A COMPARISON OF THE MENTAL TOUGHNESS OF PLAYERS IN TEAM AND INDIVIDUAL SPORT DURING PERIODIZATION.

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DECLARATION

THESIS TITLE:

“A COMPARISON OF THE MENTAL TOUGHNESS OF PLAYERS IN TEAM AND INDIVIDUAL SPORT DURING PERIODIZATION”

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Abstract

The contribution of psychological skills on performance enhancement and mental toughness attributes and development is still limited within the sport context, even though it has numerously been proven to be an important factor that influences the success of sport achievement outcomes. No concise agreement towards the prescription of the development and improvement of mental toughness has been designed in order to improve the athletes' mental toughness during their annual training programs. The aim of this dissertation was to explore the differences in mental toughness of rugby players during periodization phases, as well as the differences between the rugby forwards' and backs' mental toughness. The differences between the mental toughness of golf players and rugby players have also been explored during periodization phases.

Data from rugby players and golf players, who participate in sport on a university and regional level, had been obtained by means of the Psychological Performance Inventory that was completed by all players during the preparatory, competition, and transition periodization phases. Differences in mental toughness of rugby players between preparatory, competition and transition periodization phases were analysed using a repeated measures mixed linear model with periodization phase, team and group (forwards versus backs) as fixed effects, and fitting an unstructured covariance matrix to the repeated measures of mental toughness. From this model, mean values for each group and phase, as well as differences between mean values between periodization phases together with associated p-values and 95% confidence intervals were calculated. The data on mental toughness were compared between rugby players and golf players through a one-way analysis of variance with group (rugby vs golf) as factor, allowing for different residual variances for the two groups. The results indicated that significant differences had been found amongst rugby players with regards to their attitude control ($p=0.00$) that revealed significantly higher values during competition phase than during the preparation phase. When the components of mental toughness had been compared for the competition phase and the transition phase, significant differences were found for overall mental toughness ($p=0.01$), motivation ($p=0.04$), and

attitude control (p=0.05), with the latter phase having scored lower than the competition phase. No significant differences were found between the mental toughness components of the preparation phase compared to the transition phase. The mental toughness of forwards and backs revealed no significant differences, although a tendency occurred where the backs obtained higher mean values for all of the mental toughness components. Significant differences had only been found for negative energy control between the golf players and rugby players. Negative energy control differed significantly (p=0.03) where the golf players portrayed much better values during the transition periodization phase than the rugby players' negative energy control values.

This is the first study designed to explore mental toughness of rugby players and golf players during periodization phases, and could be the foundation for future studies to the further investigate which mental toughness components seems to be dominant during specific periodization phases – and which components still have room for improvement, while comparing the physical performances and parameters of the athletes as well – in order to facilitate with the development of training guidelines that enhances athletes' performances and help them to achieve their goals.

Key words: Mental toughness, Rugby, Golf, Periodization phases

Opsomming

Die bydrae van psigologiese vaardighede op die verbetering van prestasie, asook die ontwikkeling van psigiese gehardheid is steeds beperk binne die sport konteks, alhoewel dit met talle geleenthede bewys is as `n belangrike faktor wat die sukses van sport-uitkomste beïnvloed. Geen bondige ooreenstemmings teenoor die voorskrifte van die ontwikkeling en verbetering van psigiese gehardheid is al ondersoek om sportlui se psigiese gehardheid tydens hul jaarlikse oefenprogramme te verbeter nie. Die doel van hierdie verhandeling was om die verskille tussen rugby spelers se areas van psigiese gehardheid tydens verskillende periodiseringsfases, asook die verskille tussen rugby voor-en agterspelers se psigiese gehardheid, te ondersoek. Die psigiese gehardheidsverskille tussen golf en rugby is ook tydens die periodiseringsfases ondersoek.

Data is vanaf rugby en golf spelers, wat op universiteits- en streeksvlakke deelneem, deur middel van die Psigologiese Vaardighede Inventaris verkry, wat deur al die spelers tydens voorbereidende fase, kompetisie fase en oorskakelingsfase voltooi is. Die psigiese gehardheidsverskille van die rugby spelers tydens die periodiseringsfases is ontleed deur `n herhalende-metode-gemengde-liniêre-model waar periodiseringsfase, span en groep (voorspelers teenoor agterspelers) as vasgestelde effekte gebruik is en `n ongestruktureerde kovariansiematriks tot die herhalende metodes van psigiese gehardheid ingestel is. Vanuit hierdie model is gemiddelde waardes vir elke groep en fase, sowel as die verskille tussen die gemiddelde waardes tussen die periodiseringsfases saam met die geassosieerde p-waardes en 95% intervalle bereken. Die data vir die psigiese gehardheid tussen rugby spelers en golf spelers was vergelyk deur middel van `n eenrigting-variansie analise met groep (rugby teenoor golf) as faktor, wat verskillende oorblywende afwykings vir die twee groepe meegebring het. Die resultate het aangedui dat betekenisvolle verskille tussen rugby spelers gevind is met betrekking tot die komponent houding (p=0.00) wat hoër waardes tydens die kompetisie fase in vergelyking met die voorbereidingsfase getoon het. Toe die komponente van psigiese gehardheid tussen die kompetisie fase en oorskakelingsfase vergelyk is, is

betekenisvolle verskille gevind vir algehele psigiese gehardheid (p=0.01), motivering (p=0.04) en houding (p=0.05), waar die oorskakelingsfase laer waardes as die kompetisie fase behaal het. Geen betekenisvolle verskille is gevind vir die komponente van psigiese gehardheid tussen die voorbereidingsfase en die oorskakelingsfase nie. Die psigiese gehardheid van die voor-en agterspelers het geen betekenisvolle verskille getoon nie, alhoewel `n tendens waargeneem is waar die agterspelers hoër gemiddelde waardes vir al die komponente van psigiese gehardheid behaal is as die voorspelers. Betekenisvolle verskille is slegs gevind vir negatiewe energie beheer tussen golf spelers en rugby spelers. Negatiewe energie beheer het betekenisvol verskil (p=0.03) waar die golf spelers baie beter waardes getoon het tydens die oorskakelingsperiodiseringsfase as die rugby spelers se negatiewe energie beheer waardes.

Hierdie is die eerste studie wat uitgevoer is om psigologiese gehardheid van rugby spelers en golf spelers tydens verskillende periodiseringsfases te ondersoek en kan die fondasie vir toekomstige studies wees. Verdere ondersoek kan ingestel word rakende watter psigologiese gehardheid-komonente dominant tydens spesifieke periodiseringsfases voorkom, asook watter verbeter kan word – terwyl die fisieke prestasies en parameters van sportlui daarmee vergelyk word – om sodoende die ontwikkeling van oefeningsriglyne te fassiliteer wat sportlui se prestasie kan verbeter en hul help om doelwitte te kan bereik.

Sleutelwoorde: Psigiese gehardheid, Rugby, Golf, Periodiseringsfases

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CHAPTER 1

Introduction, problem statement and aims of the study.

1.1 Introduction

Mental toughness in sport is a complex, yet popular subject which has been studied intensively over the past decades (Goldberg, 1998; Fourie & Potgieter, 2001; Clough, Earle & Sewell, 2002; Connaughton, Wadey, Hanton & Jones, 2008). The literature suggests that mental toughness is one of the most crucial factors contributing to athletic success and should be further explored (Jones, Hanton & Connaughton, 2002; Golby & Sheard, 2004; Hogg, 2007; Gucciardi, 2010). Hogg (2007) stated that sport participation at an elite level has become remarkably more competitive and demanding, while it has been observed that winning seems to be associated with a player's unique characteristics. Coaches and athletes describe this phenomenon as a player's mental toughness – a term very often used, but much less understood (Hogg, 2007). In 1996, the Olympic athletes were requested to list the ten most important components that they believed to have contributed to the success they had achieved. These athletes listed psychological components as the fifth most important and mental toughness as the first most important factor for their athletic success (Hacker, 2000). Williams and Krane (cited by Hogg, 2007) stated in this regard that most coaches and athletes believe that between forty and ninety percent of sporting success is due to mental factors. Furthermore, mental toughness is one of the most important psychological characteristics for achieving excellent performance in sport (Goldberg, 1998).

The core of mental toughness in sport is controlling the connection of the mind and body, whilst developing and implementing mental strength skills such as concentration, attitude control, and pressure management, thinking in the right ways, energy control, motivation, and visualization (Loehr, 1982). When players start to utilize these skills, they start to portray constant athletic achievement, for it has been proven that mental toughness can be taught – it is not genetically inherited nor is it related to personality types (Loehr, 1982). According to Edwards and Edwards (2012) psychological skills can be improved and taught to athletes through various psychological skills training programs. These programs may vary according to

athletes' age, the psychological skills required for the sport, their personal skills and the type of sport and the level of participation in their particular sport. These authors also concluded that implementing psychological skills training programs showed improvements of athletes' imagery skills, their mental preparation, their self-confidence and their overall mental skills (Edwards & Edwards, 2012).

1.2 Problem statement

Gucciardi (2010) concluded that very few empirical studies have been executed on mental toughness, even though it has been a well-known topic in practical and applied sport psychology for quite a while. Most of the studies previously compiled about mental toughness, had been based on anecdotal reports without paying much attention to the more precise understanding and definitions thereof (Gucciardi, 2010). According to Jones *et al*. (2002) this resulted in various mental toughness definitions as well as psychological characteristics that have been incorrectly referred to as mental toughness.

Despite the research findings concerning the contribution of psychological skills on performance enhancement, the understanding of being mentally tough and the causable effects of mental toughness is still limited within the sports context (Mack & Ragan, 2008). Limited research articles report data of psychological profiles of athletes (Bois *et al*., 2009) and therefore the information obtained would be specific to the unique psychological demands of a team sport like rugby and an individual sport like golf, and the results may indicate specific requirements for certain positions played in rugby and for different rugby and golf participation levels during the different periodization phases. A greater understanding of athletes' psychological needs and demands could offer coaches the opportunity to better support and advise these athletes to help them enhance their overall development and performance.

It is in the light of the previously-mentioned limitations that the research questions that will be asked in this study are the following: Firstly, to determine if the dimensions of mental toughness of rugby players differ significantly during preparation, competition and transitional periodization phases. Secondly, to determine if significant differences in mental toughness occur between rugby

forwards and backs players during the periodization phases. Finally, to investigate the differences in mental toughness during periodization phases between golf as an individual sport and rugby as a team sport.

Results of this study should enable players, coaches, and sport psychologists to recognize the mental toughness characteristics that contribute to adult performance and may serve as important mental toughness indicators to identify adolescents for early selection (Morris, 2000). McKenzie *et al*. (2000) stated that there is limited research available concerning the differences in the dimensions of mental toughness between rugby players of different participation levels, and currently there is no literature concerning the mental toughness of golfers in South Africa – which further accentuates the importance of this study.

1.3 Aims of the study

The specific aims of this study are:

- to determine if the dimensions of mental toughness differs significantly ($p<0.05$) between rugby players during periodization phases;
- to determine if there are significant differences ($p<0.05$) in mental toughness among rugby playing-positions (forwards versus backs) during periodization phases;
- to investigate the differences in mental toughness during periodization phases between golf as an individual sport and rugby as a team sport.

Research article 1 will cover the first two aims, while research article 2 will cover the last aim.

1.4 Structure of dissertation

This dissertation will be presented in five parts. Chapter one is an introduction followed by a literature review in chapter two. Chapter three to four are presented in research article format and the research methods will be discussed in each article. Research article titles are as follows: Chapter 3: Mental toughness of rugby players during periodization phases, Chapter 4: Mental toughness of golf players and rugby players during periodization phases. The final chapter is a

collective summary, conclusion, and recommendations of the study and is followed by references and appendices. Referencing is done according to the Harvard method.

The dissertation is submitted in article format, as approved by the senate of the University of the Free State (UFS), according to the guidelines for post-graduate studies. Chapters 1, 2 and 5 have been written according to the prescribed standards of the UFS Guidelines for References. The articles have been prepared for publication in accredited peer-reviewed journals. Research article 1 has been written according to the guidelines to authors of the Journal of Applied Sport Psychology (Appendix B) and research article 2 has been written according to the author's guidelines of the African Journal for Physical, Health Education, Recreation and Dance (Appendix A).

The structure of the dissertation is presented in Figure 1.

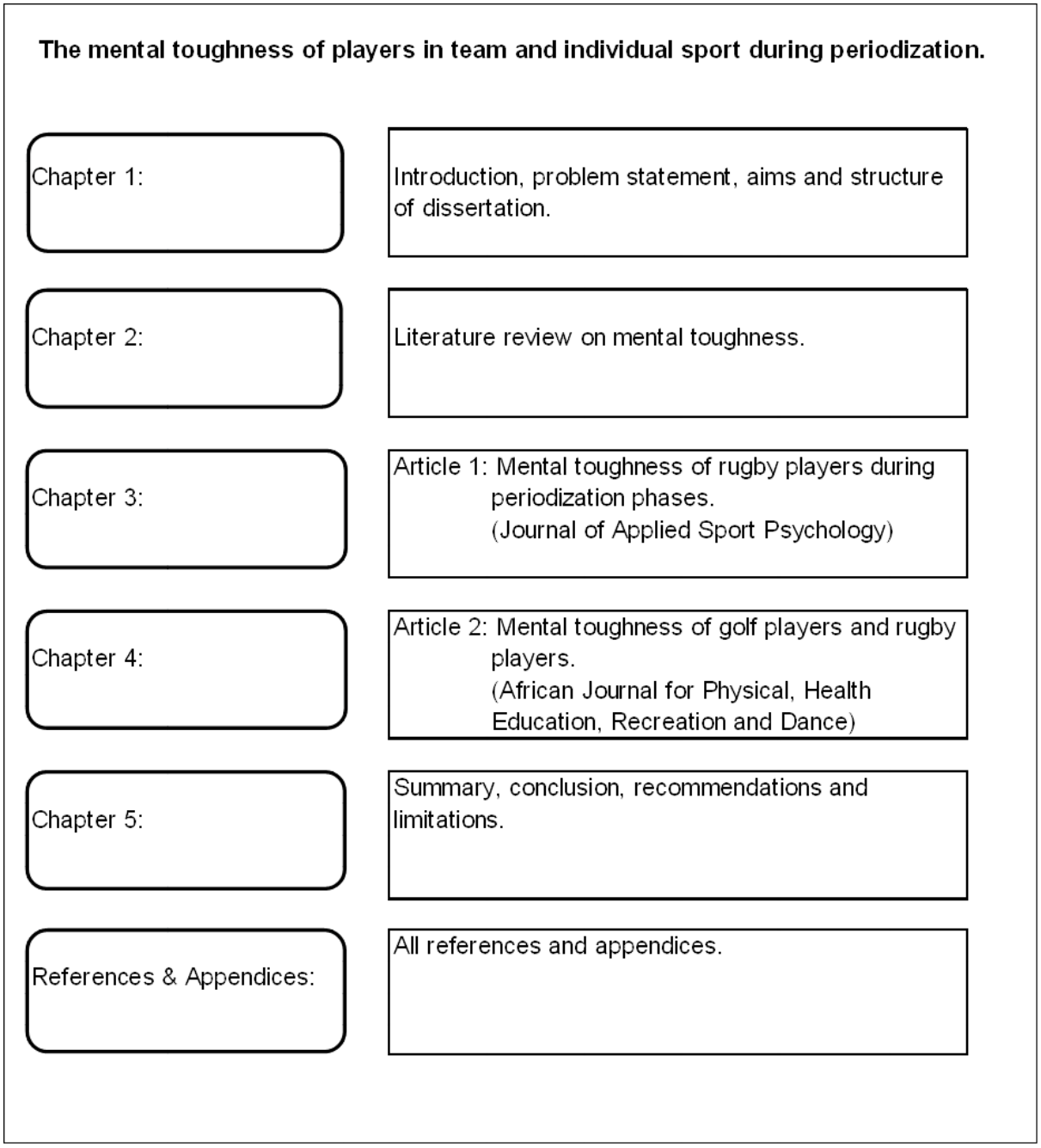

Figure 1: Structure of the dissertation

1.5 Ethical considerations

It will be verbally communicated to each player and their respective coaches that their participation is voluntary and each player will also receive an informed consent document (Appendix A) in which their anonymity, confidentiality, and the ending of their participation at any time during the study – will be assured. In addition, informed consent was obtained from the rugby and golf coaches, as well as the Dean of Student Affairs of the University of the Free State. Ethical

clearance was obtained from the University of the Free State, where the study was conducted, with the ethical clearance number: **UFS-HUM-2014-36**.

1.6 Conclusion

Chapter one introduced various suggestions of the influence that mental toughness portrays to contribute to sport accomplishments. It has been determined that mental toughness plays an important role in athletic achievement, although limited research thereof has been conducted. Therefore, information regarding psychological demands and strengths of rugby players and golfers could contribute to the development of programs that could specifically be designed to increase athlete's mental toughness.

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CHAPTER 2

Literature review

Referencing is done according to the Harvard method

2.1 Introduction

The aim of chapter 2 is to summarise the essence of mental toughness for it is a complex phenomenon, and in order to assist athletes to better understand and develop mental toughness, researchers need to grasp all aspects of it. This implies sound background knowledge on the definitions, significance, and components of mental toughness as well as the occurrence of mental toughness in team and individual sports during periodization phases.

2.2 Definitions and significance of mental toughness

Jones *et al.* (2002:209) defined mental toughness as "having a natural or developed psychological edge that enables you to generally cope better than your opponents with the many demands (competition, training, and lifestyle) that sport places on a performer". Jones *et al*. (2002) also stated that mentally tough performers were more consistent in remaining determined, focused, confident, and in control under pressure in comparison to their less mentally tough opponents.

Twelve attributes of mentally tough performers have been categorized and identified by super-elite athletes that include: coping skills, level of motivation, maintenance of confidence, discipline and goal directedness, cognitive skills, competitiveness, possession of prerequisite physical and mental requirements, team unity, preparation skills, psychological hardiness, religious convictions and ethics (Fourie & Potgieter, 2001). These attributes have been divided into four dimensions (Gucciardi, 2010) from which the attitude/mindset dimension describes the performer's ability to stay focused on their ultimate goal that they thrive to fulfill, notwithstanding the stumbling-blocks they might encounter (Jones *et al*., 2007). The training dimension defines the performer's performance-motivation, and more specifically, how the mentally tough athlete maintains his/her high level of motivation and how they tend

to use it to benefit from every challenging situation they come across (Jones *et al*., 2007). The competition dimension refers to the behaviour of mental tough athletes when they are under an enormous amount of pressure, especially during important competitions. The post-competition dimension describes the mentally tough athlete's rational perception of success and/or failures they have attained during competition (Jones *et al*., 2007).

From the 4C's model of mental toughness that was developed by Clough, Earle & Sewell (2002) the authors proposed that individuals who viewed negative encounters to be a challenge and a natural and necessary building block for improvement, who believed that they could beneficially control and handle negative life experiences – were mentally tough. These individuals loyally commit to the activities they are involved with in order to reach their goals (Gucciardi, 2010).

In conclusion, Clough *et al*. (2002:38) proposed the following definition: "Mentally tough individuals tend to be sociable and outgoing, as they are able to remain calm and relaxed; they are competitive in many situations and have lower anxiety levels than others. With a high sense of self-belief and an unshakable faith that they can control their own destiny, these individuals can remain relatively unaffected by competition or adversity".

2.3 Mental toughness components

When exploring mental toughness, it is important to examine all subcomponents thereof, namely self-confidence, attention control, positive energy control, motivation, negative energy control, attitude control and visualization and imagery control. The following components of mental toughness would be further explained:

According to Jones *et al*. (2002) attention control is defined as the ability of an athlete to remain focused on the specific task at hand, even when distractions during important competitions may, and probably will occur. Athletes show great control of their attention when they are capable to regain psychological control after they have encountered unexpected, competition-specific events. Attention control is not only of

importance during conditions of extreme pressure and ambiguity, as it is present during competitions, but it is also an important attribute and the ability of the athlete to remain focused and to stay in control during other external factors like personal life situations that play an important role in their daily lives (Jones *et al*., 2002). Research findings from a previous study that has been done by Golby and Sheard (2004), presented that the International rugby league players scored significantly higher scores in attention control than the Super league and Division one players.

According to Connaughton *et al*. (2008), the ability to use imagery is an important psychological skill that plays an exceeding important role during learning and training in certain sport activities. Kruger (2003) defined imagery as structured physiological activities that include the use of one's senses to construe a specific activity in an athlete's thoughts. Visualization forms a part of the imagery process (Hale & Howe, 2002). In a previous study by Mahoney and Avener (1997) with thirteen elite gymnasts, they have found that the gymnasts, who were most successful, had higher self-confidence levels and made significant use of imagery and visualization. Imagery is an effective technique used by athletes to improve their performance (Hallman & Munroe-Chandler, 2009) and more successful athletes use relaxation and mental rehearsal strategies to enhance their performance (Kruger, 2010).

Jones *et al*. (2002) describes self-confidence as having an unshakeable self-believe in your ability to achieve your competition goals, to pose unique qualities and abilities that make you better than your opponents (Hodge & Mckenzie, 2002). Self-confidence can also relate to having an inner arrogance that makes you believe that you can achieve anything you set your mind to and pushing yourself to the limit to beat other athletes in training (Jones *et al*., 2002). Previous research findings by Andrew *et al*. (2007) displayed moderately significant differences for state self-confidence, with the top ranked players showing better scores for self-confidence, thus supporting our findings of the elite-level players that had higher scores for self-confidence than the sub-elite level players. According to Gould *et al*. (1996) elite athletes have greater self-confidence than less successful athletes.

Most of the performance related fears that athletes encounter are the product of their emotions, active imagination, and distorted knowledge that can all be controlled and

maintained by the implementation of negative energy control. To control negative energy the athlete must show resilience in handling situations that contain uncontrollable pressure (Goldberg, 1998). Athletes, who accept the inevitability of anxiety before and during competitions, learn to handle negative energy accordingly (Jones *et al*., 2002). The results that were concluded from the study done by Golby and Sheard (2004) do not support our research findings. Their study concluded that the International rugby league players scored significantly higher scores in negative energy control than the Super league and Division one players, whereas our study's results showed that the elite-level players had not attained significant higher scores than the sub-elite level players, but a tendency did occur between the two groups, where the elite-level players still had the higher score for negative energy control.

For one to succeed it is very important to have an insatiable desire and internalized motives for success (Jones *et al*., 2002). To be motivated means that a player should not be influenced by other rugby player's performance - good or bad, but rather focus on their own goals, refusing to be prevailed by a player's short-term successful performance by risking their achievements of their long-term goals (Jones *et al*., 2002).

A study done by Wilson and Hodge (2005) determined that their motivational results demonstrated the adaptive influence of psychological needs for satisfaction, intrinsic motivation and task-goal orientation with respects to success in rugby. Patton (2002) and Weidong *et al*. (2005) found that motivation showed a high correlation with self-confidence and mental preparation and to remain performing at a high participation level (elite-level), athletes must have and show significant motivation to train frequently.

Any athlete can make mistakes in the process of achieving their goals, it is not the setback that counts but the way an athlete rises from that setback to create a comeback (Goldberg, 1998). Positive energy relates to matters that reflect the action of taking the learning points out of failure and converting those failures to a more positive state of mind (Jones *et al.,* 2002). Players who are enabled to remain relaxed, calm and energized show the ability to enhance their positive energy flow in difficult situations and hardiness (Loehr, 1986). Golby and Sheard (2004) noted that no significant differences were found between motivation, positive energy and

attitude control between the International league players, Super league players, and Division one players. Attitude control is defined as having the ability to be unshakable, steadfast and rigid (Golby & Sheard, 2004), while maintaining technique and effort under distress (Jones *et al*., 2002).

2.4 Mental toughness and team sports

Psychological skills are regarded as an undeniable prerequisite for success in professional sport (Cox & Yoo, 1995) and have an important attribution to a player's ability to cope with the competitive demands in a team sport like elite rugby (Kruger *et al*., 2010). Kruger (2003) states that rugby players who consist of great physical and tactical skills would most likely perform even better when they contain excellent developed psychological skills. According to Gucciardi (2010) research has shown that mental toughness is complex, and that it consists of several components like attitudes, emotions, cognitions, values, behaviors and other sport-specific key components.

Evidently, success in rugby is not only dependent on physical and tactical aspects but also on psychological aspects which reflect mental toughness (Loehr 1982, 1986). In addition, studies by Loehr (1982, 1986) have shown that fifty percent of success in rugby could be attributed to the mental toughness of the players. It has also been stated that being mentally fit plays as much as an important factor to competitive performance as physical fitness and strength. Hale and Collins (as cited in Kruger, 2003) contend that the reason why the best players in international rugby reach their full potential are because they incorporate psychological skills training into their daily preparation.

Numerous researchers have studied the relationship between rugby performance and psychological skills by comparing rugby players from various participation levels (Kruger, 2003; Golby & Sheard, 2004; Andrew *et al*., 2007; Kruger *et al*., 2010). In a previous study by Kruger (2003) remarkable differences in the psychological skills of elite and club-level senior rugby players in South Africa were reported. The study concluded that South African Super Twelve rugby players reflected better coachability, general coping skills, and less worries when compared to South African

club-level rugby players (Kruger, 2003). Kruger (2003) also found that players of the Super Twelve rugby team that attained the highest ranking in 2003, scored higher in concentration, self-confidence, achievement motivation, and mental preparation than the players of lower ranked teams. In a team sport like rugby there are various rigorous testing procedures for strength, body composition, and speed, yet there are minimal findings on the mental and psychological demands of the game that has been published (Hogg, 2007).

Kruger (2003) also established that numerous psychological factors are known to be of absolute importance for sport performance like: goal setting and motivation, self-confidence, concentration, optimal coping with stress, the absence of fear or worry and visualization, and from the results of his study it was noted that the Super 12 rugby players, who were exposed to or adhered to regular psychological skills training and who set individual goals for themselves had better concentration skills and had a better ability to cope with setbacks than players who did not participate in psychological skills training and who did not set any individual goals for themselves. The ability of rugby players to perform optimally under pressure is partially influenced by the psychological skills that these players use, while Hodge and McKenzie (1999) also states that the psychological strategies that players use determines constant achievement of international standards.

In a study compiled by Gucciardi (2010), it was hypothesized that mentally tough Australian footballers reflect greater preference for approach-goals instead of avoidance-goals, where full support was reported therefore, and that they would have higher levels of self-determinedness of sport motivation than athletes who were less mentally tough. The latter was only partially supported. This study also supports previous findings (Gucciardi & Gordon, 2009) that concluded that differences in mental toughness exist between players' experience levels and years of playing football that have been recorded for football players even at an early stage of adolescence, but it has also been reported that chronological age has no correlation with the differences in mental toughness (Connaughton *et al.,* 2008). Results indicated that the group of players, who reflected high mental toughness, were associated with high mastery-approach goals, moderate levels of mastery-avoidance goals, moderate performance-approach goals, but these players also showed higher intrinsic motivation levels (Gucciardi, 2010).

2.5 Mental toughness and individual sports

Golf, on the contrary, is an individual sport that can be described to be psychologically - very challenging (Kirschenbaum *et al*., 1998). The golf legend, Sam Snead defines golf as “an inherently challenging game played on a six inch course – the space between a player’s ears” (Kirschenbaum *et al*., 1998). The results of a previous study done by Thomas and Over (1994) indicated that expert golfers preserved to have better mental preparation and increased concentration levels during their game, when compared with less skilled golfers, whereas Douglas and Fox (2002) recorded that elite golfers believed that the essential psychological qualities needed for tournament success are attitude, motivation and desire.

In contrast to rugby as a team sport, Hayslip *et al*. (2010) suggests that golf – as an individual sport – also consists of exclusive psychological and a physiological encounters, which enhances the importance of exploring the effects that psychological skills have on players’ performance, within different ranks of competition and experience. Hellström (2009) concludes that psychological factors have an outstanding influence on golf competition outcomes, and has proved that golfers with different participation and skill levels also reflect golf-related psychological differences. Educating golfers about the benefits of utilizing psychological skills might be an effective strategy to enhance the overall quality of golfer’s games as well as improve the enjoyment of and commitment to their golf experience (Hayslip *et al*., 2010).

Within the Athletic Excellence Training model that was created from the advice and experiences from hundreds of coaches and athletes it was agreed that “the extent to which individuals or teams will perform toward the upper range of their talent and skill largely depends on the success they have in creating and maintaining a particular kind of mental climate within themselves” (Loehr, 1982). When athletes are able to create and maintain the correct internal climate, which is better known as the ideal performance state, optimal performance will become natural and spontaneous – thus the ability of mentally tough competitors to portray this essential characteristic of performing well under pressure (Loehr, 1982).

According to Loehr (1982) the reason why athletes and coaches spend so little time on improving mental skills – even when it is acknowledged to have fundamental importance on competition outcomes – are because there a lack of knowledge exists about training mentally. Athletes' training programs should be planned carefully and divided into three specific phases which include: a preparatory phase, a competition phase and a transition phase (Bompa, 2009). These phases are designed to encourage and motivate athletes' adaptation to the specific needs and the desired development with particular attention to the physical, tactical, technical and psychological components of their sport performance.

Psychological preparation should be given much more consideration during the planning and implementation of training programs in order to compliment physical, tactical and technical training – and thus increasing the possible benefits of all the components of training and preparation (Lidor *et al*., 2007). In this regard Hacker (2000) stated that psychological skills mirror physical training parameters.

2.6 Mental toughness within periodization phases

According to Bompa, (2009) periodization is a popular term that is infinitely evolving, and has been defined as: "a method by which training is divided into smaller, easy-to-manage segments that are typically referred to as phases of training" which in most sport types consist of preparatory, competition, and transition phases. The main purpose of periodization is to ensure that athletes adequately prepare themselves within the correct physical, tactical, technical, and psychological training guidelines in order to peak at the right moments during competition and perform optimally to achieve their goals (Bompa, 2009).

As the physical and physiological differences between winning and losing athletes decrease every year, the realization that psychological skills might be one of the most important contributing factors for athletic success increases (Birrer & Morgan, 2010). Just as periodization occurs for the development of physical, tactical end technical aspects of training, Bompa (2009) also recommends that psychological aspects should also be addressed in order to reach optimal performance. It is recommended that athlete's physical, tactical, technical and psychological skills be

planned and organized according to the demands of a specific sport's preparatory, competition and transition phase (Bompa, 2009).

Birrer and Morgan (2010) conducted a study to determine the effect of psychological skills training on athletic accomplishment, where they found that psychological skills required for a specific sport should firstly be identified before implementation thereof could occur – and that the application of the psychological skills training should be specifically designed for each periodization phase for that sport. This statement that psychological skills should be specified according to each periodization phase is supported by Holiday *et al.* (2008). This could imply that athlete's psychological skills do vary during preparatory, competition and transitional periodization phase.

In a study conducted by Balague (2000) with the aim to suggest a periodization model for psychological skills, it has been established that athletes' psychological skills development and preparation are most often implemented either during the preparatory phase of training or when an athlete encounters a problem that requires psychological intercession (Gordin, 1995). According to Balague (2000) the first step in creating a training program for the improvement of athletes' psychological skills is to evaluate the athletes' current skills, to identify skills that require development, as well as an athlete's positive and negative characteristics. This statement highlights the essence of this study – as the mental toughness of the rugby players and the golfers are evaluated, important information regarding their psychological strengths and weaknesses would be determined in order to improve their overall performance, for it has been concluded that sport relevant psychological skills can be similarly improved just as athletes' physical skills are improved with the correct training guidelines (Balague, 2000).

According to Balague (2000) during each training phase, certain psychological skills are more likely to be extant than other psychological skills at specific periods. Thus the awareness of athletes' skills and needs during each periodization phase could allow the couch, and sport psychological consultant to modify psychological improvement programmes accordingly. Balague (2000) also noted that athletes could portray consistency when control over ones performance has been increased. This statement has also been supported by Loehr (1982).

Furthermore, Balague (2000) has established guidelines for individual sports' periodization of psychological skills, where it has been found that athletes' should pay attention to motivation, pain and fatigue tolerance, self-efficacy, goal-setting, relaxation techniques, visualization and mental rehearsal, and cognitive awareness and control during preparatory phases. During the competition period – athletes' focus can be re-addressed to optimal arousal, focus, and attention control, while implementing positive self-talk patterns to facilitate self-regulating psychological skills performance during main competitions (Balague, 2000). Setting new goals, evaluating and reflecting on previous preparation and competition phases are of utmost importance during the athletes' transition phase. Ultimately, if athletes' facilitative psychological skills could be evaluated during all periodization phases – interdisciplinary models could be designed, based on the fundamental results regarding their mental skills to increase athletes' sporting success (Balogue, 2000).

During preparatory, competition and transition phases, the psychological training programs that are presented to the athletes should portray the specific goals for each phase because athletes' experiences of psychological stressors vary in intensity during each periodization phase (Lidor *et al.,* 2007). This is a topic that has not received much attention, and by conducting this research study, the psychological needs and necessary psychological skills preparation for rugby players and golfers could be determined by recognizing their mental toughness profiles for each phase of periodization.

2.7 Conclusion

Chapter 2 focused on important aspects regarding mental toughness, psychological skills development, and psychological skills training of various sports during periodization phases, although limited research had been found that specifically investigated the mental toughness of golf and rugby players during their respective annual training programs.

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CHAPTER 3

RESEARCH ARTICLE 1

This chapter is herewith included according to the guidelines of the Journal of Applied Sport Psychology

Mental Toughness of Rugby Players During Periodization Phases

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Running head: Mental Toughness of Rugby Players

Abstract

Periodization of athletes' training programs often neglects the psychological skills development and training that has been proven to be a key element of optimal sport performance. The purpose of this current study was to determine if the dimensions of mental toughness differs significantly between thirty rugby players during preparatory, competition and transition phases, and secondly to determine if significant differences in mental toughness between forwards and backs occurred. A significant difference between preparatory and competition phase was revealed for attitude control ($p = 0.00$), while significant differences between competition and transition phase were found for overall mental toughness ($p = 0.01$), motivation ($p = 0.04$), and attitude control ($p = 0.05$). These findings could facilitate future research regarding mental toughness and psychological skills development during periodization phases.

Mental Toughness of Rugby Players During Periodization Phases

Mental toughness of athletes who perform at a high level of competition has been identified as one of the most significant factors for determining athletic success (Cox & Yoo, 1995; Jones, Hanton, & Connaughton, 2002; Kruger, Potgieter, Malan, & Steyn, 2010; Mack & Ragan, 2008). As the physical and physiological differences between winning and losing athletes decrease each year, the realization that psychological skills might be one of the most critical elements contributing to athletic achievement increases (Birrer & Morgan, 2010; Drees & Mack, 2012). Skilled athletes tend to apply psychological skills to a greater extent than less skilled athletes (Hayslip, Petrie, MacIntire, & Jones, 2010), and it has been suggested that athletes' skill level may affect their mental toughness, although it may not account for it (Newland, Newton, Finch, Harbke, & Podlog, 2013). Rugby is an ideal sport type to examine the differences between mental toughness of players during different periodization phases. Loehr (1982; 1986) stated that success in rugby is not solely reliant on a player's physical or tactical skills, but also on psychological skills that can be revealed by a player's mental toughness, which has been proven to be just as important, although it is most often neglected. Rugby as a sport has various testing protocols for physical aspects like speed, endurance, body composition, and strength, but mental toughness and psychological aspects have been little explored (Hogg, 2007). Coaches and athletes also design and implement their periodization training based on the existing and familiar physical, tactical, and technical demands of their specific sport type, without much consideration for psychological skills training. It has been concluded that sport-relevant psychological skills can be similarly improved, just as athletes' physical skills are improved with the correct training guidelines (Balague, 2000).

The main purpose of periodization is to ensure that athletes adequately prepare themselves through correct physical, tactical, technical, and psychological training guidelines, in order to peak at the right moments during competition and perform optimally to achieve their goals (Bompa, 2009). Harmison (2006) stated that athletes perform beyond their average levels during peak performance, which is one of the goals that most sport psychologists aim to help athletes achieve. Just as periodization occurs for the development of physical, tactical, and technical aspects of training, Bompa (2009) recommended that the psychological aspects should be addressed in order to reach optimal performance. Young and Pearce (2010) have stated that mental toughness is an attribute that most athletes want to acquire and develop, since it is believed to distinguish between good and bad players. According to Balague (2000), the first step in creating a training program for the improvement of athletes' psychological skills is to evaluate the athletes' current skills, identifying skills that require development, as well as the athlete's positive and negative characteristics. The general assumption is that rugby players' physical, tactical, technical, and psychological skills are expected to peak during the competition periodization phase: the period in which they are expected to perform at their optimal range of ability. Insufficient psychological skills training during the rugby players' preparatory periodization phase and poor reflecting, post-evaluation skills, and active rest during their transition periodization phase may be possible factors contributing to inadequate mental toughness during the rugby players' competition phase. This statement highlights the essence of this article, as the mental toughness of rugby players was evaluated, gathering information regarding their psychological strengths and weaknesses with regard to different playing positions during the different periodization phases. The aim of this study was to explore the differences in mental toughness of rugby players between periodization phases and between rugby playing positions.

Mental toughness has been and continues to be a popular phenomenon which has been defined as "a natural or developed psychological edge that enables mentally tough performers to generally cope better than their opponents with the demands and related pressures that occur at the highest level in sport" (Jones et al., 2002, p. 209). Loehr (1982; 1986) furthermore stated that mental toughness consisted of seven subscales, namely self-confidence, positive energy control, attitude control, motivation, negative energy control, attention control, and visualization and imagery control. Further research suggests that mental toughness development and maintenance entail a variety of mechanisms that should be addressed cooperatively to attain a more extensive outcome (Connaughton, Wadey, Hanton, & Jones, 2008). According to results from a study conducted by Drees and Mack (2012), a positive correlation that has been found between mental toughness and success confirms their suggestion that "coaches should create and utilize activities that could increase mental toughness" (p. 379).

The aim of many sport psychology researchers has been to identify the best psychological state—as well as the capacity to train oneself mentally for that specific state—to perform to one's optimal ability (Hammermeister & VonGuenthner, 2005). The importance of an optimal state of mind and the implementation of a psychological skills training program cannot be denied, since a strong correlation has been found between optimal sport performances and the psychological construct of flow (Jackson, 1992), where flow has been described "as the state in which people are so involved in an activity that nothing else seems to matter" (Csikszentmihalyi, as cited in Hammermeister & VonGuenthner, 2005, p. 160). The implementation of relaxation techniques, the use of imagery, goal-setting, efficient self-talk pattern application and arousal control are some of the most typical tools considered for a mental skills training program in order to improve athletes' attention control, motivation, and self-confidence, which are elements recognized to be associated with better

performance (Hammermeister & VonGuenthner, 2005). In a study conducted by Gould, Guinan, Greenleaf, Medberty, and Peterson (1999) during the 1996 Atlanta Summer Games, the authors compared Olympic teams that were expected to receive medals but did not, with teams who received medals when they were expected to. The authors determined that the teams who did not receive medals had no regular or adequately addressed mental skills training, inconsistent team uniformity appeared, no effective communication existed between team members, and they had not been well prepared for the accommodation requirements in the Olympic Village. The teams who did receive medals reported having had strategic and consistent planning executed with their sport psychologist, effective event planning with regard to accommodation and social modalities had been applied, they had received adequate training for optimistic mental attitudes, team unity had been present, and they had adhered to peak performance mental plans. The results of this study emphasize the importance of constant mental skills preparation in order to peak in athletes' performance periodization phases during the most important competitions.

A procedure to develop mental toughness has become increasingly urgent within the sport psychology context, a fact that has drawn more athletes, coaches, and practitioners toward a clear and concise understanding thereof (Crust, 2008). In a study by Lidor, Blumenstein, and Tenenbaum (2007), the authors examined the use of psychological interventions during elite basketball players' annual training programs, and concluded that the goals of each periodization phase should be imitated by the interventions applied. In addition, each periodization phase makes a unique contribution to the ultimate success that athletes attain (Lidor et al., 2007). Furthermore, the psychological demands that athletes are expected to cope with differ in each periodization phase (Lidor et al., 2007), thus it can be expected that the psychological skills training should also be adapted accordingly. In addition, anecdotal reports and empirical studies reported by Lidor et al. (2007) support the

fact that the correct sport-enhancing psychological techniques offer sufficient mental preparation for athletes' practice, competition, and games. Gucciardi, Gordon, and Dimmock (2009a; 2009b) revealed that psychological skills training proved to be useful for assisting younger sports participants with the development of mental toughness, as well as for maintaining great levels of mental toughness in the future.

Balague (2000) has established guidelines for individual sports' periodization of psychological skills, and has found that athletes should pay attention to motivation, pain and fatigue tolerance, self-efficacy, goal-setting, relaxation techniques, visualization and mental rehearsal, and cognitive awareness and control during preparatory phases. Lidor et al. (2007) suggested that athletes should be evaluated during the first stages of the preparatory phase in order to obtain knowledge that could assist the sport psychology consultant to plan psychological training sessions with regard to factors and skills that need to be addressed for the present phase as well as to set a solid foundation for the following phases of periodization. Another important factor to consider when planning a team's psychological training program is the differences between the players' positions, their positional responsibilities, skill levels, and experience, in order to fulfill their psychological needs individually (Lidor et al., 2007). Planning an annual training program is of uttermost importance, as it has been stated by Garfield and Bennett (1984, p. 29): "Without the structure provided by a clear, step-by-step training program, the athlete can waste precious hours, or even years, seeking a path to excellence down cul-de-sacs where little or nothing is accomplished." During the competition period athletes' focus can be re-addressed to optimal arousal, focus, and attention control, while implementing positive self-talk patterns to facilitate self-regulating psychological skills performance during main competitions (Balague, 2000). Setting new goals, and evaluating and reflecting on previous preparatory and competition phases are of utmost importance during the athletes' transition phase

(Balague, 2000). Ultimately, if athletes' facilitative psychological skills could be evaluated during all periodization phases, interdisciplinary models could be designed based on the fundamental results regarding their mental skills to increase athletes' sporting success (Balague, 2000). Coaches and specialist coaches can use the findings of the study as a foundation for determining their athletes' mental toughness over an extensive period in order to design and implement psychological skills training programs according to each athlete's needs during their particular periodization phases. The purpose of this study was to determine if the dimensions of mental toughness differs significantly between rugby players during periodization phases, and secondly to determine if there are significant differences in mental toughness among forwards and backs.

Method

Participants

This explorative study included rugby players (n = 52) of different participation levels, namely players from the University of the Free State, Bloemfontein, South Africa who participate in rugby during university and regional championships, as well as players participating in rugby during student hostel championships between different universities. Due to the extended period of this study which included the preparatory, competition and transition periodization phases of both rugby teams, a remarkable dropout figure had been experienced where after the data of thirty rugby players (n=30) could have been used.

Measures

Two questionnaires were used for this study:

Demographic and rugby history questionnaire. During the testing period a questionnaire was administered in which the players had to provide information with regard to the following:

- Demographic and personal information: the name, birth date, and current age of the player.
- Information with regard to the player's rugby history: an indication of how many years the player has been playing rugby, an indication of the highest level of rugby played, and an indication of the player's current position as well as preferred position.

Psychological performance questionnaire. The mental toughness level of each player was determined by means of the Psychological Performance Inventory (PPI) of Loehr (as cited in Hogg, 2007). The PPI questionnaire consists of 42 items measuring seven six-item subscales, namely self-confidence, negative energy control, attention control, visualization and imagery control, motivation, positive energy, and attitude control. The average of the seven subscales was calculated to yield an overall mental toughness score. Each of the seven subscales is recorded on a five-point Likert scale anchored by "almost always" and "almost never". Subscale scores range from a low of six to a desirable high of 30, and total scores from 42 to 210. The PPI has been found to be internally consistent, with Cronbach alphas for the seven subscales indicating high reliability (self-confidence 0.69, negative energy control 0.42, attention control 0.75, visualization and imagery control 0.82, motivation 0.70, positive energy 0.71, attitude control 0.71) (Golby & Sheard, 2004).

Design and Procedure

This research is descriptive and explorative and aimed at documenting the differences in mental toughness amongst rugby players during different periodization phases. A cross-sectional research design with convenience sampling was used. The aim of the study was explained to all participants and their permission, as well as the permission of their coaches, was obtained by means of an informed consent form. The questionnaires were completed before the players' training sessions or before competitions, either on the rugby field, or in the team's clubhouse, during each team's preparatory, competition, and transition

periodization phases. A sport psychology consultant was present for the duration of completion of the questionnaire to clarify terms that might be unfamiliar to the players. Each player present on the agreed dates for data collection of the preparatory, competition, and transition periodization phases, was asked to complete a Psychological Performance Inventory (PPI) questionnaire, along with the Demographic Information Questionnaire, but only the data of the players who were present during all periodization phases and who completed the PPI questionnaire were used in this study.

Data Analysis

The statistical analysis was undertaken by a biostatistician, using the SAS statistical software package (version 9.22). The validity and reliability of the psychological scales for the specific sample was determined by means of factor analysis and the Cronbach alpha coefficient. Descriptive statistics (mean values, standard deviations, minimum and maximum values) are reported for the different test variables. Differences in mental toughness of rugby players between preparatory, competition, and transition periodization phases were analyzed using a repeated-measures mixed linear model with periodization phase, team, and group (forwards versus backs) as fixed effects, and fitting an unstructured covariance matrix to the repeated measures of mental toughness. From this model, mean values for each group and phase, as well as differences in mean values between periodization phases together with associated p-values and 95% confidence intervals were calculated. The practical significance of differences in rugby players' mental toughness during preparatory, competition, and transition periodization phases was assessed by effect sizes (ES). The effect sizes were interpreted as follows: a value smaller than 0.10 was considered as trivial; a value of 0.10 to 0.30 was considered small; a value of higher than 0.30 to 0.50 medium; and a value greater than 0.50 was considered large (Fröhlich, Emrich, Pieter, & Stark, 2009). The level of significance was set at $p \leq 0.05$.

Confidentiality and anonymity of all participants were ensured, and ethical clearance was obtained from the South African university where the study was conducted, with the ethical clearance number UFS-HUM-2014-36.

Results

Table 1

Differences between competition and preparatory phases

Variable	Phase	N	Mean	SE	Mean Difference	SE	p-value	SD	ES
Overall Mental Toughness	Competition	30	23.02	0.42	1.02	0.55	0.0766	2.68	0.38**
	Preparation	30	22.00	0.53					
Self-Confidence	Competition	30	25.03	0.64	-0.09	0.66	0.8962	3.61	0.02
	Preparation	30	25.12	0.64					
Negative Energy Control	Competition	30	20.74	0.45	1.44	0.76	0.0683	2.94	0.49**
	Preparation	30	19.30	0.68					
Attention Control	Competition	30	20.44	0.63	0.82	0.68	0.2362	3.49	0.24*
	Preparation	30	20.44	0.72					
Visualization and Imagery Control	Competition	30	20.71	0.81	0.37	0.88	0.6732	3.90	0.10*
	Preparation	30	20.33	0.73					
Motivation	Competition	30	24.37	0.72	0.95	1.01	0.3528	4.09	0.23*
	Preparation	30	23.42	0.79					
Positive Energy Control	Competition	30	23.30	0.65	0.23	1.03	0.8237	3.97	0.06
	Preparation	30	23.30	0.82					
Attitude Control	Competition	30	24.97	0.59	1.98	0.60	0.0000**	3.86	0.51**
	Preparation	30	22.98	0.70					

P ≤ 0.05*; P ≤ 0.01**; Effect size: > 0.50 is large***; 0.50 - 0.30 is medium**; 0.30 - 0.10 is small*.

Table 1 shows that there is a statistically significant difference for attitude control between the competition and preparatory phases. The players attained higher scores in attitude control during the competition phase (p = 0.00). Although no other statistically significant differences were found, the players attained higher mean values during the competition phase than during the preparatory phase for negative energy control, with an effect size of 0.49, visualization and imagery control, with an effect size of 0.10, motivation,

with an effect size of 0.23, as well as the overall mental toughness score, with an effect size of 0.38.

Table 2

Differences between competition and transition phases

Variable	Phase	N	Mean	SE	Mean Difference	SE	p-value	SD	ES
Overall Mental Toughness	Competition	30	23.02	0.42	0.87	0.32	0.0100**	2.35	0.37**
	Transition	30	22.15	0.61					
Self-Confidence	Competition	30	25.03	0.64	0.62	0.52	0.2427	3.56	0.17*
	Transition	30	24.41	0.61					
Negative Energy Control	Competition	30	20.74	0.45	0.90	0.55	0.1115	2.56	0.35**
	Transition	30	19.84	0.52					
Attention Control	Competition	30	20.44	0.63	0.13	0.54	0.8129	2.94	0.04
	Transition	30	21.13	0.47					
Visualization and Imagery Control	Competition	30	20.71	0.81	0.56	0.89	0.5329	3.93	0.14*
	Transition	30	20.14	0.75					
Motivation	Competition	30	24.37	0.72	1.66	0.78	0.04*	4.32	0.38**
	Transition	30	22.71	0.88					
Positive Energy Control	Competition	30	23.30	0.65	-0.12	0.66	0.8590	3.53	0.03
	Transition	30	23.65	0.63					
Attitude Control	Competition	30	24.97	0.59	0.87	0.41	0.0500*	3.52	0.25*
	Transition	30	24.10	0.61					

P ≤ 0.05*; P ≤ 0.01**; Effect size: > 0.50 is large***; 0.50 - 0.30 is medium**; 0.30 - 0.10 is small*.

Table 2 shows statistically significant differences between the competition and transition phases for overall mental toughness, motivation, and attitude control. The players attained higher scores in overall mental toughness ($p = 0.01$), motivation ($p = 0.04$) and attitude control ($p = 0.05$) during the competition phase. No other statistically significant differences were found between the competition and transition phases, but players attained higher mean values during the competition phase than during the transition phase for the variables self-confidence, with an effect size of 0.17, negative energy control, with an effect size of 0.35, and visualization and imagery control, with an effect size of 0.14.

Table 3

Differences between preparatory and transition phases

Variable	Phase	N	Mean	SE	Mean Difference	SE	p-value	SD	ES
Overall Mental Toughness	Preparation	30	22.00	0.53	-0.15	0.54	0.7903	2.53	0.06
	Transition	30	22.15	0.61					
Self-Confidence	Preparation	30	25.03	0.64	0.71	0.78	0.3679	3.20	0.22*
	Transition	30	24.41	0.61					
Negative Energy Control	Preparation	30	19.30	0.68	-0.53	0.76	0.4894	3.14	0.17*
	Transition	30	19.84	0.52					
Attention Control	Preparation	30	20.44	0.72	-0.69	0.74	0.3536	3.28	0.21*
	Transition	30	21.13	0.47					
Visualization and Imagery Control	Preparation	30	20.33	0.73	0.19	0.86	0.8277	3.70	0.05
	Transition	30	20.14	0.75					
Motivation	Preparation	30	23.42	0.79	0.70	0.84	0.4129	4.27	0.16*
	Transition	30	20.14	0.75					
Positive Energy Control	Preparation	30	23.30	0.82	-0.35	0.88	0.6930	3.73	0.09
	Transition	30	23.65	0.63					
Attitude Control	Preparation	30	22.98	0.70	-1.12	0.59	0.0708	3.69	0.30**
	Transition	30	24.10	0.61					

P ≤ 0.05*; P ≤ 0.01**; Effect size: > 0.50 is large***; 0.50 - 0.30 is medium**; 0.30 - 0.10 is small*.

Table 3 illustrates that no statistically significant differences were found between the preparatory and transition phases. The players did, however, attain higher mean values for self-confidence, visualization and imagery, and motivation for the preparatory phase than for the transition phase, with an effect size for self-confidence of 0.22, for visualization and imagery control of 0.05, and for motivation of 0.16. The players also attained higher mean values for overall mental toughness, negative energy, attention control, positive energy, and attitude control during the transition phase, with effect sizes of 0.06 for the overall mental toughness, 0.17 for negative energy, 0.21 for attention control, 0.09 for positive energy, and 0.30 for attitude control.

Table 4

Differences between forwards and backs

Variable	Position	N	Mean	SE	Mean Difference	SE	p-value	SD	ES
Overall Mental Toughness	Forwards	16	22.12	0.52	0.53	0.80	0.5139	2.53	0.21*
	Backs	14	22.65	0.56					
Self-Confidence	Forwards	16	24.42	0.71	0.87	1.07	0.4222	3.46	0.25*
	Backs	14	25.29	0.76					
Negative Energy Control	Forwards	16	19.76	0.54	0.39	0.81	0.6334	2.89	0.14*
	Backs	14	20.15	0.58					
Attention Control	Forwards	16	20.34	0.64	1.22	0.91	0.1937	3.25	0.37**
	Backs	14	21.55	0.69					
Visualization and Imagery Control	Forwards	16	20.09	0.82	0.60	1.13	0.6410	3.84	0.16*
	Backs	14	20.69	0.88					
Motivation	Forwards	16	23.44	0.83	0.12	1.19	0.9195	4.23	0.03
	Backs	14	23.56	0.88					
Positive Energy Control	Forwards	16	23.32	0.71	0.34	1.09	0.7568	3.75	0.09
	Backs	14	23.66	0.76					
Attitude Control	Forwards	16	23.82	0.79	0.39	1.22	0.7504	3.70	0.11*
	Backs	14	24.22	0.85					

$P \leq 0.05$*; $P \leq 0.01$**; Effect size: >0.50 is large***; 0.50 - 0.30 is medium**; 0.30 - 0.10 is small*.

Table 4 shows that no statistically significant differences were found between the forwards and the backs during all three periodization phases. The backs scored higher mean values than the forwards for overall mental toughness, with an effect size of 0.21, self-confidence, with an effect size of 0.25, negative energy, with an effect size of 0.14, attention control, with the effect size as 0.37, visualization and imagery control, with an effect size of 0.16, motivation, with an effect size of 0.03, positive energy, with an effect size of 0.09, and attitude control, which had an effect size of 0.11.

Discussion

The purpose of this study was to determine if the dimensions of mental toughness differs significantly between rugby players during periodization phases, as well to determine the

differences in mental toughness between different rugby playing positions (forwards versus backs). As previously mentioned, evaluating athletes during the preparatory phase plays a fundamental role in determining athletes' current levels of psychological skills as well as which of those skills need to be improved (Lidor et al., 2007). The main objective proposed by Lidor et al. (2007) is to assist athletes in utilizing psychological skills training techniques that supplement coping with the high physical strains they are exposed to during this phase of training. Goal-setting, relaxation techniques, and practicing imagery techniques are some of the skills that were reported to be implemented during the preparatory phase. With the use of imagery techniques, players were expected to try, understand and rehearse defensive or offensive technical concepts relating to each player's specific contribution to the game. Attention focus, team cohesion and leadership, motivation, negative attitude control, and self-talk were important aspects which were discussed with the whole team to educate them about the possible ways to implement these strategies (Lidor et al., 2007). The suggested psychological skills training and skills that are recommended to focus on during the preparatory phase have not been indicated by the results of the present study, in which the rugby players attained lower mean values for the attributes visualization and imagery control, attention control, and negative energy control. This could be an important indication of weaknesses among these rugby players during the preparatory phase. Athletes can benefit from coaches who can explain these psychological skill components in theory, and then implement it practically by showing and advising them how to use it during their actual sport participation. This has also been suggested by Harmison (2006).

The competition phase is commonly characterized by a lower volume of physical training and preparation in order to prevent injuries along with emotional and physical burnout, while focusing on positive measures to help players to mentally cope with the pressure and demands of important competitions (Lidor et al., 2007). The results indicated

that self-confidence scored the highest mean value during the competition phase, whereas visualization and imagery control scored the lowest mean value. The psychological training suggested during this phase focused on developing total concentration, awareness and maintenance of regulations, and positive affirmations before and after important games. The players were also expected to mentally rehearse tactical aspects of the game plan using imagery techniques (Lidor et al., 2007). This implies that the rugby players who participated in the present study should focus on increasing their visualization and imagery control during competition phases, for it has previously been identified that athletes spend much less time on physical preparation and exercise, and should instead practice their technique and tactical skills with imagery recall and visualization. It has been noted that visualization and imagery control was a psychological skill that already required more attention during the rugby players' preparatory phase, and perhaps this limitation can be attributed to the poor visualization and imagery control scores revealed during the competition phase as well.

During transition phases the players receive a period of active rest, physically and psychologically, after which they are allowed to participate in sport recreationally. Some players are asked to continue with their psychological skills training to develop their basic psychological skills, like imagery and attention control (Lidor et al., 2007). Once again the results of the present study indicated that the highest mean value scored during the transition phase was self-confidence, the lowest mean value scored was negative energy control, and visualization and imagery control had yet again scored very low values. This could be a very important indication that the rugby players who participated in this study clearly needs to direct their focus to improving their visualization and imagery control skills, which scored very low mean values during all three periodization phases. In a study conducted by Omar-Fauzee et al. (2012) aimed at examining mental toughness as it was perceived by national football players, the authors found that the players ranked the components of mental

toughness with motivation as the most important component, followed by negative energy control, self-confidence, positive energy control, and imagery and visualization control.

Although no studies could be found that have investigated the differences between mental toughness during the preparatory, competition, and transition periodization phases, the results of this study suggest a significant difference in the players' attitude control between the competition and preparatory phases, with higher scores for attitude control being recorded during the competition phase. The results also indicate that higher mean values were scored for negative energy control, visualization and imagery control, motivation, and overall mental toughness during the competition phase than during the preparatory phase. Statistically significant differences were also found between the competition and transition phases, where the players' overall mental toughness, motivation, and attitude control scores were found to be higher during the competition phase than during the transitional phase. No other statistically significant differences were found between the preparatory and transition phases of periodization, although the players scored higher mean values during the preparatory phase for self-confidence, visualization and imagery control, and motivation. During the transitional phase, the players scored higher mean values for overall mental toughness, negative energy control, attention control, positive energy control, and attitude control than during the preparatory phase. The aim of a study conducted by Lidor et al. (2007) was to suggest and demonstrate the implementation of different psychological preparations during elite basketball players' annual training plan. If their suggestions could be applied and compared to actual physical performance during these periodization phases, discoveries could be made regarding the exact development and training prescriptions to be focused on for the enhancements of psychological skills during each specific periodization phase. This can assist athletes, coaches, and sport consultants with incorporating psychological skills training with

physical preparation, because the ultimate goal for all athletes is to be equally tough mentally and physically.

Rugby players are involved in multiple forms of collisions during match play, including rucking, mauling, ball carries, and tackles, with the latter being the predominant form of impacts sustained. Results of the rugby playing positions reflected that the backs' and forwards' highest mean value obtained was for the component self-confidence, while the lowest mean value was scored for negative energy control. An unexpected result of this study was found when comparing the backs' and forwards' mental toughness during all three periodization phases with one another. No statistically significant differences were found between the two playing positions, although the backs had scored higher mean values for overall mental toughness and for all of the mental toughness components, namely self-confidence, negative energy control, attention control, visualization and imagery control, motivation, positive energy control, and attitude control. In a study conducted by Van Rooyen (2012) the results revealed that forwards made more tackles (66%) than backs (34%), and the difference were significant even when group size was accounted for. Sirotic, Knowles, Catterick, and Coutts (2011) showed that forwards have the highest involvement in defensive skills during match play, because forwards perform the most tackles. Similarly, time motion studies have shown that rugby players perform different match-play activities during competition depending on playing position (Meir, Colla, & Milligan, 2001), with forwards being involved in significantly more physical collisions and tackles than backs (Gissane, White, Kerr, & Jennings, 2001). The results of Fuller et al. (2010) indicated that centers tend to make more tackles in a match than other backs and are significantly more prone to injury when tackling than players in other positions. These studies have created expectations about the psychological skills of different rugby playing positions that are in opposition to the findings of the present study. Due to the fact that forwards are much more

involved in vigorous tackles made during a match, one would expect that their mental toughness would portray higher values than that of the backs.

These findings suggest the recommendation for future studies to explore the precise psychological skills that forwards attain, and furthermore what psychological skills are displayed by players who are part of the defensive system in relation to those who play a role on the offensive technicalities of a team sport like rugby, since the backs had scored higher values for all the mental toughness components, whereas previously mentioned studies have clearly indicated that the forwards are more dominantly involved in more aggressive play.

Unfortunately no other literature concerning the mental toughness of rugby players during periodization phases has been published, which limits further discussion of our results. Although only a very small sample size had been obtainable, the results of this study could be the foundation for future research regarding the mental toughness of players in team sports during periodization phases, in which physical parameters and psychological skills present could be explored to identify possible training guidelines for the enhancement of players' physiological and psychological skills needed to perform to their optimal ability.

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CHAPTER 4

RESEARCH ARTICLE 2

This chapter is herewith included according to the guidelines of the African Journal for Physical, Health Education, Recreation and Dance (Appendix A).

Mental toughness of golf players and rugby players during periodization phases

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Short title: Mental toughness in golf and rugby

Abstract

Mental toughness has been a very popular and complex consideration for its remarkable influence on elite sport performance, while little research has been done regarding the differences between the dimensions of mental toughness revealed by individual and team sports during different periodization phases. This article is the first to investigate the differences in mental toughness during periodization phases between golf players and rugby players. Data from seven golf players (n = 7) and fifteen rugby players (n = 15) who participated in golf and rugby at university and provincial level were obtained by means of the Psychological Performance Inventory during preparatory, competition and transition periodization phases. A repeated-measures mixed linear model revealed that the only significant difference between the golf and the rugby players was for the component negative energy control ($p = 0.03$) during the transition phase. No other research concerning the differences between golf players' and rugby players' mental toughness during periodization phases has been found, and thus future studies with bigger sample sizes are recommended in order to determine which mental toughness components are poorly or well developed during the periodization phase, and whether certain components of mental toughness are more developed or required for an individual or a team sport.

Keywords: Mental toughness; Golf players; Rugby players; Periodization phases.

Introduction

Mental toughness in sport is a complex, yet popular subject which has been studied intensively over the past decades (Goldberg, 1998; Fourie & Potgieter, 2001; Clough, Earle & Sewell, 2002; Connaughton, Wadey, Hanton & Jones, 2008). The literature suggests that mental toughness is one of the most crucial factors contributing to athletic success and should be further explored (Jones, Hanton & Connaughton, 2002; Golby & Sheard, 2004; Hogg, 2007; Gucciardi, 2010).

Mental toughness has been described as athletes' ability to cope better than their opponents with high sport and life demands, to be consistent while maintaining their focus, determination and confidence, and to stay in control under pressure (Jones et al., 2002). Mental toughness consists of several elements, including self-confidence, positive energy control, motivation, attention control, visualization and imagery control, negative energy control and attitude control (Loehr, 1982; Loehr, 1986). It has been concluded that these elements are perceived as important psychological skills that athletes of various sport types should attain and develop in order to reach their optimal performance levels (P. Kruger, 2003; Andrew, Grobbelaar & Potgieter, 2007; A. Kruger, 2010).

Zienius, Skarbalius, Zuoza and Pukėnas (2014) remarked that psychological attributes, sport performance indicators and physiological demands of elite golf players are important elements taken into consideration by players and their coaches when designing their annual training programmes, all these elements being considered equally important. According to Hellström (2009), adolescent golf players are required and expected to develop these elements in order to improve and optimize their golf performance, and when elite golf players' fitness and technique is optimally developed, their psychological skills determine their performance and success in the sport. Douglas and Fox (2002) suggest that attitude, concentration, motivation, confidence, desire, and the ability to handle pressure are essential psychological qualities required for elite golf players to successfully participate in tournaments, while loss of confidence has been stated to be the key source of poor performance.

The average distance that golf players cover during a single round of golf is usually less than ten kilometres, while a round can last between two and a half to six hours (Smith, 2010). Rugby, on the contrary, is played over two forty-minute halves separated by a ten-minute break (Meir, Newton, Curtis, Fardell & Butler, 2001). Rugby is characterised by frequent high-intensity bouts of sprints and high levels of physical contact. According to P. Kruger, Potgieter, Malan and Steyn (2010), it is apparent that psychological skills play an important role in players' ability to cope with the demanding competitive environment of elite rugby. P. Kruger (2003) stated that rugby players who attained the highest ranking during the South African Super Twelve Rugby League scored higher than their lower ranked opponents in concentration, self-confidence, achievement motivation and mental preparation. Furthermore, P. Kruger (2003) reported that goal-setting, optimal coping strategies, motivation, self-confidence, visualization and the absence of fear were important psychological factors for optimal rugby performance.

Limited research studies have been conducted on the differences in mental toughness between team and individual sports (Nicholls, Polman, Levy & Backhouse, 2009), and to our knowledge no research has been done to determine the differences between the mental toughness required in golf as an individual sport and in rugby as a team sport during periodization phases. Exploring the psychological skills and thus mental toughness profiles of golf and rugby players during preparatory, competition and transitional periodization phases could form the foundation for developing psychological skills training models to optimize athletic performance in both individual and team sports.

Methodology

Design

This study was aimed at documenting the differences between mental toughness in rugby and golf players during different periodization phases. A cross-sectional research design with convenience sampling was used. The questionnaires were completed before training sessions or before competitions – on the golf course, rugby field, or in the rugby team's clubhouse – with a sport psychology consultant present to answer any questions and to explain any unfamiliar terms.

Participants

This study included the Varsity Cup rugby players (Shimlas) of the University of the Free State (n = 45) and golf players (n=12) of the same university who participate in golf and rugby at university and provincial level. Due to the extended period (preparatory, competition and transition periodization phases of both sports) of this study, a considerable dropout figure in both rugby players and golf players was experienced. Therefore, data of only fifteen (n=15) rugby players and seven golf players (n = 7) could be used.

Measuring Instruments

A demographic rugby and golf history questionnaire was administered during the testing period, in which the players had to provide information with regard to the following:

Demographics and personal information:

The player's name, birth date and current age at the date of testing.

Information with regard to the players' rugby or golf history:

An indication of how many years the player had been playing rugby or golf and the highest level of rugby or golf played; as well as an indication of the players' current position as well as their preferred position (rugby) or handicap and preferred handicap (golf).

The mental toughness level of each rugby player and golfer was determined by means of the Psychological Performance Inventory (PPI) of Loehr (as cited in Hogg, 2007). The PPI questionnaire consists of 42 items measuring seven six-item subscales, namely self-confidence, negative energy control, attention control, visualization and imagery control,

motivation, positive energy and attitude control. An overall mental toughness score was derived as the average of the seven subscales. Each of the seven subscales are recorded on a five-point Likert scale anchored by "almost always" and "almost never". Subscale scores range from a low of six to a high of 30, and total scores from 42 to 210. The PPI has been found to be internally consistent, with Cronbach alphas for the seven subscales indicating high reliability (self-confidence 0.69, negative energy control 0.42, attention control 0.75, visualization and imagery control 0.82, motivation 0.70, positive energy 0.71, attitude control 0.71) (Golby & Sheard, 2004).

Ethical Clearance

Informed consent with guaranteed confidentiality and anonymity was obtained from all rugby and golf players involved. In addition, informed consent was obtained from the rugby and golf coaches, as well as the Dean of Student Affairs of the University of the Free State. Ethical clearance was obtained from the University of the Free State, where the study was conducted, with the ethical clearance number UFS-HUM-2014-36.

Data Analysis

Descriptive statistics (mean values, standard deviations, minimum and maximum values) were calculated for the rugby and golf players' mental toughness components during preparatory, competition and transition periodization phases. The statistical analysis was undertaken by a biostatistician, using the SAS statistical software package (version 9.22). The data on mental toughness were compared between rugby and golf players through a one-way analysis of variance with group (rugby vs golf) as factor, allowing for different residual variances for the two groups. The practical significance of the differences between the test variables was determined by calculating effect sizes, expressed as Cohen's d-value. The effect sizes were interpreted as follows: a value smaller than 0.10 was considered as trivial; a value of 0.10 to 0.30 was considered small; a value of higher thanabove 0.30 up to 0.50 medium; and a value greater than 0.50 was considered large (Fröhlich, Emrich, Pieter & Stark, 2009). The level of significance was set at $p \leq 0.05$.

Results

Table 1: Golf players: Descriptive statistics for mental toughness components during competition, preparatory and transition phases (p.5)

Variable/Component	Competition			Preparation			Transition		
	n	Mean	SE	n	Mean	SE	n	Mean	SE
Overall Mental Toughness	7	23.9	1.1	7	24.0	0.7	7	24.0	0.6
Self-Confidence	7	26.6	1.2	7	26.1	1.0	7	25.3	0.9
Negative Energy Control	7	22.1	0.8	7	22.0	1.1	7	22.7	1.1
Attention Control	7	20.6	1.3	7	20.7	0.9	7	21.4	1.2
Visualization & Imagery Control	7	22.1	2.1	7	21.6	1.6	7	22.1	1.2
Motivation	7	26.3	0.8	7	27.1	0.9	7	26.6	1.1
Positive Energy Control	7	24.7	1.4	7	24.6	0.8	7	24.3	0.8
Attitude Control	7	24.7	1.3	7	25.6	1.2	7	25.9	1.2

The results in Table 1 show that, of the seven mental toughness components, self-confidence had the highest mean value (26.6) during the competition phase, while attention control had the lowest mean value of 20.6. During the preparatory phase, motivation had the highest mean value (27.1), followed by self-confidence, and again attention control had the lowest mean value (20.7). During the transition phase, motivation had the highest mean value (26.6), and attention control the lowest mean value (21.4).

Table 2: Rugby players: Descriptive statistics for mental toughness components during competition, preparatory and transition phases (p.6)

Variable/Component	Competition			Preparation			Transition		
	n	Mean	SE	n	Mean	SE	n	Mean	SE
Overall Mental Toughness	15	24.0	0.5	15	23.1	0.8	15	23.0	0.5
Self-Confidence	15	26.4	0.7	15	26.1	0.9	15	25.9	0.7
Negative Energy Control	15	20.6	0.6	15	19.7	0.9	15	19.7	0.6
Attention Control	15	21.2	1.0	15	20.2	1.1	15	21.8	0.8
Visualization & Imagery Control	15	22.2	1.0	15	21.9	1.0	15	20.1	1.0
Motivation	15	26.9	0.7	15	25.6	1.0	15	23.6	1.0
Positive Energy Control	15	24.6	0.8	15	24.2	1.1	15	24.9	0.8
Attitude Control	15	25.9	0.8	15	24.3	1.2	15	24.9	0.8

Table 2 shows that during the rugby players' competition phase, motivation had the highest mean value (26.9) and negative energy control the lowest (20.6). During the preparatory phase, self-confidence had the highest mean value (26.1), while negative energy control had the lowest mean value (19.7). During the transition phase, self-confidence and negative energy control again had the highest and lowest mean values, 25.9 and 19.7 respectively.

Table 3: Differences between golf players and rugby players during competition phase

Variable	Sport	N	Mean	SE	Mean Difference	SE	p-value	sd_C	ES
Overall Mental Toughness	Golf	7	23.9	1.1	0.1	1.3	0.94	3.6	0.0
	Rugby	15	24.0	0.5					
Self-Confidence	Golf	7	26.6	1.2	0.2	1.4	0.91	4.3	0.0
	Rugby	15	26.4	0.8					
Negative Energy Control	Golf	7	22.1	0.8	1.5	1.0	0.14	3.1	0.5*
	Rugby	15	20.6	0.6					
Attention Control	Golf	7	20.6	1.3	0.6	1.6	0.73	5.0	0.1
	Rugby	15	21.2	1.0					
Visualization and Imagery Control	Golf	7	22.1	2.1	0.1	2.4	0.98	6.8	0.0
	Rugby	15	22.2	1.0					
Motivation	Golf	7	26.3	0.8	0.6	1.0	0.54	3.3	0.2*
	Rugby	15	26.9	0.7					
Positive Energy	Golf	7	24.7	1.4	0.0	1.6	0.98	4.8	0.0
	Rugby	15	24.6	0.8					
Attitude Control	Golf	7	24.7	1.3	1.2	1.5	0.43	4.5	0.3*
	Rugby	15	25.9	0.8					

P ≤ 0.05*; P ≤ 0.01**; Effect size: > 0.50 is large***; 0.50 - 0.30 is medium**; 0.30 - 0.10 is small*.

Table 3 shows that there were no statistically significant differences between golf and rugby players during the competition phase. The rugby players did, however, score somewhat higher mean values than the golf players for overall mental toughness, attention control, with a small effect size (0.10), visualization and imagery control, motivation, with a small effect size (0.20), and attitude control, which also had a small effect size (0.30). The golf players attained higher mean values for self-confidence, negative energy control, with a medium effect size (0.50), and positive energy control.

Table 4: Differences between golf players and rugby players during preparatory phase

(p.6)

Variable	Sport	N	Mean	SE	Mean Difference	SE	p-value	sd_P	ES
Overall Mental Toughness	Golf	7	24.0	0.7	0.8	1.1	0.46	3.7	0.2*
	Rugby	15	23.1	0.8					
Self-Confidence	Golf	7	26.1	1.0	0.1	1.3	0.96	4.3	0.0
	Rugby	15	26.1	0.9					
Negative Energy Control	Golf	7	22.0	1.1	2.3	1.4	0.13	4.6	0.5**
	Rugby	15	19.7	0.9					
Attention Control	Golf	7	20.7	0.9	0.5	1.4	0.72	4.9	0.1
	Rugby	15	20.2	1.1					
Visualization and Imagery Control	Golf	7	21.6	1.6	0.3	1.9	0.88	5.9	0.1
	Rugby	15	21.9	1.0					
Motivation	Golf	7	27.1	0.9	1.5	1.3	0.26	4.6	0.3*
	Rugby	15	25.6	1.0					
Positive Energy	Golf	7	24.6	0.8	0.4	1.4	0.80	4.9	0.1
	Rugby	15	24.2	1.1					
Attitude Control	Golf	7	25.6	1.2	1.3	1.7	0.45	5.6	0.2*
	Rugby	15	24.3	1.2					

$P \leq 0.05$*; $P \leq 0.01$**; Effect size: > 0.50 is large***; 0.50 - 0.30 is medium**; 0.30 - 0.10 is small*.

From Table 4 it is clear that no statistically significant differences were found between the golf and rugby players during the preparatory phase. However, the golf players scored higher mean values for most of the components, such as overall mental toughness, with a small effect size (0.20), self-confidence, negative energy control, with a medium effect size (0.50), attention control, with a small effect size (0.10), motivation, with a small effect size (0.30), positive energy control, and attitude control, with a small effect size (0.20). The rugby players had higher mean values than the golf players only for visualization and imagery control.

Table 5: Differences between golf players and rugby players during transition phase

(p.6-7)

Variable	Sport	N	Mean	SE	Mean Difference	SE	p-value	sd_T	ES
Overall Mental Toughness	Golf	7	24.0	0.6	1.1	0.8	0.19	2.5	0.4*
	Rugby	15	23.0	0.5					
Self-Confidence	Golf	7	25.3	0.9	0.6	1.2	0.62	3.7	0.2*
	Rugby	15	25.9	0.7					
Negative Energy Control	Golf	7	22.7	1.1	3.0	1.2	0.03*	3.6	0.85***
	Rugby	15	19.7	0.6					
Attention Control	Golf	7	21.4	1.2	0.3	1.4	0.84	4.4	0.1
	Rugby	15	21.8	0.8					
Visualization and Imagery Control	Golf	7	22.1	1.2	2.0	1.5	0.21	4.9	0.4*
	Rugby	15	20.1	1.0					
Motivation	Golf	7	26.6	1.1	3.0	1.5	0.06	4.9	0.6**
	Rugby	15	23.6	1.0					
Positive Energy	Golf	7	24.3	0.8	0.6	1.2	0.59	3.9	0.2*
	Rugby	15	24.9	0.8					
Attitude Control	Golf	7	25.9	1.2	0.9	1.4	0.53	4.4	0.2*
	Rugby	15	24.9	0.8					

$P \leq 0.05$*; $P \leq 0.01$**; Effect size: > 0.50 is large***; 0.50 - 0.30 is medium**; 0.30 - 0.10 is small*.

Table 5 shows that there was a statistically significant difference ($p = 0.03$) between the golf and rugby players' negative energy control during the transition phase, where the golf players attained higher mean values than the rugby players, with a large effect size of 0.85. The golf players also attained higher mean values for overall mental toughness with a medium effect size (0.40), visualization and imagery control, also with a medium effect size (0.4), motivation, which had a large effect size (0.60), and attitude control (small effect size of 0.20). The rugby players scored higher mean values for self-confidence and positive energy control, both with small effect sizes of 0.20, and attention control, with a small effect size (0.10).

Discussion

The aim of this study was to explore the differences in mental toughness between golf players and rugby players during periodization phases. The only statistically significant difference

found between these two groups of players was for the component negative energy control ($p = 0.03$), where golf players attained significantly higher values during the transition phase than the rugby players did. Nicholls et al. (2009) found no significant differences in mental toughness between individual and team sports, and concluded that mental toughness is a personality trait that does not change in different situations. Hagag and Ali (2014), who compared the mental toughness of medallist and non-medallist fencing athletes – an individual sport, revealed that the medallists had higher negative energy control, self-confidence, and visualization and imagery control. In agreement with Hagar and Ali (2014), Kuan and Roy (2007) also found that medallist Wushu athletes scored significantly higher values for negative energy control and self-confidence than non-medallists. Thus, successful individual athletes seem to display very high scores for the negative energy control and self-confidence components of mental toughness. Rushall (1988) stated that a recurrence of negative experiences encountered by athletes could account for athletes' negative self-judgements. In the present study, no other significant differences were found between the golf and rugby players during any of the periodization phases, and no other research studies relevant to the present study have been found.

The results of our study indicate that self-confidence and motivation are the mental toughness components with the highest mean values for both golf and rugby players during all periodization phases. This observation could imply that self-confidence and motivation are perceived as equally important, or that team and individual sports equally require and develop the mental toughness components of self-confidence and motivation. Weissensteiner, Abernethy, Farrow and Gross (2012) revealedshowed that highly skilled batsmen were identified through their higher mental toughness scores with regard to motivation, coping skills and self-belief when compared to less skilled batsmen. As previously mentioned, P. Kruger (2003) stated that rugby players who attained the highest ranking during the South African Super Twelve Rugby League scored higher in concentration, self-confidence, achievement motivation and mental preparation than the lower ranked teams.

Lidor, Blumenstein and Tenenbaum (2007) suggested that psychological demands placed on athletes differ between sporting activities as well as in each periodization phase, as do the coping strategies of athletes during preparatory, competition and transition phases (Gaudreau, Lapierre & Blondin, 2001). The results of the present study suggest that mental toughness of rugby players and golf players – thus comparing a team sport to an individual sport – do not

differ significantly. However, the components dominating during each periodization phase could be investigated in future research with the use of higher sample sizes.

Conclusion

This study illustrates the importance of psychological variables in sport, and thus provides a basis for further research aimed at investigating the contributions of various factors to performance in an individual sport (golf) and a team sport (rugby). Psychological skills training programmes have been shown to be effective in enhancing sporting performance and may be the key to sporting excellence. The exploration and development of physical trademarks and mental toughness components and profiles for successful individual and team sport athletes could constitute a breakthrough within the sport and psychological domains. Therefore, information obtained through the implementation of the Psychology Performance Inventory, which highlights the attributes and constructs most frequently employed by players, would be specific to the unique psychological demands of a team sport (rugby) and an individual sport (golf) as well as the demands of sport in general. In our study, the only significant difference found between golf and rugby players during any periodization phase has been for negative energy control, where the golf players scored higher values than the rugby players during the transition phase of periodization. A greater understanding of the psychological needs would offer coaches the opportunity to provide better support and advice to athletes.

Tables

Table 1: Golf players: Descriptive statistics for mental toughness components during competition, preparatory and transition phases (p.5)

Variable/Component	Competition			Preparation			Transition		
	n	Mean	SE	n	Mean	SE	n	Mean	SE
Overall Mental Toughness	7	23.9	1.1	7	24.0	0.7	7	24.0	0.6
Self-Confidence	7	26.6	1.2	7	26.1	1.0	7	25.3	0.9
Negative Energy Control	7	22.1	0.8	7	22.0	1.1	7	22.7	1.1
Attention Control	7	20.6	1.3	7	20.7	0.9	7	21.4	1.2
Visualization & Imagery Control	7	22.1	2.1	7	21.6	1.6	7	22.1	1.2
Motivation	7	26.3	0.8	7	27.1	0.9	7	26.6	1.1
Positive Energy Control	7	24.7	1.4	7	24.6	0.8	7	24.3	0.8
Attitude Control	7	24.7	1.3	7	25.6	1.2	7	25.9	1.2

Table 2: Rugby players: Descriptive statistics for mental toughness components during competition, preparatory and transition phases (p.6)

Variable/Component	Competition			Preparation			Transition		
	n	Mean	SE	n	Mean	SE	n	Mean	SE
Overall Mental Toughness	15	24.0	0.5	15	23.1	0.8	15	23.0	0.5
Self-Confidence	15	26.4	0.7	15	26.1	0.9	15	25.9	0.7
Negative Energy Control	15	20.6	0.6	15	19.7	0.9	15	19.7	0.6
Attention Control	15	21.2	1.0	15	20.2	1.1	15	21.8	0.8
Visualization & Imagery Control	15	22.2	1.0	15	21.9	1.0	15	20.1	1.0
Motivation	15	26.9	0.7	15	25.6	1.0	15	23.6	1.0
Positive Energy Control	15	24.6	0.8	15	24.2	1.1	15	24.9	0.8
Attitude Control	15	25.9	0.8	15	24.3	1.2	15	24.9	0.8

Table 3: Differences between golf players and rugby players during competition phase

(p.6)

Variable	Sport	N	Mean	SE	Mean Difference	SE	p-value	sd_C	ES
Overall Mental Toughness	Golf	7	23.9	1.1	0.1	1.3	0.94	3.6	0.0
	Rugby	15	24.0	0.5					
Self-Confidence	Golf	7	26.6	1.2	0.2	1.4	0.91	4.3	0.0
	Rugby	15	26.4	0.8					
Negative Energy Control	Golf	7	22.1	0.8	1.5	1.0	0.14	3.1	0.5*
	Rugby	15	20.6	0.6					
Attention Control	Golf	7	20.6	1.3	0.6	1.6	0.73	5.0	0.1
	Rugby	15	21.2	1.0					
Visualization and Imagery Control	Golf	7	22.1	2.1	0.1	2.4	0.98	6.8	0.0
	Rugby	15	22.2	1.0					
Motivation	Golf	7	26.3	0.8	0.6	1.0	0.54	3.3	0.2*
	Rugby	15	26.9	0.7					
Positive Energy	Golf	7	24.7	1.4	0.0	1.6	0.98	4.8	0.0
	Rugby	15	24.6	0.8					
Attitude Control	Golf	7	24.7	1.3	1.2	1.5	0.43	4.5	0.3*
	Rugby	15	25.9	0.8					

P ≤ 0.05*; P ≤ 0.01**; Effect size: > 0.50 is large***; 0.50 - 0.30 is medium**; 0.30 - 0.10 is small*.

Table 4: Differences between golf players and rugby players during preparatory phase

(p.6)

Variable	Sport	N	Mean	SE	Mean Difference	SE	p-value	sd_P	ES
Overall Mental Toughness	Golf	7	24.0	0.7	0.8	1.1	0.46	3.7	0.2*
	Rugby	15	23.1	0.8					
Self-Confidence	Golf	7	26.1	1.0	0.1	1.3	0.96	4.3	0.0
	Rugby	15	26.1	0.9					
Negative Energy Control	Golf	7	22.0	1.1	2.3	1.4	0.13	4.6	0.5**
	Rugby	15	19.7	0.9					
Attention Control	Golf	7	20.7	0.9	0.5	1.4	0.72	4.9	0.1
	Rugby	15	20.2	1.1					
Visualization and Imagery Control	Golf	7	21.6	1.6	0.3	1.9	0.88	5.9	0.1
	Rugby	15	21.9	1.0					
Motivation	Golf	7	27.1	0.9	1.5	1.3	0.26	4.6	0.3*
	Rugby	15	25.6	1.0					
Positive Energy	Golf	7	24.6	0.8	0.4	1.4	0.80	4.9	0.1
	Rugby	15	24.2	1.1					
Attitude Control	Golf	7	25.6	1.2	1.3	1.7	0.45	5.6	0.2*
	Rugby	15	24.3	1.2					

P ≤ 0.05*; P ≤ 0.01**; Effect size: > 0.50 is large***; 0.50 - 0.30 is medium**; 0.30 - 0.10 is small*.

Table 5: Differences between golf players and rugby players during transition phase

(p.6-7)

Variable	Sport	N	Mean	SE	Mean Difference	SE	p-value	sd_T	ES
Overall Mental Toughness	Golf	7	24.0	0.6	1.1	0.8	0.19	2.5	0.4*
	Rugby	15	23.0	0.5					
Self-Confidence	Golf	7	25.3	0.9	0.6	1.2	0.62	3.7	0.2*
	Rugby	15	25.9	0.7					
Negative Energy Control	Golf	7	22.7	1.1	3.0	1.2	0.03*	3.6	0.85***
	Rugby	15	19.7	0.6					
Attention Control	Golf	7	21.4	1.2	0.3	1.4	0.84	4.4	0.1
	Rugby	15	21.8	0.8					
Visualization and Imagery Control	Golf	7	22.1	1.2	2.0	1.5	0.21	4.9	0.4*
	Rugby	15	20.1	1.0					
Motivation	Golf	7	26.6	1.1	3.0	1.5	0.06	4.9	0.6**
	Rugby	15	23.6	1.0					
Positive Energy	Golf	7	24.3	0.8	0.6	1.2	0.59	3.9	0.2*
	Rugby	15	24.9	0.8					
Attitude Control	Golf	7	25.9	1.2	0.9	1.4	0.53	4.4	0.2*
	Rugby	15	24.9	0.8					

$P \leq 0.05$*; $P \leq 0.01$**; Effect size: > 0.50 is large***; 0.50 - 0.30 is medium**; 0.30 - 0.10 is small*.

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CHAPTER 5

Summary, Conclusion, Recommendations and Limitations

5.1 Summary

The research questions addressed in this study were the following: Firstly, to determine if the dimensions of mental toughness of rugby players differ significantly during preparation, competition and transitional periodization phases. Secondly, to determine if significant differences in mental toughness occur between rugby forwards and backs players during the periodization phases. Finally, to investigate the differences in mental toughness during periodization phases between golf as an individual sport and rugby as a team sport.

Chapter 1 provided a brief introduction and outline of the problem statement that underlies the research questions and aims that form the basis of this study. The thesis is submitted in article format, as approved by the senate of the University of the Free State (Bloemfontein Campus), and therefore includes a literature review (Chapter 2) and two research articles (Chapter 3, and 4) which will be presented to accredited peer reviewed journals.

In order to answer the aims of this study, the current literature on mental toughness was investigated in Chapter 2. Firstly definitions and terminologies used for mental toughness were discussed, together with the significance of mental toughness and sport outcomes. An overview of the mental toughness attributes and applied models were provided. The importance of several components of mental toughness has been defined and discussed in terms of their influences on athletic accomplishment. Furthermore, mental toughness has been studied with regard to individual sport types, as well as team sport types. Mental toughness within periodization phases have also been explored, while the preparation, competition, and transition phase of periodization has been reflected to be important indicators of athlete's annual training plans.

In conclusion, the literature indicated that it is without doubt that mental toughness is an important attribute to successful sport accomplishments that can be portrayed by an athlete's well developed psychological skills and according to some authors –

specific characteristics as well. The development and improvement of these skills have been controversially explored, studied and discussed among researchers, while no concise prescription therefore has been designed.

Mental toughness consists of components like self-confidence, negative energy control, attention control, visualization and imagery control, motivation, positive energy control, and attitude control, which are all skills and psychological tools that could – when taught how to utilize them – play a fundamental role in attaining optimal athletic performance. As physical, tactical and technical features of elite athletes seem to differ less and less each year, the athlete who consists of better developed psychological skills would finally be the victor among them. It is clear that individual and team sports differ significantly with regard to physical, technical and tactical trademarks; thus it can be expected and assumed that the psychological skills that are obtained and used would also differ among the sport types, as well as during different periodization phases. Ultimately, in order to design and implement any program or model of improvement – the evaluation of the particular components should firstly be carried out.

In Chapter 3, the research article entitled “Mental toughness of rugby players during periodization phases” by Janse van Rensburg, C., Coetzee, F.F., Schall, R. and Schoeman, R. will be presented for publication in the Journal of Applied Sport Psychology. The aim of this study was to determine if the dimensions of mental toughness of rugby players differ significantly during preparation, competition and transitional periodization phases.Secondly, to determine if significant differences in mental toughness occur between rugby forwards and backs players during the periodization phases. Thirty rugby players (n=30), that participate in rugby on a university and regional level, contributed to the results of this study by completing the Psychological Performance Inventory during each periodization phase. Descriptive statistics (mean values, standard deviations, minimum and maximum values) were reported for the different test variables. Differences in mental toughness of rugby players between preparation, competition and transition periodization phases were analysed using a repeated measures mixed linear model with periodization phase, team and group (forwards versus backs) as fixed effects, and fitting an unstructured covariance matrix to the repeated measures of mental toughness. From this model, mean values for each group and phase, as well as differences between mean values

between periodization phases together with associated p-values and 95% confidence intervals were calculated. Results indicated that a significant difference was found for attitude control (p=0.00) between competition and preparation phase, while significant differences were found for overall mental toughness (p=0.01), motivation (p=0.04), and attitude control (p=0.05) between competition and transition phase. No statistically significant differences were found between the two playing positions, although the backs had scored higher mean values for all of the mental toughness components namely: overall mental toughness, self-confidence, negative energy control, attention control, visualization and imagery control, motivation, positive energy control, and attitude control. These findings could facilitate future research regarding mental toughness and psychological skills development during periodization phases.

In Chapter 4, the second research article entitled “Mental toughness of golf players and rugby players during periodization phases” by Janse van Rensburg, C., Coetzee, F.F. and Schall, R. was presented for publication in the African Journal for Physical, Health Education, Recreation and Dance (AJPHERD). The aim of this study was to investigate the differences in mental toughness during periodization phases between golf as an individual sport and rugby as a team sport, using the Psychological Performance Inventory questionnaire. The participants consisted of seven golf players (n=7) and fifteen rugby players (n=15) who participate in their sport type on a regional and university level. Descriptive statistics (mean values, standard deviations, minimum and maximum values) were calculated for the rugby and golf players’ mental toughness components during preparation, competition and transition periodization phases. The data on mental toughness were compared between rugby and golf players through a one-way analysis of variance with group (rugby vs golf) as factor, allowing for different residual variances for the two groups. The only statistically significant difference found between these two groups of players was for the component negative energy control (p=0.03), where golf players attained significantly higher values during the transition phase than the rugby players did. This study indicates the importance of psychological variables in sport, and thus provides a basis for further research aimed at investigating the contributions of various factors to performance in an individual (golf) and a team sport (rugby).

5.2 Conclusions

The conclusions that are drawn from this research are presented in accordance with the research aims set in Chapter 1, (p.3).

Research aim 1:

To determine if there are significant differences ($p<0.05$) in mental toughness of rugby players during the preparation, competition and transitional periodization phases.

The qualitative research on which this study is based, suggest that significant differences had been found amongst rugby players with regards to their attitude control ($p=0.00$) that has shown significantly higher values during competition phase than during the preparation phase. When the components of mental toughness had been compared for the competition phase and the transition phase, significant differences were found for overall mental toughness ($p=0.01$), motivation ($p=0.04$), and attitude control ($p=0.05$), with the latter phase having scored lower than the competition phase. No significant differences were found between the mental toughness components of the preparation phase compared to the transition phase.

Research aim 2:

To determine if there are significant differences ($p<0.05$) in mental toughness among rugby playing-positions (forwards versus backs).

The conclusions drawn from the results suggest that when the mental toughness of two diverse rugby playing positions namely, forwards and backs had been compared with one another, no significant differences were revealed, although a tendency occurred where the backs had obtained higher mean values for all of the mental toughness components.

Research aim 3:

To determine if the dimensions of mental toughness differs significantly ($p<0.05$) between rugby players (team sport) and golfers (individual sport) during periodization phases.

The only statistically significant difference found between these two groups of players was for the component negative energy control ($p = 0.03$), where golf players attained significantly higher values during the transition phase than the rugby players did. The conclusion drawn from the results of our study indicate that self-confidence and motivation are the mental toughness components with the highest mean values for both golf and rugby players during all periodization phases. This observation could imply that self-confidence and motivation are perceived as equally important, or that team and individual sports equally require and develop the mental toughness components of self-confidence and motivation.

5.3 Recommendations and Limitations

Periodization is a term used to explain how athletes' annual training programs are designed. In order for athletes to reach their peak performance level, at the most crucial time during a competition or tournament – where it is expected that they would reveal their best developed physiological, psychological, technical and tactical capabilities regarding the sporting activity – the correct training principles for all of the components need to be applied. Periodization should also be implemented and applied according to the specific requirements of a sport type, the physical demands thereof, as well as individual and team specifications needed in order to excel. Thus, it is clear that individual and team sports differ significantly with regard to physical, technical and tactical trademarks; it can be expected and assumed that the psychological skills that are obtained and used would also differ among the sport types, as well as during different periodization phases.

Within the limited literature concerning mental toughness during periodization phases, certain psychological skills have presented themselves during different phases, which has been the foundation from where the results and discussion of our study has been based. Future studies are recommended to further investigate which mental toughness components seems to be dominant during specific periodization phases – and which components still have room for improvement, while comparing the physical performances and parameters of the athletes as well. It is also recommended to evaluate different sport types with larger sample groups of both individual and team sports to determine if mental toughness components that are revealed during each periodization phase, are specific to a certain sport type or even

a specific position of certain team sports (defensive or offensive), and to determine if those components have an effect on the sport outcome when it is compared to physical conditioning and achievements. If these factors that have a physical and psychologically combining effect on athletes' success in sport, major breakthroughs could facilitate the development of training guidelines that enhances athletes' performances and help them to achieve their goals. Results could also enable players, coaches, and sport psychologists to recognize the mental toughness characteristics that contribute to adult performance and may serve as important mental toughness indicators to identify adolescents for early selection (Morris, 2000).

The study demonstrated limitations on the following areas, which could be overcome in future research:

- The results of the study were based on data obtained from a very small sample size. It is recommended that future studies should be conducted to incorporate larger sample sizes of team and individual athletes.
- Limited research available concerning differences in the dimensions of mental toughness between rugby players during different periodization phases and no literature concerning the mental toughness of golf players in South Africa – is another limitation recognized in this study.

Mental toughness was a topic that has been presented by the researcher at the Life Through Movement Congress in 2012, held at the North-West University – Potchefstroom Campus – with the title: Differences in the dimensions of mental toughness between university level rugby players of different participation levels, where a silver award had been received.

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APPENDICES

Appendix A: Authors guidelines for AJPHERD

GUIDELINES FOR AUTHORS

The African Journal for Physical, Health Education, Recreation and Dance (AJPHERD) is a peer-reviewed journal established to:

i) provide a forum for physical educators, health educators, specialists in human movement studies and dance, as well as other sport-related professionals in Africa, the opportunity to report their research findings based on African settings and experiences, and also to exchange ideas among themselves.

ii) afford the professionals and other interested individuals in these disciplines the opportunity to learn more about the practice of the disciplines in different parts of the continent.

iii) create an awareness in the rest of the world about the professional practice in the disciplines in Africa.

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AJPHERD publishes research papers that contribute to knowledge and practice, and also develops theory either as new information, reviews, confirmation of previous findings, application of new teaching/coaching techniques and research notes. Letters to the editor relating to the materials previously published in AJPHERD could be submitted within 3 months after publication of the article in question. Such letter will be referred to the corresponding author and both the letter and response will be published concurrently in a subsequent issue of the journal.

Manuscripts are considered for publication in AJPHERD based on the understanding that they have not been published or submitted for publication in any other journal. In submitting papers for publication, corresponding authors should make such declarations. Where part of a paper has been published or presented at congresses, seminars or symposia, reference to that publication should be made in the acknowledgement section of the manuscript.

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Three copies of original manuscript and all correspondence should be addressed to the Editor-In-Chief:

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Articles can also be submitted electronically, i.e. via e-mail attachment. However, the corresponding author should ensure that such articles are virus free. AJPHERD reviewing process normally takes 4-6 weeks and authors will be advised about the decision on submitted manuscripts within 60 days. In order to ensure anonymity during the reviewing process authors are requested to avoid self-referencing or keep it to the barest minimum.

PREPARATION OF MANUSCRIPT

Manuscripts should be type written in fluent English (using 12-point Times New Roman font and 1½ line-spacing) on one side of whiteA4-sized paper justified fully with 3cm margin on all sides. *Guidelines for Authors* 317 In preparing manuscripts, MS-Word, Office 98 or Office 2000 for Windows should be used. Length of manuscripts should not normally exceed 12 printed pages (including tables, figures, references, etc.). For articles exceeding 10 typed pages US$ 10.0 is charged per every extra page. Longer manuscripts may be accepted for publication as supplements or special research reviews. Authors will be requested to pay a publication charge of US$ 350.0 to defray the very high cost of publication. The pages of manuscripts must be numbered sequentially beginning with the title page. The presentation format should be consistent with the guidelines in the publication format of the American Psychological Association (APA) (4th edition).

Title page:

The title page of the manuscript should contain the following information:

Concise and informative title.

Author(s') name(s) with first and middle initials. Authors' highest qualifications and main area of research specialisation should be provided.

Author(s') institutional addresses, including telephone and fax numbers.

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A short running title of not more than 6 words.

Abstract

An abstract of 200-250 words is required with up to a maximum of 5 words provided below the abstract. Abstract must be typed on a separate page using single line spacing, with the purpose of the study, methods, major results and conclusions concisely presented. Abbreviations should either be defined or excluded.

Text

Text should carry the following designated headings: Introduction, materials and methods, results, discussion, acknowledgement, references and appendices (if appropriate).

Introduction

The introduction should start on a new page and in addition to comprehensively giving the background of the study should clearly state the problem and purpose of the study. Authors should cite relevant references to support the basis of the study. A concise but informative and critical literature review is required.

Materials and Methods

This section should provide sufficient and relevant information regarding study participants, instrumentation, research design, validity and reliability estimates, data collection procedures, statistical methods and data analysis techniques used. Qualitative research techniques are also acceptable.

Results

Findings should be presented precisely and clearly. Tables and figures must be presented separately or at the end of the manuscript and their appropriate locations in the text indicated. The results section should not contain materials that are appropriate for presentation under the discussion section. Formulas, units and quantities should be expressed in the *systeme* 318 *Guidelines for Authors*

internationale (SI) units. Colour printing of figures and tables is expensive and could be done upon request authors' expense.

Discussion

The discussion section should reflect only important aspects of the study and its major conclusions. Information presented in the results section should not be repeated under the discussion. Relevant references should be cited in order to justify the findings of the study. Overall, the discussion should be critical and tactfully written.

References

The American Psychological Association (APA) format should be used for referencing. Only references cited in the text should be alphabetically listed in the reference section at the end of the article. References should not be numbered either in the text or in the reference list.

Authors are advised to consider the following examples in referencing:

Examples of citations in body of the text:-

For one or two authors; Kruger (2003) and Travill and Lloyd (1998). These references should be cited as follows when indicated at the end of a statement: (Kruger, 2003); (Travill & Lloyd, 1998).

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Multiple references when cited in the body of the text should be listed chronologically in ascending order, i.e. starting with the oldest reference. These should be separated with semi colons. For example, (Tom, 1982; McDaniels & Jooste, 1990; van Heerden, 2001; de Ridder at al., 2003).

Reference List

In compiling the reference list at the end of the text the following examples for journal references, chapter from a book, book publication and electronic citations should be considered:

Examples of journal references:

Journal references should include the surname and initials of the author(s), year of publication, title of paper, name of the journal in which the paper has been published, volume and number of journal issue and page numbers.

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For authored references: Amusa, L.O. & Toriola, A.L. (2003). *Foundations of Sport Science* (1st ed.) (pp. 39-45). Mokopane, South Africa: Dynasty Printers.
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Appendix B: Authors guidelines for Journal of Applied Sport Psychology

Instructions for authors

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This journal uses ScholarOne Manuscripts (previously Manuscript Central) to peer review manuscript submissions. Please read the guide for ScholarOne authors before making a submission. Complete guidelines for preparing and submitting your manuscript to this journal are provided below.

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Editorial Statement: The *Journal of Applied Sport Psychology* is a nonproprietary journal that is operated by the Association for Applied Sport Psychology for the promotion of quality research in the field of applied sport psychology. The publisher of the *JASP* is Taylor and Francis, Inc. of Philadelphia, PA. The *JASP* is published four times a year, and is a refereed publication with all submissions reviewed by three peers via blind review process. The editor of the jounal is selected by the Executive Board of AASP by a formal vote. He/She is appointed to a three-year term with one consecutive renewal possible if so voted by the Executive Board. The Associate Editors are approved by the Executive Board of the Association and serve staggered terms ranging from three to five years. An individual holding an AASP Executive Board office as a Division Head cannot serve as an Associate Editor. Editorial Board members are appointed to three, four or five-year terms as determined by the Editorial staff of the *JASP*. Editorial Board members may be reappointed to one consecutive term or may be asked to retire their seat on the Board at the discretion of the Editorial staff. The journal is a direct benefit of membership in AASP and is received by student and professional members.

The *JASP* is designed to advance thought, theory and research on applied aspects of sport psychology. Submissions such as position papers, reviews, theoretical developments specific to sport and/or exercise and applied research conducted in these settings or having significant applied implications to sport and exercise are appropriate content for the *JASP*.

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All parts of the manuscript should be typewritten, double-spaced, with margins of at least one inch on all sides. Articles will normally be no more than 30 double-spaced pages in length (including tables, figures and references). They should also include a title page, a 100-word abstract and complete references. The title of the manuscript should reappear on the first page of the text. Authors should also supply a shortened version of the title suitable for the running head, not exceeding 50 character spaces. Research notes (13 pages including references, tables, figures, 100 word abstract) are welcomed submissions.

Manuscripts, including tables, figures and references, should be prepared in accordance with the Publication Manual of the American Psychology Association (Sixth Edition, 2010). Copies of the manual can be obtained from the Publication Department, American Psychological Association, 750 First Street NE, Washington, DC 20002-4242; phone (202) 336-5500.

Authors are to avoid the use of sexist, racist, and otherwise offensive language. Manuscript copies should be clear and legible and all figures must be camera ready. All reviews are blind and conducted by two reviewers and Associate Editors with a first decision made in approximately 30 days. Authors will receive typed feedback regarding the editorial decisions made on their manuscript and any suggested revision recommendations. Authors should be prepared to provide their raw data if requested during the review process. A file copy of the manuscript should be kept by the author.

Illustrations: Illustrations submitted (line drawings, halftones, photos, photomicrographs, etc.) should be clean originals or digital files. Digital files are recommended for highest quality reproduction and should follow these guidelines:

- 300 dpi or higher
- sized to fit on journal page
- EPS, TIFF, or PSD format only
- submitted as separate files, not embedded in text files

Color Reproduction: Color art will be reproduced in color in the online publication at no additional cost to the author. Color illustrations will also be considered for print publication; however, the author will be required to bear the full cost involved in color art reproduction. Please note that color reprints can only be ordered if print reproduction costs are paid. Print Rates: $900 for the first page of color; $450 per page for the next three pages of color. A custom quote will be provided for articles with more than four pages of color. Art not supplied at a minimum of 300 dpi will not be considered for print.

Tables and Figures: A short descriptive title should appear above each table with a clear legend and any footnotes suitably identified below. All units must be included. Figures should be completely labeled, taking into account necessary size reduction. Captions should be typed, double-spaced, on a separate sheet.

Proofs: One set of page proofs is sent to the designated author. Proofs should be checked and returned within 48 hours.

Reprints:

Authors for whom we receive a valid email address will be provided an opportunity to purchase reprints of individual articles, or copies of the complete print issue. These authors will also be given complimentary access to their final article on *Taylor & Francis Online*.

Open Access: Taylor & Francis Open Select provides authors or their research sponsors and funders with the option of paying a publishing fee and thereby making an article fully and permanently available for free online access – *open access* – immediately on publication to anyone, anywhere, at any time. This option is made available once an article has been accepted in peer review. Full details of our Open Access programme.

Search Engine Optimization: Search Engine Optimization (SEO) is a means of making your article more visible to anyone who might be looking for it. Please consult our guide here.

Appendix C: Informed Consent Form

Department of Exercise and Sport Sciences

Departement Oefen- en Sportwetenskappe

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS UV

Informed Consent Form

Mental toughness among rugby players and golfers during periodization phases.

Mental toughness has been defined as having a natural or developed psychological edge that enables you to generally cope better than your opponents with the many demands (competition, training, and lifestyle) that sport places on a performer (Jones, Hanton & Conaughton, 2002). Research by Jones et al., (2002) has shown that mentally tough performers were more consistent in remaining determined, focused, confident, and in control under pressure in comparison to their less mentally tough opponents.

The purpose of this research project will be to determine the differences in mental toughness between rugby players of different participation levels, and different playing positions as well as to determine which of the dimensions of mental toughness differs significantly between rugby players and golf players during the preparation, competition and transitional periodization phases.

Results of this study should enable players, coaches, and sport psychologists to recognize the mental toughness characteristics that contribute to adult performance and may serve as important mental toughness indicators to identify adolescents for early selection.

Each player (rugby/golf) that will be present on the agreed dates for data collection of the preparation, competition and transition periodization phases, will be asked to complete a

Psychological Performance Inventory (PPI) questionnaire, along with the Demographic Information questionnaire, but only the data of the players who would've been present during all periodization phases, and whom completed the PPI questionnaire, will be used in this study to maintain the anonymity and confidentiality of each player.

Participation in this study is voluntary and individuals who refuse to participate in the study will not be penalized in any way. The participants may also decide to discontinue their participation in the study at any time.

Measurements:

Demographic, rugby or golf history and sport psychological background questionnaire

A questionnaire will be administered during the testing period, in which the players have to provide information with regard to the following:

- Demographics and personal information
- Information with regards to the players' rugby or golf history
-

Psychological performance questionnaire

The mental toughness level of each player and/or golfer will be determined by means of the Psychological Performance Inventory (PPI) Questionnaire.

The PPI questionnaire consists of 42 items measuring seven six-item subscales, namely: self-confidence, negative energy control, attention control, visualization and imagery control, motivation, positive energy and attitude control. An overall mental toughness score can also be derived (average value of the seven subscales).

I,_____, (full name and surname) have read the above mentioned information and understand the terms, nature and possible benefits of the study. I understand that I may withdraw my participation from this study at any time.

I understand that with signing this consent form, I am not waiving any legal claims, rights or remedies.

_____.. _____.

Signature Date

(Participant)

I, hereby confirm that I have explained the nature, purpose, and potential benefits of participating in this study to the above mentioned individual and that I have answered any questions that had been raised.

_____. _____.

Chrisna J.v. Rensburg Date

(Researcher)

chrisna.sport@gmail.com

(051) 401-3361 / (051) 401-2944

Appendix D : Demographic Questionnaires

Demographic, rugby or golf history questionnaire

- **<u>Demographics and personal information:</u>**

- The name of the player:

- The birth date of the player:

- The current age at the date of testing of the player:

- **<u>Information with regards to the players' rugby or golf history:</u>**

  - An indication of how many years the player has been playing rugby or golf:

  - An indication of the highest level of rugby or golf played on university level:

  - An indication of the players' current position as well as their preferred position / current handicap and preferred handicap:

Appendix E: Psychological Performance Inventory Questionnaire

	Almost Always	Often	Sometimes	Seldom	Almost Never
1 I see myself as more of a loser than a winner in competition.					
2 I get angry and frustrated during competition.					
3 I become distracted and lose my focus during competition.					
4 Before competition, I picture myself performing perfectly.					
5 I am higly motivated to play my best.					
6 I can keep strong positive emotion flowing during competition.					
7 I am a positive thinker during competition.					
8 I believe in myslef as a player.					
9 I get nervous or afraid in competition.					
10 It seems my mind starts racing 100mph during critical moments of competition.					
11 I mentally pratice my physical skills.					
12 The goals I've set for myself as a player keep me working hard.					
13 I am able to enjoy competition even when I face lots of difficult problems.					
14 My self-talk during competition is negative.					
15 I lose my confidence very quickly.					
16 Mistakes get me feeling and thinking negatively.					
17 I can clear interfering emotion quickly and regain my focus.					
18 Thinking in pictures about my sport becomes easy for me.					
19 I don't have to be pushed to play or practice hard. I am my own best igniter.					

Continued Overleaf

	Almost Always	Often	Sometimes	Seldom	Almost Never
20 I tend to get emotionally flat when things turns against me during play.					
21 I give 100 percent effort during play, no matter what.					
22 I can perform toward the upper range of my talent and skill.					
23 My muscles become overly tight during competition.					
24 I get spacey during competition.					
25 I visualise working through tough situations prior to competition.					
26 I'm willing to give whatever it takes to reach my full potential as a player.					
27 I practice with high positive intensity.					
28 I can change negative moods into positive ones by controlling my thinking.					
29 I'm a mentally tough competitor.					
30 Uncontrollable events like the wind, cheating opponents, and bad referrees get me very upset.					
31 I find myself thinking of past mistakes or missed oppertunities as I play.					
32 I use images during play to help me perform better.					
33 I get bored and burned out.					
34 I get challenged and inpired in tough situations.					
35 My coaches would say I have a good attitude.					
36 I project the outward image of a confident fighter.					
37 I can remain calm during competition when confused by problems.					

Continued Overleaf

	Almost Always	Often	Sometimes	Seldom	Almost Never
38 My concentration is easily broken.					
39 When I visualise myself playing, I can see and feel things vividly.					
40 I wake up in the morning and am really excited about playing and practicing.					
41 Playing this sport gives me a genuine sense of joy and fulfilment.					
42 I can turn crisis into opportunity.					

Appendix F: Coach Information

Mental toughness of players in team and individual sport during periodization

Chrisna Janse van Rensburg

2012193963

In fulfillment of the degree

MAGISTER ARTIUM

(SPORT SCIENCE)

In the

Faculty of Humanities

(Department of Exercise and Sport Science)

at the

University of the Free State

Study leader: Prof. F.F. Coetzee

Co-study leader: Mr. R. Schoeman

1. Background

Sport participation at an elite level has become remarkably more competitive and demanding, while it has been observed that winning seems to be associated with a player's personality and unique characteristics. Coaches and athletes describe this phenomenon as a player's mental toughness – a term very often used, but much less understood (Hogg, 2007).

Mental toughness has been defined as having a natural or developed psychological edge that enables you to generally cope better than your opponents with the many demands (competition, training, and lifestyle) that sport places on a performer (Jones, Hanton & Conaughton, 2002). Research by Jones et al., (2002) has shown that mentally tough performers were more consistent in remaining determined, focused, confident, and in control under pressure in comparison to their less mentally tough opponents. Twelve attributes of mentally tough performers have been categorized and identified by super-elite athletes, which include: coping skills, level of motivation, maintenance of confidence, discipline and goal directedness, cognitive skills, competitiveness, possession of prerequisite physical and mental requirements, team unity, preparation skills, psychological hardiness, religious convictions and ethics (Fourie & Potgieter, 2001).

Psychological skills are regarded as an undeniable prerequisite for success in professional sport (Cox & Yoo, 1995) and have an important attribution to a player's ability to cope with the competitive demands in a team sport like elite rugby (Kruger, Potgieter, Malan & Steyn, 2010). Kruger, (2003) states that rugby players who consist of great physical and tactical skills would most likely perform even better when they contain excellent developed psychological skills. Evidently, success in rugby is not only dependent on physical and tactical aspects but also on psychological aspects which reflect mental toughness (Loehr, 1982; 1986).

Golf, on the contrary, is an individual sport that can also be described to be psychologically – very challenging (Kirschenbaum, Owens & O'Connor, 1998). The golf legend, Sam Snead defines golf as an inherently challenging game played on a six inch course – the space between a player's ears (Kirschenbaum et al., 1998). The results of a previous study done by Thomas and Over (1994) indicated that expert golfers preserved to have better mental preparation and increased concentration levels during their game, when compared with less skilled golfers, whereas Douglas and Fox (2002)

recorded that elite golfers believed that the essential psychological qualities needed for tournament success are attitude, motivation and desire.

2. Research problem and objectives

Numerous researchers have studied the relationship between rugby performance and psychological skills by comparing rugby players from various participation levels (Andrew et al., 2007; Golby & Sheard, 2004; Kruger, 2003; Kruger, Potgieter, Malan & Steyn, 2010). In a previous study by Kruger (2003) remarkable differences in the psychological skills of elite and club-level senior rugby players in South Africa were reported. The study concluded that South African Super Twelve rugby players reflected better coachability, general coping skills, and less worries when compared to South African club-level rugby players (Kruger, 2003). Kruger (2003) also found that players of the Super Twelve rugby team that attained the highest ranking in 2003, scored higher in concentration, self-confidence, achievement motivation, and mental preparation than the players of lower ranked teams. In a team sport like rugby there are various rigorous testing procedures for strength, body composition, and speed, yet there are minimal findings on the mental and psychological demands of the game that has been published (Hogg, 2007).

In contrast to rugby as a team sport, Hayslip, Petrie, Macintire and Jones (2010) suggests that golf – as an individual sport – also consists of exclusive psychological and a physiological encounters, which enhances the importance of exploring the effects that psychological skills have on players' performance, within different ranks of competition and experience. Hellström (2009) concludes that psychological factors have an outstanding influence on golf competition outcomes, and has proved that golfers with different participation and skill levels also reflect golf-related psychological differences. Educating golfers about their mental toughness profiles as well as the benefits of utilizing psychological skills might be an effective strategy to enhance the overall quality of golfer's games as well as improve the enjoyment of and commitment to their golf experience (Hayslip et al., 2010).

The specific aims/objectives of this study are:

- To determine if there are significant differences ($p<0.05$) in mental toughness between rugby players during periodization phases.
- To determine if there are significant differences ($p<0.05$) in mental toughness among rugby playing-positions during periodization phases..

- To determine if the dimensions of mental toughness differs significantly ($p<0.05$) between rugby players and golfers periodization phases.

3. Research design and methodology:

a. Research design: This research will focus within the descriptive and explorative paradigm and a cross sectional research design with convenient sampling will be used.

b. Research method and measuring instruments: This study will include rugby players of different participation levels which include:, the University of the Free State's first rugby team – the Shimla's, and the Hostel Varsity Cup Champions: 2012, Abraham Fischer Hostel's first rugby team. The study will also include a convenience sample of golfers who participate in golf at university and regional level. These participants will complete a demographic, rugby or golf history questionnaire as well as a Psychological Performance Inventory Questionnaire (PPI) during the three different periodization phases. These questionnaires will be presented in the language of their choice (English or Afrikaans). Each participant will also receive an information document explaining the outline of the research study.

c. Statistical procedure: Data will be captured from the data forms to Microsoft Excel by the researcher. Further analysis will be done by a statistician using SAS version 9.1.3. Frequencies and percentages will be calculated for categorical data. Means and standard deviations or medians and percentiles will be calculated for numerical data. Appropriate p-values and/or confidence intervals will be calculated to compare pre- and post-test values.

d. Ethical considerations: It will be verbally communicated to each player that their participation is voluntary and each player will also receive an informed consent document in which their anonymity, confidentiality, and the ending of their participation at any time during the study – will be assured.

4. Value of the research:

Results of this study should enable players, coaches, and sport psychologists to recognize mental toughness characteristics that contribute to adult performance and may serve as important indicators to identify players at an early stage for selection.

5. Contact details of the researcher:

1. Contact number: 079 880 3970

2. Email address: chrisna.sport@gmail.com

6. What is needed?

1. The names and ages of the rugby players and golfers.
2. Three contact sessions with all the players (duration – max. 10 minutes) to complete the PPI questionnaire:
   a) During their transition periodization phase.
   b) During their preparation periodization phase.
   c) During their competition periodization phase.
3. Dates to be determined for data collection after ethical clearance have been obtained.

Appendix G: Coach Consent (House Abraham Fischer)

3 Hillside view

Jan Wilken straat

Bloemfontein

9301

22 Augustus 2013

To whom it may concern,

I, Johan Koen, hereby authorise Miss C. Janse van Rensburg to evaluate the rugby players of House Abraham Fischer's first rugby team during their preparation, competition and transitional periodization phases as well as to use the data gathered from the rugby players to complete her research study

I look forward to receiving the results and feedback from her the conducted study.

Kind regards

Johan Koen

Vishuis rugby coach

Appendix H: Coach Consent (Shimlas)

30 February 2014

To whom it may concern,

I, Riaan Schoeman, hereby authorize Miss Janse van Rensburg to evaluate our players and use the data gathered from the Shimla rugby players in her academic research.

I hope that there will be feedback on the findings and look forward to receiving a copy.

Kind regards

Riaan Schoeman

Team manager

Appendix I: Coach Consent (Golf)

Academy of Golf

Bloemfontein
Masselspoort rd
Ooseinde
9301

To whom it may concern,

I, Quintin Williams, hereby authorise Miss C. Janse van Rensburg to evaluate the golf players during their preparation, competition and transitional periodization phases as well as to use data gathered from the golf players to complete her research study.

I look forward to receiving the results and feedback from her the conducted study.

Kind regards,

Quintin Williams
Head Teaching Professional
Bloemfontein Golf Club

Appendix J: Ethical Clearance

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HUMANITIES
GEESTESWETENSKAPPE

27 June 2014

Miss C. Janse van Rensburg
Department of Exercise and Sport Science
UFS

Ethical Clearance Application: The mental toughness of players in team and individual sport during periodization

Dear Miss Janse van Rensburg

With reference to your application for ethical clearance with the Faculty of the Humanities, I am pleased to inform you on behalf of the Ethics Board of the faculty that you have been granted ethical clearance for your research with the following stipulation:

- Please obtain authorisation to conduct the study from the Dean of Student Affairs before commencing the study (to be submitted to the Ethics Officer before the onset of research)
- Remove the question that relates to the ethnicity of players
- Improve the explanation of upholding individual respondents' anonymity and confidentiality (especially in the informed consent form) as discussed during our meeting on 25/6/2014
- Include contact numbers on the informed consent form for respondents who might have queries

Your ethical clearance number, to be used in all correspondence, is:

UFS-HUM-2014-36

This ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension in writing.

We request that any changes that may take place during the course of your research project be submitted in writing to the ethics office to ensure we are kept up to date with your progress and any ethical implications that may arise.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours sincerely,
Katinka de Wet

Research Ethics Committee (Faculty of the Humanities)

Copy: Ms Charné Vercueil (Research Co-ordinator, Faculty of the Humanities)

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Ofisa ya Dine

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P.O. Box/Posbus 339
Bloemfontein 9300
South Africa/Suid-Afrika

www.ufs.ac.za

Appendix K: Study Approval

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
STUDENT AFFAIRS
STUDENTESAKE
DITABA TSA BAITHUTI

06 August 2014

Faculty of Humanities
University of the Free State

Dear Miss Janse van Rensburg

CSA Research Committee: Study approval and registration

With reference to your application for approval by registration with the College of Student Affairs (CSA) Research Committee of your study, *mental toughness among rugby players and golfers during periodization phases*, submitted on 24 July 2014, I am pleased to report that committee approval has been granted for your study to engage the student population for purposes of the research.

Your study is registered with the CSA Research Desk for its full duration, which desk is appointed to offer you support in further detailing access to and data collection among students. Also, please note that Mr DB Prinsloo is appointed to serve as your principal contact and you are requested to please contact him for further arrangements.

Kindly also note upon completion of the study to schedule the submission of the required report of findings to the Research Desk.

Please do not hesitate to contact Mr Vhugala Nthakheni, CSA Secretary, with further queries or requests for support.

Yours sincerely,

B Rudi Buys VDM,
Dean of Student Affairs

cc: Dr. FF Coetzee
Dr. L Lange
Mr. DB Prinsloo
Mr. V Nthakheni

OFFICE OF THE DEAN: STUDENT AFFAIRS
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205 Nelson Mandela Drive/Rylaan, Park West/Parkwes
Bloemfontein 9301, South Africa/Suid-Afrika
PO Box/Posbus 339
Bloemfontein 9300
South Africa/Suid-Afrika
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Appendix L: Declaration of Article Editing – Article 1

Monique Esterhuyse

P.O. Box 100965
BRANDHOF
9324
Cell: 072 226 4754
E-mail: m_esterhuyse@yahoo.com

30 January 2015

To whom it may concern

I hereby confirm that I have edited the article I hereby confirm that I have edited the article *Mental toughness of rugby players during periodization phases* and that I am a qualified language practitioner.

Yours faithfully

Monique Esterhuyse

Appendix M: Declaration of Article Editing – Article 2

Monique Esterhuyse

P.O. Box 100965
BRANDHOF
9324
Cell: 072 226 4754
E-mail: m_esterhuyse@yahoo.com

30 January 2015

To whom it may concern

I hereby confirm that I have edited the article I hereby confirm that I have edited the article *Mental toughness of rugby players and golfers during periodization phases* and that I am a qualified language practitioner.

Yours faithfully

Monique Esterhuyse