent of accelerations found in the equivalent velocity range. Bishop *et al.* (2001) suggested that most team sports, such as rugby or football, require many near maximal to maximal sprints over short periods of time. Duthie *et al.* (2006) composed a study on the sprint patterns made by players in rugby union during competition, they found that players would produce different sprint patterns dependant on their position, this could be divided in to the two different playing styles of the backs and the forwards; where the backs had a higher frequency of sprinting. Just as Arabaci (2008) used 30 metre sprint timing as their test to look at sprint performance both Duthie *et al.*, (2006) and Moir *et al.*, (2004), accepted the sprint distance of 30 metres to be reliable and valid. When looking at the direction of the sprint test, it was found that linear sprinting is most reliable (Vescovi and McGuigan, 2007). Nevertheless, when looking at the direction where sprints are made in team sports such as rugby and football, they may not always be of a straight line.

Justification for this study can be made acceptable by the irregularity of findings by previous studies. As massage is greatly used within all areas of sport today, it is vital to understand exactly what the effects are on the athletes themselves, and what beneficial effect if any it can have on their performance. From looking at the literature discussed above it is clear that many researchers have attempted to find whether massage has an effect on an athlete's performance, and all have found no significant effect, yet, none of the studies reviewed allowed for the an athlete specific massage to be conducted rather than a pre-determined protocol which had been used in the majority of the studies. Therefore, further research needs to be conducted in order to consider an athlete specific massage, as each individual will have different needs, so certain protocols may not be suitable when others might be. Hence, the purpose of this study will be to look at an athlete specific lower-limb massage, in which the athlete may choose what they would like to be performed; against a pre-determined

protocol, suggested by the researchers through taking into account reviewed literature. These massages will be conducted pre 30 meter sprint testing.

# CHAPTER THREE

# METHODOLOGY

## **3.0 Methodology**

### *3.1 Main study research design*

This project consisted of two groups of 5 participants each. One of the groups involved the participants receiving a 10 minutes pre-determined pre-performance lower limb massage, and the other an athlete specific massage. This meant the athlete could have a say in how they would like their lower limb massage to be delivered. After these interventions the participants then completed three thirty metre sprint tests. 72 hours later the participants switched roles and all received the opposite massage to what they previously received, and once again performed three thirty meter sprint tests. The testing was performed at the same time on each day, in the same conditions and environment in order to keep investigational errors low and maintain efficiency.

### *3.2 Participants*

This project consisted of 10 university male athletes, who were all at similar fitness levels, partaking in training 4-5 times a week at first or second team level. The participants at the time were all studying an undergraduate degree at Cardiff Metropolitan University, and were aged between 19 and 21, the mean and standard deviation as well as the participants height and weight are displayed in (appendix A) Each participant is a member of one the universities sports teams, either competing for the football or rugby team. All participants were free of injury and had been competing with their team at either 2<sup>nd</sup> team level or above and therefore were all experiencing similar levels of fitness during the testing, this will allow for greater reliability, along with the participants all begin male which enhances validity of the tests. The amount of participants chosen was a realistic number considering the use of massage is time consuming and only certain qualified practitioners were able to be involved in the study; therefore an even larger participant size would mean involving more practitioners to help out who were not easily accessible.

### *3.3 Instruments*

The instruments used throughout this study will be kept the same during each participants testing and pre-testing procedures to ensure validity and reliability. These instruments will include the same massage table and the same oil selected;

this is to ensure that one participant won't get a different therapeutic effect from a different massage medium. For the testing procedure infrared timing gates will be used which will then be transferred on to its own software on a laptop. Other instruments involved will be cones within the standardized warm up, all participants will also be using an indoor track within the National Indoor Athletics Centre (NIAC) in order to ensure validity and reliability of the testing results.

### *3.4 Testing procedure*

Participants firstly completed an informed consent form (appendix B) which must be signed in order to be appropriate for testing. They then received a participant information sheet (appendix C) which will give them an insight into how the procedure will progress and also allow them to understand a basis behind why the study is taking place. And finally all participants filled out a compulsory client assessment form to ensure they were suitable to have a massage. All participants then followed a 10 minute standardized warm-up involving the running track and cones (appendix D). The participants were involved in a cross-over design in which half of the group received a 15 minute lower limb massage which had a pre-determined protocol similar to Goodwin *et al.* (2007) study, involving effleurage techniques, petrissage and tapotement (appendix E). The pace of massage was high in order to create a stimulatory effect on the subject (Goodwin *et al.* 2007). The pre-determined protocol was designed by massage practitioners with the intent of creating the best possible effects pre sprint trials; such as increased flexibility, improved range of movement and mental and physical awareness. However, the other half then received a 15 minute massage involving techniques and certain areas of the lower limbs that the athlete's wished for themselves, as all subjects had received a sports massage before, mostly all had an understanding of what techniques they like; if subjects' were not that knowledgeable, the masseur then explained the different effects of techniques in order for the subject to make an informed decision. After the participants had received their massages they then took part in three trials of 30 meter sprint testing from which their average time was recorded at both the 10 meter and 30 meter distances. Reilly (1996) suggests that both of these sports require similar sprint patterns and that football players have an average sprint distance of around 15m which occur roughly every 90 seconds. As stated this is an average and due to the complete distance a footballer may run is up

to 110 yards around 100 metres (length of the football pitch) (Kay, 2013), a 30 meter sprint test is the most realistic one for the sport. This distance of sprint testing is also suitable for rugby players who run similar distances (Reilly, 1996). Once the sprint testing was completed and due to all participants still being fit and healthy, 72 hours later the cross over design took place, and participants switched to the other intervention. The above procedure followed Goodwin *et al.* (2007) method similarly with the difference being the pre performance intervention techniques.

#### 3.4.1 *Massage procedure*

For the pre-determined protocol of massage, there was be a mixture of effleurage, petrissage and tapotment (cupping and hacking), which were be delivered at a high pace to create a stimulatory effect, which is important to achieve in sports that require explosive power and strength (Cash, 1996). Both the pre-determined and athlete specific massages will be conducted by three qualified sports masseuses. Prior to testing the sports masseuses took part in a session to help familiarise themselves with the correct tempo and depth of massage they were to produce, to help with validity when it came to the pre-determined massage. Each massage had 15 minutes of contact time, with massage being applied to the calves and hamstrings for the pre-determined massage, and to the areas of choice of the lower limbs in the athlete specific massage. This may have been all the areas aforementioned, or just one or two. The overall time for each massage was around 20 minutes, which allowed time for correct draping, oil application and changing of positions. For the pre-determined massage each lower limb received seven and a half minutes of contact. This was divided into 5 minutes of effleurage including flat hand, rotary, "V", forearm glide and cam and spindle (120 strokes per minute), 45 seconds of tapotment, including cupping and hacking (240 contacts per minute) and 45 seconds of petrissage on the calf muscles only (120 strokes per minute). For the athlete specific massage, the participants were able to choose which techniques they prefer. This was done through a verbal discussion with the masseuse; where areas of tightness, tempo, depth and preferences of muscle groups were addressed. From this a session was then comprised.

### *3.5 Data analysis*

For this study, all statistical analysis was conducted through the Statistical Package for the Social Sciences (SPSS) software. Both a two-way and one-way repeated measures analysis of variance tests was used. The two-way repeated measures analysis of variance compared the massage treatments and sprint trial effects for the participants 30m sprint times, as well as their 10m split times. The one-way repeated measures analysis of variance discovered if there are any treatment effects on the participants best times at the 10m split and 30m sprint times.

### *3.6 Ethical considerations*

From receiving the participant information sheet and the informed consent form, the participants were aware that they had a right to withdraw from the study at any stage, with no reason necessary. It was also made clear that the personal information received from any of the participants were to be made completely confidential according to the Data Protection Act (1998), and that best efforts would be made to conceal their identity throughout all documentation from the research.

# CHAPTER FOUR

# RESULTS

## **4.0 Results**

This chapter illustrates the participants' descriptive statistics and main study results from the 30 metre sprint tests on two different massage interventions.

### *4.1 Data analysis by hypothesis*

The hypothesis suggested in chapter one will be taken into account when analysing the data, which has been done through a two way repeated measures analysis of variance (ANOVA). This test determines any significant differences between the two massage interventions at both the 10 metre and 30 metre split times. The mean and standard deviation are also highlighted in this section, and the raw data obtained from testing is displayed in (appendix F)

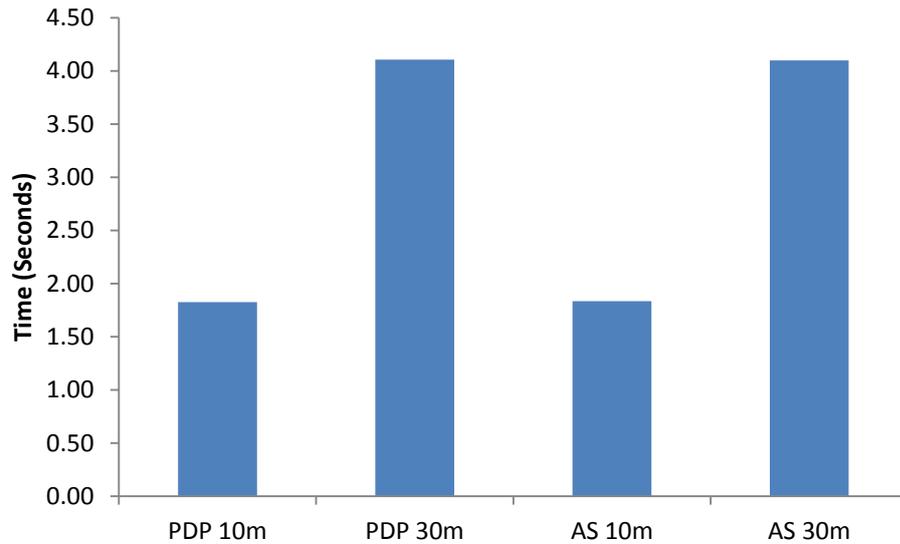
### *4.2 Main study results*

The abbreviations used in this results section are as follows: PDP10 which stands for pre-determined protocol of massage 10 metre sprint time; PDP30 which stands for pre-determined protocol of massage 30 metre sprint time; AS10 which stands for athlete specific massage 10 metre sprint time and AS30 which stands for athlete specific massage 30 metre sprint time. The pre-determined protocol of massage is also referred to as intervention 1, and the athlete specific massage is known as intervention 2.

**(Table 1.0)** Shows the descriptive statistics of the participants' results (mean and standard deviation)

	Mean	Std. Deviation
PDP10	1.83	0.12
PDP30	4.10	0.23
AS10	1.84	0.12
AS30	4.10	0.21

Through the use of SPSS the mean of the participants 10 and 30 metre split times have been calculated for both the pre-determined and athlete specific massage interventions. It can be seen that there is only a 0.01 difference in only the 10 metre split times, and the mean results of the 30 metres have stay exactly the same (Figure 1). This can suggest that is no difference between the two types of massage interventions on 10 and 30 metre sprint times, however further statistical analysis has been done to prove this. When looking at the standard deviation of these descriptive statistics the same can be said, however, the slight change is of the 30 metre sprint times, with a 0.02 difference.



**(Figure 1.0)** Graph showing the mean results of both interventions at 10 and 30 metre distances.

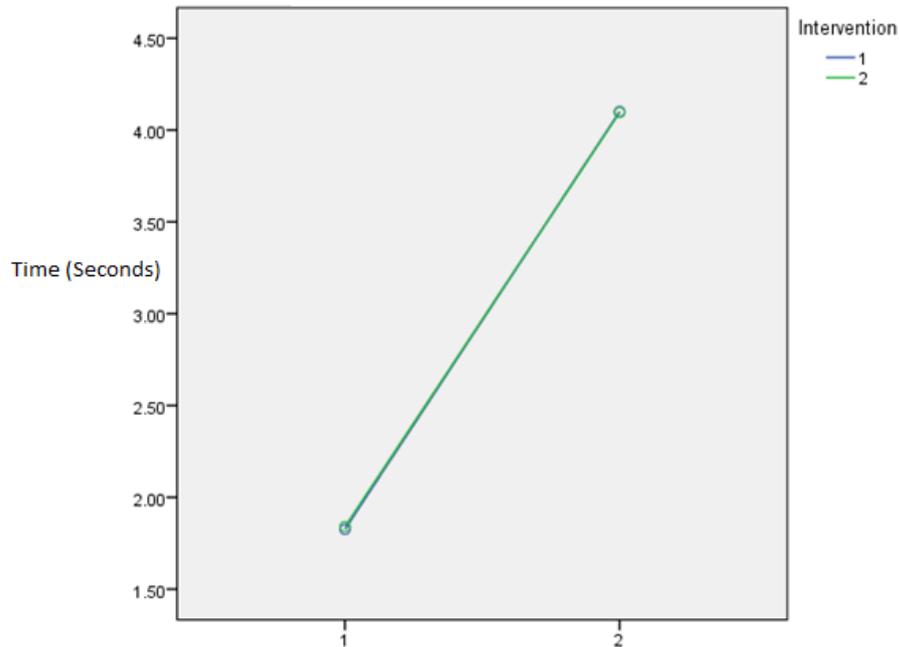
Through calculating the means of the PDP10, PDP30, AS10 and AS30 it gives a preliminary idea of whether there is a difference between the two massage interventions, however, to scientifically and statistically support this a two way repeated measures ANOVA test was done.

**(Table 2.0)** Displays the SPSS ANOVA outputs of the 10 and 30 metre results at both interventions

Source	Sig.
Intervention	0.36
Distance	0.00
Intervention *	
Distance	0.10

Through calculating a two way repeated measures ANOVA test on the results assuming sphericity, the results above have shown that there is no significant difference between interventions ( $p > 0.05$ ). The results also show that there is a significant difference between the distances ( $p < 0.05$ ), however, this was an obvious fact before the SPSS results as 10 metres is evidently a different distance to 30

metres. When looking at the interaction of distances and interventions the results have shown there to be no significant difference ( $P>0.05$ ).



**(Figure 2.0)** Graph displaying the estimated marginal means of the two way repeated measures ANOVA

Through calculating the estimated marginal means of the ANOVA test, it can be seen that the two interventions have followed an almost identical path from the 10 metre sprint results (first co-ordinate on the graph) to the 30 metre sprint results (final co-ordinate on the graph). This supports the findings that there is not a noticeable difference in the two massage interventions on 10 and 30 metre sprint times.

# CHAPTER FIVE

# DISCUSSION

## **5.0 Discussion**

The investigational purpose of this study was to look at whether an athlete specific sports massage had better results on an athlete's 30 metre sprint performance rather than a pre-determined massage intervention. From the results found it has been made clear that the null hypothesis suggested in chapter one has been accepted and the specified hypothesis has been rejected.

### *5.1 Research question*

The results of this study found that the application of an athlete specific lower limb massage had no significant difference ( $p>0.05$ ) on 10 and 30 metre sprint times when compared to a pre-determined massage protocol. When looking at the 10 metre mean and standard deviation values it is clear that there is only a minimal change in mean values with a 0.01 increase in the athlete specific 10 metre mean time. Within sprint performance a 0.01 increase is seen as miniscule, and could be down to a number of factors, not just the sports massage. These factors could be a change in the athletes' concentration levels, their clothing or footwear, or even how tired they are. However, this 0.01 variance is not substantial enough to suggest a significant difference between the two massage interventions. There is no change in the standard deviation of the athletes' 10 metre sprint times. When looking at the mean and standard deviation for the athletes' 30 metre sprint times, there is no change in the mean times, however, a 0.02 increase in the standard deviation results. This 0.02 increase is of the pre-determined protocol of massage which suggests that the data from the athletes' 30 metre sprint time is more dispersed around the mean than that of the athlete specific massage. The mean and standard deviation results help support the overall result of no significant difference between the two massage interventions, as although there is a very slight change in some of the results, there is no notable change in the athletes' performance.

The results of this study are somewhat consistent with those of previous studies which have looked at pre-performance massage, either finding no significant difference or even a decrease in performance. For instance Goodwin *et al.* (2007) found no significant difference in 30 metre sprint times as a result of a 15 minute lower limb massage, and McKechine *et al.* (2007) found no significant change in power measures succeeding a sports massage. Many research papers did find a

change in the performance levels of athletes, for example Wiktorsson-Moller *et al.* (1983) found that after 6-15 minutes of relaxing sports massage using petrissage, the participants experienced a reduction in muscle strength. In addition, Hunter *et al.* (2006) found that within their pre to post massage interventions there was a decrease in the mean force production. Another paper which found no significant difference in their performance measures, was one by Harmer (1991) who found after 30 minutes of whole body massage, there was no difference in the athletes mean stride frequencies when compared to a control group of no massage. Two papers which found a positive effect of massage on performance were Crosman *et al.* (1984) and McKechine *et al.* (2007), however these were not found on sprint performance and only on static performance tests. Crosman *et al.* (1984) found that a hamstring massage will increase the passive range of motion in the hip joint, and McKechine *et al.* (2007) more recently found that pre-event massage increases plantar flexor flexibility. All of these papers have found similar results to those of this present study, with no significant difference being found on dynamic performance against other interventions. Although there was no significant difference found in this study, prospective negative effects on performance were not taken into account nor analysed.

## 5.2 Limitations

There were several limitations to the study and in order to overcome these limitations future research should consider the following:

- The sample size of this study was small, being only ten male participants. This put the research at great risk if a participant was to suddenly withdraw from the testing procedures. Increasing the sample size, will increase reliability of result and compensate for if there are any drop outs.
- Restricting to only male participants has limited the quality of results; if female participants were also included it could allow investigation into the difference on how males and females react to pre-performance massage.

- This study is currently lacking in pre intervention data, including the 10 and 30 metre sprint times of participants previous to any testing procedures. No pre-test measures were conducted on the participants, if a 30 metre sprint trial was carried out before both massage interventions it would give a comparable set of data, which the intervention results could be measured against. This would then give another set of results, looking at whether massage in general has an effect on sprint performance
  
- In regards to the warm up protocol, the intensity and inter-drill recovery period was not suggested which leaves it open to interpretation. This adds a certain level of unreliability to this present study.
  
- Although the timing of the pre-determined massage protocol was stated the depth was not, so different variations may have been applied. This would have had varying physiological and psychological effects on the participants.
  
- As rugby and football are both predominately outdoor sports, performing the testing indoors creates a decrease in the environment reliability of the results. Although, conducting the experimental procedures inside cancelled out any extrinsic factors which may have affected validity such as weather.
  
- Due to the absence of research papers which have stated the correct and successful massage techniques needed to improve sprinting performance, choosing the right techniques was difficult.

### *5.3 Potential Improvements*

#### *5.3.1 Massage*

When involving massage in a study it is important to verify which massage style and techniques are to be involved. This is as there are many different styles practiced

within the sporting environment as well as with massage in general. Over one hundred massage therapies and styles were recognized by Eisenberg *et al.* (1993), so taking this into account it is important to determine which exact massage therapy is to be used, in order to have the participants experience the same physiological and psychological effects. However, as this study looked at using a pre-determined massage protocol as well as an athlete specific massage, the techniques within the athlete specific massage would have varied and been interpreted by the masseuse in conjunction with how the athlete felt they should be massaged.

If a significant effect was to be discovered in an improved study of similar nature, then the psychological effects should be monitored too. This could be done by giving the participants a questionnaire after each intervention. Doing so will add to the knowledge already available on the psychological effects of pre-event massage. The qualitative research does not have to be limited to just a questionnaire however, focus groups and interviews could be conducted to find out how certain techniques made the athletes feel and respond mentally.

### *5.3.2 Sprint testing*

As previously mentioned in the limitations section, the warm up protocol that was implemented was vague and not specific to sprint exercises. This itself would have had an effect on the participants sprint performance, if a more specific warm up was used it would have given the athlete the greatest preparation for a 30 metre sprint test. The test itself, in regards to smart speed timing gates, is a common measure of sprint testing, however, a further gate could have been added at the 20 metre mark in order to receive further results which could be discussed. Another suggestion would be to give the participants a running start. This is as within football and rugby, players don't tend to perform a sprint from a standing start, and are more likely to run into one.

### *5.4 Future recommendations*

Once again the use of sports massage as a pre-performance tool has been proven to not show any significant results. In order to research this topic further the following recommendations should be considered.

The sample of participants should be increased and varied which may lead to more significant results being discovered. The participants could be sub divided into gender, including women into the testing. The results could then be compared within and against genders. This would give an insight into how sports massage affects different genders. The present study, although looking at first or second team levels of participants, did not specifically include elite level athletes. This could be a consideration if the study was to be repeated, as the participants' level of fitness will be extremely high, and they would be more than likely experienced with sports massage. This familiarity with the application of sports massage is an important factor, as then the participant knows how they react to the therapy, and would be able to give valuable feedback on how they felt the different massage intervention affected their performance.

Another important factor to consider is the use of massage techniques. Aforementioned there are many massage therapies and styles which can be applied, so in order to create greater reliability and validity the exact method of sports massage should be suggested, with correct tempo, depth, direction and hand skill made clear. It is also a good idea, when asking the participants for feedback, to ask how they felt each individual technique felt, and if possible, look at the physiological and psychological effects of each skill (effleurage, petrissage and tapotement) individually.

# CHAPTER SIX

# CONCLUSION

## **6.0 Conclusion**

The purpose behind this study was to determine whether an athlete specific massage will create a significant improvement in sprint performance over a pre-determined protocol of massage. The results have proven that there was no significant difference ( $p>0.05$ ) between the two massage interventions, meaning that the null hypothesis has been accepted, and the alternate hypothesis has been rejected.

From conducting this present study it has been made evident the absence of research surrounding sports massage, has made it difficult to select the correct methodology and therefore made for many limitations within this study. It is clear that further research should be conducted to provide results showing a significant difference of sports massage on performance, or any beneficial effects that it may create. Although the results of this research have found no significant effect on sprint performance, many sports professionals and their coaches will still consider it to have beneficial effects on performance.

# CHAPTER SEVEN

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# CHAPTER EIGHT

## APPENDICES

# APPENDIX

## A

Mean data:

Participant	Age	Height (cm)	Weight (kg)	Sex
1	20	178	84	M
2	21	162	73	M
3	20	170	79	M
4	21	188	95	M
5	21	184	89	M
6	20	181	91	M
7	19	178	92	M
8	20	194	105	M
9	22	169	78	M
10	20	175	86	M
Mean	20.4	177.9	87.2	
Standard Deviation	0.84	9.49	9.33	

# APPENDIX

## B

**CARDIFF METROPOLITAN  
INFORMED CONSENT FORM**

**CSS Reference No:**

**Title of Project:** Effects of an athlete specific lower limb massage versus a pre-determined protocol of lower limb massage on thirty meter sprint running

**Name of Researcher:** Stacie Fudge

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Participant to complete this section:                      Please initial each box.

1. I confirm that I have read and understand the information sheet dated ..... for this evaluation study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
  
2. I understand that my participation is voluntary and that it is possible to stop taking part at any time, without giving a reason.
  
3. I also understand that if this happens, our relationships with the Cardiff Metropolitan University, or our legal rights will not be affected
  
4. I understand that information from the study may be used for reporting purposes, but I will not be identified.
  
5. I agree to take part in this study 'Effects of an athlete specific lower limb massage versus a pre-determined protocol of lower limb massage on thirty meter sprint running'on .....(Date)...

Name of Participant:  
\_\_\_\_\_

Signature of Participant:  
\_\_\_\_\_

Date:  
\_\_\_\_\_

Name of person taking consent: Stacie Fudge

Date:

# APPENDIX

# C

**Cardiff School of Sport Ethics Committee  
Research Participant Information Sheet**

**Project Title:** Effects of an athlete specific lower limb massage versus a pre-determined protocol of lower limb massage on thirty meter sprint running

This document provides a run through of:

- 1) the background and aim of the research,
- 2) my role as the researcher,
- 3) your role as a participant,
- 4) benefits of taking part,
- 5) how data will be collected, and
- 6) how the data / research will be used.

The purpose of this document is to assist you in making an *informed* decision about whether you wish to be included in the project, and to promote transparency in the research process.

**1) Background and aims of the research**

Sports massage can be a useful therapy for almost any sports performer, but whether it has a beneficial effect on their actual performance is questionable (Goodwin et al, 2007). Massage is used within other aspects of life as well as sport, and can help target injuries which may not be due to the sport itself. We (me and my research team) aim to find out whether pre-performance massage will have any beneficial effects on thirty meter sprint sessions.

**2) My role as the researcher:**

The project involves me (Stacie Fudge), the researcher, controlling a team of sport masseuses along with myself to deliver two different types of massage followed by 3 thirty metre sprint trials.

**3) Your role as a participant:**

Your role is to receive a 15 minute pre-determined lower limb massage involving effleurage techniques, petrissage and tapotment, as well as one that you may dictate for the lower limb area. After each massage (set a week apart) you will then perform a 10 minute standardized warm-up and then perform a three 30 metre sprint trials at the best of your ability. If this at any point is not viable you do not have to complete the sprints yet you must inform me or another researcher of your decision.

**4) Benefits of taking part:**

The information we obtain from this study will further knowledge on the sporting benefits of massage. From this new information obtained we will be able to understand whether a pre-performance massage is effective towards 30 meter sprints. We will also be able to judge whether a pre-determined protocol is necessary or if the athletes' opinion should be taken into consideration. Receiving two separate massages will also benefit you even if it may not benefit your performance; this is as massage has many calming properties. You have the right to ask for the results of the tests and review the study once completed. You may also receive your own individual results from each of the sprint trials.

## Cardiff School of Sport Ethics Committee Research Participant Information Sheet

### 5) How data will be collected:

As mentioned above data will be collected from the 3 sprint trials within each of the two massage conditions. 10 meter split times will also be recorded and available at your demand. This will be measured using infrared timing gates, and data will be analysis using the SPSS (Statistical Package for the Social Sciences) software that will be stored on my password protected laptop.

### 6) How the data / research will be used:

In agreeing to become a voluntary participant, you will be allowing me to use your testing results and include them within a larger data set that includes the data of other participants. Your personal data will be anonymous and will not be reported alone, but within the total sample of participants.

### Your rights

Your right as a voluntary participant is that you are free to enter or withdraw from the study at any time. This simply means that you are in full control of the part you play in informing the research, and what anonymous information is used in its final reporting.

### Protection to privacy

Concerted efforts will be made to hide your identity in any written transcripts, notes, and associated documentation that inform the research and its findings. Furthermore, any personal information about you will remain confidential according to the guidelines of the Data Protection Act (1998).

### Contact

If you require any further details, or have any outstanding queries, feel free to contact me on the details printed below.

Stacie Fudge

Cardiff School of Sport  
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CF236XD, United Kingdom  
E: st10001834@outlook.uwic.ac.uk

# APPENDIX D

Warm up protocol:

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Dynamic warm up exercise	10 minutes
1	200 metre full lap of NIAC track
2	Toe Raises
3	Hamstring sweeps
4	Walking lunges
5	Internal and external hip rotation
6	Heel flicks
7	High knees
8	Grapevine
9	Arm swings

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# APPENDIX E

Pre-determined massage protocol:

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Techniques	Time (seconds)	Strokes per minute
Effleurage- Rotary	60	120
Effleurage- "V"	60	120
Effleurage- Flat hand	60	120
Effleurage- Forearm glide	60	120
Effleurage-Cam and Spindle	60	120
Tapotement- Cupping	45	240
Tapotement- Hacking	45	240
Petrissage (Calves only)	45	120

---

# APPENDIX F

Raw data results:

Pre-determined massage protocol results (10 and 30 metres) showing means and standard deviations:

Participant	10m 1st	10m 2nd	10m 3rd	10m Average	30m 1st	30m 2nd	30m 3rd	30m Average
1	1.80	1.79	1.76	1.78	4.06	3.97	3.95	3.99
2	1.83	1.85	1.93	1.87	4.12	4.15	4.21	4.16
3	1.68	1.72	1.70	1.70	3.84	3.87	3.86	3.86
4	1.77	1.82	1.73	1.77	3.90	4.04	3.97	3.97
5	1.90	1.84	1.83	1.86	4.26	4.22	4.18	4.22
6	2.05	1.96	1.99	2.00	4.49	4.38	4.41	4.43
7	1.73	1.75	1.69	1.72	3.88	3.90	3.86	3.88
8	1.70	1.68	1.72	1.70	3.92	3.87	3.95	3.91
9	2.06	2.03	1.98	2.02	4.59	4.53	4.47	4.53
10	1.85	1.89	1.78	1.84	4.03	4.10	4.06	4.06
Mean	1.84	1.83	1.81	1.83	4.11	4.10	4.09	4.10
StandDev	0.13	0.11	0.12	0.12	0.26	0.22	0.22	0.23

Athlete specific massage results (10 and 30 metres) showing means and standard deviations:

Participant	10m 1st	10m 2nd	10m 3rd	10m Average	30m 1st	30m 2nd	30m 3rd	30m Average
1	1.81	1.75	1.84	1.80	4.08	4.01	3.92	4.00
2	1.94	1.85	1.82	1.87	4.20	4.23	4.12	4.18
3	1.70	1.71	1.73	1.71	3.91	3.87	3.82	3.87
4	1.82	1.75	1.68	1.75	4.05	3.98	3.87	3.97
5	1.90	1.91	1.82	1.88	4.30	4.22	4.15	4.22
6	1.99	1.97	2.06	2.01	4.49	4.35	4.39	4.41
7	1.68	1.75	1.81	1.75	3.90	3.88	3.86	3.88
8	1.70	1.69	1.73	1.71	3.94	3.87	3.91	3.91
9	2.06	2.07	1.98	2.04	4.51	4.47	4.36	4.45
10	1.83	1.91	1.93	1.89	4.10	4.08	4.02	4.07
Mean	1.84	1.84	1.84	1.84	4.15	4.10	4.04	4.10
StandDev	0.13	0.13	0.12	0.12	0.22	0.21	0.21	0.21

Averages of both massage interventions (10 and 30 metres):

Participant	PDP		AS 10m	AS 30m
	10m	30m		
1	1.78	3.99	1.80	4.00
2	1.87	4.16	1.87	4.18
3	1.70	3.86	1.71	3.87
4	1.77	3.97	1.75	3.97
5	1.86	4.22	1.88	4.22
6	2.00	4.43	2.01	4.41
7	1.72	3.88	1.75	3.88
8	1.70	3.91	1.71	3.91
9	2.02	4.53	2.04	4.45
10	1.84	4.06	1.89	4.07
Mean	1.83	4.11	1.83	4.10