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THE EFFECT OF DIFFERENT REST INTERVALS BETWEEN MULTIPLE BENCH PRESS BOUTS

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ABSTRACT

In order to examine the effects of different rest intervals between sets on the training volume completed during a workout, 15 male bodybuilders served as subjects (Mean SD, age=25.28±2.01; mass=73.06±8.33 kg; height=176.33±6.30 cm). All the subjects performed a minimum of three strength workouts per week for a period of two years. Data collection took place over a period of four weeks with four testing sessions. During the first session, one repetition of the maximum (1RM) for the Bench Press (BP) was tested. Each of the next three sessions included four sets of exercises performed with a 75% of 1RM load. Rest between sets was randomly assigned from: a timed three-minute rest period; a 1:3 work: rest (W/R) ratio (1:3 W/R) and achieving a post exercise heart rate (HR) of 60% age-predicted maximum (60% Post-HR). The repetitions to exhaustion from set two to set four were significantly higher in three-minute rest conditions than 1:3 W/R and a 60% Post-HR rest conditions (P<0.05), and there was no significant differences between the 60% Post-HR and 1:3 W/R conditions. Within each condition the number of repetitions to exhaustion decreased significantly for each set (P≤ 0.01). The results showed that a three-minute rest interval was the most effective method of recovery compared to 60% Post-HR and 1:3 W/R conditions during the four sets of bench press to exhaustion.

Key words: Resistance exercise; Rest interval; Work; Rest ratio; Post exercise heart rate

INTRODUCTION

Resistance training (RT) programmes are commonly used to enhance performance in many sports. Resistance training variables, originally defined by Kraemer (1983), include a number of sets and repetitions, training intensity, training volume and rest periods between sets. Manipulating any of these variables will alter the specific training stimulus, which in turn is determined by the goals of the program and the needs of the athletes. Mistakes in any of these variables in the progression of a program could, in theory, result in overtraining syndrome. Therefore, the manipulation of these variables must be done correctly (Kreider *et al.*, 1998).

Among these variables, rest periods between sets in RT have a special importance. A rest period is defined as the time period between the end of a training set and commencement of the next, or until the body condition of the individual approaches the physiological state as

before the activity. It is necessary to establish suitable recovery periods between successive sets to sustain consistent repetitions.

Time, work: rest ratio (W/R) and achieving a specific recovery heart rate (HR) during the rest period are indicators as to whether the body is physiologically prepared for another work period/load. In terms of the effects of a fixed time period between sets on training volume as measured by repetitions to exhaustion, Kraemer's (1997), 3 set×10RM with 1 and 3 minutes rest, Richmond and Godard's (2004), 2 set×75% 1RM with 1, 3 and 5 minutes rest, Todd's *et al*. (2001), 3 set×60% 1RM and 90% 1RM with 1, 2, 3, 4 and 5 minutes rest, Rahimi's (2005), 4 set×85% 1RM with 1, 2 and 5 minutes rest and Willardson and Burkett's (2005), 4 set× 8RM with 1, 2 and 5 minutes rest demonstrated that when training with sub maximal

loads between 50 and 90% of 1RM, long rest periods of 3-5 minutes between sets allowed for more total repetitions to be completed during a workout.

However, Larson and Potteiger (1997), in relation to W/R ratio and achieving a specific post exercise heart rate (Post-HR) as indicators of rest periods between sets, compared resistance training workout in four sets of squats with 85% of 10RM to either a 3 minute rest period, 1:3 W/R ratio and a Post-HR of 60% age-predicted maximum. They reported that three different rest conditions were equally effective methods of recovery during the four sets of parallel squats to exhaustion.

To our knowledge, the impact of a 3 minute rest, 1:3 W/R ratio and a Post-HR of 60% age-predicted maximum rest period on the bench press completed over four sets with 75% of a 1RM load has not been reported and resistance-trained athletes, such as bodybuilders or power-lifters, must perform exercises at maximal or near maximal intensities with repeated efforts in order to enhance muscular hypertrophy. Recovery between efforts for these athletes may be a critical issue for maximising performance. Therefore, the purpose of this study was to compare the effects of three different rest intervals on the bench press as measured by repetitions to exhaustions over four sets with 75% of a 1RM load.

METHODS

Experimental approach to the problem

To test the hypothesis that there is a significant difference in training volume completed during a workout involving the bench press (BP) due to different rest intervals between sets and the training volumes completed during a workout in this exercise were compared for each rest interval condition (3 minute rest, 1:3 W/R ratio and a Post-HR of 60% age-predicted maximum rest period).

Subjects

A group of 15 college-aged men volunteered for this study (age, 25.28± 2.01 years; body mass, 73.06 ± 8.33 kg; height, 176.33±6.30 cm). All the subjects were classified as experienced recreational lifters by having consistently performed a minimum of three strength workouts per week for the previous two years and none of the subjects had any experience with such training styles before the study. The subjects signed a informed consent

form before participating in the study and completed a medical history questionnaire in which they were screened for any possible injury or illness. The Institutional Review Board of the University approved the research protocol.

1RM testing and exercise sessions

Data collection occurred in four sessions with 48 hours recovery between each session in a week. The subjects were required to warm up prior to each testing session, which consisted of 4 minutes of low intensity exercise on a cycle ergometer and performing upper body flexibility movements. In the first session, 1RM on the bench press was determined in accordance with Willardson and Burket (2006). Briefly, the bench press was performed with an Olympic bar through the full range of motion. Subjects descended to the point at which the Olympic bar touched the chest, before pressing the resistance back to the starting point with the elbows extended. One spotter was used during all sets to assist in racking the bar and to ensure that subjects maintained a consistent and safe technique (i.e., hyper extending the lumbar spine or bouncing the bar off the chest was not permitted). Three to five subsequent lifts were then made to determine the 1RM with 5 minutes rest between lifts. To ensure that all subjects were moving at approximately the same velocity for each repetition, each set was timed using a metronome and consisted of a one second eccentric phase followed by a one second concentric phase. The rest interval between sets was timed using a hand-held stopwatch. After the determination of the 1RM on the bench press, the 75% of 1RM load selected represented the load used in the testing sessions.

During the next three testing sessions, four sets of the bench press were performed to voluntary exhaustion at 75% of 1RM and one of the rest periods were used in each session in

a counterbalance procedure (a 3 minute rest, 1:3 W/R ratio and a Post-HR of 60% age-predicted maximum rest period). Immediately following each set, the subjects sat down on chairs and remained passive during the recovery phase. Heart rates were monitored with a heart rate telemetry unit (Polar Instrument) beginning with the completion of the bench press and continuing throughout Post-HR recovery. Time was measured with a digital stopwatch for the 3 minute and the 1:3 W/R recovery periods. To calculate recovery time for the 1:3 W/R ratio, the duration of the previous work interval was multiplied by three (rest interval).

Statistical analysis

Data are expressed as Mean ± SD. Statistical evaluation was performed with SPSS 12.0 for windows and one-way ANOVA with repeated measures that were used to compare repetitions per set to exhaustion among three recover conditions. Multiple comparisons with confidence interval adjustment by the Least Significant Difference (LSD) method were used as post hoc when necessary. The significance level was set at $p<0.05$.

RESULTS

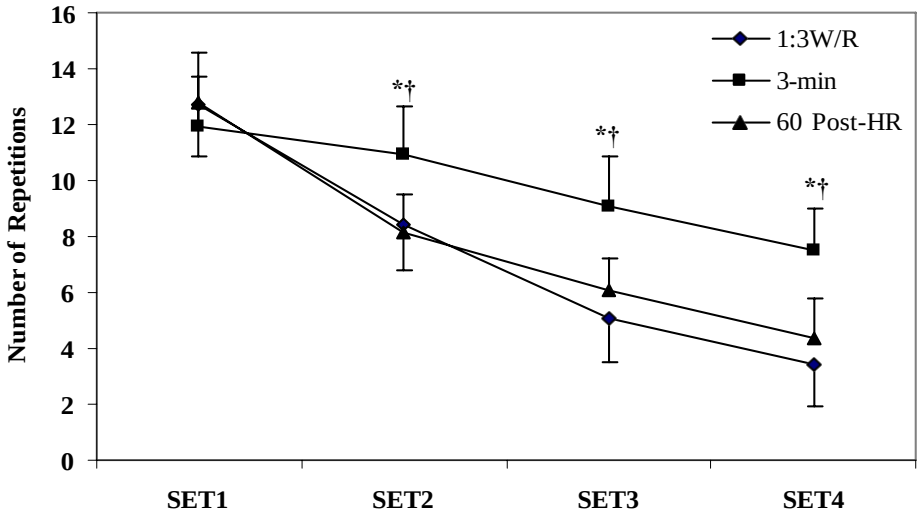
The repetitions to exhaustion for each set under the three recovery conditions are shown in Table 1. Significant differences were observed among the rest conditions ($p<0.05$). The repetitions to exhaustion from set two to set four were significantly higher in a 3 minute rest condition than 1:3 W/R ratio and a Post-HR of 60% age-predicted maximum rest condition ($p<0.05$, see Table 1, Figure 1) and there was no significant difference between the Post-HR

and 1:3 W/R ratio conditions. Within each condition the number of repetitions to exhaustion decreased significantly for each set ($p\leq 0.01$).

TABLE 1: **MEAN ± SD VALUES FOR REPETITIONS COMPLETED**

Rest conditions	Set 1	Set 2	Set 3	Set 4	D	Total
60% Post-HR	12.8±1.74	8.8±1.40†	6.06±1.16†	4.33±1.49†	8.46±1.88†	31.33±4.63†
1:3 W/R	12.73±1.86	8.40±1.63†	5.60±1.54†	3.46±1.50†	9.26±1.43†	30.26±6.02†
3-min	11.93±1.79	10.93±1.70	9.06±1.83	7.53±1.45	4.40±2.19	39.46±5.57

(D: difference between set 1 and set 4; Total: repetitions completed in four sets)
† Significant difference with a 3 minute rest condition ($p < 0.05$).



† Significant difference with a 60% Post-HR rest condition ($p<0.05$).
* Significant difference with a 1:3 W/R ration rest condition ($p<0.05$).

FIGURE 1: **BENCH PRESS MEAN REPETITIONS PER SET IN A 3 MINUTE REST, 1:3 W/R RATIO AND A POST-HR OF 60% AGE-PREDICTED MAXIMUM REST PERIOD PROTOCOLS**

DISCUSSION

The purpose of this study was to investigate the effects of different rest intervals between sets on the training volume during multiple bench press bouts. The results demonstrated that the

repetitions to exhaustion from set two to set four were significantly higher in a 3 minute rest condition than in a 1:3 W/R ratio and in a Post-HR of 60% age-predicted maximum rest condition and there was no significant differences between the 60% Post-HR and 1:3 W/R ration conditions. These results are not consistent to a study carried out by Larson and Potteiger (1997) that compared resistance training workout in four sets of squats with 85% of 10RM to either a 3 minute rest, 1:3 W/R ratio and a 60% Post-HR. They reported that the three different rest conditions were equally effective methods of recovery during the four sets of parallel squats to exhaustion. The differences in the results may be accounted for by the differences in the training status of the subjects, the resistance used and the muscles being trained (bench press versus squat).

The results of the current study are supported by Richmond and Godard's (2004), 2 set×75% 1RM with 1, 3 and 5 minutes rest, Todd's *et al.* (2001), 3 set×60% 1RM and 90% 1RM with 1, 2, 3, 4 and 5 minutes rest, Rahimi's (2005), 4 set×85% 1RM with 1, 2 and 5 minutes rest, Willardson and Burkett's (2005), 4 set× 8RM with 1, 2 and 5 minutes rest and Mirzaei's *et al.* (2008), 4 set × 60 & 90% of 1RM with 150 and 240 seconds rest intervals between sets. The results demonstrated that when training with sub maximal loads between 50 and 90% of 1RM, long rest periods of 3 to 5 minutes between sets allowed for more total repetitions to be completed during a workout. Also, results of the current study were different from those demonstrated by Kraemer *et al.* (1997) who found that when subjects rested for 3 minutes between sets, they were able to complete all 10 repetitions over three sets of the bench press with a 10RM load. In the current study, the subjects failed to complete maximum repetitions over four sets of the bench press with 75% of a 1RM load, even when resting 3 minutes between sets, the repetitions decreases from set one to set four. These differences in results may be accounted for by differences in the training status of subjects, training loads and different recovery periods.

When lifting a sub maximal amount of resistance, the slow and fast-twitch muscle fibres are recruited, but at first the slow-twitch muscle fibres exert force and when the slow-twitch muscle fibres become progressively fatigued, the fast-twitch muscle fibres continue to produce sufficient force. Finally, when all available muscle fibres are fatigued and cannot produce sufficient force, the set is ended (Zatsiorsky, 1995). When considering the rest intervals between sets, slow twitch muscle fibres would require shorter recovery due to their oxidative characteristics, whereas fast twitch muscle fibres would require longer recovery due to their glycolytic characteristics (Weiss, 1991).

Because fast-twitch muscle fibres rely heavily on anaerobic glycolysis for energy production, these fibres would accumulate higher levels of lactic acid during high intensity exercise. The accumulation of lactic acid has been shown to lower intracellular pH through the dissociation of hydrogen ions (H^+), which results in muscle fatigue (Jones *et al.*, 1986; Taylor *et al.*, 1990). However, Robergs *et al.* (2004) demonstrated that there is no biochemical support for lactate production causing acidosis. Lactate production rather retards/delay acidosis.

Similarly, there is a wealth of research evidence to show that acidosis is caused by reactions other than lactate production (Kowalchuk, 1988; Corey, 2003). Every time ATP is broken down to ADP and Pi, a proton is released. When the ATP demand of muscle contraction is met by mitochondrial respiration, there is no proton accumulation in the cell, as protons are

used by the mitochondria for oxidative phosphorylation and to maintain the proton gradient in the intermembranous space. It is only when the exercise intensity increases beyond steady state that there is a need for greater reliance on ATP regeneration from glycolysis and the phosphagen system. The ATP supplied by these non-mitochondrial sources is eventually used to fuel muscle contraction increases, proton release and causes the acidosis of intense exercise. Lactate production increases under these cellular conditions to prevent pyruvate accumulation and supply the NAD^+ needed for phase two of glycolysis (Robergs *et al.*, 2004).

It is important to note that lactate production acts as both a buffering system, by consuming H^+ and as a proton remover by transporting H^+ across the sarcolemma to protect the cell against metabolic acidosis. The cause of metabolic acidosis is not merely proton release, but an imbalance between the rate of proton release and the rate of proton buffering and removal. As previously shown, proton release occurs from glycolysis (an accumulation of $NAD+H^+$ produced by the Glyceraldehyde 3-phosphatdehydrogenas reaction) and ATP hydrolysis. However, there is not an immediate decrease in cellular pH due to the capacity and multiple components of cell proton buffering and removal. The intracellular buffering system, which includes amino acids, proteins, Pi, $HCO3^-$, creatine phosphate (CrP) hydrolysis and lactate production, binds or consumes H^+ to protect the cell against intracellular proton accumulation. Protons are also removed from the cytosol via mitochondrial transport, sarcolemmal transport ($lactate^-$ /H^+symporters, Na^+/ H^+ exchangers) and a bicarbonate dependent exchanger ($HCO3^-$ /Cl^-). Such membrane exchange systems are crucial for the influence of the strong ion difference approach at understanding acid-base regulation during metabolic acidosis (Kowalchuk, 1988; Corey, 2003). However, when the rate of H^+ production exceeds the rate of the capacity to buffer or remove protons from skeletal muscle, or when there is not enough time to buffer or remove H^+ production, metabolic acidosis ensues and results in muscle fatigue.

Short rest intervals of one minute or less have been shown to significantly increase lactic acid levels during heavy resistance exercise (Kraemer *et al.*, 1987). The time needed for lactic acid clearance following high-intensity exercise has been shown to be four to10 minutes (Jones *et al*., 1986). Although lactate production and pH was not measured in the current study the data representing the 3 minute rest condition shows that it is likely enough time to uptake H^+ and delay fatigue, which allowed subjects to complete a higher volume of training, versus the 60% Post-HR and 1:3 W/R ratio conditions.

There are limitations in this study that warrant discussion. First, the training volume decreased from set two to set four during three rest conditions. This may have been due to H^+ production, which exceeds the rate of capacity to buffer or remove the deficiency in the intercellular buffering system. Therefore, it is recommended that future studies evaluate H^+ production, the rate of the capacity to buffer or remove H^+ and the intercellular buffering system in the muscles during the performance of RT with different rest intervals between sets. Secondly, the results related to upper body exercise (bench press) had different response to the protocols. Therefore, it is recommended that future studies evaluate the effects of the 3 minute, 60% Post-HR and 1:3 W/R ratio rest conditions on the sustainability of repetitions in different muscle groups of male and female athletes.

PRACTICAL APPLICATIONS

Bench press is a common exercise performed during workouts designed for the upper body. The results of the present investigation can be applied to bench press workouts with athletes who train in order to gain muscle hypertrophy in the upper body. Bench press repetitions sustainability during four sets with 75% of 1RM was greater in fixed 3 minute rest periods compared to 60 Post-HR and 1:3 W/R ratio conditions. It should be noted that an optimum rest period between sets depends on training goals, type of exercise, training load, number of repetitions per set and other factors. Therefore, the manipulation of these variables must be done correctly so that training goals could be attained.

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8

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EFFECT OF TWO DIFFERENT FORMS OF THREE-POINT LINE ON GAME ACTIONS IN GIRLS' MINI-BASKETBALL

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ABSTRACT

The aim of this study was to compare two different designs of the three-point line to analyze which one allows for a higher frequency of motor actions that, according to the literature, should be strengthened when including a three-point line in youth basketball. In the first of two championships, female mini-basketball players (N=67) played with a three-point line delimited by the free throw lane, while during the second one, they played with a rectangular three-point line. Four observers were trained. The reliability reached values between .90 and .98. The Mann-Whitney U Test was used to determine if there were significant differences among the averages of the compared variable. When participants used the three-point line delimited by the free throw lane, there were increases in the percentage of ball possessions that ended in a shot (U=1280785, Z=-3.827, p=.000), that ended in shots from zones A (U=1286321, Z=-3.531, p=.000) and C (U=1356614, Z=-2.182, p=.029), in standard shots (U=1294771, Z=-3.269, p=.001), in hook shots (U=1358526, Z=-3.176, p=.001), in three-point shot attempts (U=1314902, Z=-6.600, p=.000) and in successful three-point shots (U=1355201, Z=-3.888, p=.000). This study confirms the necessity of consulting with analysts before introducing and modifying a rule in sport.

Key words: Basketball; Rule modification; Shot; Youth sport.

INTRODUCTION

Jay Archer created mini-basketball as an adaptation of basketball for children's characteristics and needs so that they could play and enjoy it in accordance with their capabilities. In Spain, according to regulations by the Spanish Basketball Federation (SBF), mini-basketball is played between two teams of five players each, who are 11 years of age and under. Six periods of eight minutes are played on a court measuring 28 x 15 meters in

which there are two basketball hoops at a height of 2.60 meters. According to Piñar *et al.* (2002/2003), Piñar (2005) and Arias *et al.* (2009), ball possessions that end in shot attempts, successful shots, lay-ups, hook shots, shot attempts from distances greater than four meters or from positions outside the free throw lane ("lane") are scarcely carried out in mini-basketball. Additionally, since there is no three-point line, players cannot score three-point baskets. This, and the fact that players attempt few shots outside of four meters, limits their play and enjoyment in accordance with their capabilities. The SBF proposed a three-point line delimited by a rectangular area similar to a goal area in soccer. With this new rule in mind,

9

some organizations (counties basketball federations and the counties governments) in each Spanish autonomous community opted to use a three-point line delimited by the rectangular area, while others opted to use the line that delimits the free throw lane as a three-point line (see Figure 1). However, none of the organizations conducted studies beforehand to assess the impact that either of these two lines can have on the game actions of mini-basketball players during the game. From reference studies, the three-point line should facilitate the development of situations that end in a shot, that strengthen the shot from outside of the free throw lane, lay-ups and hook shots and that increase the number and effectiveness of three-point shots (D´Silva *et al.*, 1988; Andreasen, 1990; Adams, 1991; Piñar *et al.*, 2002/2003; Piñar, 2005; Arias *et al.*, 2008/2009). However, information does not exist about what type of three-point line facilitates these motor actions to the greatest extent.

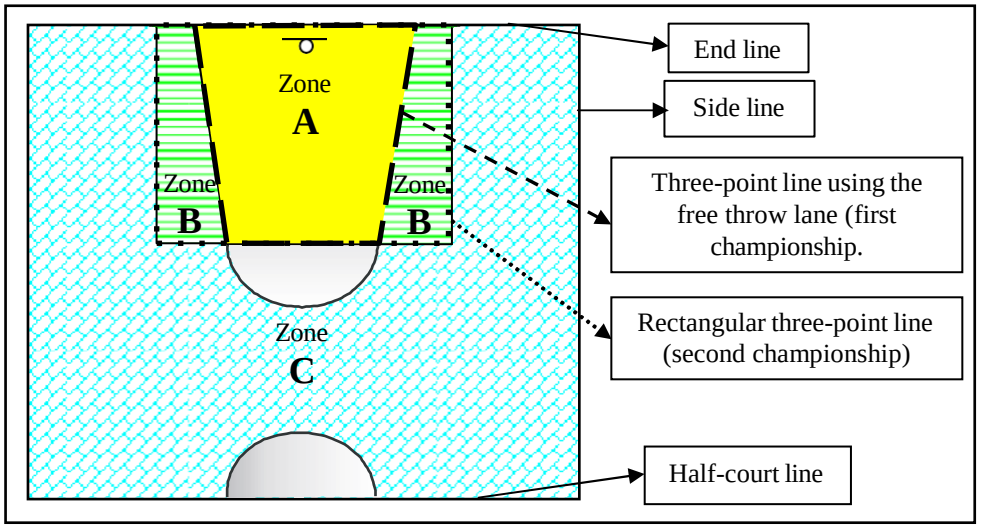

FIGURE 1: **THREE-POINT LINE USING THE FREE THROW LANE AND RECTANGULAR THREE-POINT LINE.**

The motor praxeology establishes that rules designate the requisites for the development of the game actions, which determine the internal logic of the sport that they regulate (Parlebas, 2001). The prescriptions set forth by the regulations define the game actions, given that the regulations establish four types of relationships that cause the motor action to emerge (Parlebas, 2001), namely: (a) between participants; (b) between the participant and the game space; (c) between the participant and the objects and/or tools that influence the contest; and (d) the mode in which the participant must adjust to the game tempo. When changing the three-point line, the game space is modified and it may also change the game actions. This requires that studies be conducted that are focused on the analysis of game actions. The game action is the fundamental aspect that is directly affected by the changes and it is expressed through observable, objective motor behaviours.

From a pedagogical perspective, rules are a didactical resource and are established to cause the desired adaptation in individuals (Rink, 1993; Pellett *et al.*, 1994; Pellett & Lox, 1998).

10

The modification of the practice conditions has specific objectives, namely: (a) to generate a simplified approach that is suitable for the level of the children; (b) to allow much

opportunity for practice; (c) to be able to execute it successfully; and (d) to increase the enjoyment (Pellett *et al*., 1994; Brown *et al*., 2000; Prusak & Darst, 2000). According to Prusak and Darst (2000), small adjustments can make a tremendous impact in the learning environment. However, there are few scientific studies that analyze the rules and their modification as pedagogical variables (Weidner, 1998).

Previous studies justify the need to assess whether the objective for which a rule is modified is actually fulfilled before the objective is definitively established (Nevill *et al*., 2008). In basketball, D'Silva *et al*. (1988) analyzed the impact of the inclusion of a three-point line on the shot in the National Championship at Calcutta. The results demonstrated that the standard shot was the most suitable for making a three-point field goal and increased the number of successful three-point field goals by the shortest players, although the shots that were close to the hoop were still the most predominant. Romanowich *et al*. (2007) studied the effect of first bringing the three-point line nearer the basket and later distancing the line in the National Basketball Association (NBA). The conclusions indicated that when bringing the three-point line nearer to the hoop, the relative frequencies of shot attempts and successful shots were increased. On the other hand, when they again distanced the line, the relative frequency of attempts, but not successful shots, decreased. In youth basketball, Andreasen (1990) analysed the effect of the inclusion of a three-point line on seven teams of 15 to 16 year-old players. The results demonstrated an increase in man-on-man defence, which allows for creating spaces and facilitating the shot from inside positions. The coaches proposed situating the three-point line nearer to the basket, but they did not specify the distance. Adams (1991) evaluated the three-point shots from the basketball team at Mountain View High School in relation to various game statistics. The results indicated that the three-point line seemed to cause the defensive players to organise themselves around this line and increased the use of man-on-man defence.

In mini-basketball, Piñar *et al*. (2002) found that the majority of shots were taken from inside the free throw lane (81%), after analysing the positions and distances during the regular season. From their results, they proposed a three-point line that was similar to the adult line and that was four meters from the hoop in order to increase the number of shots taken outside of the free throw lane, the free spaces close to the hoop and the variability of the shots taken. As far as it is known, only two studies about modifications in the mini-basketball regulations have been done in the context of competition. Piñar (2005) modified a series of rules during two championships, among which was the inclusion of a three-point line four meters from the hoop, which was similar to the adult three-point line. The purpose of Piñar's study was to increase the number of ball possessions that end in a shot, the shots from outside of the free throw lane, the lay-ups and hook shots and to offer the opportunity to try to achieve three-point shots. The results demonstrated a 17% increase in the number of successful shots, a 3.5% increase in the standard and hook shots, a 13.7% increase in ball possessions in which the ball was shot from outside the free throw lane and a 9.6% increase in ball possessions in which the ball was shot from a distance greater than four meters. However, as various modifications were included (size of the court, free throw line, player participation time and number of players taking part), it could not be determined whether the results were a consequence of the inclusion of the three-point line only, or if other modifications affected

these results. Arias *et al*. (2009) compared the two three-point lines that are studied in the current study during two championships. The results demonstrated that there was an increase in points scored, number of players taking part in the ball possession, number of passes and number of 1-on-1 situations when players utilised the three-point line delimited by the free throw lane. Although these variables would appear to be unaffected by the modification of the three-point line, the results were due to the fact that the modification affects the game dynamics. This is an effect of the interaction between the rule change and the game actions (Parlebas, 2001). However, the study of Arias *et al*. (2009) did not evaluate which of the two models should facilitate the development of situations recommended in the literature for the three-point line: (a) those that end in a shot attempt; (b) those that strengthen the shot from outside of the free throw lane; (c) those that make use of the lay-up and hook shot; and (d) those that increase the number and effectiveness of three-point shots.

The aim of this study was to compare the three-point line delimited by the free throw lane and the three-point line delimited by a rectangular area to analyze which of the two three-point

line designs allows for a higher frequency of ball possessions that end in a shot, that end in a shot attempt from outside of the free throw lane, that increase the number of lay-up and hook shot attempts and that attain a higher number and effectiveness of three-point shots. The hypothesis is that with the three-point line delimited by the free throw lane, there could be a greater frequency of shot attempts from outside the free throw lane as well as three-point shot attempts and successful three-point shots, as the free throw lane is smaller than the rectangular area. The authors did not hypothesise about which three-point line would obtain a greater frequency of ball possessions that end in a shot attempt and with which there would be more lay-up and hook shot attempts, as there are no previous studies that have analysed these relationships.

METHOD

Participants

The participants of the study consisted of female players (N=67) with an average age of 10.39 years (SD=0.67) from six mini-basketball teams that played in an official competition within their province during the 2006-2007 season. The players had been competing in their sport for 2.11 (SD=0.77) years and they played 3.5 (SD=0.55) days per week for a total of 5.33 (SD=1.35) hours. The players participated in two championships. In each championship there was a total of nine games, with each team competing in three games. The sample consisted of 3,311 ball possessions, 1,642 ball possessions from the first championship and 1,669 from the second one. The sample was selected through a total sampling of the actions that took place (Anguera, 2003). The University's Institutional Ethics Review Board approved the study (CEI 22-540). Before carrying out the empirical part of the study, the players' parents and coaches provided informed consent to participate in this study.

Experimental set-up

Ten mini-basketball teams were invited to compete in two championships. From the 10 teams six were selected to participate because they had not previously practiced or competed with a three-point line. Neither the coaches nor the players knew the goal of the study. The coaches

were informed that: (a) they would play in two championships of nine games each (three games per team); (b) there would be 30 days between championships; and (c) in each championship players would use a different three-point line. Further, coaches were asked to: (a) train with the three-point line delimited by the free throw lane (see Figure 1) for four weeks before the first championship; (b) train with the three-point line delimited by the rectangular area (see Figure 1) for four weeks before the second championship; (c) hold a minimum of three one-hour practices each week; (d) remind players at the beginning of each practice that the shot attempts from behind the three-point line are worth three points; (e) continue working on the same content in each practice session and not include specific exercises to work on three-point shots; and (f) assure that the same players participated in the two championships. The principal researcher informed the coaches about the characteristics of the two championships (see Table 1) two months before the first championship. Successful shots outside zone A were worth three points in the first championship and shots outside zones A and B were worth three points in the second championship. The lane consisted of a trapezoid with a 6 meter base that runs along the baseline, a 3.6 meter free throw line at the opposite end and sides that measured 5.80 meters. The rectangular area measured 8 meters long by 4 meters wide.

TABLE 1: **CHARACTERISTICS OF THE CHAMPIONSHIPS**

System of competition	
Participating players	

Aspect	Characteristics
- Teams were divided into two groups of three teams each. Within each group, all teams played each other and a classification was determined. Finally, teams played against the other group according to their classification (1st vs. 1st, 2nd vs. 2nd, 3rd vs. 3rd). - The match-ups were the same in the two championships. - Man-on-man defense was required. - This took place in one day, from 9AM to 6PM. - The same players had to participate in the two championships. - Teams were composed of 8-12 players. - Five players on the court at a time.	
Age of players	- Between 9 and 11 years.
Duration of games	- Six periods of 8 minutes.
Rest time per game	- One minute between periods. - Five minutes between the 3rd and 4th periods.
Rest time between games	- Ten minutes.
Court dimensions	- 28 × 15 m.
Court placement	- Within the same gymnasium.
Game ball size	- Weight: 470-500 g., Circumference: 69-71 cm.
Basket height	- 2.60 m.
Referees	- Four.
External factors	- Public in the stands.

Design and procedure

Observational methodology, which is accepted as an empirical methodology for the performance sciences (Anguera & Blanco, 2003) was used through a follow-up, idiographic, multidimensional design type (Anguera, 2003).

Preparation of the observation instrument. The authors used a category system as the observation instrument (Anguera & Blanco, 2003). The process of elaborating the category system consisted of three steps. In the first step, an expert group of coaches and the researchers determined the variables to be studied following the empirical inductive strategy affected by the lack of theoretical constructs and the multidimensional character of the action (Gorospe *et al.*, 2005). In the second step, an operational definition of each variable and its categories was distinguished. This system took shape during the observer training phase. The category system was exhaustive and mutually exclusive. The categories were coded using a numeric system to facilitate its register. The category system was formed by the following variables and categories:

1. Manner of ending the ball possession: the action with which players stopped controlling the ball was registered. Adapting the categories cited by Piñar (2005) and the conditions of the shot clock, the following categories were established: (a) shot; (b) turnover; (c) steals and interceptions; (d) defensive error; and (e) referee's decision.

2. Shooting zone: the area where shots were executed in each ball possession was registered. From Piñar (2005) and Arias *et al.* (2009), the following categories were established (see Figure 1): (a) zone A; (b) zone B; and (c) zone C.

3. Type of shot: the shooting technique used in each ball possession was registered. From Piñar (2005), the following categories were established: (a) standard shot; (b) lay-up; and (c) hook shot.

4. Three-point shooting performance: the number of three-point shot attempts and the number of successful three-point shots were registered in each ball possession. The following categories were established: (a) number of three-point shot attempts; and (b) number of successful three-point shots.

Filming. Nine games were recorded within each championship with two video cameras (JVC, Everio Full HD-GZ-HD7), each one situated transversely to one of the two mini-basketball courts. The cameras were placed at a height of five meters. The recording focused on the player with the ball and the basketball hoop, while also including as much of the rest of the court as possible in the image. The three-point lines of each court were measured and put into

place with 200 m of adhesive tape the night before each championship.

Preparation of the register instrument, the training manual and the instruction manual for the observers. The register instrument (Anguera & Blanco, 2003) was created from the adaptation of a Microsoft Excel 2003 worksheet (Microsoft Corporation, United States of America) to which a tool to capture and process the videos was added (Virtual Dub, v. 1.7.0.). This instrument allowed the observers to register the number corresponding to each category in the Excel sheet while likewise viewing the recording at a speed of 25 frames per second. This instrument fostered correct transcription of the data (Castellano *et al*., 2008). To guide the observers' training process, the researchers created a training manual that described: (a) the objective of the training process; (b) basic concepts of observational methodology; (c) the stages to follow in the training process; and (d) the structure of the training sessions. An instruction manual for the observers was also created, which consisted

of: (a) the category system; (b) the coding of the categories; and (c) the process for completing the register instrument.

Observer training and obtaining the register's reliability. Four observers were trained for at least 40 hours, following the training and coaching stages suggested by Anguera (2003). Observers' performance was evaluated through reliability when compared to an expert observer. The expert observer had more than 100 hours logged in the registering of game actions as well as intra-observer reliability values between .98 and 1. To measure the reliability, the observers and the expert individually observed an 18-minute fragment of an additional game. The data they recorded were compared and the reliability was calculated utilizing the Kappa's concordance coefficient, reaching values between .90 and .98.

Data collection. Data were collected via systematic registration (Anguera & Blanco, 2003) through observation of the recorded games. Each ball possession was considered a unit of analysis. To increase the observation reliability, the protocol of observing each ball possession four times at real time was used. Each time one of the criteria to analyse was focused on. Once the corresponding category to each criterion was located, the observers again viewed the ball possession at 25 frames per second as many times as necessary to identify whether it fulfilled the key aspects that determined each category. In each observation of a ball possession, observers registered the numerical code corresponding to each criterion on which an observation was focused. Once this process was finished, the protocol was repeated with all the ball possessions.

Statistical analysis

Data were collected through a register instrument to capture, file and later treat them statistically with the Statistical Package for Social Sciences (SPSS) v.13.0. for Windows. Descriptive analyses were performed for each variable, calculating frequencies and percentages. The normality of the data through the Kolmogorov-Smirnov test was examined and according to this test the data were non-parametric. The Mann-Whitney U Test was used to determine if there were significant differences among the averages of the compared variables according to the two three-point line designs. Significance was set at $p < 0.05$.

RESULTS

As shown in Table 2, statistically significant differences between the two championships were found for ball possessions that ended in a shot (U=1280785, Z=-3.827, p=.000) and those that ended with a defensive error (U=1339674.5, Z=-2.416, p=.016). A higher percentage of ball possessions ended in shots during the first championship (62.9% vs. 56.3%), while a higher percentage of ball possessions ended with a defensive error during the second championship (6.5% vs. 8.7%). Statistically significant differences were not found for ball possessions that ended in a turnover (U=1356561, Z=-.715, p=.474), a steal or interception (U=1342866.5, Z=-1.851, p=.064), or a referee's decision (U=1352430, Z=-2.851, p=.061). Statistically significant differences were found between the two championships for ball possessions in which there was a shot attempt from zones A (U=1286321, Z=-3.531, p=.000) and C (U=1356614, Z=-2.182, p=.029). During the first championship, a higher percentage of ball possessions ended with a shot attempt from zones

A (56.4% vs. 50.3%) and C (2.3% vs. 1.3%). No statistically significant differences were found for shot attempts from zone B (U=1361329, Z=-.900, p=.368). Statistically significant differences were found between the two championships for ball possessions in which there was a standard shot attempt (U=1294771, Z=-3.269, p=.001) or a hook shot attempt (U=1358526, Z=-3.176, p=.001). During the first championship, there was a higher percentage of ball possessions in which a standard shot (40.5% vs. 35%) or a hook shot (1% vs. 0.2%) was attempted. There were statistically significant differences between the two championships for ball possessions in which there was a three-point field goal attempt (U=1314902, Z=-6.600, p=.000), as well as a successful three-point field goal (U=1355201, Z=-3.888, p=.000). In the first championship, there was a higher percentage of ball possessions in which there was a three-point field goal attempt (6.4% vs. 1.3%) and a successful three-point field goal (1.2% vs. 0.1%).

TABLE 2: **FREQUENCIES, PERCENTAGES AND SIGNIFICANT DIFFERENCES OF THE MEANS OF THE COMPARED VARIABLES ACCORDING TO THE TWO THREE-POINT LINE DESIGN**

Variables	Categories	Championship			
		First: free throw lane		Second: rectangular area	
		n	%	n	%
Manner of ending the ball possession	Shot.***	1032	62.9	941	56.3
	Turnover.	324	19.7	346	20.7
	Steal or interception.	161	9.8	196	11.8
	Defensive error.**	107	6.5	146	8.7
	Referee's decision.	018	1.1	40	2.4
Shooting zone	Zone A.***	926	56.4	838	50.3
	Zone B.	069	4.2	81	4.9
	Zone C.*	037	2.3	22	1.3
Type of shot	Standard.***	665	40.5	584	35
	Lay-up.	350	21.3	354	21.2
	Hook.***	017	1	3	0.2
Three-point shooting performance	Three-point shot attempts.***	106	6.4	22	1.3
	Successful three-point shots.***	020	1.2	2	0.1

Note. *($p < .05$); **($p \leq .01$); ***($p \leq .001$)

DISCUSSION

The aim of this study was to compare the three-point line delimited by the free throw lane and the three-point line delimited by a rectangular area to analyse which of the two three-point line designs allows for a higher frequency of ball possessions that end in a shot, that end in a shot attempt from outside of the free throw lane, that increase the number of lay-up and hook shot attempts and that attain a higher number and effectiveness of three-point shots. The percentage of ball possessions that ended in a shot attempt, in a shot attempt from zone A or C, a standard or hook shot and both three-point field goal attempts and successful three-point field goals increased when participants used the three-point line delimited by the free throw lane. The frequency of shot attempts from outside the free throw lane and of lay-ups was not different between the two designs that were studied. This demonstrates that the three-point

line with which participants played in the first championship better facilitated the playing and enjoyment of the youth participants in accordance with their capabilities (Piñar *et al.*, 2002/ 2003; Piñar, 2005; Arias *et al.*, 2009), which according to the literature should foster an increase in the perceived competence (Hassandra *et al.*, 2003) in fun and enjoyment (MacPhail *et al.*, 2008) and in self-efficacy (Bandura, 1977; Chase *et al.*, 1994). The predominance of these motives should allow for greater adherence to mini-basketball specifically and to sport participation in general (Hassandra *et al.*, 2003; Weiss & Williams, 2004; Xiang *et al.*, 2004).

The primary goal of a mini-basketball game is to score or make baskets as with other team ball sports. This does not mean that the other motor skills are not necessary, but rather that the other motor skills are done to facilitate making baskets. Therefore, the shot should be the motor skill that finishes most ball possessions in mini-basketball (Piñar, 2005). In the first championship, 6.6% more ball possessions ended in a shot. This situation is ideal in mini-basketball because the shot is one of the most motivating motor actions (Prusak, 1997; Vollmer & Bourret, 2000; Palao *et al*., 2008). The data with regard to ball possessions that end in shots from the current study were higher than those found by Piñar (2005) in girls' mini-basketball. Piñar (2005) found that 24.1% of the possessions in 5-on-5 ended in a shot compared to 29.1% in 3-on-3. Also, 2.2% more ball possessions ended with a defensive error (violation and personal foul) in the second championship. In general, 5.2% more ball possessions ended in a negative action (turnover, steal/interception, or defensive error) in the second championship. The players ended more possessions with errors in the second championship, which could have been due to the inclusion of a three-point line that is not well-adapted to the development of the players, as inferred in the literature (Piñar, 2005; Arias *et al*., 2009). The fact that the rectangular three-point line was so far from the hoop and the organisation that teams adopt in offense and defence, in relation to the three-point line, seemed to produce an adverse effect on the actions of the players. Nonetheless, this result requires future study to discover whether the inclusion of a three-point line affects the spatial perception of offense and defence.

According to Miller and Bartlett (1996) and Liu and Burton (1999), shooting distance is the first factor that affects shooting accuracy and form. The analysis of the shooting distance contributes useful information for improving youth development. In accordance with Liu and Burton (1999), it is necessary to know the critical distance to the hoop where the number of shots, the precision and the form are affected or impaired. The number of shot attempts from zone A was higher in the first championship. This could be due to a placement of the defence, such that it permitted more space inside the free throw lane (D´Silva *et al*., 1988; Andreasen, 1990; Adams, 1991; Piñar, 2005; Arias *et al*., 2009). D'Silva *et al*. (1988) argue that in spite of the increase in the three-point shots, the shots closer to the hoop still predominated after the inclusion of the three-point line. The shots that are close to the hoop predominate because of their greater effectiveness in basketball (Tsitskaris *et al*., 2002; Tavares & Gomes, 2003; Mexas *et al*., 2005). The number of shots attempted from outside the free throw lane was similar in the two championships. The number of shot attempts was similar from zone B and greater from zone C in the first championship. This result could be surprising because the value of the shots from zones B and C in the first championship was three points and in the second championship only the shots from zone C had a value of three points; thus, it seems logical that there should have been an increase in the number of shots from zone B in the first

championship, since it was closer to the hoop. From the results of a study by Adams (1991), it was found that defenders seemed to organise themselves around this line. This result seems to be related to the placement of the offense and defence in zone B in the first championship, which would limit the shots from this zone. In the second championship, the offensive and defensive organisation in zone C would have predominated, which would have reduced the number of shots from this zone. However, this should be tested in future studies by analysing the placement of the offense and defence and asking those on offense about their shot decisions. Piñar *et al*. (2002) observed that 81% of shots were attempted from inside the restricted area when playing without a three-point line in boys' mini-basketball. Piñar *et al*. (2003) likewise obtained a value of 69.5% without a three-point line in boys' mini-basketball. For girls' mini-basketball, Piñar (2005) reported that 71.6% of shots were attempted from inside the restricted area for the 5-on-5 modality when playing without a three-point line, compared to 54.7% for the 3-on-3 modality when playing with a three-point line. As confirmed by previous studies when introducing a three-point line, the number of shots attempted from distances greater than the restricted area increase (Piñar, 2005), but in the present study the shot percentages were not as high as reported in the literature. This could be due to the series of modifications introduced by Piñar (2005). It seems that it is necessary to analyse other modifications in the regulations in order to increase the number of shots from outside the free throw lane.

Because of its special importance as a specific motor action with which the rest of the actions and tactical resources are completed and because of its direct relationship with the goal of the

game, it is important to know the kind of shots that player's attempt (Tsitskaris *et al*., 2002; Ibáñez *et al*., 2009). The participants mostly used the standard shot in the first championship. The higher number of standard shots in the first championship was due to the greater number of shot attempts from zones A and C. In zone A, the standard shot increased because the presence of close opponents requires increasing the angle and release height of the ball and this is achieved with the standard jump shot (Rojas *et al*., 2000). The shots from zone C were standard because the increase in the distance with regard to the hoop brings about an increase in the speed of ball release (Elliott, 1992; Miller & Bartlett, 1996). This causes the players with less strength to increase their horizontal displacement in order to generate the necessary speed to allow the ball to reach the hoop (Elliott, 1992; Miller & Bartlett, 1996; Liu & Burton, 1999). D'Silva *et al*. (1988) also found that the standard shot was the shot that was most utilised for attempting three-point field goals. The hook shot was the other type of shot that was most used in the first championship from zone A. In mini-basketball, the hook shot is suggested for positions that are close to the hoop and with defenders that are very close, since it is used to protect the ball. However, it is not utilised much due to the difficulty that its execution involves (Ibáñez *et al*., 2009). Piñar (2005), after including the three-point line, found a 3.5% increase in standard and hook shots. In the present study, the first championship had an increase of 6.3%. The increase in the number of hook shots means that the participants had the opportunity to practice a type of shot that is not used much. The standard shot was the type of shot that was most used, followed by the lay-up and the hook shot in both championships. This shot pattern is common in basketball (Tsitskaris *et al*., 2002; Ibáñez *et al*., 2009). Ibáñez *et al*. (2009) analysed 8,471 shots from the NBA and found that 62.7% were standard shots, 19.1% were lay-ups and 5.9% were hook shots. Tsitskaris *et al*. (2002) found that for shots taken in the Green national leagues, 49.2% were standard shots and 14.4% were lay-ups. However, working on variability of shot type is necessary in youth

basketball (Tsitskaris *et al*., 2002; Piñar, 2005). Variability fosters the learning of a considerable number of types of shots, which contribute to the development of an adaptable cognitive-motor system in this regard (Memmert & Roth, 2007). More analytical studies should allow us to know how the type of shot is modified in regard to the increased distance and zone (frontal or lateral) with regard to the hoop in mini-basketball.

In mini-basketball, the study by Arias *et al*. (2009) analysed the influence of simply including a three-point line on various motor actions during the game. In addition to this study, there are others that demonstrate the importance of including a three-point line with regard to the practice of motor actions that are better adapted to the capabilities of the players during the game (Piñar, 2005; Arias *et al*., 2008). Participants made 6.3% more three-point shot attempts in the first championship. This aspect is especially important as noted by Piñar (2005) and Arias *et al*. (2009) because an increase in the amount of practice can aid in learning and development. Participants made 1.1% more three-point shots in the first championship. This coincides with the fact that a greater number of three-point shot attempts allows for more successful three-point shots (Romanowich *et al*., 2007). Arias *et al*. (2009) also found that the participants achieved a higher percentage of ball possessions in which they made a successful three-point field goal (1.1%) when playing with a three-point line delimited by the free throw lane. Therefore, in the first championship the possibilities to attempt and score a three-point shot were more suitable for the capacities of the players. This would contribute to the increase in the levels of perceived self-efficacy (Bandura, 1977; Chase *et al*., 1994), which likewise reflects on motivation (Bandura, 1977; Chase, 2001). Piñar (2005), when including a three-point line in the 3-on-3 modality that was similar to the adult three-point line, but at four meters from the hoop, found that the girls achieved a successful three-point basket in 4% of the ball possessions for a total of nine baskets. For male players, this happened in 13.9% of possessions, which were a total of 36 baskets. In the present study, when playing with the three-point line delimited by the restricted area, players only made three-point baskets in 1.2% of ball possessions, which comprised 20 baskets. As it is necessary for mini-basketball players to practice shooting from distances greater than that which delimits the restricted area without hurting their precision and form, it is necessary for future studies to assess the optimal distance from the basket to place the three-point line as well as studying other aspects that facilitate successful three-point baskets. Participants took successful three-point shots from zone B, 60% of the time and from zone C, 40% of the time in the first championship. The only two successful three-point shots were attempted from zone C in the second championship. However, if in this championship, shots from zone B had been worth three points, 17 more would have been made. The reduction in the distance from the basket to the

three-point line in the first championship had a favourable effect on the effectiveness of the three-point shot. Given that zone B is between 2.87 and 5.65 meters from the basket, it seemed that the three-point line should be situated between these distances for the participants of this study.

In conclusion, the current study provides evidence of the effect of two three-point line designs on variables that are directly related to the shot, an area in which there is a lack of information. The results demonstrated that when girls play with the three-point line delimited by the free throw lane, there in an increase in the frequency of ball possessions in which the players: (a) finish with a shot attempt; (b) shoot from inside the free throw lane and from a distance of between 4 and 5.65 meters; (c) attempt a standard or hook shot; and (d) attempt

and score a three-point shot. This study confirms the necessity of consulting with analysts before introducing and modifying a rule in sport (Weidner, 1998; Nevill *et al*., 2008). Administrators of youth sport have little data for designing competitions and adapting them to game regulations (Weidner, 1998; Bergeron, 2007). The current study provides useful information as an example of analysis of the regulation modification before its definitive inclusion in athletic competition, especially in youth sport. These results may serve as the basis for studies that analyse physiological and psychological variables as well as variables related to the learning and motor development of the children that play mini-basketball in real game-like situations.

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22

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WAS THE CONCONI TEST VALIDATED BY SPORTING SUCCESS, EXPERT OPINION OR GOOD SCIENCE?

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ABSTRACT

The application of the scientific method in sport demands that regular and standardised testing must be implemented by the coach or scientist to determine whether the intervention, for instance training, has had the desired effect on sporting performance. However, the test administered by the coach or scientist must have been rigorously evaluated for acceptable validity and reliability. Moreover, the judgment as to the validity of a test must not be influenced by the popularisation of a test. Despite scientific evidence to the contrary, a popular incremental field test for endurance athletes (Conconi Test) has been uncritically accepted as valid by some coaches and sport scientists. The Conconi Test is assumed a non-invasive measure of the anaerobic threshold through the identification of a coincident deflection in heart rate. This paper briefly considers the methodology and biological explanation for the Cononic Test. The paper also elaborates on the historical context within which the popular Conconi Test was developed and how factors other than scientific

evidence have led to the popularisation of this test amongst sport scientists and coaches. Users of this test should consider the possibility that at least some part of the accepted validity of the Conconi Test was due to appeals to authority (eminent scientists, prominent athletes, magnitude of the feat, medal counts, records), popularity and coincidental correlation (performance and test result).

Key words: Testing; Validity; Conconi; Anaerobic threshold; Heart rate

INTRODUCTION

The popularisation of invasive and non-invasive means of measuring the anaerobic threshold were strongly influenced by an entrenched theoretical paradigm (Figure 1). This theoretical framework provided the foundation to which all practical applications of anaerobic threshold testing appeal for ultimate justification. A competing theoretical framework, using a complex systems-based approach, has been suggested as a viable alternative to the anaerobic threshold model (St. Clair Gibson & Noakes, 2004). It is the contention of this paper that the historical backdrop against which non-invasive measures of the anaerobic threshold such as heart rate deflection (HR_D) (Conconi *et al.,* 1982; Conconi *et al.,* 1996) were developed, must be considered. Arguably, the historical context within which this method was developed and implemented, served to popularise, and to some degree, validate the method. Consequently, this paper will attempt to briefly trace the scientific evidence and historical factors, which have led to the popularisation of a field-based method to estimate the anaerobic threshold, specifically the use of HR_D.

THE CONCONI TEST: DETERMINING THE ANAEROBIC THRESHOLD BY NON-INVASIVE MEANS

The influence and acceptance of anaerobic threshold testing by not only athletes and coaches, but also sport scientists, was likely extended and entrenched even further by the work of Italian sport scientist and medical doctor Professor Francesco Conconi who developed the popular Conconi Test (Conconi *et al.,* 1982; Janssen, 1987; Edwards, 1994; Conconi *et al.,* 1996; Sleamaker & Browning, 1996). This test is based on the premise that a HR_D obtained during an incremental exercise test could be used to non-invasively estimate the anaerobic threshold (Figure 1 and Figure 2). In fact, the Conconi Test has been described as *"the bloodless method of establishing the deflection point"* (Janssen 1987: 20). Similar statements have been made by other sport scientists (Edwards, 1994; Sleamaker & Browning, 1996). The suggestion that heart rate can be used to identify blood lactate thresholds has also led sport scientists to produce lactate–pulse rate curves (Janssen, 1987).

Prior to wrist-mounted heart rate monitors sport scientists and coaches collected heart rate data either through cumbersome data loggers, laboratory-based electrocardiograms or manually (Montoye *et al.,* 1996). The Conconi Test required portable technology that would measure and record heart rate continuously during the incremental test. Such equipment was available for researchers, but was neither designed nor marketed with the athlete or coach in mind (Rodahl *et al.,* 1974; Conconi, 1991). The introduction of accurate wrist-mounted heart rate monitors in 1983, due to advances in microchip technology (Laukkanen & Virtanen, 1998), was arguably an important contributing factor in the growth of the popularity of the Conconi Test. Furthermore, this new generation of portable, wireless heart rate monitors was designed and marketed with the sporting and research communities in mind (Edwards 1994; Laukkanen & Virtanen, 1998). Notably, the Conconi Test has been included in popular commercial heart rate analysis software (Polar Heart Rate Analysis SW, 1992; Polar ProTrainer, 2010) and software which accompanies computer-interfaced wind load trainers for cyclists (Elite, 2010).

The validity of the Conconi Test was not evaluated by well-designed experimental work, but rather on the basis of initial positive studies from principally one laboratory (Conconi *et al.,* 1982; Droghetti *et al.,* 1985; Cellini *et al.,* 1986; Conconi *et al.,* 1988). Subsequently, the underlying methodology and biologic plausibility of the Conconi Test have been questioned (Leger & Tokmakidis, 1988; Van Handel *et al.,* 1988; Jeukendrup *et al.,* 1997). Furthermore, the accomplishments of Italian cyclists during the 1980's, notably the establishment of new sea level and altitude records for the individual hour ride and the Olympic gold medal for the 100 km team time trial, are promoted as examples of the success and validity of the Conconi

Test (Janssen, 1987; Edwards, 1994; Sleamaker & Browning, 1996).

Proponents of the Conconi Test have asserted that the training programmes of successful elite athletes have been devised around the results of the Conconi Test (Edwards, 1994; Sleamaker & Browning, 1996). Hence, a causal link between the use of the Conconi Test and athletic success is strongly implied. For instance, Edwards (1994: 115) states that:

> "Using this test, Conconi devised a training program using periodic workouts at heart rates close to the threshold for Francesco Moser …. Conconi used anaerobic

> threshold training as the cornerstone of Moser's special training program and the result astonished the cycling community as Moser broke the World Hour Record twice ….".

Validity of the Conconi Test on the basis of scientific evidence

The Conconi Test is controversial (Bodner & Rhodes, 2000) with enthusiastic proponents (Janssen, 1987; Edwards, 1994; Sleamaker & Browning, 1996) and outspoken critics (Van Handel *et al.*, 1988; Burke, 1995; Jeukendrup *et al.*, 1997). Proponents of the test argue that i) the test is non-invasive, easy to administer, not costly, highly specific and can be incorporated as a field test into the athletes training programme, ii) HR_D coincides with the anaerobic threshold (r=0.84 to r=0.99), iii) HR_D is reliable (r=0.99), iv) HR_D correlates with endurance performance (r=0.80 to r=0.99) and v) HR_D defines an exercise intensity that can be maintained for prolonged periods (Conconi *et al.*, 1982; Droghetti *et al.*, 1985; Cellini *et al.*, 1986; Janssen 1987; Argentieri *et al.*, 1988; Conconi *et al.*, 1988; Edwards, 1994; Sleamaker & Browning, 1996; Grazzi *et al.*, 1999/2008; Gripp *et al.*, 2009).

Since the first paper by Conconi *et al.* (1982), evidence has been accumulating disputing the methodology and the proposed underlying physiological mechanism of the Conconi Test. First, the blood lactate data that was presented by Conconi *et al.* (1982) was not collected at the same time as the heart rate data and used a different and more prolonged protocol with recovery between bouts. Furthermore, the blood lactate protocol consisted of three speeds chosen below and three speeds above the velocity at which HR_D occurred. Surprisingly, heart rate data obtained during the blood lactate trials were not reported and blood lactate data was collected in a small sample of the subjects (Conconi *et al.*, 1982; Leger & Tokmakidis, 1988; Tokmakidis & Leger, 1989). Consequently, this protocol would have substantially increased the likelihood of a significant, positive association between HR_D and the blood lactate threshold and would explain the unusually high correlation coefficients for biological data reported by Conconi and associates (Leger & Tokmakidis, 1988; Tokmakidis & Leger, 1989). It is also surprising that results from Conconi's laboratory always indentify HR_D in athletes (Conconi *et al.*, 1982; Droghetti *et al.*, 1985; Cellini *et al.*, 1986; Conconi *et al.*, 1988; Grazzi *et al.*, 2008). However, high correlation coefficients between HR_D and anaerobic threshold and performance indices do not imply a cause-effect relationship (Lucia *et al.*, 1999).

Secondly, in response to criticism of the original constant stage length protocol (Conconi *et al.*, 1982), the protocol was modified to constant stage durations (30 seconds) (Conconi *et al.*, 1996). Despite the modification, Pokan *et al.* (1999) concluded that the HR_D was still strongly dependent on the incremental test protocol. Furthermore, steady state heart rates will likely not be attained at higher speeds, increasing the possibility of detecting HR_D (Achten & Jeukendrup, 2003).

Thirdly, to date Conconi and associates have not presented an investigation that specifically tests the metabolic hypothesis forwarded to explain the HR_D (Lucia *et al.*, 1999). Studies have shown evidence for non-metabolic explanations of the HR_D (Hofmann *et al.*, 1994b; Lucia *et al.*, 1999/2002; Hofmann *et al.*, 2005; Lepretre *et al.*, 2005). Interestingly, Ozcelik and Kelestimur (2004) tested a core assumption of the Conconi Test by having eight subjects breathe room air and a 12% O_2 gas mixture during two incremental tests. The investigators

reported that the HR_D did not occur in all subjects during the hypoxia trial, the HR_D did not coincide with the anaerobic threshold in any subjects and when the HR_D occurred it was at higher workloads than the anaerobic threshold.

Additional criticisms of the test are that:

- the heart rate response to incremental exercise varies in shape between individuals to include linear and sigmoidal patterns (Hofmann *et al.*, 2005),
- a HR_D is not always identifiable (Jones & Doust, 1997; Carey *et al.*, 2002) or is totally absent (Kuipers *et al.*, 1988),
- the HR_D is not reliable (Jones & Doust, 1995),
- there is no physiological rationale for linking the sudden increase in ventilation and blood lactate concentrations with a plateau in the heart rate (Bourgois *et al.*, 2004),
- the HR_D is an artifact of the protocol (Leger & Tokmakidis, 1988; Tokmakidis & Leger, 1989/1992; Jeukendrup *et al.*, 1997; Achten & Jeukendrup, 2003),
- there is a dissociation between the HR_D and the anaerobic threshold (Tokmakidis & Leger, 1992; Jones & Doust, 1997; Vachon *et al.*, 1999; Bourgois *et al.*, 2004),
- in those subjects where HR_D does occur it can manifest at work rates well above a true lactate turnpoint, increasing the likelihood of over-training (Jones & Doust, 1997; Vachon *et al.*, 1999; Bourgois *et al.*, 2004),
- there are significant differences within and between observers when selecting the HR_D (Carey *et al.*, 2002),
- there are significant differences between visual and computer generated HR_D (Carey *et al.*, 2002),
- careful laboratory work suggests that to obtain reproducible HR_D may require precisely controlled, progressive work output and computerised analysis of heart rate response which negates the supposed ease with which results can be obtained during field trials (Hofmann *et al.*, 1994a),
- the HR_D should not be confused with representing an anaerobic threshold, but rather as a quantification of exercise intensity (Brooks *et al.*, 1996),
- endurance performance is predicted accurately with other methodologies and indices, which use the same data but do not rely on HR_D assumptions (Tokmakidis & Leger, 1992; Petit *et al.*, 1997).

Validity of the Conconi Test based on two athletic achievements

World one-hour cycling record

Proponents of the Conconi Test often cite the performance of Italian professional cyclist Francesco Moser, who successfully improved the prestigious world one-hour cycling record during the period 1984 to 1988 (Wikimedia Foundation, 2010), set 12 years earlier by the legendary Belgian cyclist Eddy Merckx, as evidence for the validity of the Conconi Test (Janssen, 1987; Edwards, 1994; Sleamaker & Browning, 1996). In his first attempt on 19 January 1984 at the Mexico City Sports Center, Mexico, Moser broke the magical barrier of 50 $km.h^{-1}$ and raised the bar to 50.808 $km.h^{-1}$. Four days later, at the same venue, Moser raised the mark even further to 51.151 $km.h^{-1}$ (Peronnet *et al.*, 1991). By 1988, Moser had

made three more successful attempts at the record, establishing records for both altitude and sea level events (Peronnet *et al.*, 1991).

Importantly, Conconi had made extensive use of his heart rate-based test in the training and preparation of Moser for his world record attempts (Conconi, 1991). Interestingly, Conconi reports that during his training of Moser for the hour attempts, Moser's speed at HR_D and actual race pace dissociated. Consequently, prior to Moser's successful attempt at the Stuttgart velodrome in 1988, the measure for his readiness was not the result of the Conconi Test, but rather a 30 minute time trial (Conconi, 1991). In fact, a week prior to the failed attempt at Moscow in 1987, the Conconi Test that was performed revealed nothing untoward and the anaerobic threshold was high according to Conconi (1991). However, while completing his last high intensity training session (3 x 10 km @ 50 $km.h^{-1}$) four days before the Moscow attempt, Conconi (1991: 28) noted that *"even though he managed to ride at 50*

kph, it cost him more than it should have". Cleary, Moser was showing signs of overtraining from his road training and racing, yet the Conconi Test was not able to detect it. Prior to the first successful Mexico attempt in 1984, Moser completed a 3 x 10 km @ 50 $km.h^{-1}$ with ease and Conconi judged Moser to be *"in excellent physical condition"* (Conconi, 1991: 9). Contrary then to the assertion of proponents of the Conconi Test (Janssen, 1987; Edwards, 1994; Sleamaker & Browning, 1996), it was likely that the feedback from steady state trials provided more valuable information than the Conconi Test. Indeed, there is good evidence for the validity and reliability of steady state protocols (Brooks *et al.,* 1996; McGehee *et al.,* 2005; Vobejda *et al.,* 2006).

Some sport scientists readily acknowledge Conconi's involvement in the training of Moser (Janssen, 1987; Edwards, 1994). However, they do not fully appreciate that Moser was the first of the modern-era cyclists who significantly reduced aerodynamic drag for his six one-hour record attempts through attention to altitude, riding position, clothing and bicycle design (Conconi, 1991; Peronnet *et al.,* 1991). It was also the first recorded case in the history of the hour ride that used blood boosting (transfusional polycythaemia) (Armstrong & Reilly, 1996; Sawka *et al.,* 1996; Leigh-Smith, 2004; Waddington & Smith, 2009).

Only more recently (2000 to 2005) did modern era cyclists using standard bicycles under the new International Cycling Union (UCI) rules and at sea level, better the 1972 altitude record and the 1967 sea level record (UCI, 2009). The more recent sea level rides of Chris Boardman and Ondřej Sosenka and Merckx's 1972 altitude ride amounted to an approximate 3% improvement over Bracke's 1967 sea level attempt. In contrast, Moser's 1984 altitude ride was 6% better than Bracke's 1967 ride. Clearly, some extraordinary measures must have been employed during Moser's 1984 attempts to improve the world hour cycling by an astounding 3 058 m - altitude, specialised clothing and bicycle equipment and artificial manipulation of physiological parameters.

Moser's use of mechanical means to reduce air resistance and physiological means to increase his skeletal muscle power output are considered ergogenic aids (Williams, 1989), both of which were legal at that time although it could be argued were against the ethical intent and spirit of the rules. Not surprisingly, Merckx who had beaten Moser in every time trial they had ever met in and used standard road equipment and clothing for his 1972 hour ride, is quoted as saying of Moser's successful 1984 hour attempt that *"for the first time in*

the history of the hour record, a weaker man has beaten a stronger man" (Mulholland, 1991: 81).

Mechanical ergogenic factors

Although some would argue that Moser's achievement was the result of superior testing and training techniques (Edwards, 1994), Peronnet *et al.* (1991) demonstrated quite elegantly that between 1967 and 1988 the improvements in the world one-hour cycling record, with the assistance of altitude and/or aerodynamic improvements of the rider-bicycle system, were not inherently better than the mark of 48.093 $km.h^{-1}$ set in 1967 at sea level using a standard road racing bicycle. In other words, the increase in speed of 3.058 $km.h^{-1}$ between 1967 and 1988 was due to aerodynamic improvements and not because of superior athletes. The effect of aerodynamic refinements is also demonstrated by Moser's most recent and final attempt on 15 January 1994 in Mexico City, aged 42 years, under the guidance of Conconi (Wikimedia Foundation, 2010). Moser rode using the now UCI-outlawed Obree praying mantis riding position and exceeded his distance of 51.151 km set 10 years earlier by 689 meters, earning him the UCI veterans record for the hour ride.

More recent work from an independent group has extended the Peronnet *et al.* (1996) analysis to include successful hour attempts up to 1996 and used more accurate and directly obtained data to develop a mathematical model (Bassett *et al.,* 1999). This study has confirmed the dominant effect of aerodynamics (60%) on the increase in the hour record, compared with 40% due to physiological factors (Bassett *et al.,* 1999). Moreover, Moser's attempts were not inherently better than Merckx's 1972 ride. Although Moser trained specifically for the hour event more so than his predecessors did (Conconi, 1991), his hour performances were due principally to altitude and aerodynamics. The more recent rides of Boardman, Rominger and Indurain have been due to increases in power output not aerodynamic improvements because since Graham Obree's 1993 ride, positions and equipment have not materially changed. By

adjusting all hour records since 1967 to sea level and using Chris Boardman's 1996 aero-equipment and position, Merckx would have achieved the fifth best distance ever, with Moser the seventh (Bassett *et al.,* 1999).

Physiological ergogenic factors

Another factor that played a significant role in Moser's achievements, was his self-confessed use of blood doping under the direction of Conconi and others (Leigh-Smith, 2004; Waddington & Smith, 2009). Twelve years prior to Moser's confession, it was alleged that accompanying Moser was *"an entourage of two cardiologists and eight men, 18 to 20 years of age, who were chosen several months before because of their blood type compatibility with Moser"* (Brien & Simon, 1987: 2761). Blood doping, declared illegal in 1985 by the IOC (Armstrong & Reilly, 1996), has been shown to significantly improve endurance performance (Sawka *et al.,* 1996; Leigh-Smith, 2004). Furthermore, all attempts at the hour record have taken place at altitudes <2 500 m above sea level (Peronnet *et al.,* 1991), such that blood doping would have had an ergogenic effect. Interestingly, none of this is mentioned in Conconi's book wherein he details the preparation of Moser for the hour attempts (Conconi, 1991). Over the period 1997 to 2004 Conconi and Ferrari, co-authors of the original paper (Conconi *et al.,* 1982) and both medical doctors who were involved in preparing Moser for his hour rides (Conconi, 1991), were implicated in doping offences related to erythropoietin

(EPO) and subsequently charged (Hoberman, 2001/2002; Waddington & Smith, 2009). However, because of the statute of limitations, Conconi and Ferrari were acquitted of all charges (Waddington & Smith, 2009). Notably, the presiding judge concluded that Conconi and associates were fully aware of the use of EPO by athletes and actively engaged in providing support to optimize EPO usage (Waddington & Smith, 2009).

Donati, leading anti-doping advocate spearheaded the investigation into doping in Italian sport and scathingly alleged that:

> "…. it was under the pretext of administering the Conconi test, which I've scientifically proven to be useless, that he was able to practise blood doping [i.e. the original red cell augmentation technique] on my athletes. But the world of sport is a stupid and imbecile one and that's why Conconi and others have been able to rampage about with impunity" (Cycling News, 1997).

Hoberman (2001: 252) offers another insight into the involvement of Conconi in the doping of athletes:

> "It is also possible that he is one of the well-situated amoralists of the elite sport world who move easily back and forth across the line that separates 'legitimate' from 'illegitimate' sports medicine. Indeed, Conconi's career at the cutting edge of high-performance sports medicine may well have encouraged in him a keen, relativist and cynical view of the often subtle differences between the natural and the artificial, between nutrients and stimulants. His insights into the arbitrary nature of these classifications may have led him to conclude that such distinctions make no sense at all".

One hundred kilometer cycling team time trial

The second impressive achievement by Italian cyclists, referred to by proponents of the Conconi Test to justify its use, was the foursome Bartalini, Giovannetti, Poli and Vandelli that set world and Olympic records on their way to winning the 1984 Olympic 100 km road team time trial gold medal (Sleamaker & Browning, 1996). The Italian team was also the first since 1960 to break the 50 $km.h^{-1}$ mark (50.6 $km.h^{-1}$) over 100 km. These athletes reportedly also used the Conconi Test to prepare for their Olympic performance (Sleamaker & Browning, 1996). To make their feat even more impressive was the fact that former Union of the Soviet Socialist Republic (USSR) teams had won the previous three Olympic 100 km team time trials (1972 to 1980) (*Athletics Weekly*, 2008).

However, this feat must be placed within its proper historical context. Firstly, from 1972 to 1992 the former USSR and Eastern Bloc countries dominated the event, winning 9 of the 18

medals (4 gold, 4 silver, 1 bronze), in comparison to 1 bronze medal in the period 1960 to 1968 (*Athletics Weekly*, 2008). Secondly, apart from the 1984 gold, Italy had won the event only once before 1960. Thirdly, the former USSR and East European countries boycotted the 1984 Los Angeles Games in retaliation for the American boycott of the 1980 Moscow Games. Fourthly, upon their return, the former Eastern Bloc countries once again won gold

29

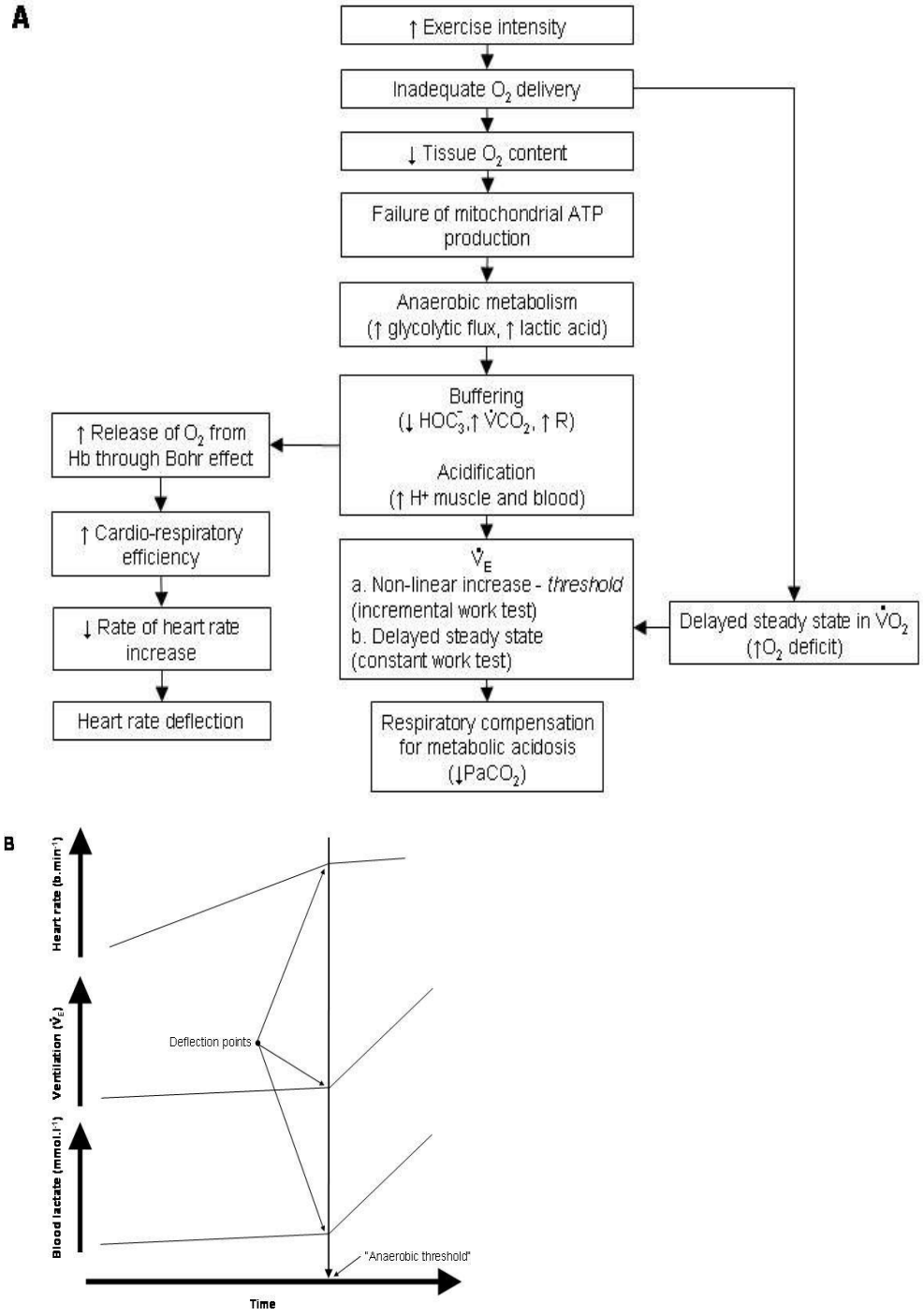

FIGURE 1: **DIAGRAMMATIC REPRESENTATION OF THE THEORETICAL PARADIGM UNDERLYING THE ANAEROBIC THRESHOLD**

30

and silver in 1988 and a unified German team triumphed in 1992 with Italy in the second place. Fifthly, on their return, the German Democratic Republic (formerly East Germany) team achieved the best time ever for the event in 1988 (50.9 $km.h^{-1}$) (*Athletics Weekly*, 2008).

Seen against this backdrop, Italy's triumph in 1984 was against current trends and probably due more to the effects of the Cold War than the purported efficacy of the Conconi Test. Moreover, the 1984 Los Angeles Games was a watershed in terms of blood doping, such that up to that point many athletes, including Italian runners and cyclists, were employing this performance enhancing technique (Armstrong & Reilly, 1996). However, the author is not aware of any statement implicating the 1984 Italian 100 km time trial team in blood doping.

The Hill-Meyerhof-Wasserman hypothesis suggests that increasing work rate results in a threshold at which the oxygen demand of the active skeletal muscle is greater than the oxygen supply to the mitochondria, resulting in a greater reliance on anaerobic metabolism, which culminates in changes in blood lactate concentration and gas exchange variables (Wasserman *et al.,* 1973; Noakes, 1988; Conconi *et al.,* 1996). The Conconi hypothesis builds on the Hill-Meyerhof-Wasserman hypothesis, suggesting that the heart rate deflection is linked to the increasing glycolytic flux (A). The Hill-Meyerhof-Wasserman-Conconi hypothesis predicts that blood lactate, ventilator and heart rate thresholds or deflections coincide (B).

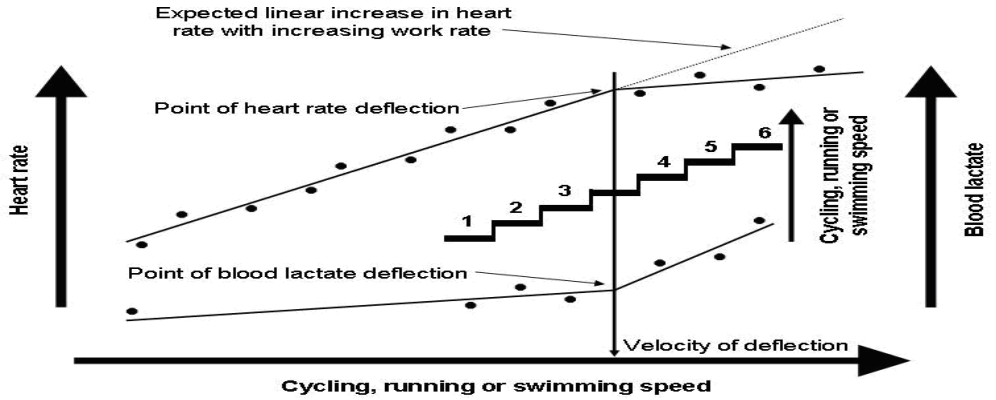

FIGURE 2: **DIAGRAMMATIC REPRESENTATION OF THE CONCONI TEST**

The Conconi Test is dependent on a deflection in the heart rate–work rate relationship away from the expected linear increase in heart rate. The testing protocol requires a progressive, regular increase in work rate with heart rate monitored at each stage and plotted against the velocity. A linear regression line is determined for the lower data points and a deflection point from the regression line is usually visually adjudged. Alternatively, a linear regression line is also determined for the upper data points and the deflection point calculated from the intersection of the lower and upper regression lines. A right-shift in the heart rate deflection point and thus the velocity of deflection would indicate improved performance. The heart rate and blood lactate concentration deflection points are said to coincide at the anaerobic threshold. The speed at which the heart rate deflection occurs is defined as the velocity of deflection (Burke, 1995).

CONCLUSION

The adoption of a fitness or performance test must be preceded by reports of acceptable validity and reliability that are consistent between independent laboratories. This has not been the case with the Conconi Test, which has shown divergent levels of validity and reliability between independent laboratories. Alluding to selected positive examples of elite athletes trained by eminent scientists as evidence for the validity of a test is an appeal to authority and popularity. Rather, those elite athletes that have performed well using the Conconi Test probably did so because regular performance testing would have implied the use of the scientific method in sport, at least to some degree. It is likely that successful implementation of the Conconi Test in selected prominent athletes was the result of i) the methodological bias inherent in the Conconi Test which makes finding an HR_D more probable and ii) individual heart rate responses to the Conconi Test that resulted in a consistent HR_D. Moreover, the HR_D occurred at speeds such that correct training intensities could be inferred and thus not over-train. Insightfully, Tokmakidis and Leger (1989: 446) concluded that:

> "…. considering the results of our study and the success that Conconi obtained with his method on world class athletes, one may wonder if it is the method itself or

individual talent and endowment that was responsible for the gold medals and world records".

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FANS' MULTIPLE POINTS OF ATTACHMENT AND THEIR INFLUENCE ON ATTENDANCE IN RUGBY MATCHES

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ABSTRACT

Rugby is one of South Africa's big three sports, alongside soccer and cricket. For many South African fans, rugby is a medium that provides entertainment, cultural identity and a sense of belonging to a particular sport. One of the main appeals for watching competitive sport events is the distinctive nature of competition. Unlike the predictable form of leisure behaviour, sport events embody an experience in which outcomes are unknown prior to the commencement of the event. The purpose of the study was to identify specific points (objects) of attachment that influence fan attendance. The secondary purpose of the study was to use the scale items to examine the relationship between the identified factors on fan attendance. The two measures of fan attendance namely, frequency of attendance and length of time being a fan used in the study were obtained from previous studies. Completed questionnaires were obtained from respondents (N=180) from a provincial based team in Gauteng. The data was analysed using exploratory factor analysis, independent sample t-tests and regression analysis. In addition, rugby fans were categorised into die-hard, submissive and care free casuals or theatre-goers. A priori determination of five points of attachment, namely attachment to a team, player, sport, coach and level of sport attachment were used to examine the relationship of the points of attachment through regression models. Attachment to rugby as a sport in general appeared to significantly predict fan attendance. Implications for future research are outlined.

Key words: Fan attachment; Fan attendance; Rugby; Social identity

INTRODUCTION

Rugby is one of South Africa's big three sports, alongside soccer and cricket. For many South African fans, rugby is a medium that provides entertainment, cultural identity and a sense of belonging to a sport. One of South Africa's rugby highlights took place in 1995 when the country hosted the biggest tournament, the Rugby World Cup. The 1995 Rugby World Cup was held in South Africa just one year after the country's first democratic elections. South Africa competed in the World Cup for the first time, following its re-entry into the international sport arena after many years of sport isolation, hosting the finals and celebrating their inclusion in the competition in the best possible way by defeating New Zealand 15-12 to become world champions (Du Plessis, 2007). Whilst the triumph of the 1995 Rugby World Cup may still be embedded on the minds of many South Africans, it is viewed as temporary in uniting a rainbow nation with a "eighty minutes patriotism" (Jarvie, 1994: 115). In addition, arguments have been put forward by many scholars that sport in general in South

Africa has an inflated status as a nation builder and social unifier (Labuschange, 2008). For example, the 1995 Rugby World Cup was invigorating for South Africans at a time when the nation was spurred through the one team, one nation and the rainbow nation catchphrases, which served its time and purpose. However, these slogans gradually faded and the lustre dissipated largely in the light of ongoing transformation squabbles within sport (Booth, 1996; Black & Nauright, 1998; Gründlingh, 1998). Gründlingh (1998: 75), commenting on the performance of the South African rugby team in the 1995 Rugby World Cup states that:

> "the fact that the Springboks won all their matches ensured that the public interest is kept alive", adding that "if the results were different there would not have been much cause for nation wide celebration".

Balibar cited in Booth (1996) is of the opinion that no nation possesses an ethnic base naturally, as it emerges from greater social cohesions that materialise from a natural community that transcends individual or social conditions. In other words, forced cohesion cannot unite a divided nation which was historically characterised by deep divisions as a result of past segregation policies where they were no form of a united community between a country's racial groupings.

One of the main appeals amongst fans for watching a sport event is the distinctive nature of athletic competitiveness. Like many competitive sport events including rugby, the final

outcome of the game is unknown prior to the commencement of the event (Madrigal, 1995). Sport events also symbolise hedonic experiences in which the event itself elicits a sense of drama and outcomes yield cognitions about the "performance as well as affective reactions" (Wann & Branscombe, 1992: 49). Research suggests that the type and extent of cognition and emotions that are associated with watching one's favourite team participate at a competitive level is dependent upon an individual's outlook towards the team (Madrigal, 1995).

Before venturing into the realms of fan attendance and sport consumption behaviour, the study precedes by an examination of the description of a fan.

Fan

A fan is a person with an overwhelming liking or interest in a particular team (Hunt *et al*., 1999). The behaviour that a person exhibits is typically viewed by others as unusual or unconventional but "does not violate prevailing social norms" (Thorne & Bruner, 2006: 52). Such fans may be fanatical by regularly following a team in terms of match updates (for example, by finding out matches won or lost when games are not attended) by attending games, engaging in activities such as purchasing memorabilia, such as a jerseys and caps, of the team. Such fans are distinguished in literature from a dysfunctional fan whereby the latter is described as anti-social, disruptive or deviant and are more likely to be verbally aggressive towards officials or other fans (Wakefield & Wann, 2006).

Hunt *et al.* (1999: 440) define a fan as "an enthusiastic person of some particular sport consumption object (team)". Fanaticism on the other hand is defined as the degree of intensity to which one is a fan, with the level of involvement ranging from low to high intensity. Although this term is often used negatively, this research applies it neutrally (Thorne & Bruner, 2006). In some instances the terms fans and spectators are used

interchangeably (Funk & James, 2001; Wann & Waddill, 2003). Sloan (1989: 177) made a distinction between fans and spectators, noting that spectators in its strictest sense are those who merely watch and observe, while fans are the "enthusiastic devotees of a given diversion". Wann and Branscombe (1990) presented categories of die-hard and fair weather fans. Die-hard fans stand by the team even after years of losing, while fair-weather fans support the team when successful, but will not stay if the team starts losing. Die-hard fans possess a high emotional attachment to a team that is enduring; make major financial investment and time commitments (Trail *et al*., 2003).

Literature groundwork for this study is based on an existing social identity theory in order to examine variables of fan attachment that influence fan attendance (Leverie & Arnett, 2000; Gwinner & Swanson, 2003). An overview of this theory is a useful point of departure in understanding salient factors that influence a fan attendance.

Fan attendance

The social identity theory focuses on the connection between self and society. The self is composed of multiple selves some of which are more important than others (Trail *et al*., 2000). The view of the self recognise that social units that people live in, are relatively small and these networks of social relationships impacts on a person's identity (Laverie & Arnett, 2000; Madrigal, 2000). Kleine *et al*. (1993) established that a social identity perspective is a useful approach to study the many different types of consumption people routinely participate in. In addition, this theory suggests that society is important to the self because the individual is part of a cluster of the population groups that are formed on the basis of common identities. Individuals are more likely to be influenced by perceived expectations of other group members and act in ways that reinforces their membership to the group (Madrigal, 2000). Therefore, whilst the self can be conceptualised as independent, an individual does possess a partially overlapping self. Hence, in a person's sense of connectedness to a cause, event or a sport team, support is reminiscent of Belk's (1988: 139) notion of the "extended self". This perspective suggests that people form emotional attachments to physical possessions, places, people and groups. Thus, acting in ways that promote a groups best interest is based on one's own social identity rather than personal identity (Madrigal, 2000). Individuals may therefore be found playing a distinct role and when these roles are personalised they become identities. As social beings, fans have a desire to be with others and behave as members of groups

(McDonald *et al*., 2002) through the socialisation process. They affiliate and maintain association or relations with others in the group (Handy, 1993). In this way they confirm their sense of identity with others who enjoy the same activity. Studies have shown peer and family relations in the sport setting, such as friendship, peer acceptance, family presence and social interactions could motivate an attachment to a sport (Weiss & Duncan, 1992; Jamber, 1999). The social identity theory is therefore utilised to obtain a better understanding of how and why individuals select certain identity related activities, given all the possible alternatives. In addition, the social identity theory suggests that these types of choices can be explained by identity salience (Laverie & Arnett, 2000).

Identity salience is influenced positively by feelings related to identity. Salient identities are those identities that are an important part of who we are and ones we display routinely. These identities are socially derived and require self-expression and positive feelings affirming the

identity (Laverie & Arnett, 2000). Hence, identities insinuate action by definition and "it is through action that role identities are realised and validated" (Callero, 1985: 205). As fan identity becomes more salient, specific fan activities may be acted out more frequently, for example, attending games, watching games on television or following the scores in the newspaper. On the other hand, negative evaluations would shape inappropriate identity performances. In this instance individuals are likely to take steps to improve their performance or abandon their identity.

In addition to, and linked to the social identity theory, a large amount of research has also been cited on fan attachment especially within the context of winning and losing matches (Campbell *et al*., 2004). These aspects of positive and negative fan behavior are referred to as BIRGing (basking in reflected glory) and CORFing (cutting off reflected failure). The BIRGing effect refers to an individual's inclination to share in the glory with another person with whom they are in some way associated (Cialdini *et al*., 1976). In the case of BIRGing, team success and fan association is positive. Fans tend to associate themselves in a positive light with a successful team. After a team wins, the loyal fan will tend to wear the team colours, show off with team logos and take any opportunity to build an association with the team through their behaviour (Campbell *et al*., 2004). Kimble and Cooper (1992: 305) concur that fans accomplishes a feeling of "vicarious achievement" simply through being fans.

In instances of CORFing, the team is unsuccessful and fan associations are correspondingly negative. Fans will tend to dissociate themselves from an unsuccessful team. After a team loses, fans will be less likely to wear the team colours, attend events or outwardly support the team. Providing further support for such outcomes Hirt *et al*. (1992) established that in accordance with the social identity theory, fans' mood and self-esteem are influenced by the outcome of the sporting event. In addition, Wann *et al*. (1996: 995) noted that the lack of team success over a period of time has been one of the influential reasons in "seising to follow a once-favourite team".

Hence, this study attempts to explore and combine different streams of research (Trail, *et al*., 2003; Kwon & Armstrong, 2004; Won & Katamura, 2007) in order to enhance the understanding of the points (dimensions) of attachment regarding fan attendance measures in rugby games. These researchers have suggested that there may be other factors that influence people's decision concerning sport consumption behaviour such as strong psychological connections (attachments) with a team, coach, players, university, community, level of sport and the type of sport.

PROBLEM STATEMENT

Not all consumers are equally passionate and fanatical, nor use their team to confirm their personal identity (Stewart *et al*. 2003). All consumers are not totally loyal or engrossed in a team clubs history. Some attend games on a regular basis, while others attend only on special occasions. Some display their fandom by watching pay television channels. Whilst the desire to understand the behaviour of sport consumers has been a long standing goal for sport marketers in other countries, there is little evidence of such research within a South African context. No scale has thus far been adapted or developed which takes into account the unique attendance factors of South African rugby fans. Furthermore, scales developed in other

countries were sport specific, for example, for basketball, baseball, softball and football and tested mostly in the United Kingdom (UK) and United States (US). Therefore, studies that focus on identifying South African fans are required with regard to various sport events. Discerning sport fans attachment and their behaviour is important to sport marketers (Hunt *et al.*, 1999). Such assessments are pertinent in order to make sense of fans disparate behaviour in specific sport events in order to facilitate the implementation of relevant marketing strategies.

PURPOSE OF THE STUDY

The purpose of the study was to identify specific points (objects) of attachment that influence fan attachment in rugby. The secondary purpose of the study was to use the identified scale items to examine the relationship between the a priori factors (points of attachment) on fan attendance.

METHODOLOGY

In conceptualising the purpose of the study, the following framework in the research design was followed. The design details the procedures followed in eliciting the required information with reference to the compilation of the sample, questionnaire construction and data collection in order to determine the dimensions of fan attachment.

Sample composition

Both male (n=137) and female (n=43) fans in various age categories (under 20 years; 20-29 years; 30-39 years; 40-49 years; 50-59 years; 60 years and over) where chosen as respondents (N=180) from a Gauteng based provincial team. The situational variable (geographical distance) was suited for determining motives for fan attendance since a wide variety of the different segments of the population groups and fans from different suburbs of the province (South, Central, Northern Gauteng) frequent these games. Whilst the Gauteng province provides a greater number of teams with a large fan base, it was decided not to extend the study to fans of other provincial rugby teams as this would dilute the number of fans in different categories with reference to fan typologies if spread over a number of teams. In addition, concentrating on specific teams allows for specific marketing communication and segmentation strategies to be developed for the management of the team (Fink *et al*., 2002; McDonald *et al*., 2002). This procedure was used by Laverie and Arnett (2000).

Data collection

Respondents were interviewed before the game in the parking lot and at the entrance before entering the stadium. The goal was to make sure that the sample was representative of the fans who attended the games. Every second person or group entering the stadium was chosen for the interview in order to ensure randomness. Home games were only used as the survey location due to cost constraints and that previous research studies showed that these games are good predictors of fan attendance and behaviour (Mahony *et al*., 2002). Postgraduate Sport Management students, Marketing Research students and students who were affiliated with a university campus rugby team were used as fieldworkers. Potential respondents were

approached and asked if they would be willing to participate in the study. In order to reduce the potential influence of others who accompanied the respondent (children, friends, family, working colleagues), those agreeing to participate were asked to step away from the group and were requested to complete the questionnaire on their own. No more than one person in a group was invited to complete the questionnaire. The questionnaires were completed in the presence of the fieldworkers. Interviewers were required to ensure that they interviewed both male and female fans and different age groups. Of the uniform questionnaires (N=216) administered, data was obtained from 180 respondents since 36 questionnaires were incomplete and could not be used in the analysis.

Item generation and measuring instrument

Three stages were used in the generation of the variables and factors to be included in the current study in the compilation of the scale. First, an analysis was undertaken of previous studies on attachment and identification of sport fans in order to establish consistently supported factors that influence fan attendance. The fan attachment scale for the study was drawn from previous research (Mahony, *et al*., 2002; McDonald *et al*., 2002; Trail *et al*., 2003). The study used a common approach involving a series of Likert scaled anchored questions ranging from 7= strongly agree and 1= strongly disagree (Mahony *et al*., 2002). Some factors were excluded because of a weak support in past research or not relevant to the study. For example, the factor, affiliation to the university (Trail *et al.,* 2003) was excluded as the team was not affiliated to a particular university. Second, the author examined other factors which would be appropriate to be included within the context of the study. This was established from a review of literature on fan attendance and attachment. Finally, a pilot-test of 40 respondents who attend the team games was conducted to investigate the initial reliabilities of the scale. Initial pre-testing is common on the refinement of such scales (McDonald *et al.,* 2002; Won & Kitamura, 2007). Several items were dropped due to low item-to-total correlations. At this point in the pilot-test, the goal was to retain a rich and diverse set of items. Where necessary some of the items were reworded that had low item-to-total correlations.

RESULTS

The empirical results presented in this section comprise the following steps. The characteristics of the sample are reported, followed by the results of the factor analysis of the various dimensions of attachment. Fan profiles, independent sample t-tests were conducted between the points of attachment and age categories of respondents. Regression analysis was undertaken to establish significant relationships between the five extracted dimensions with frequency of attendance and length of time being a fan.

Sample characteristics

The participation profile of the sample comprised 76% males (n=137) and 24% females (n=43). Married respondents constituted 51.7% (n=93) and single respondents constituted 48.3% (n=87) of the sample. The sample distribution regarding the age categories were as follows: under 20 years, 5.6% (n=10); 20-29 years, 37.8% (n=68); 30-39 years, 25.6% (n=46); 40-49 years, 18.9 (n=34); 50-59 years, 8.9% (n=16); and 60 years and over, 3.33% (n=6). The majority of the respondents, 77.8% (n=83) attended the games with friends or

family, whilst 5% (n=9) attended the games alone and others, 17.1% (n=31) attended the games with their boyfriends or girlfriends. A large majority of respondents were whites (98%). In terms of the frequency of games attended, 46.7% (n=84) reported attending the games three times or less in the season, 38.9% (n=70) attended the games between four to seven times in the season and 14.4% (n=26) attended the games more than eight times in the season. In terms of the length of time respondents were fans of the team, the majority 58.9% (n=106) were fans for over eight years, 11.7% (n= 21) for two years and under and 29.4% (n=53) were fans between three to eight years.

Factor analysis

A common factor route with varimax rotation was used to extract factors (Britsow & Schneider, 2003). Prior to factor extraction the Bartlett's test of Sphericity and the Kaiser-Meye-Olkin (KMO) measure of sampling adequacy was conducted to establish whether the factor analysis procedure was appropriate for the data set. The Bartlett's test of Sphericity was significant at $p<0.000$ inferring that the data set was not an identity matrix with zero correlations thus, suitable for factor analysis. The KMO measure of sampling adequacy was 0.828, also inferring that the data was suitable for factor analysis. The percentage of variance explained, the scree plot and eigen value criterion guided the extraction of factors. In addition, Churchill *et al*. (1974) also suggested that items that load heavily on more than one factor should be eliminated from further scale development. Hence, cross-loading were also examined in the factor structure. Five items were eliminated because of cross loading as such cross-loading suggests that the item may be incapable of differentiating between factors. This

procedure resulted in the extraction of five meaningful factors, which were labelled as team, player, sport, coach and level of sport attachment. Table 1 summarises the factor structure and psychometric evaluation of the scale.

TABLE 1: **FACTOR LOADING MATRIX AND PSYCHOMETRIC EVALUATION OF THE SCALE**

Scale item no	Factor 1 Team attachment	Factor 2 Player attachment	Factor 3 Sport attachment	Factor 4 Coach attachment	Factor 5 Level of sport attachment	Scale item mean	Item- to-total correlation	Alpha if item deleted
Team criticism – feel insulted	**.789**	.027	.173	.016	.090	84.91	.589	.877
Personal interest in team	**.565**	.190	.108	.037	-.172	84.92	.416	.883
We say 'we' rather than 'they'	**.718**	-.029	.117	.169	.120	84.35	.555	.878
Praise for the team	**.740**	.030	.188	.146	-.014	84.44	.580	.878
Team is ridiculed – feel insulted	**.743**	.032	.190	-.039	-.025	84.76	.517	.880

Scale item no	Factor 1 Team attachment	Factor 2 Player attachment	Factor 3 Sport attachment	Factor 4 Coach attachment	Factor 5 Level of sport attachment	Scale item mean	Item- to-total correlation	Alpha if item deleted
Reminds me of who I am	**.834**	.085	-.054	.104	.008	85.31	.569	.878
Team used to describe myself	**.810**	.000	.033	.116	.140	85.30	.586	.878
Team disbanded – be at a loss	**.732**	-.015	.094	.140	.090	84.96	.540	.879
Feel less like my self-by non-attendance	**.602**	.217	.248	.024	.028	85.76	.553	.879
Consider myself a fan	.119	**.804**	.024	.031	.087	86.09	.413	.883
Have favourite player/s	.106	**.826**	.028	.207	.059	86.18	.466	.881
Favourite player left out	.016	**.867**	.003	.043	.030	86.58	.349	.885
Favourite player is important to me	.027	**.853**	.020	.100	.190	86.86	.422	.883
Big fan of coach	.196	-.005	.188	**.842**	.120	85.84	.460	.881
Follow the coach	.167	.215	.116	**.888**	.023	86.41	.501	.880
Fan of team because of coach	.085	.375	.041	**.569**	.310	86.85	.457	.881
Fan of rugby as a sport	.158	-.100	**.836**	.164	.127	83.84	.403	.883
Rugby my favourite sport	.285	.069	**.874**	.033	.119	84.01	.527	.879

Fan of rugby at all levels	.254	.112	**.774**	.168	.237	84.07	.570	.878
Support rugby in general	.021	.240	.160	.150	**.838**	85.25	.397	.883
Fan of rugby and team	.097	.112	.269	.120	**.840**	84.99	.426	.882
Cronbach α	0.897	0.881	0.856	0.783	0.797			
Rotation: Varimax with Kaiser normalization. Loadings below 0.50 were excluded from analysis *Standard overall Cronabch alpha for the scale: 0.89*								

Regression

The results of the factor analysis provided empirical support for five factors. Of interest was the relationship between the five factors and fan behaviour. A regression analysis was undertaken between the five factors with frequency of attendance and length of time being a fan. The results of the two regression models are presented in Table 3.

DISCUSSION OF RESULTS

The primary objective of the study was to empirically test a fan attachment scale. The five factors accounted for 69% of the variance, which according to Malhotra (2004) is satisfactory. Factor one, **team attachment** relates to the interest and praise for the team. This factor comprised nine variables and accounted for 32% of the variance. Fans were of the view that if someone ridiculed their favourite team, they felt personally insulted. Variable loadings to the questions from the questionnaire such as "When I talk about this rugby team, I usually say we rather than they", "When someone praises this rugby team, it would feel like a personal compliment", "This team reminds me of who I am", "If this rugby team was disbanded, I would feel like I have lost a little bit of myself" indicates the level of attachment to a team. Consistent with literature, an attachment with a particular team is embedded within the social identity theory where a team's success or failure is interpreted as a personal success or failure (Pooley, 1978; Wann & Dolan, 1994).

Hence, people will engage in activities (Ashforth & Mael, 1989) to support their team, which is in turn congruent to their identity. Funk and Pastore's (2000) study also found that individuals, who rated team importance highly, placed more psychological significance on their relationship with their team.

Factor two, **player attachment** accounted for 16% of the variance and comprised four items. Fans were of the view that they choose a team based on the inclusion of their favourite players and if these players were left out of the selection, they felt that it would have a major impact on the interest of the team. Variable loadings to the questions from the questionnaire such as "I consider myself a fan of certain player(s)", "Having a favourite player is important to me" and "I choose my favourite rugby team based on the presence of my favourite rugby player(s)" suggests that rugby fans draw the level of attachment to the sport from individual players as well. Factor three, **sport attachment** comprised three variables and accounted for 10% of the variance. Variable loadings to the questions from the questionnaire such as "First and foremost, I consider myself a rugby fan", "Rugby is my favourite sport" and "I am a rugby fan at all levels" affirm a fan's attachment to rugby in general. Fisher and Wakefield's (1998) study found that personal relevance to a particular object is an essential feature of identifying with the sport. This personal relevance is referred to as domain involvement and refers to a particular field (type of sport). Nakazawa *et al*. (1999) established that fans attended games because of their attachment to the sport.

Factor four, **coach attachment** comprised three variables and accounted for 7% of the variance. Variable loadings to the questions from the questionnaire such as "I am a big fan of the coach", "I follow the coach in all his decisions and coaching styles", "I am a fan of this team because of the coach" affirm a fan's coach attachment. Factor five, **level of sport**

attachment comprised two variables and accounted for 4% of the variance. Fans attach themselves to a particular sport based in the heightened level of the sport in general.

Profiling rugby fans

In sport academic literature, profiling is usually taken to mean the process whereby the fans are divided into distinct groups (Hoek *et al*., 1996). In many sport research on fans, simple behavioural analysis is often used to profile fans. Based on Quick's (2000) fan typology, rugby fans in the current study were assigned to one of three fan profiles based on the proportion of home games attended, into die-hard fans, submissive fans and fair weather fans or theatre-goers. Their characteristics were clustered according to how they described themselves from a list of characteristics provided. Die-hard fans made up 14% of the sample, submissive fans comprising 39% of the sample and fair weather or theatre-goers made up 47% of the sample.

Die-hard fans expressively supports the team, are fanatics, draw a large amount of interest and excitement for the team, develop strong association with the team and rugby as a sport, with players and attend more home games. They are generally season ticket holders. They are team loyalist, dubbed as 'regulars' and spend money on paraphernalia in order to associate with the team. Submissive rugby fans are strongly committed and they identify mostly because of cultural and ethnic traditions of rugby. They are social fans and like the excitement in the games and especially watch a closely contested game. Submissive fans do not overtly express their association with a team like the die-hard fans and are more likely to make a last minute decision to go to a game. However, their attendance is not as frequent compared to a die-hard fan. The fair weather or theatre goers are committed casuals who associate with the game for the excitement value and attend games to see some of their favourite players. They attend games because of good weather and on special occasions (e.g., their company purchased tickets for them) (Garland *et al*., 2004).

In addition to establishing the fan profiles, independent sample, *t*-tests were used to examine whether there were any significant differences among the age groups and their attachment to team, players and the coach of the team. The results are reported in Table 2. Only those points of attachment that showed significant differences are reported for the sake of brevity.

TABLE 2: **EXAMINING DIFFERENCE AMONG AGE GROUPS AND POINTS OF ATTACHMENT**

Points of attachment/ and age	**Significance**	**t-value**
Player attachment with age categories <20 years ($\bar{X}$ =3.2); age 50-59 years ($\bar{X}$ =2.8)	0.016	0.691
Coach attachment with age categories <20 years ($\bar{X}$ =3.4); 50-59 years ($\bar{X}$ =2.9)	0.021	0.740
Player attachment with age categories 20-29 years ($\bar{X}$ =4.4); 40-49 years ($\bar{X}$ =3.4)	0.040	0.156
Significant at p<0.05 level		

Fans under 20 years of age were more likely to be attached with their favourite player and the coach compared to those fans who were 50-59 years of age. Those fans that were between 20-29 years of age were more likely to be attached to individual players compared to those fans

who were 40-49 years of age. It therefore seems that the younger fans had a greater propensity to be attached with individual players and the coach of the team than older fans in rugby.

Regression analysis using the enter method was used to test two regression models presented in Table 3. The results of the first regression model indicated that approximately 9% of the variance in frequency of attendance of home games was explained by team attachment, player attachment, sport attachment, coach attachment and level of sport attachment. An assessment of the t-values for the partial regression coefficients indicated that attachment to the sport in general contributed significantly to the regression equation (t=2.536; p<0.05). Coach and level of sport attachment were negatively related in predicting fan attendance. An

examination of the beta

(β) weights indicated that sport attachment (β = 0.223) explained most of the variance, followed by team attachment (β = 0.153) and player attachment (β = 0.035). Coach attachment (β = -0.113) and level of sport attachment (β = -0.158) showed negative relationships with frequency of attendance of home game matches.

The results of the second regression model also indicated that approximately 9% of the variance in length of time being a fan was explained by team attachment, player attachment, sport attachment, coach attachment and level of sport attachment. The t-values for the partial regression coefficients indicated that attachment to the sport in general contributed significantly to the regression equation (t=2.950; p<0.05). Player, coach and level of sport attachment were negatively related in predicting fan behaviour. Examination of the beta (β) weights indicated that sport attachment (β = 0.258) explained most of the variance, followed by team attachment (β = 0.033). Coach (β = -0.105), player (β -0.108) and level of sport attachment (β = -0.163) showed negative relationships with the length of time being a fan.

TABLE 3: **SUMMARY OF REGRESSION ANALYSIS FOR FAN ATTACHMENT WITH FREQUENCY OF ATTENDANCE AND LENGTH OF TIME AS A FAN**

Frequency of attendance (predictor variable)						**Length of time as a fan (predictor variable)**					
Dimension	**SE B**	**(β)**	**R^2**	**t-value**	**Sig**	**Dimension**	**SE B**	**(β)**	**R^2**	**t-value**	**Sig**
Team	0.045	.153	.036	1.847	.067	Team	.068	.033	.004	.403	.687
Player	0.036	.035	.038	.438	.662	Player	.051	-.108	.035	-1.359	.176
Sport	0.045	.223	.052	2.536	.012*	Sport	.066	.258	.058	2.950	.004*
Coach	0.046	-.113	.068	-1.327	.186	Coach	.064	-.105	.073	-1.242	.216
Level of sport	0.040	-.158	.086	-1.859	.065	Level of sport	.054	-.163	.092	-1.914	.057
* Significant at p<0.05 level											

The correlation matrix was also examined for existence of multicollinearity, i.e. if the predictor variables correlates too highly (*r*>0.9) with each other (Field, 2005). None of the

correlations reached a value of *r*>0.9. In further examining the presence of co-linearity in the data set, the variance inflation factor (VIF) was used and the following recommendations (Field, 2005: 196) were applied:

- if the largest VIF was greater than 10 then there was a cause for concern;
- tolerance level below 0.1 indicated a serious problem; and
- tolerance below 0.2 indicated a potential problem.

Assumptions of the multiple regressions were checked along with co-linearity diagnostics provided by Statistical Package for Social Sciences. In all cases the two regression models were appropriate for the data as the VIF ranged from 1.47 to 1.21 and the tolerance statistics for the five factors ranged from 0.969 to 0.693 inferring that there was no co-linearity within the data.

In summary, attachment with rugby as a sport appears to be the strongest predictor of fan attendance. Weak relationship between team, player, coach attachment and fan attendance emerged in this study which is consistent with previous research (Nakazawa *et al*., 1999). Within the context of this study, weak relationships may be attributed to the perception that rugby is still the domain of the White population group, which has not yet pervaded other population groups in South Africa despite the attempts of the South African Rugby Union to make the game for all South Africans, mainly through active participation and development programmes throughout the country. Mahony *et al*. (2002) observed some logical explanations for these weak relationships. Firstly, the result does not suggest that these forms of attachment are negatively related to the decision to attend home games; fans have an

attachment but these forms of attachment do not influence their decision to attend the games. Such forms of attachment may be linked to being a fan; yet still following the player, team or coach by watching television or other forms of the media. Secondly, while player and team coach attachment does not lead to high frequency of attendance, a strong attachment to the sport is necessary for rugby fans to keep coming back. In addition, coaches often change and having attachment to a coach may have no bearing on fan attendance. Stewart *et al.* (2003) accentuates that the relationship between various forms of attachment and fan attendance is complicated by the fact that individuals bring their own personalities and values to their sport experience. Moreover, fans are subject to a broad range of external factors that mediate their relationship with their favourite team and players. Such factors may include the family structure, culture, household incomes, friendship groups, the social milieu in which sport consumers run their lives, their sensitivity to price, transport and the cost of activities (Fort, 2003). These fundamental factors may influence the fan base and attachment to a sport.

Reliability

As suggested by Churchill *et al.* (1974) the internal consistency of the items included in the fan attachment scale was first evaluated. The resultant coefficient alpha of 0.89 indicated that the scale items performed adequately in capturing the elements of fan attachment. As suggested by Churchill (1979), the internal consistency of the fan attachment scale was further examined by calculating the coefficient alphas for each factor of the scale. The results are show in Table 1. All five factors were above the benchmark level of 0.70 (Nunnally & Bernstein, 1994).

CONCLUSION AND IMPLICATIONS FOR FUTURE RESEARCH

The five points of attachment, namely: team attachment; player(s) attachment; sport attachment; coach attachment; and level of sport attachment sub-scales, which were adapted for rugby from various different codes of sport from other countries, provides preliminary evidence for the reliability of a rugby fan attachment scale. The regression models indicated that attachment to rugby as a sport appeared to be correlated to and significantly predicted fan attendance. Overall, the results of the regression analysis lead to two conclusions. Three of the five dimensions of attachment included in the study did not appear to contribute to being strong predictions of fan attendance. The usefulness of each dimension may vary depending on other factors that may influence fan attendance.

Satisfaction is often used in predicting fan attendance (Laverie & Arnett, 2000). Future research should include satisfaction in predicting fan attendance. It is also possible that future research could use different variables that would capture fan attachment. Research efforts should also examine teams in other geographic areas and across different sports. Although this study represents an important step towards understanding fan-related behaviour, future researchers need to employ and test multiple constructs in their exploratory model to yield a deeper understanding of fan attendance. For example, motivation factors and social connections could be included in future studies to predict fan attendance. Consumer research has suggested that media information influences fan attendance (Kleine *et al*., 1993), which can also be an important avenue for further research as many fans follow televised matches or reported accounts of games in the newspapers or on the Internet. Since weak relationships were found between four of the five dimensions of attachment and measures to establish fan attendance, further research including other variables, for example, a combination of motivational variables, purchases of season tickets, safety and security, overcrowding and atmospherics may provide fertile grounds for further research. As the purpose of the study was initially to establish and validate various points or objects of attachment, the study did not delve into the issue of culture, ethnicity and race. Since a large majority of respondents were classified as White, it was not possible to conduct an analysis of fan attendance using race categories. These dimensions may yield pertinent revelations in terms of rugby consumption behaviour within a South African context.

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52

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PERPETRATORS OF SEXUAL HARASSMENT EXPERIENCED BY ATHLETES IN SOUTHERN NIGERIAN UNIVERSITIES

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ABSTRACT

Evidence in literature and reports showed that both male and female athletes are sexually harassed in their course of participating in sports. The purpose of the study was to find out the perpetrators of sexual harassment experienced by athletes in southern Nigerian universities. A cross-sectional survey design was employed for the study. A 22-item structured questionnaire was used to generate data from athletes (N=1 214) which included males (n=789) and females (n=425) in federal (n=856) and state (n=358) universities. The data analysis was based on athletes who indicated that they have experienced one form of sexual harassment or the other. Percentage was used to analyze the data. Results showed that among the athletes who experienced gender harassment, 8.97% of them had it from the directors of sports, 34.31% from the coaches, 96.55% had it from fellow athletes and 4.33% from spectators. Among the athletes who experienced unwanted sexual attention, 2.57% had it from directors of sports, 29.52% from coaches, 86.35% from fellow athletes and 1.49% had it from spectators. For athletes who experienced sexual coercion, 3.15% had it from directors of sports, 23.16% from coaches, 79.74% had

it from fellow athletes and 0.37% from spectators. It was recommended among other things that a sexual harassment intervention programme should be designed and mounted for all the perpetrators of sexual harassment on athletes with much attention to the athletes and coaches.

Key words: Perpetrators; Sexual harassment; Athletes; Southern Nigerian universities

INTRODUCTION

A social problem that pervades and violates the fundamental human rights of members of every social institution is sexual harassment. It is rare to see any social institution including sport that is harassment-free. Several cases of sexual harassment have been exposed in athletics and sport. For instance, a report by Klingaman (1997) that Coach Tarleton in Towson, Maryland pleaded guilty to fondling and kissing a 15 year old student athlete. Nickel (1998) reported that Coach Titus in Wisconsin was arrested on charges of touching a female student athlete inappropriately and propositioning a female student for sex. He also reported that Coach Pierce of Menomonie High School in Milwaukee, Wisconsin was sentenced to eight years in prison on a count charge of sexual assault of a 15 year old boy. Also, Coach Nyhus of Barneveld High School in Wisconsin was accused and sentenced to two years in prison and 20 years of probation for sexually assaulting a 14 year old girl.

Sexual harassment, according to Brackenridge and Fasting (2006), refers to behaviour directed towards an individual or group of individuals that involves sexualised, verbal, non-verbal or physical behaviour, whether intended or unintended, legal or illegal, that is based upon an abuse of power and trust and that is considered by the victim or a bystander to be unwanted or coerced. Elendu (2009) defined sexual harassment as any unwanted sexual behaviour(s) directed to an athlete or group of athletes from the same or opposite sex. In athletic settings, sexual harassment refers to any behaviour of a sexual nature which is directly or indirectly directed to a sport participant or group of sport participants in the course of participation in sport, which the recipient considers to be unwanted, unwelcome, offensive, intimidating, insulting, malicious and degrading. The three empirically tested and confirmed categories of sexual harassment by Gelfand *et al.* (1995), which are gender harassment, unwanted sexual attention and sexual coercion were used for the study. According to them, gender harassment covers a range of verbal and non-verbal behaviours aimed not at getting sexual co-operation, but at denigrating, insulting, or conveying hostility towards men and women. Unwanted sexual attention covers a range of verbal and non-verbal behaviour of a sexual nature that is unwanted, unreciprocated and offensive, but with no implication of job related losses or benefits. They further explain that sexual coercion attempts to get sexual co-operation by bribes or threats. The categorisation by Gelfand *et al.* (1995) was adopted for this study because according to them it was generaliseable across settings, job types and cultures and athletic settings are not an exception.

Most empirical studies (Adamolekun, 1989; Holman, 1995; O'Connell, 1997; Gettman, 2003; Hayden, 2003; Martin, 2003; Okoro & Obozokhai, 2005) have been conducted on the incidence and prevalence of sexual harassment in workplaces and athletic settings with little attention to the perpetrators. Fasting (2005) reported that sexual harassment can affect more than the targeted person. She further explained that a team member, who witnesses repeated incidents, even if it is not directed at him or her, may be considered a victim of sexual harassment as well. Timmerman and Bajema (1997) reported that the victim of sexual harassment is one who is directly or indirectly affected by the behaviour. Likewise, in this study a victim of sexual harassment is an athlete who directly or indirectly receives an unwanted conduct of a sexual nature, finds the behaviour offensive and is affected by it.

Hastings Institute (2003) noted that a victim of sexual harassment may be male or female; the harasser may be of the same or opposite sex of the victim and the harasser may be a manager, supervisor, co-worker, or subordinate. It can be deduced from Hastings Institute (2003) that sports participants irrespective of class, could be a victim and/or perpetrator of sexual harassment on sport participants especially athletes.

Sexual harassment can be perpetrated by anyone irrespective of gender, socio-economic class, age, occupation, race and ethnicity, level of education, marital status, rank or position,

among others. Brackenridge (1997) noted that harassers could be parents, coaches, social service providers, or officials from sport clubs. The National Association for Sport and Physical Education (2000) has earlier buttressed that sexual harassment besides occurring between coaches and athletes, can occur between athletic directors and athletes; coaches and assistant coaches; athletic directors and coaches and athletes and athletes. In athletic settings, sport participants comprising athletes, coaches, officials, spectators and fans are potential

victims and perpetrators of sexual harassment. This simply means that athletes can be sexually harassed by fellow athletes, sport administrators, officials, fans and spectators. At the same time, sport administrators can be sexually harassed by athletes, fellow sport administrators, officials, spectators and fans. It is also worthy to note that the spectators and fans can equally be sexually harassed by the athletes, officials, sport administrators, fellow fans and spectators. There is unequal power distribution among the sport participants. The power imbalance in sport exposes athletes who appear to have less power to suffer sexual harassment more than any other category of sport participants. This could be why more attention is always focused on athletes, as most sexually harassing behaviours are directed at them.

STATEMENT OF THE PROBLEM

Studies (Sabo, 1994; Martin, 2003) have suggested that sexual harassment in universities deserves attention and the need exists to formulate and implement policies and procedures to prevent it and protect student athletes. Sev'er (1995) stated that sexual harassment rarely goes away without some form of intervention. Brackenridge and Fasting (2006) pointed out that everyone in sport shares the responsibility to identify and prevent sexual harassment and abuse and to develop a culture of dignity, respect and safety in sport. There is no doubt that there is a need for intervention programmes aimed at preventing the perpetration of sexual harassment on student athletes. However, the perpetrators need to be identified because for the intervention programme to be effective, it must be directed towards the perpetrators. The categories of potential perpetrators as identified in the literature, which were explored in this study are "Director of Sport (DS)" "Coaches (C)" "Athletes (A)" and "Spectators (S)". These categories were adopted as they cover all the participants in university athletic settings. Hence, the purpose of the study was to find the perpetrators of sexual harassment experienced by athletes in southern Nigerian universities.

Research Questions

1. Who are the perpetrators of gender harassment experienced by athletes in southern Nigerian universities?
2. Who are the perpetrators of unwanted sexual attention experienced by the athletes?
3. Who are the perpetrators of sexual coercion experienced by athletes in southern Nigerian universities?

Methods

A cross-sectional survey design was employed for the study. The population for the study was 3 408 athletes. A sample size of 1 214 athletes (789 males and 425 females; 856 above 25 years and 358 less than 25 years; 927 undergraduates and 287 postgraduates; 232 married and 982 unmarried) were selected for the study. The multi-stage sampling procedure was used for sample selection. Firstly, a simple random sampling technique without replacement was used to select 15 out of 28 southern Nigerian universities. Secondly, a proportionate stratified random sampling technique was used to select 50% of the athletes in each of the selected universities. Finally, a simple random sampling technique without replacement was also used to select the athletes. Data collection was done using a 22-item structured questionnaire which was validated by seven experts to ascertain its content and face validity.

The experts are in the fields of Physical Education, Sociology and Anthropology, Psychology and Measurement and Evaluation at the University of Nigeria, Nsukka. The questionnaire alongside with the research questions and instrument validation evaluation guide were given to the experts to comment on the face and construct validity of the instrument. The

questionnaire comprised of section A, which generated personal data (age, gender, marital status and level of education) of the respondents and section B contained 18 questions on sexually harassing behaviours experienced by the athletes with the potential perpetrators (director of sport, coaches, athletes, spectators) for each participant to indicate by ticking (√) in the appropriate box as applicable to him or her. With 20 copies of the questionnaire administered to the University of Abuja (a northern university) athletes, and the subsequent application of the split-half method, the questionnaire had an overall reliability co-efficient of .8267, which was established using the Pearson product moment correlation in conjunction with the Spearman-Brown correction statistic. Furthermore, the subsections reliability co-efficients of .7627 for gender harassment, .8520 for unwanted sexual attention and .9071 for sexual coercion were established using the Cronbach alpha statistic. At the end, 1 214 questionnaires were administered to the athletes. Only 975 questionnaires were returned, giving a return rate of 80.31%. Nine hundred and forty-six (946) questionnaires were properly filled out and finally used for analysis. Descriptive statistics in the Statistical Package for Social Sciences (SPSS) were used to analyze the data. Percentages of each item were calculated based on the number (frequency) of athletes that experienced each item as represented by "F" in each table.

RESULTS

Data answering the research questions are presented in Tables 1 to 3.

Research Question 1: Who are the perpetrators of gender harassment experienced by athletes in southern Nigerian universities?

Table 1 shows that 574 (98.45%) athletes experienced sexist jokes from fellow athletes and 341 (58.49%) of them experienced it from the coaches. Also, 276 (98.22%) athletes experienced the display and distribution of sexual material to them from fellow athletes, and none of them experienced it from directors of sport and coaches. For those who experienced sexually suggestive comments about their body, 506 (94.4%) athletes had it from athletes, 121 (22.57%) from coaches and 66 (12.31%) from directors of sport. Among the athletes who were treated differently because of their gender, 215 (95.13%) had it from athletes, 127(56.19%) from coaches, 37(16.37%) from directors of sport and none (0.00%) from the spectators.

TABLE 1: **PERPETRATORS OF GENDER HARASSMENT EXPERIENCED BY THE ATHLETES**

			DS		C		A		S	
	Items	F	f	%	f	%	f	%	f	%
1	Directing sexist jokes to athletes	583	42	7.2	341	58.49	574	98.45	24	4.12
2	Displaying and distribution of sexual materials to athletes	281	0.00	0.00	0.00	0.00	276	98.22	13	4.63
3	Sexually suggestive comments about athlete's body	536	66	12.31	121	22.57	506	94.4	46	8.58

4	Being treated differently because of athlete's gender	226	37	16.37	127	56.19	215	95.13	0	0.00
	Cluster percentage			8.97		34.31		96.55		4.33

Note: DS= Director of Sports; C= Coaches; A= Athletes; S= Spectators

Research Question 2: Who are the perpetrators of unwanted sexual attention experienced by the athletes?

Table 2 reveals that among athletes who experienced sexualised name-callings directed to them, 268 (57.14%) had it from coaches and 451 (96.16%) of them experienced it from fellow athletes. The table shows that 198 (52.66%) athletes experienced sexual rumours spread about them from coaches and 274 (72.87%) of them indicated that they had it from fellow athletes. Among the athletes who experienced talk about sex all the time in their presence, 406 (98.54%) had it from fellow athletes and none of them experienced it from the directors of sport and spectators respectively. Again, among the athletes who experienced pressure for sex, 144 (92.31%) indicated that they had it from fellow athletes, 96 (61.54%) had it from coaches and none experienced it from the spectators. Data in Table 2 show that 244 (80.26%) athletes experienced pressure for a date or relationship with people who refuse to take "no" for an answer from fellow athletes and 118 (38.82%) of them experienced it from the coaches. Among the athletes who experienced their clothing pulled in a sexual way, none (0.00%) had it from the directors of sport and spectators. However, 237 (82.01%) of them experienced it from fellow athletes. It is evident that 261 (81.31%) athletes experienced sexual gestures directed to them from fellow athletes and only 2 (0.62%) athletes had it from the spectators. Among the athletes who experienced attempts from someone to establish a romantic relationship with them, none (0.00%) had it from the directors of sport and spectators, while 247 (84.59%) had it from fellow athletes. Table 2 shows that 172 (89.12%) experienced sexually offensive messages and or calls sent to them from fellow athletes.

TABLE 2: **PERPETRATORS OF UNWANTED SEXUAL ATTENTION EXPERIENCED BY THE ATHLETES**

			DS		C		A		S	
	Item	F	f	%	f	%	f	%	f	%
1	Directing sexualized name-callings to athletes.	469	0	0.00	268	57.14	451	96.16	17	3.62
2	Spreading sexual rumours about athletes.	376	0	0.00	198	52.66	274	72.87	9	2.39
3	Talking about sex all the time in athlete's presence.	412	0	0.00	113	27.43	406	98.54	0	0.00
4	Pressuring athletes for sex.	156	4	2.56	96	61.54	144	92.31	0	0.00
5	Pressuring athletes for a date or relationship refusing to take "No" for an answer.	304	56	18.42	118	38.82	244	80.26	16	5.26
6	Pulling athlete's clothing in a sexual way.	289	0	0.00	61	21.11	237	82.01	0	0.00
7	Directing sexual gestures to athletes	321	7	2.18	76	26.67	261	81.31	2	0.62
8	Attempt to establish romantic relationship with athlete.	292	0	0.00	76	26.03	247	84.59	0	0.00
9	Sending sexually offensive messages and or calls to athletes.	193	0	0.00	22	11.40	172	89.12	3	1.55
	Cluster percentage			2.57		29.52		86.35		1.49

Note: DS= Director of Sports; C= Coaches; A= Athletes; S= Spectators

Research Question 3: Who are the perpetrators of sexual coercion experienced by athletes in

southern Nigerian universities?

Data in Table 3 reveal that among the athletes who experienced benefits being offered to them as incentives to engage in sexual relationship with them, 197 (67.01%) had it from fellow athletes, whereas 83 (28.23%) experienced it from the coaches. One hundred and thirty-four (67.68%) athletes experienced threats with negative consequences for refusing to engage in a sexual relationship, 134 (67.68%) athletes indicated that they had it from fellow athletes, 76 (38.38%) of them encountered it from the coaches and none (0.00%) of them experienced it from the spectators. Among those who experienced forceful attempts to touch or fondle their bodies, 213 (83.20%) athletes had it from other athletes, none (0.00%) from the spectators and 68 (26.56%) encountered it from the coaches. Also, 77 (88.51%) athletes experienced attempted rape or forceful sexual intercourse from fellow athletes, 13 (14.94%) from the coaches and 3 (3.45%) of them experienced it from the directors of sport. Moreover, among athletes who experienced rape or forceful sexual intercourse, none of them had it from the directors of sport and spectators, whereas 12 (92.31%) of them had it from fellow athletes, with only 1 (7.69%) athlete affirming to have experienced it from the coach.

TABLE 3: **PERPETRATORS OF SEXUAL COERCION EXPERIENCED BY THE ATHLETES**

			DS		C		A		S	
	Item	F	**f**	**%**	f	%	f	%	f	%
1	Offering benefits as incentives to engage in sexual relationship with athlete.	294	26	8.84	83	28.23	197	67.01	2	0.68
2	Threatening athlete with negative consequences for refusing to engage in sexual relationship.	198	3	1.52	76	38.38	134	67.68	0	0.00
3	Forceful attempts to touch or fondle athlete's body.	256	5	1.95	68	26.56	213	83.20	0	0.00
4	Attempted rape or forceful sexual intercourse on athlete	87	3	3.45	13	14.94	77	88.51	1	1.15
5	Rape or forceful sexual intercourse on athlete.	13	0	0.00	1	7.69	12	92.31	0	0.00
	Cluster percentage			3.15		23.16		79.74		0.37

Note: DS= Director of Sports; C= Coaches; A= Athletes; S= Spectators

Major Findings

1. Gender harassment experienced by athletes in southern Nigerian universities was mostly perpetrated by athletes (96.55%), followed by the coaches (34.31%), directors of sport (8.97%) and spectators (4.33%).
2. Unwanted sexual attention experienced by the athletes was mostly perpetrated by athletes (86.35%), followed by the coaches (29.52%), directors of sport (2.57%) and spectators (1.49%).
3. Sexual coercion experienced by southern Nigerian universities athletes was mostly perpetrated by the athletes (79.74%), followed by the coaches (23.16%), directors of sport (3.15%) and spectators (0.37%).

DISCUSSION

It is clear from the study that fellow athletes were mostly the perpetrators of gender harassment experienced by southern Nigerian universities athletes. The finding was not surprising as athletes spend most of their time with fellow athletes during training, camping and competition than every other sport participant. However, it is agonising and disgusting that athletes are the source of embarrassment, humiliation and unhappiness to fellow athletes through gender harassment. In support of the finding, Fedgin and Hanegby (2000) and Gunduz *et al.* (2006) reported that teammates among other people are the harassers of sportspersons. Furthermore, the finding corroborates with Brackenridge and Cert's (2000) report that the harassers are usually sportsmen.

The finding that fellow athletes were mostly the perpetrators of unwanted sexual attention experienced by southern Nigerian universities athletes did not deviate from Hayden's (2003) report that most often the majority of perpetrators of sexual harassment on athletes were male athletes. The finding is not in any way a surprise because the athletes socialise more among

themselves than any other group and are also likely to develop emotional feelings, possibly

sexual interest directed at fellow athletes.

It is not surprising that fellow athletes are mostly the perpetrators of sexual coercion experienced by southern Nigerian universities athletes. During competitions athletes train and camp together irrespective of their gender. Some of the athletes are adolescents and some of them are in early adulthood. Due to a strong sexual drive at this stage of human development, the athletes are sexually active, thereby making them to coerce themselves into sex on any slightest opportunity. The finding shares with earlier studies (Fedgin & Hanegby, 2000; Gunduz *et al.*, 2006) that teammates among other people are the harassers of sportspersons.

CONCLUSIONS AND RECOMMENDATIONS

It was concluded that apart from athletes who were mostly the perpetrators of gender harassment, unwanted sexual attention and sexual coercion on southern Nigerian universities athletes, coaches, directors of sport and spectators were also involved. In order to prevent the athletes from experiencing these forms of sexual harassment from sports participants, the following recommendations are suggested:

1. A sexual harassment intervention programme should be designed and mounted in southern Nigerian universities.
2. While mounting the intervention programme, attention and efforts should be directed to all the perpetrators especially the athletes and coaches.
3. Moral education should be integrated into the athletic settings of southern Nigerian universities.
4. Workshops, seminars and symposia against sexual harassment should be organised for sport participants especially the athletes and coaches. These programmes should discourage sexual perpetration.
5. Serious punitive measures should be mapped out and taken on the perpetrators of sexual harassment.
6. Anti-sexual harassment campaigns should be taken with the assistance of the media. This will ensure that the message gets to every member of society.
7. The social and moral life of the athletes and coaches should be established before admitting any athlete and recruiting coaches into the university athletic team.
8. Athletes and coaches should be made to sign an undertaking of good moral conduct annually.
9. Athletes should collect an attestation letter of good behaviour from their parents or guardians.

In addition, to overcome sexual harassment at university level, the university should employ the following strategies: an anti-sexual harassment policy; an education programme; a sexual harassment complaint system; a support system; and a monitoring network and evaluation.

a. The university authorities should formulate policy prohibiting sexual harassment of athletes. In specific terms, the policy:

- should be approved by all authorities involved in university sports
- should be clear and widely communicated to participants of university sports
- should be easily understood by participants of university sports

- should involve consultations with university athletes
- should apply to all involved in university sports
- should be reviewed on regular basis by all involved in university sports
- should specify what constitutes sexual harassment to university athletes and the ranges of the consequences or punishment for violations
- should specify sexual harassment complaint procedures for university athletes
- should provide support systems for athletes who are sexually harassed

b. The universities should match the sexual harassment prevention programme with a

comprehensive education programme. The education programme:

- should employ role plays on sexual harassment
- should open debates on sexual harassment of university athletes
- should provide resources on what constitute sexual harassment to athletes in departmental, faculty and university libraries for the consumption of the university community
- should incorporate sexual harassment of athletes in the university's general studies for all the students as a means of sensitising the students on what constitutes sexual harassment
- should provide video scenarios that discourage sexual harassment of athletes
- should provide for focus group discussions on sexual harassment disseminated by the mass media
- Flyers, posters and educational pamphlets about sexual harassment should be developed and distributed to the members of the public. A day should be mapped out for anti-sexual harassment campaign with T-shirts bearing anti-sexual harassment slogans worn by all the students. Strategic bill boards with anti-sexual harassment slogans around the sports settings should be provided
- Research on sexual harassment of athletes should regularly be conducted, published and made available to the public by the university

c. There should be a complaint system set up by the university. The university:

- should provide an accessible independent sexual harassment complaint unit for harassed athlete(s)
- should ensure proper filing of sexual harassment complaints by athlete(s)
- should ensure proper handling of sexual harassment complaints by athlete(s)
- should ensure that members of the sexual harassment complaint unit should be professionals of high integrity

d. A support system should be provided by the university for sexually harassed athletes. The support system:

- should safeguard the privacy of sexually harassed athlete(s)
- should ensure speedy, fair and confidential investigation of reported case(s) of sexual harassment of athlete(s)
- should ensure the security of sexually harassed athlete(s)
- should provide confidential counselling for sexually harassed athlete(s)
- should provide compensation to sexually harassed athlete(s) by the perpetrator(s)

e. The universities should establish a monitoring network especially in or around the university athletic settings. The universities should:

- mount surveillance cameras around its sport settings
- create a task force to gather information about sexual harassment of athletes
- install adequate lightning around and in its sport settings
- clear the bushes and all hide outs around and in its sport settings
- have adequate security teams to patrol around and in sport settings
- constitute sexual harassment policies and an implementation and monitoring team especially for sport

f. There should be regular evaluation of sexual harassment experiences among athletes by the universities. Sexual harassment forms should be provided regularly to the athletes by university and sincerely completed by the athletes.

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THE LEISURE AND SPORT PARTICIPATION PATTERNS OF HIGH SCHOOL LEARNERS IN POTCHEFSTROOM

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ABSTRACT

Leisure and sport activities are thought to be developmentally important because it provides opportunities for skill development and the formation of social relationships during adolescence. Added to this the number and variety of leisure and sport activities create ample opportunities for participation. However, it became evident that leisure behaviour of adolescents today is not always constructive or positive and that the learners are becoming more passive. This passivity is influenced by various factors such as lack of time for leisure, too much exposure to technological means of spending leisure time, changing lifestyles and other influences. Leisure can be seen as an activity chosen in relative freedom for its qualities of satisfaction, whereas sport can be seen as organised activities focused on physical effort with some relative measurement of outcomes. The aim of this article is therefore to determine the leisure and sport participation patterns of high school learners and to indicate differences in preferences for leisure and sport activities based on socio-demographic variables. A survey was conducted at six high schools in Potchefstroom resulting in 1 036 questionnaires being used for statistical analysis. The results revealed that high school learners experience boredom in Potchefstroom, even though they have little time available per week for participation in leisure activities. When participating in leisure activities, they prefer socialising with friends, watching television or spending time on the computer. In terms of sport, respondents prefer typical school sports such as athletics, soccer and hockey. It was also noted that a large proportion of the learners visit a gymnasium. Correlations were determined between gender and sport, gender and leisure, race and sport, as well as race and leisure. It was noted that rugby and soccer were more associated with males. Although there were small practical significant differences between gender and leisure activities, it was found that males and females do not necessarily differ in their preferences of leisure activities. Females participated in leisure activities more than males. Soccer was preferred by predominantly black respondents and visits to the gymnasium by predominantly white respondents. Watching television, movies, visiting boys and socialising with friends were preferred by white respondents whereas black respondents enjoyed reading, studying, religious activities and visiting girls as leisure activities.

Key words: Recreation; Leisure; Adolescents; Needs; Behaviour; Correlation analysis

INTRODUCTION

Research concerning the youth, leisure and recreation has spanned decades and has been approached from sociological, economical, psychological, recreational, physiological and philosophical perspectives (Caldwell *et al*., 1999; Mahony *et al*., 2004). More extensive educational participation (Furlong & Cartmel, 1997), lifecycle changes and cultural influences have led to changes in lifestyle patterns of youth. Adolescents, according to Piko and Vazsnyi (2004) not only have more free time, but also a greater variety of leisure activities from which to choose. Leisure activities play a very important role in forming an identity, providing interaction with peers, well being, health and problem behaviour.

Being an adolescent (between 11 years old and the early twenties) refers to that stage in life where a person is neither a child nor an adult (Edwards & Louw, 1998). High school learners can therefore be considered as adolescents. Willits and Willits (1987) state that adolescence is a unique part of life where young people worry about schoolwork and relationships, they dress differently and listen to contemporary music. Their greatest concern according to Willits and Willits (1987) is their future and purpose in life and they prefer to spend time with friends and to partake in group activities.

Evans and Poole (1991) state that leisure activities among adolescents are diverse and play an important role in the forming of adolescent self-perceptions. However, negative leisure participation can lead to negative behaviour (Trainor *et al*., 2010) and therefore knowledge concerning leisure participation enables pro-active strategies focusing on positive leisure participation. Therefore, the aim of this article is to determine the leisure and sport participation patterns of high school learners and to indicate differences in preferences for leisure and sport activities based on socio-demographic variables. In order to achieve the latter, the article will be structured as follows: the literature review follows the introduction; thereafter the methodology will be explained; the results and implications of the study follow; and where after conclusions will be drawn.

LITERATURE REVIEW

According to statistics provided by the Medical Research Council (*Die Burger*, 2004), a quarter of all substance-abusing patients in South Africa are younger than 20 years. Results from a survey completed in the United States (US) in 2000, indicate that children and adolescents between the ages of two and 17 years spend an average of five hours and 29 minutes on all media combined (including music and reading) per day (Gillespie, 2002). The distinctive US adolescent watches an average of three hours of television per day (Hampl *et al*., 2004). This situation is very similar to that of the youth in South Africa (Fourie, 2006). Hampl *et al.* (2004) purports that most media tools have a negative influence on adolescents regarding their impressions of bodyweight, sex appeal and food and beverage consumption. At least three quarters of adolescents eat fast food once or more times a week (Anon, 2004) and obesity, from an early age, is increasingly becoming a problem worldwide (Troiano & Flegal, 1998; Lajunen *et al*., 2009). Added to this is the fact that most schools do not offer physical education as they formerly were required to do. This contributes to a lack of physical exercise and to the development of unhealthy lifestyles. There is also an increase in

aggressiveness that researchers ascribe to a lack of activities that could serve as an outlet for children's frustrations (Piko & Vazsnyi, 2004).

Caldwell (2005) state that practitioners and scientists consider positive usage of leisure to be completely beneficial. Conversely, today greater consideration is given to the fact that leisure can be negative as well. Caldwell (2005) further explains that negative leisure patterns can be influenced by negative experiences (for example, boredom, over scheduling, loneliness and leisure addiction) and negative behaviour (for example, substance abuse and risky sexual behaviour). Leisure serves as a central life force that the individual can shape to have either positive or negative consequences (Edginton *et al*., 2006). Sport and recreation, on the other hand, can be seen as organised activities focused on physical effort with some relative measurement of outcomes. For some individuals, sport is considered leisure (passive or active), while for others it is work, education and development (Edginton *et al*., 2006).

According to Caldwell *et al.* (1999: 1) leisure boredom is a 'complex phenomenon' and is defined as ''the subjective perception that available leisure experiences are not sufficient to instrumentally satisfy needs for optimal arousal'' (Iso-Ahola & Weissinger, 1990: 4). This may be the main reason for negative leisure experiences and behaviour, but is definitely not the only one. Other significant causes can be due to pressure from peers, low self-esteem, broken families and trauma. Gordon and Caltabiano (1996) note that leisure boredom and dissatisfaction have been implicated in substance abuse.

Positive leisure behaviour is influenced and encouraged by the availability of leisure activities and facilities (Edginton *et al*., 1998). It is therefore important that there are a sufficient variety of activities and facilities available in a city such as Potchefstroom in order to satisfy the needs of various groups (Fourie, 2006). Saayman (1993) and Mogajane (2005) indicated the following problem areas in the provision of sport and recreation in South Africa:

- Lack of transport to events and facilities;
- Lack of leisure time;
- Safety and security;
- Lack of trained staff to present activities and to manage facilities;
- The differences in cultural preferences;
- Lack of facilities;
- Vandalism and lack of proper maintenance of facilities; and
- Lack of finances.

Therefore, according to Edington *et al.* (1998) the social, cultural and individual context in which adolescents live have an enormous influence on them in terms of how they spend their leisure time. Edgington *et al.* (1998) note that the foundation of leisure behaviour is both intrinsic and extrinsic. Intrinsic motivation means that the behaviour is based on the enjoyment of the behaviour itself, rather than relying on or requiring external reinforcement. Hence, people engage in leisure of their own choice. On the other hand, extrinsic motivation refers to the desire or drive to perform in order to gain external rewards from the leisure activity.

According to Murphy *et al*. (1991) there are different leisure behaviour dimensions, such as motives, individual differences, social relationships and attitudes and beliefs. This may lead

to the fact that individuals pursue leisure for different reasons and these reasons may vary from person to person, depending on each person's unique personality, lifestyle, goals and needs. Many participants pursue leisure primarily for fun and enjoyment. Leisure programmes can help the youth in meeting developmental needs such as a need for positive social interaction, safety, belonging, creative expression, physical activity, a sense of competence and a sense of individualism (Edginton *et al*., 2006).

Floyd *et al*. (1994) state that race and ethnicity also influence the leisure preferences of people. Therefore, the socio-demographics (gender, race, language, etc.) of participants influence leisure behaviour. Different cultures prefer different leisure and recreation activities. South Africa is diverse in culture and race and this diversity can influence leisure behaviour and motivation as an external driving force (Lumsdon, 1997; Page *et al*., 2001). Thus, research concerning the leisure participation patterns of different cultures is important. Murphy *et al.* (1991) state that leisure behaviour is a complex phenomenon; a dynamic, fluid, on-going process that changes continually amongst adolescents, both for peer groups, as well as for individuals.

In summation, Lu and Pas (1999) state that a combination of socio-demographic determinants play a role in leisure behaviour. The following model (Figure 1) can assist in conceptualising a framework in order to determine leisure needs and preferences. The model makes provision for in-house and out-of house activity participation and the impact thereof on leisure behaviour. The model is also supported by numerous studies (reflected in Table 1), indicating how different people, countries and cultures participate in different activities. The relevance of this is that one approach to sport and recreation provision could address everybody's needs.

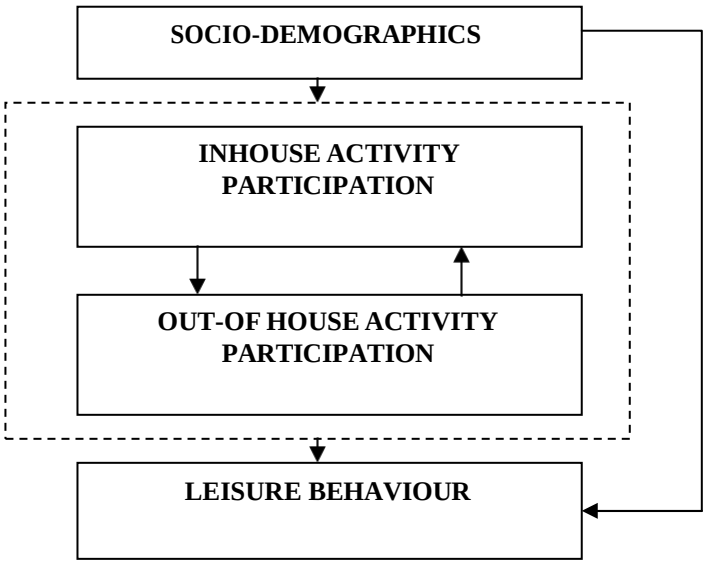

FIGURE 1: **SOCIO-DEMOGRAPHIC AND LEISURE BEHAVIOUR MODEL**
Source: Adapted from Lu and Pas (1999)

A literature review on leisure needs and leisure behaviour research conducted in South Africa revealed the following publications as indicated in Table 1.

TABLE 1: **PREVIOUS STUDIES WITH SPECIFIC REFERENCE TO THE SOUTH AFRICAN CONTEXT**

Author	**Title and purpose of the study**
HRSC (1982)	*National survey of sport and recreation in South Africa.* The first and the only national survey conducted on sport and recreation needs and provision in the country. It was found that adults staying in cities do not participate in sport due to a lack of time and facilities.
Scholtz *et al*. (1989)	*The need for a sport and a recreation centre for the Nelspruit region* A needs assessment study was done for Nelspruit City Council for a sport and recreation centre. The results showed that there was an immense need for a sport and recreation centre.
Scholtz (1989)	*The sport and recreation participation and needs of Soweto* This study aimed at listing all the preferred sport activities of the black communities. A need analysis was undertaken regarding the requirements for a Sport and Recreation centre in Soweto.
Scholtz *et al*. (1990)	*The provision of leisure services and resources for Verwoerdburg* The aim of this study was to determine the sport and leisure needs of the residents of Verwoerdburg. It was, however, found that there was a shortage of information on how to provide the needs of the residents and that more studies similar to this one need to be conducted.
Hattingh (1990)	*Ontspanningsfasiliteit vir swartes: Behoeftes en voorsiening / Leisure facilities for black people: Needs and provision* This study demonstrated that participation in recreation is influenced by various factors.
Pistorius (1990)	*Rekreasievoorsiening vir swart werknemers: 'n Behoeftebepaling / Recreation provision for black employees: A needs analysis.* The study determined that the availability and accessibility of facilities could inhibit participation. It was also found that television is the favourite recreation pastime, followed by church activities.
Wilson (1992)	*Sport, recreation and tourism in South Africa: Preferences and participation patterns* This study indicated that community members participate in activities focused on culture, and that participation in recreation led to an improved quality of life. Wilson indicated that culture or ethnical differences play a role in sport and recreation choices.
De Man (1992)	*Rekreasie en sport voorkeure van swartmense in die Suid-Oranje Vrystaat / Recreation and sport preferences of black people in the Southern Orange Free State* The aim of this study was to plan recreation and sports activities as well as facilities according to identified preferences.
Kohler (1992)	*Sport, recreation and tourism in South Africa: A review of theory, demography and patterns of preferences and participation* This study indicated that people want to participate in recreation activities close to home due to mobility and safety.

Scholtz *et al*. (1992)	*A strategic plan for the provision of leisure services and resources for Randburg* The focus of this study was to develop a strategic plan to provide leisure services and resources to the community of Randburg. It was therefore necessary first to identify leisure services and resources that answered to the needs of the community and to develop a varied leisure program for the entire Randburg community.
Scholtz *et al*. (1993)	*A strategic plan for the provision of leisure services and resources for Potchefstroom* A strategic plan for the provision of leisure services and resources was developed for Potchefstroom.
Scholtz (1993)	*Leisure preferences and needs of South Africans between 15 and 30 years of age* The aim of this study was to investigate and analyse the sport and recreation preferences and needs of South Africans in the identified age groups.

Saayman (1993)	*Rekreasiebestuur in swart plaaslike owerhede/ Recreation management in black local municipalities* A comprehensive analysis of recreation services in South Africa was conducted in order to identify areas that need attention.
Saayman (1994)	*A strategic plan for the provision of leisure services and resources for Klerksdorp* A plan was developed for Klerksdorp to implement reconstruction and to determine objectives and action steps regarding better facilities and the implementation of the plan.
Wessels (1995)	*Leisure needs of young people in Pietersburg* This study aimed to determine the current, as well as latent, patterns of leisure participation and the demand of youths in Pietersburg. It also focused on the market strategies and leisure products or services of the Department of Parks, Sport and Recreation.
Scholtz *et al*. (1995)	*Sport and recreation provision for Promosa* This extended study focused on gathering scientific data regarding the sport and recreation needs of Promosa with exceptional focus on the youth population. A development plan was compiled for systematic implementation.
Saayman & Van den Berg (1995)	*Sport and leisure provision for the township of Mohadin* This study aimed at identifying the sport and recreation needs of the Mohadin community and the specifically people between the ages of 12 and 19 years old.
Saayman & Muller (1996)	*Sport and recreation needs and preferences for the community of Reitz/Pestana* It was the focus of this study to obtain scientific information regarding the sport and recreation preferences and needs of the community members in Reitz/Pestana.
Scholtz (1997)	*Gross list of leisure activities* The purpose of this study was to identify the leisure activities people preferred and in which they participated.
Meyer (1997)	*Recreation provision in the North West Province* This study aimed to determine the role of local government in providing Parks and Recreation services, as well as identifying leakages to improve the current provisioning systems of Parks and Recreation in the North West Province.
Mogajane (2005)	*Leisure and tourist behaviour in rural areas in North West Province* This study focused on determining the ways in which the accessibility of leisure and tourist behaviour patterns can be improved to ultimately improve the quality of life of people in rural communities in the North West Province
Wegner *et al*. (2006)	*Leisure boredom and substance use among high school students in South Africa* This study aimed to determine whether leisure boredom is a predictor of high school dropout among high school students in Cape Town (South Africa).

The majority of the studies summarised in Table 1 concluded firstly that it is important to determine leisure, recreation and sport needs as this assists in decision-making regarding planning of future developments and improvement of current facilities. Secondly, that needs differ from culture to culture. Thirdly, that needs change over time. Fourthly, that the world is changing at a rapid pace and this affects leisure behaviour. These changes include technological, political, environmental, economical and cultural changes, to name but a few. However, with few exceptions, most of these studies were conducted in the 1980's and 1990's, which may make them irrelevant to the generation of today as needs are changing and are directly influenced by internal and external forces. Finally, these studies also showed that very little has been done to accurately determine the leisure needs of the youth.

Having taken the above in consideration, Mogajane (2005) indicated that sport and recreation provision is also a responsibility of municipalities, schools and sport and recreation departments. However, these organisations cannot provide the leisure needs of a community or its youth if they do not know what the needs are. Therefore, the current research is important as it can assist the local government, private sector or schools in the planning and development of the most appropriate leisure facilities and activities for the youth in

Potchefstroom. This insight can engender more positive, emotional, physical and healthy leisure behaviour patterns in a safe environment that may lead to an increase in the quality of life of adolescents.

METHOD OF RESEARCH

Quantitative research has been conducted by means of a survey in 2006. There are approximately 5 850 high school learners (Grades 8 to 12) in Potchefstroom, distributed amongst eight high schools that formed part of the sample framework. However, the study only focused on Grade 10 (9%), Grade 11 (67%) and Grade 12 (15%) learners. The sampling procedure was twofold. Firstly, all high schools were approached to determine their willingness to take part in the survey. Six of the eight schools were willing to be part of the research. The selection of the sample members was therefore based on saturation sampling, indicating that sample members (schools) were chosen on the basis of their being readily available. The primary data was gathered by means of questionnaires, distributed by the Life Orientation teachers of Grade 10, 11 and 12 learners as agreed with the headmaster of each school. Questionnaires were only distributed in the Life Orientation classes as it is a compulsory subject. Therefore, the second part of the sampling procedure was also based on saturation sampling, meaning that those learners willing to participate and attending class on the day of distribution were included. The questionnaires were anonymously completed by the learners. Approximately 1 500 questionnaires were distributed amongst participating schools and 1 036 questionnaires were usable for data analysis. This gives a return rate of 69%.

The questionnaire design was based upon a similar questionnaire developed by Scholtz *et al.* (1995). However, changes were made according to the needs and particular purpose of this study. The questionnaire obtained information with regard to the socio-demographic profile (gender, race, age and language) of the respondents, as well as their leisure (boredom) preferences, frequency of participation and sport profiles (preferences and frequency of participation).

The researchers collected the questionnaires at each school after which the data was captured and analysed on the Statistical Package for Social Sciences 14 (SPSS) by Statistical Consultation Service (SCS). The statistics obtained included descriptive statistics focusing on one-way and two-way frequency tables in order to determine correlations between variables.

RESULTS

The results consist of two sections – a socio-demographic and a leisure profile of respondents, followed by the correlation analysis.

Section A: Socio-demographic and leisure profile

As shown in Table 2, there was a fair distribution regarding gender, with 52% of respondents being male and 48% being female. Similarly with regard to race, 41% were white and 59% were black respondents. Most of the respondents were 17 years of age, followed by the

second largest group that were 16 years of age. Fifty-nine percent (59%) of the respondents were Afrikaans-speaking followed by 27% Tswana-speaking respondents.

TABLE 2: **THE SOCIO-DEMOGRAPHIC PROFILE OF RESPONDENTS**

Attribute	**Percent:** ***N*** **= 1036**
Gender:	
Male	52%
Female	48%
Race:	
White	41%
Black	59%
Age:	
< 16 years	10%
16 years	20%

17 years	43%
18 years	17%
>18 years	13%
Language:	
Afrikaans	59%
English	6%
Tswana	27%
Other	8%

It is evident from Table 3 that most respondents experienced boredom (63%) and almost unanimously, they would enjoy more things to do (97%). Wegner *et al*. (2006) confirms that boredom among South African adolescents is high. The respondents felt that weekends were fairly interesting (32%), or interesting (34%). Time for leisure seemed to be scarce with 22% having only 3-4 hours free for leisure time and 21% having only a half day available per week. Even though they did not seem to have that much time available for activities they were still bored at times. Concerning leisure activities, respondents preferred socialising with friends (29%), watching television or spending time on the computer (26%). Respondents listened to the radio (73%), watched television (71%) and socialised with friends (54%) on a daily basis. In terms of sport activities, respondents preferred to partake in athletics (43%), followed by soccer (32%) and hockey (31%). However, they visited the gymnasium (68%) and took part in netball (48%), rugby (38%) or tennis (38%) on a daily basis. The results confirmed research conducted by Trainor *et al*. (2010) who indicated that young people appeared to be active in their leisure time and they preferred going to clubs and parties, visiting restaurants, listen to music and playing sport. Activities such as reading did not appear to be so popular although 38% of respondents enjoy reading.

TABLE 3: **LEISURE PROFILE OF RESPONDENTS** (N=1036)

ATTRIBUTE			**%**
Experiencing boredom in Potchefstroom:			
Yes			63%
No			37%
Preference for more things to do in Potchefstroom:			
Yes			97%
No			3%
Experience of weekends in Potchefstroom:			
Very interesting			18%
Interesting			34%
Fairly interesting			32%
Boring			12%
Very boring			4%
Amount of leisure time per week:			
No free time			4%
More than a day			9%
One day			11%
Half day			21%
Approximately 3-4 hours per week			22%
Approximately 3 hours per week			18%
Approximately an hour per week			9%
Less than an hour per week			6%
LEISURE PROFILE			
Leisure preferences:		**Frequency of participation:**	
Socialisation	29%	**Almost daily:**	
Audio-visual media	26%	Radio	73%
Leisure activities	14%	Television	71%
Going out	11%	Socialisation	54%
Sport	9%	Studying	52%
Art	4%	Reading	38%
Other	7%	**Once a week:**	

		Religion	53%
		Visiting girls/boys	34%
		Video's	32%
		Movies	31%
SPORT PROFILE			
Sport preferences:		**Frequency of participation:**	
Athletics	43%	**Almost daily:**	
Rugby	29%	Gymnasium	68%
Hockey	31%	Rugby	38%
Cricket	28%	Hockey	37%
Soccer	32%	Soccer	37%
Netball	18%	Netball	48%
Swimming	8%	Tennis	38%
Tennis	12%	**Once a week:**	
Gymnasium	11%	Swimming	38%
Other	33%		

Section B: Correlation analyses

The purpose of the correlation analyses was to determine the relationships between the different variables by means of two-way frequency tables. The following relationships were determined: between gender and sport; between gender and leisure; between race and sport; and between race and leisure.

73

In this case, the effect size (importance of the relationship between two variables) is given by $w = \sqrt{\frac{X^2}{n}}$,

where X^2

is the usual Chi-square statistic for the two-way frequency tables and

n is the sample size. In the current case, a medium effect of

$w = 0.3$

might indicate practical significance and significance.

Gender correlations

$w \geq 0.5$

is considered as a large effect and of practical

Table 4 shows the relationships between gender and various sport activities. The percentages indicate the level of participation by each gender group according to sport. It is evident that females indicated lower levels of interest in sport activities than males. According to the Phi Coefficient, there was a medium effect between rugby and gender (-0.44) and soccer and gender (-0.47) (highest Phi coefficient), which indicated a practical significance between gender and the identified sport activities. There was a small effect between cricket and gender (-0.34) and between netball and gender (0.35). It is therefore clear that rugby, cricket and soccer were associated with males, while netball was associated with females. These sport codes seem to remain gender specific even though women can participate in rugby, soccer or cricket and males can take part in netball. Previous studies found that boys prefer competitive sport (e.g., soccer and weight-lifting) and girls low intensity sport (e.g., aerobic dance, swimming) (De Man, 1992; Saayman, 1994; Delaney & Lee, 1995; Sallis *et al.*, 1996; Mogajane, 2005). In the current study, however, the females preferred swimming, which contradict most of the previous research.

TABLE 4: **THE RELATIONSHIP BETWEEN GENDER AND SPORT**

SPORT	MALE	FEMALE	PHI COEFFICIENT
	LEVEL OF PARTICIPATION	LEVEL OF PARTICIPATION	
Athletics	49%	35%	-0.14
Rugby	**49%**	8%	**-0.44**
Hockey	36%	25%	-0.12
Cricket	**43%**	12%	**-0.34**
Soccer	**54%**	9%	**-0.47**
Netball	0%	**23%**	**0.35**
Swimming	6%	3%	0.05
Tennis	6%	9%	0.06
Gymnasium	4%	8%	0.08

The relationship between gender and various leisure activities is recorded in Table 5. The percentages indicate the level of leisure participation by each gender group. According to the Phi Coefficient, there was only a small effect between visiting girls and gender (-0.18) (highest Phi coefficient) and visiting boys (0.12) and gender, as well as listening to the radio and gender (0.11), which might indicate practical significance. It is therefore clear that males and females did not necessarily differ in their preferences of leisure activities. In general, females participated more in leisure activities than males, especially religious activities and socialisation. Respondents were, however, more involved in leisure activities (Table 5) than in sport activities (Table 4).

Race correlations

Table 6 records the relationship between race and various sport activities. The percentages indicate the level of participation by each race according to sport. According to the Phi Coefficient, there was only a medium effect between soccer and race (0.31) (highest Phi coefficient) and a small effect between visiting the gymnasium and race (-0.20), which might indicate practical significance. Soccer was mostly preferred by black respondents, while visits to the gymnasium were preferred by white respondents.

TABLE 5: **THE RELATIONSHIP BETWEEN GENDER AND LEISURE**

LEISURE	MALE	FEMALE	PHI COEFFICIENT
	LEVEL OF PARTICIPATION	LEVEL OF PARTICIPATION	
Reading	72%	78%	0.01
Radio	81%	**89%**	**0.11**
Television/Computer activities	84%	90%	0.08
Movies	83%	89%	0.08
Parties	80%	80%	0.00
Visiting girls	**84%**	69%	**-0.18**
Visiting boys	67%	78%	**0.12**
Socialising with friends	87%	92%	0.07

Religion	87%	94%	0.07
Hobbies	79%	80%	0.02
Studying	83%	87%	0.06
Night clubs	70%	67%	-0.03
Doing nothing	73%	75%	0.02

The current research therefore supports previous studies conducted by Scholtz *et al*. (1992), Wilson (1992) and Scholtz (1993). White respondents participated more in athletics, hockey, netball and visiting the gymnasium. These findings are similar to results by Saayman (1993). On the other hand, black respondents participated slightly more in rugby, hockey, cricket, soccer and tennis. The latter confirms research by Mogajane (2005).

TABLE 6: **THE RELATIONSHIP BETWEEN RACE AND SPORT**

SPORT	WHITE	BLACK	PHI COEFFICIENT
	LEVEL OF PARTICIPATION	LEVEL OF PARTICIPATION	
Athletics	47%	37%	-0.01
Rugby	28%	30%	0.02
Hockey	31%	30%	0.00
Cricket	26%	31%	0.06
Soccer	20%	**50%**	**0.31**
Netball	13%	9%	-0.05
Swimming	5%	5%	0.01
Tennis	7%	8%	0.02
Gymnasium	**10%**	0%	**-0.20**

Table 7 shows the relationship between race and various leisure activities. The percentages indicate the level of participation by each race according to leisure. According to the Phi Coefficient, there was a small effect between doing nothing and race (-0.25) (highest Phi

coefficient) as well as nightclubbing, socialisation and parties and race (-0.22 each respectively) indicating practical significance. There was also a small effect between television (-0.15), religion (-0.15), hobbies (-0.14), studying (-0.13), movies (-0.12), visiting boys (-0.11) and race indicating practical significance. Watching television, movies, visiting boys and socialising with friends were thus preferred by white respondents, whereas black respondents enjoyed reading, studying, religious activities and visiting girls as leisure activities. The latter contradicts research by De Man (1992), Wilson (1992) and Mogajane (2005) who found that television is the most preferred recreation activity by black respondents.

TABLE 7: **THE RELATIONSHIP BETWEEN RACE AND LEISURE**

LEISURE	WHITE	BLACK	PHI COEFFICIENT
	LEVEL OF PARTICIPATION	LEVEL OF PARTICIPATION	
Reading	72%	79%	0.08
Radio	87%	82%	-0.07
Television/ Computer activities	**91%**	81%	**-0.15**
Movies	**90%**	81%	**-0.12**
Parties	**87%**	69%	**-0.22**
Visiting girls	75%	81%	0.07
Visiting boys	**95%**	66%	**-0.11**
Socialising with friends	**94%**	81%	**-0.22**
Religion	**84%**	84%	**-0.15**
Hobbies	**89%**	72%	**-0.14**
Studying	**78%**	79%	**-0.13**
Night clubs	**83%**	57%	**-0.22**
Doing nothing	**83%**	61%	**-0.25**

IMPLICATIONS

Based on the results of the research, the following implications were identified.

Firstly, the research support the findings of Lu and Pas (1999) who found that a variety of socio-demographic variables determine leisure behaviour. In the case of the youth in

Potchefstroom, it was found that gender and race had a profound impact on their needs and leisure behaviour. Sports such as rugby, cricket and soccer were associated with males whilst females participated in netball. However, the current study found no significant differences between gender and leisure activity preferences. Black respondents preferred participation in soccer, cricket and tennis, while white respondents participated in athletics, hockey, netball and visiting the gymnasium. Watching television, movies, visiting boys and socialising with friends were preferred by white respondents, whereas black respondents enjoyed reading, studying, religious activities and visiting girls as leisure activities.

Secondly, compared with previous research, this undertaking also confirmed that there have been changes in leisure and sport behaviour over the past two to three decades. Regarding leisure, there was a greater focus on the use of technology at leisure, on socialising with

friends and in participation in more passive types of activities (e.g., watching television or computer related activities). Sport participation was not exclusive, but still gender specific and more focused on general health and socialisation. Even though respondents participated in both sport and leisure activities, there was a greater demand for leisure than for sport activities. It was interesting to note that respondents also had a wider variety of activities which they participated in compared to more than 20 years ago.

Thirdly, adolescents were experiencing boredom in Potchefstroom and would have liked a greater variety of activities in the city. This was especially the case over weekends. The current research therefore confirms that the youth have a need for organised sport and leisure activities, which was also indicated by Scholtz *et al.* (1995), Wessels (1995) and Mogajane (2005). Therefore, municipalities, schools and recreation departments should take note of these findings and should provide for the leisure needs of the youth of South Africa. Failing to do so could increase negative leisure behaviour and unhealthy lifestyles that influence the well-being of both families and societies. This project supports the view that research of this nature is important for activity planning and for facility development decisions.

Fourthly, the research confirmed that even though adolescents had very little time available for leisure, they regarded leisure as important. It is therefore crucial to provide quality activities in the limited time available to learners. According to Caldwell (2005), provision of quality activities can lead to positive behaviour and reduce the participation in negative activities such as subsistence abuse, boredom and the like. The lack of time for leisure is confirmed by the research of Scholtz (1989), Hattingh (1990), Pistorius (1990), Scholtz *et al.* (1990) and Mogajane (2005) amongst others. However, it seemed as if learners of today have even less time for leisure. Contributing factors here might be the changed school curriculum and system that allows learners very little time for sport and leisure, as well as the absence or lack of physical education (McKenzie *et al*., 2000) that formerly contributed to the promotion of a healthy lifestyle.

Lastly, socialisation and the use of audio-visual media formed an important part of the learners' daily activities. The media, for example, Facebook, the Internet and SMS messaging can be used to communicate with the youth to make them aware of recreation, leisure and sport opportunities. The media can therefore serve as tools to communicate with the youth.

CONCLUSIONS

The purpose of this research was to determine the leisure and sport needs of high school learners in Potchefstroom. A survey was conducted at six high schools in Potchefstroom. The results revealed differences in the leisure and sport needs of males and females, as well as black and white learners, even though most learners were exposed to all available activities. The results identified the leisure and sports profiles of learners. From this research, it is evident that municipalities, schools and recreation departments need to undertake further research to determine the leisure and sport needs of learners, since these needs are continually changing. The literature review also clearly showed a decline in this type of research which could have a profound impact on the youth of South Africa. Coupled to this, facility providers also need to be aware of changes in aspects of the technology, economic and political

environments that affect how learners use their leisure time. If society do not address these issues, they could have serious consequences for the future of the country.

The results can primarily be used to develop and plan appropriate activities and facilities and secondly, encourage healthy lifestyles through increased participation. It is recommended that this research should be expanded through all secondary school levels and to conduct such research on a regular basis in order to develop a complete framework of leisure and sport needs for the youth of South Africa.

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REFLECTIONS ON THE 1862 FOOTBALL MATCH IN PORT ELIZABETH

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ABSTRACT

The oldest recorded football match in South Africa was played in Port Elizabeth on 24 May 1862. This article explores the available evidence for this match before moving on to a more general discussion of three broader contexts in which the match was played. These contexts are contemporary football developments in colonial Britain, the emergence of 'carrying codes' in the Cape Colony and the mid-19th century development of sport in Port Elizabeth. Very little is known about the 1862 match in Port Elizabeth. The discussion of the match therefore serves as a pretext for a situated exploration of the 19th century codification of 'football' – which produced, inter alia, the dominant South African codes of 'rugby' and 'soccer.' Here, 'codification' involves more than the establishment of rules and clubs; it includes the association of sporting practices with other social 'codes' – notably those associated with class, gender and race. In this article particular attention is given to the association of 'football' with a particular public school mediated model of masculinity. The author argues that the reason the Port Elizabeth game has gone largely unnoticed in most sporting histories is because it cannot easily be classified as 'a code' and thereby slotted into prevailing South African code historiographies.

Key words: Sociology of sport; History of sport; Sport and leisure studies; Football; Rugby; Soccer; Masculinity; Port Elizabeth

INTRODUCTION

The oldest recorded football match in the territory that is now South Africa was played in Port Elizabeth on Saturday 24 May 1862 (*Eastern Province Herald*, 23 May 1862). Very little is known about this match, but the evidence that has survived makes for an interesting account of an early sporting event. A key question that has inspired this article is why this game remains largely unrecorded in contemporary histories of both rugby and soccer.[1] Given the paucity of information on the match, the initial narrative forms the basis of an attempt to

[1] Raath (2002: 1) acknowledges the Port Elizabeth game as "the first recorded soccer match." The adult match played in Cape Town on 23 August 1862 is, however, more commonly referred to as the oldest recorded football game in South Africa: See Alegi (2004); Cruywagen (2006); Van der Merwe (2001); the *Standard Encyclopedia of Southern Africa* (1974); and "Historical Rugby Milestones 1860s" (http://www.rugbyfootballhistory.com /timeline1860s.htm). Dobson (1989: 18) refers to a *Cape Argus* report "that 'a game of football was to have been played at Port Elizabeth on Saturday last, for the first time.' That was reported on 29th May 1862. But there is no record of such an historic match, which would have occurred before the first recorded match in Cape Town in August 1862."

explore the social contexts in which it was played and to draw inferences about the wider historical and social significance of this match.

In this article an initial reconstruction of the 1862 event in Port Elizabeth sets the scene for a more wide-ranging exploration of three contexts in which the game was played. These contexts are: mid-19th century football developments in England; early football in the Cape and Natal colonies; and early sporting developments in Port Elizabeth. In the final section the analysis of the 1862 match therefore forms part of a more general discussion of the development of sport in Port Elizabeth during the second half of the 19th century.

While some of the inferences made about the Port Elizabeth match are tentative, the analysis is intended to provide insight into two more general social processes. The first of these is the emergence of discrete football 'codes' – notably 'Gog's football', 'rugby' and 'soccer' – through their association with a stratified Anglophone education system and a particular model of public school masculinity. The second process involves the contribution that 'football' – broadly defined – made to the development of a proto-white South African identity during the second half of the 19th century.

THE MATCH AND THE EVIDENCE

On Friday 23 May 1862 the following announcement appeared in the "local and general" column of the *Eastern Province Herald*:

> Foot Ball – The old game of Foot Ball is again to be revived here. We are informed that the first game of the season will be played on Saturday afternoon next, in front of the Grey Institute at three o'clock. Saturday is a capital day for such sports and the pleasure to be derived from witnessing this game will doubtless induce many of our townsfolk to be present.

The match presumably took place the next day – Saturday 24 May 1862. A second report appeared in the *Herald* on Tuesday 10 June, confirming that the match was played "on the Hill in front of the Grey Institute." The "Hill" is the area now known as the Donkin Reserve, which overlooks the Port Elizabeth central business district (CBD) and harbour. The game occurred approximately three months earlier than a similar match played in Cape Town and is therefore the oldest recorded football match in South Africa. The match is all the more remarkable for the fact that – in addition to these two newspaper reports – it was recorded in the form of two team photographs.

83

These photos[2] indicate that the match involved a 'colonial born team' and a 'home born team' – each consisting of 18 players. Here 'home' refers to England: the home-colonial pattern of team selection had previously been established in cricket.

These are the most obvious material 'facts' that have been handed down to us with respect to this match. The remainder of this article will therefore be dedicated to an examination of the gaps in the available record and to an attempt to draw inferences from what is known about the wider context of the match. The most obvious question – which will probably never be answered – is 'who won the match?' The fact that the second *Herald* report excludes any reference to the match result, suggests that the novelty of the sporting event outweighed the details of the game itself. This omission provides some indication of how the social significance of sport has changed over time. There are, however, two additional questions of which the answers could have particular significance for the history of South African sport. Firstly, what type of 'football' was played during this match? Do the newspaper reports and photos provide any clues (e.g., the number of players and the shape of the ball) on which to

base inferences about the rules used during the match? Secondly, what is the social and historical significance of the colonial-home division evident in the match?

Answers to these questions can be inferred (albeit tentatively) from the evidence provided above, along with evidence gleaned from the wider context of this match. In the sections that follow the author explores these questions through reference to three 'levels' of this wider context: the spread of 'football codes' in the 'home country'; the introduction of 'football' to the Cape Colony; and the social significance of sport in mid-19th century Port Elizabeth.

'FOOTBALL' IN THE 'HOME COUNTRY'

The word 'football' is ambiguous today, but in 1862 it was even more so. In South Africa the now-firmly institutionalised distinction between 'rugby football' and 'association football', or 'soccer' is taken for granted. Moreover, the European convention of associating the word 'football' with 'soccer' is followed. We must, however, bracket this association when considering the manner in which the word 'Foot Ball' is used in the account of the 1862 match presented above.

For the purpose of this brief overview of the development of 'football' in 19th century England, the author begins with a discussion of rugby[3] – the oldest of the modern 'codified variants'[4] of football. In both South Africa and the United Kingdom (UK) it is widely

[2] The photos are housed in the South African Collection at the Port Elizabeth Main Library.

[3] Rugby is the oldest of the major football codes – the Rugby School rules were first published in 1845 – see "Historical Rugby Milestones 1840s" at http://www.rugbyfootballhistory.com/timeline1840s.htm. The oldest codified variant of football is the Eton 'field game', with written rules dating back to 1815 (Cox *et al.*, 2002).

[4] Following the work of Bourdieu, (1986: 243) 'codification' is understood to include more than just objectification in the form of written rules. Sporting codes are also manifested in institutions and in the embodied dispositions (e.g., attitudes and skills) of players. This argument has been developed in Hill (2010).

believed that rugby was 'invented' by William Webb Ellis, a student at Rugby School in the 1830s who "with a fine disregard for the rules of football as played in his time, first took the ball in his arms and ran with it."[5] Besides the fact that this account is not born out by evidence[6], this belief frequently overlays two more general misconceptions about the history of football – and sport more generally. Firstly, it is often assumed that the dominant code – in this case Association football or soccer – is the oldest or 'original' variant of football. Secondly, the rugby myth betrays the more general and popular tendency to explain the development of a sport purely in its own terms, i.e. in terms of innovative practices considered 'internal' to the specific sporting code. Hence, what is now considered to be the definitive characteristics in a sport – codified as 'rules' such as 'running with the ball' or the 'offside rule' – are too conveniently explained in terms of specific sporting events or innovations (e.g., Webb Ellis' putative 'decision' to run with the ball in rugby, or – in the case of soccer – the establishment of the Football Association). What these accounts invariable miss is the more complicated history of social conflict that culminates in the adoption of a specific rule or code within a specific social context. For when referring to the history of modern sporting 'codes' reference is invariably made to 'official games' that were, firstly, codified in writing and, secondly, recognised as legitimate / popular during or after the late 19th century: the age in which the economics of printing and the politics of compulsory education combined to produce mass reading publics. In this context, the new football codes were not simply leisurely pursuits, they were the products of powerful new forms of social control associated with industrialised political economies.

Both rugby and soccer therefore emerged as publically sanctioned school games at a time when the British state was clamping down on popular forms of 'folk football.'[7] The key to making an informed inference about the nature and significance of the game played in Port Elizabeth – and other early games in the Cape and Natal Colonies – therefore lies in an analysis of the relationship between sport, geography and the class structure of British migration and settlement in southern Africa. The reference to 'Saturday sports' in the *Herald* extract cited earlier, is therefore significant. The adoption of the Ten Hours Act in 1847 gave British workers more leisure time and the Saturday half-day holiday played a particularly

significant role in the development of working class sport – particularly during the last two decades of the century. In South Africa, as in Britain, the institution of Saturday sport therefore formed part of a broader process of legitimating an incipient industrial society, through the common sense distinction between 'work' and legitimate forms of leisure.

The Port Elizabeth game was played more than a year before the establishment of the Football Association (FA) – at Freemason's Tavern in London on 26 October 1863. It took

[5] These words are recorded on a plaque at Rugby School, which was erected in 1900 (Collins, 2006).

[6] At Rugby running with the ball was first officially allowed in the early 1840s – see "Historical Rugby Milestones 1840s" at http://www.rugbyfootballhistory.com /timeline1840s.htm. The Webb Ellis myth is attributed to an account provided by another old boy, Matthew Bloxam in 1877 (Collins, 2006).

[7] The UK Highways Act (1835) banned the playing of [folk] football on public highways (Collins, 2006). Bragg (2006: 96) notes how the land enclosures in England crowded out folk football and prepared the field, so to speak, for the modern codes.

the self-proclaimed governing body another month to compose a set of rules, eventually inspired by those used at Cambridge University. These 'rules' nevertheless constituted a 'broad transcription' of the wide range of verbal agreements that were typically reached before kickoff in actual football matches. The Rugby-Soccer split was effectively institutionalised in 1871, when 'handling clubs' established the Rugby Football Union. The words 'rugger' and 'soccer' (a truncation of 'association') emerged some time after this date, as university slang terms for both the players and their chosen football codes. Prior to the 1870s the FA's ability to enforce a standard was limited by organisational weakness and the 'fluid state' of rules used during this period (Collins, 2006). Before 1863, the key social division would therefore have been between the growing number of middle class school boys and ex-school boys playing hybrid 'kicking', 'handling' and 'carrying' codes and working class communities playing numerous forms of 'folk' or 'mob football.' During the 19th century a number of events conspired to promote the development of specific 'codes' – first rugby and then soccer – as dominant standardised forms of football.

First and foremost among these was the influential role that Rugby School played as a model of public school reform. Rugby football owes its early distinction not to William Webb Ellis, but to the well-known headmaster of the school, Thomas Arnold. Arnold was not a sport enthusiast, but his educational reforms established Rugby as the leading public school in 19th century England. Chief among these were the introduction of French (a prelude to the teaching of 'modern languages' and the decline of Latin and Greek) and national history to the school curriculum (Gamble, 2007). It was Arnold's successors that established Rugby football – alongside cricket – as a new type of 'sport'[8] through its association with 'athleticism'[9] and a new ideal of masculinity; the public school educated gentleman. While Eton, Harrow and other public schools codified their own versions of 'football', it was the Rugby game that was subsequently established as the football code of choice among imperial

[8] 'Sport' is a relatively new introduction to the English vocabulary (c.1500), deriving from the older French import 'disport' (1303), which via '*se desporter*' (Old French, 'to behave oneself' – cf. older sense of the English word 'deport') derives ultimately from the Latin 'portare' ('to port' or 'to carry') (Partridge, 1958). 'Disport' shares with Old English word 'game' ('gamen', 1225) an early sense akin to contemporary usage – a 'diversion' or 'pastime.' The modern sense of 'sport' as "activities involving physical exertion and skill, especially competitive activities governed by rules" is first attested in 1793, where it refers to cricket. This new 'athletic' sense may have developed through association with the classical Latin '*ludus*' ('play') and, more specifically, the public games of ancient Greece, such as the Olympic Games ('*ludi Olympii*'), which included various athletic contests, wrestling, boxing, and horse racing. See Oxford English Dictionary Online, Oxford University Press, 2009.

[9] Athleticism is defined by Mangan (2008: 607) as "physical exercise … taken considerably, and compulsorily, in the sincere belief of many [or the time], however romantic, misplaced or myopic, that it was a highly effective means of inculcating valuable instrumental and

impressive educational goals: physical and moral courage, loyalty and cooperation, the capacity to act fairly and to take defeat well, the ability to both command and obey."

and colonial authorities. Arnold's students – particularly those who became teachers[10] – were instrumental in the dissemination of the Rugby game. By far the most influential of these students was Thomas Hughes, who published *Tom Brown's Schooldays* in 1857. This novel celebrated school life at Rugby during the 1830s and its description of the Rugby game played a significant role in the establishment of rugby as an elite school game in many parts of the British Empire (Collins, 2006; Taylor, 2008). The public school sports ethos was subsequently extended to higher education. Hughes' sequel novel – *Tom Brown at Oxford* (1861) – contains the following exchange:

> 'Try cricket, for instance. The players generally beat the gentlemen, don't they?' 'Yes, but they are professionals' (Oxford English Dictionary Online, 2009).

Here the use of 'gentleman' as a gender code is associated with two distinct senses, both attributed to upper/middle class boys emerging from public schools and – more often than not – gaining access to Oxford or Cambridge. The first is the sense of "a man of superior position in society, or having the habits of life indicative of this"; while the second – associated with cricket as far back as 1806 – is sport-specific, juxtaposing the 'amateur gentleman' with the 'professional' and (initially) working class 'player', who receives remuneration (Oxford English Dictionary Online, 2009).

The second trend was therefore the emergence of post-school football, based on rules that were initially codified by the public schools. At this level the Rugby game lost ground to the codes originating at public schools in the South East of England. Particularly significant in this respect were the Cambridge and the Sheffield rules. The 'Cambridge Rules', first published in 1848, constituted the first inter-public school standard for former public schoolboys entering the university. The 'Sheffield Rules' – based on games played at Eton and Harrow – were first published in 1856 (Cox *et al.*, 2002) and provided a powerful early stimulus for the establishment of soccer-like football clubs in the North of England. Religious institutions and (initially Anglican) teacher training colleges – beginning with St Peter's College, founded in Birmingham in 1850 – also played an important role in popularising proto-football codes among the working class. During the 1880s these colleges were particularly instrumental in the growth of working class soccer (Mangan & Hickey, 2008).

A third key factor that influenced the development of standardised football codes was the industrial production of sporting equipment – beginning with the ball. Changes in the shape of the ball had both a technical and a symbolic significance, which sharpened the distinction between the codes and shifted the advantage – in terms of popular recognition of 'the round ball' – decisively in favour of association football. The original 'folk' football – a pig's bladder encased in leather – was neither round nor pronouncedly oval in shape and early balls varied considerably in terms of size, weight and shape. This changed with the industrial production of rubber. In 1854 the American inventor, Charles Goodyear, won a gold medal at the international exhibition in Paris for his vulcanised rubber football. Round rubber-cored balls would subsequently "change the shape of Golf, Tennis and Football more than any other

[10] Hilton College became the main bastion of school rugby in Natal after the arrival of its second headmaster, who was a former pupil of Rugby School. See http://www.hiltoncollege.com/history /index.htm.

single factor" (FIFA Museum Collection, 1996). The industrial production of rubber football inner-tubes began in the town of Rugby in 1862 (Hill, 2010: 17). The mass production of standardised round and oval balls provided a major impetus to the crystallisation of distinct football codes, defined both in terms of fixed 'rules' and the increasingly distinct, but variable, sets of embodied 'strategies' that emerged following the standardisation and marketisation of sporting fields and equipment.

If the small-scale industrial production of rubber 'footballs' only began in 1862, it seems

highly unlikely that one of these balls would have made it to Port Elizabeth in time for the May football match. The ball depicted in the photos is therefore almost certainly a pig's bladder and can therefore provide no clue to the nature of the game played. Neither can the size of the teams provide an indication of the rules, as most of the early rule-sets did not specify team size. For reasons discussed below, the Port Elizabeth game more than likely complied with rules imported directly from 'the home country.' The problem is that before 1862 there were far too many variants of football in England. A second line of enquiry is therefore to compare the Port Elizabeth game with other early football matches in South Africa.

'CARRYING CODES' IN THE CAPE COLONY

As in the 'home country' the diffusion of modern sporting codes in South Africa was mediated by geographical and social class divisions. The racial divisions that would become so prominent in 20th century South African sport were built on a process of 'white' social closure that followed the gradual transcendence of these earlier divisions. Sport played a significant role in bridging these 'intra-white' divisions and, with respect to 'football', there appear to have been two principle early 'modes' of diffusion: elite English (and later Afrikaans) education and predominantly working class British immigration. As in North America and the southern dominions (Australia and New Zealand) elite colleges (and later universities) played an important role in spreading Rugby-inspired 'carrying codes' – 'Gog's game' and subsequently rugby. Military regiments, on the other hand, were instrumental in propagating Association football, particularly in Natal and the South African Republic between 1880 and 1910 (Alegi, 2004).

The 'carrying codes' emerged in Cape Town and developed through their association with elite secondary and higher education. Collins (2009: 16) notes the early historical significance of Arnoldian education in South Africa:

> In South Africa, initially among English speakers, the Arnoldian model of public school life was adopted completely by white middle-class educators and sport enthusiasts. Although the Winchester School code had been originally played in Cape Town, seen as the cradle of rugby, this was abandoned in the 1870s and rugby quickly came to dominate white sporting culture. It was through elite schools such as Old Diocesans, Bishops and Hilton College that rugby acquired a social significance and the means to spread throughout white South African society.

The status of Rugby within a 'white sporting culture' nevertheless took some time to develop and this process was not evenly distributed. In the remainder of this article it is argued that

the 1862 adult games played in Port Elizabeth and Cape Town reflect an early manifestation of this uneven development and therefore provide insight into the early social role of sport in two broad processes: the construction of a domestic 'white identity'; and the stratification of education, in terms of gender, class and race.

While the Port Elizabeth match referred to above is the oldest individual South African game on record, the earliest football games were played in Cape Town. The first known 'variant' of football was played at South Africa's second oldest school, Diocesan College or Bishops. Bishops was the first Anglican school to be established in South Africa and this fits a more general colonial pattern. Anglican educational institutions were influential in propagating both specific football codes and the ideology of 'athleticism' that underpinned them (Mangan & Hickey, 2008). In 1859 Canon George Ogilvie became headmaster of the Diocesan College, where he subsequently introduced a variant of football that he learnt during his studies in England. This game formed the basis of an early inter-school rivalry between Bishops and the rival South African College (SACS). Matching a pattern evident in many parts of the UK, the rules introduced at Bishops spread first to neighbouring schools and then to senior clubs (Babrow & Stent, 1963). The relative fluidity of the rules used during these early games – notably with respect to team size – has, however, also been noted (Van der Merwe, 2001).

The first recorded adult match in Cape Town took place on Saturday 23 August 1862 – long before the establishment of formal adult football clubs.[11]

> Foot-ball – We are happy to find that this fine old English school game has been introduced among us. On Saturday next sides consisting of fifteen officers of the army and a like number of gentlemen in the civil service will open the Ball with a game on the race-course at Green Point. Of course this example will be speedily followed and we shall have foot-ball treading closely on the kibes of cricket and our other imported manly games (*Cape Argus*, 21 August 1862).

This match employed Gog's rules and there is a record of a subsequent match played between seniors and students from Bishops, which was won by the students.[12] A comparison of this report with the extract from the *Eastern Province Herald* – cited earlier – reveals the extent to which the Cape Town match was associated with education and an emerging educated class indicated that these men were 'gentlemen.' Firstly, while the initial sentences of both extracts are remarkably similar, the Argus refers more specifically to "an old *English school* game" (my italics), which reflects a recognition of the fact that this match was based on rules imported from English public schools.

[11] The first adult club, the Hamilton Football Club, was established in 1875 and was followed, a year later, by the Villager Football Club (Babrow & Stent, 1963). A football club called 'Roslyns' was established in 1881 or 1882 in a region established by freed slaves, which since 1867 had been known 'District Six' (Booley, 1998).

[12] A record of these games can be found in the *Cape Times*, 10 April 1937 and reproduced on the Bishops website (http://www.bishops.org.za/info/museum/sport.asp).

Secondly, the reference to "gentlemen in the civil service" is significant in two respects. In Cape Town during the early 1860s the word 'gentleman' would have carried the English association with education and elevated position. The reference to the civil service also indicates that these men were well educated. The Board of Examiners of Candidates for Government Service (BECGS) had been established 12 years earlier, for the purpose of training civil servants. This was the only form of post-secondary education available until 1858, when the more general Board of Public Examiners in Literature and Science (BPELS) was established. This Board was subsequently replaced by the University of the Cape of Good Hope (UCGH – 1873). Both the BPELS and the UCGH were examining institutions, responsible for accrediting the post-secondary education provided at elite high schools. In terms of the Higher Education Act of 1874 these schools became known as 'colleges'; they included SACS and Bishops in Cape Town and – crucially for the subsequent diffusion of rugby – the Stellenbosch College. The Grey Institute in Port Elizabeth – referred to in the *Herald* extract cited above – also functioned as a college, albeit for a brief period (1875-1885). The civil service also produced the first leisure club – the Civil Service Club – in 1861 (Van der Merwe, 2001). In the *Argus* report on the match the publication of the names of the civil service players is clearly an indication of status. The civil service team included John X. Merriman (later Prime Minister of the Cape Colony) and G.C. Bayne (later resident magistrate of Port Elizabeth[13]).

The 1862 Cape Town game therefore employed an established school code and, moreover, was played within the context of a relatively powerful public school system and an emerging higher education tradition.[14] The Bishops game was for this reason the most influential variety of football in South Africa prior to the institutionalisation of rugby and soccer in the 1880s and 1890s. Given the difficulty associated with the reconstruction of events during this period, it is perhaps understandable that this code has been cited as the earliest example of both rugby (Difford, 1933, Herbert, 1980) and soccer (Alegi, 2004) in South Africa. Gog's game is commonly referred to as the "Winchester code" in South African sporting histories[15], but Ogilvie also studied at St Andrew's College. The Bishops game allowed some running with the ball and has therefore been described as a 'polygenetic game' (Babrow & Stent, 1963). Indeed, enthusiasm for running with the ball has been cited as a reason for the eventual switch to Rugby.[16] Coming seven years after the establishment of the English Rugby Football Union, it nevertheless seems more likely that the switch reflected the growing status of rugby in the colonies and the cultural power of English settlers who had recently arrived at the Cape. A particular impetus for rugby came in the form of William Milton – an ex-England

[13] Interview with Margaret Harradine, retired archivist in the Africana section of the Port

Elizabeth Main Library, 23 September 2009.

[14] In addition to his role at Bishops, Ogilvie also served as a member of the BPELS and as vice-chancellor of the University of the Cape of Good Hope. He is described as "a much travelled member of that breed of muscular Christians who figured so prominently in nineteenth century British education" (Boucher, 1973: 14).

[15] See, for example, "100 years of South African rugby: Part one", http://www.irb.com/news media/features/newsid=278026.html.

[16] Babrow and Stent (1963: 8) comment that "the immediate appeal of rugby lay in the wider freedom it gave to handling."

rugby player – who convinced the Hamilton Club to switch to rugby in 1878. A year later, after a brief internal feud, the rival Villagers Club followed suit.

In South Africa, as in the UK, the crystallisation of the rugby-soccer split took place in the 1870s. The relatively few games played in the 1860s would therefore more than likely have been hybrid variants, combining practices associated with contemporary rugby and soccer with numerous other practices – such as 'hacking' – that have subsequently been banned in both codes. In Cape Town the rules introduced at the Diocesan College became the dominant code at both school and adult club level. As in the UK, the elite schools initially resisted the introduction of a new standard.[17] By 1970 these rules were also being used by schools in Natal, before being replaced by the RFU and FA codes some years later (Herbert, 1980). The earliest recorded game in the Natal Colony was played on the market square in Pietermaritzburg between the City and the Garrison on 26 September 1866. A spectator commented that "the rules were systematically disregarded by both sides through the whole game" (Hattersley, 1938: 95). This statement begs the question 'which rules'? Could this game and the earlier game played in Port Elizabeth have been based on the rules used in Cape Town? This is possible, but in Port Elizabeth it seems unlikely, for reasons explored in the next section.

THE EARLY SIGNIFICANCE OF SPORT IN PORT ELIZABETH

As a preface to a discussion of early sport in Port Elizabeth, it is worth considering three events that fundamentally changed the political context within the eastern region of the Cape Colony. The first of these was the war of Mlanjeni – more commonly known as the Eighth Frontier War (1850-1853). This war marked the beginning of the decade in which Xhosa independence was finally lost. Together with the Nomgqawuse cattle-killing of 1856-1857, this war effectively crushed the political economy of the Xhosa and prepared the ground – literally speaking – for a new wave of British immigration. By 1857 the Cape Colony was "prosperous as never before" and following the passage of Act 8 through the Cape Parliament, £50 000[18] was allocated to facilitate British immigration to Cape Town and Port Elizabeth (Bull, 1991). Between 1857 and 1867 about 12 000 immigrants settled in the Cape Colony, most of whom where drawn from the ranks of skilled labour and artisans. The significance of this figure needs to be seen in the context of the time. Prior to the immigration, Port Elizabeth was a village with just 4 000 people, compared with a population of about 25 000 in Cape Town (Bull, 1991). Given the predominantly working class status of post-1820 immigration to Port Elizabeth, this new wave of immigrants had a far more profound affect on the social structure of the settlement in Algoa Bay. Sport would appear to be one of the areas where this impact was particularly evident.

[17] SACS and the Diocesan College switched to rugby in 1884 – a year after the establishment of the Western Province Rugby Football Union. This is also the year of the first inter-college rugby match between SACS and Stellenbosch College (Babrow & Stent, 1963). Collins (2009) notes that the Rugby School joined the Rugby Football Union two decades after it was founded.

[18] This figure pales in comparison to the £2 000 000 the British spent on the Eighth Frontier War (Bull, 1991).

In the *Herald* extract cited earlier, the reference to football being 'revived' in Port Elizabeth

suggests that the match formed part of a broader pattern; the sporadic nature of sporting events at this time. While there is no known earlier reference to football, the pattern had already been established in cricket. The earliest reference to cricket in Port Elizabeth is a match played between two local teams – the "Marrowbones" and the "Sans Culottes" – in 1843 (*Grahamstown Journal*, 28 December 1843). Attempts were made to establish a cricket club in 1847, 1849 and 1856. These early efforts did not prove sustainable and on 1 February 1859 the re-establishment of the club was announced in the *Eastern Province Herald*:

> The Club, we have been informed, numbered over forty members and it would indeed be discreditable to our prestige as the descendants of "The Sons of Merrie England" were it now to languish for the want of support and attendance on "The Field!" (*Eastern Province Herald*, 1 February 1859).

The football match of 1862 would therefore seem to confirm this pattern of sporadic early sporting events that preceded the establishment of codes and clubs. This pattern is probably best explained in terms of the tendency for immigrants to use Port Elizabeth as a transit point *en route* to the various agricultural settlements in the hinterland. As the post-1857 immigrants were predominantly skilled workers, the 1860s witnessed not simply the rapid growth of 'a town', but also the emergence of new patterns of settlement and social stratification. In July 1860 the passage of the Port Elizabeth Incorporation Bill through Parliament gave Port Elizabeth the status of a borough, with an elected mayor and town council. Prior to this, Port Elizabeth had been governed by a Board of Commissioners. In March of the previous year this Board had granted the reconstituted cricket club two acres of land "at the top of a steep escarpment, on the outskirts of the village" (Levey, 1959). This land would subsequently become known as St Georges Park. There is therefore a clear sense in which the geographical elevation of sporting fields coincided with the gradual social elevation of 'sport' as means of social stratification in early Port Elizabeth, as the subsequent discussion of education will show.

By 1862 cricket was already established and football (ultimately rugby) would follow, as a seasonal alternative, in its wake. It is, however, interesting to note how long this process took. The next reference to football in the *Herald* appears on 14 May 1887, when the "opening of the football season" was announced. The article notes that the "newly-formed Crusaders Club – following Rugby Union Rules – played its first game." Curiously, the article also notes that "in 1881 the Council gave permission for *the club* to share the Port Elizabeth cricket club ground" (my italics). But was this the same club? Parker (1897) notes that the association game was played in Port Elizabeth "as far back as 1881" and that the Wanderers Association Football Club was established "fifteen years ago", which is to say in 1882. Does this mean that Crusaders or some other club was established in 1881, initially as an association football club? The water is muddied somewhat by Levey's (1959) reference to an 1889 request that "a rugby club named Crusaders" be allowed to use the cricket ground during the winter season.

The details are sketchy, but a general pattern is evident. Adult rugby was established in PE in the late 1880s, some years after the establishment of rugby in Cape Town (1883-4). Association football, it would seem, made an early debut (1881-2) during a period coinciding with the establishment of the Natal Football Association (1882) and the rapid growth of the

association code in the Natal Colony. But in Port Elizabeth the association code was weak and was eventually re-established in 1896, the year in which the Eastern Province Football Association was founded and three new clubs were established (including a newly formed Wanderers Club) (Parker, 1897; Trader, 2002). As in many other parts of the country, the rugby-soccer split can therefore be traced back to the 1880s. This period coincided with the decline of Gog's game in the Cape Colony and a new influx of British soldiers – prior to the first Anglo-Boer War and the Anglo-Zulu War – who played a significant role in promoting the association game (Alegi, 2004). In Port Elizabeth, however, the code split was difficult to pinpoint and does not seem to have been preceded by a hybrid code. The main reason for this would seem to be the contrasting status of education in the eastern and western regions of the Cape Colony.

A significant aspect of the May 1862 game is that it was played "in front of the Grey Institute" – that beyond this fact there is no known institutional connection between the match and the Grey Institute, or education more generally. Having opened its doors in 1859, the Grey Institute[19] was not the first school[20] in Port Elizabeth, but it was soon established as

the most prestigious educational centre in the town. The opening of the Grey Institute marked the beginning of educational stratification in two significant senses. Firstly, it was established on 'the Hill' above the town, which in 1859 was not very accessible. The Hill, in contradistinction to the 'town below' gradually established a reputation as the fashionable quarter of the town (Bodill, 1984). That the new school on the Hill catered to relatively wealthy families is evident from the fact that the Grey Institute offered a separate education facility for the poor in the Bethel, a chapel for seamen that was opened eight months after the school on the Hill (Harradine, 1995). By 1862 the Grey Institute would have been one of very few buildings on the Hill and the geographical class distinction would therefore not have been very well established.[21] Moreover, there is no known evidence to suggest that sport played any part in the curriculum at this time.

The second form of stratification involved the introduction of secondary and tertiary education in Port Elizabeth. As noted earlier, in Cape Town the crystallisation of discrete sporting codes was closely associated with the spread of literacy and the growth of secondary/tertiary education. In this trend Port Elizabeth lagged behind the other two colonial ports, as well as Grahamstown – the dominant centre on the eastern fringe of the Cape

[19] Technically the Grey Institute – or the school on 'the Hill' – was the first of a series of Grey institutions established in terms of Act No. 6 of 1856, "An Act for Regulating the Public Schools of Port Elizabeth upon the Grey Foundation" (Young, 2006). Two additional junior schools were established in North End (1861) and South End (1875) (Harradine, 1995).

[20] The first request for a school in Port Elizabeth came in 1824. In 1832, the Rev. Francis McCleland advertised his intention to open a day school, attached to St. Mary's Anglican Church. In 1841 a new teacher, John Paterson, arrived in Port Elizabeth and established the Senior Free Government School – the school was closed in 1866. A Diocesan Grammar school is believed to have been established in 1853, closed in 1859 and revived a number of times during the course of the eighteenth century (Harradine, 1984).

[21] Interview with Margaret Harradine, 23 September 2009.

colony. The Grey Institute was associated with 'undenominationalism', an educational reform movement that developed during the second half of the 19th century and played a significant role in the establishment of higher education in South Africa. Thus, in the same year that the Grey Institute opened its doors, the local Diocesan Grammar School was forced to close (Harradine, 1984: 17). The association of undenominationalism and written examinations dates back to the establishment of the University of London, which served as a model for the Cape higher education system – beginning with the BECGS in 1850 (Boucher, 1973). By 1862 this trend had spread to Port Elizabeth. Three months before the football match in question the Eastern Province Herald announced the introduction of "examination by written papers", which was held to be "much more thorough and searching than any *viva voce* examination could be" (*Eastern Province Herald*, 17 January 1862). This came in the wake of the establishment – in Cape Town – of the Board of Public Examiners in Literature and Science (BPELS). The establishment of this board marked the beginning of higher education certification by written examination in South Africa. Students at the Grey Institute and related colleges countrywide could sit exams and obtain first, second and third class certificates, which were based on the MA, BA and Matriculation examinations of the University of London respectively (Boucher, 1973). But in Port Elizabeth demand for these qualifications was extremely limited. In 1864 three candidates at the Grey Institute sat and failed the second class maths section (Rautenbach, 1995). In 1874, a year after the promulgation of the Higher Education Act, the first matriculation examinations were held at the Grey Institute (Young, 2006). A year later the school was accredited as a higher education 'college.'

By 1885 the effort to turn the Grey Institute into centre for higher education was judged to have failed. The end of the college system came with the appointment of a new headmaster and the introduction of the English public school system (Young, 2006). While the first sport day was held in 1867, it was the revival of the sport day in 1893, within the context of the adoption of the public school model – defined in terms of single sex education[22] and boarding hostels[23] – that marks the beginning of school football and the more general institutionalisation of athleticism in Port Elizabeth.[24] Both rugby and soccer were introduced soon after this date, with soccer said to have "ousted rugby" by 1906 (Young, 2006). This was short-lived, however, as rugby established itself alongside the other curriculum sports:

cricket, tennis, athletics and swimming. Mirroring a broader 'national' trend, rugby was established as as "the patrician football code of South Africa" (Gibson & Pickford, 1906: 201).

[22] Except for the early years – referred to as 'mixed infants' – single sex education was an ideal of the public school system. It is noteworthy that the introduction of sport at the Grey Institute coincides with the institution of separate education for girls. In 1893 the Diocesan Grammar School closed again and was replaced by a Diocesan School for Girls (Harradine, 1984). A year later Collegiate – the sister institution to the Grey Institute – opened its doors. 1906 was the last year that girls attended the Hill school (Young, 2006).

[23] The first 'proper' boarding house was established in 1911 (Young, 2006).

[24] Athleticism would seem to have peaked in the early twentieth century, when Rector William Archer Way is said to have "over stressed sport" in the selection of staff. His successor subsequently dismissed a number of teachers "who were not worth their salt" (Young, 2006).

The key difference between the two adult games played in Port Elizabeth and Cape Town in 1862 therefore relates to their association with education and the educational philosophy of athleticism. The Cape Town game was the manifestation of a football 'code' introduced to Cape Schools and developed within the context of an emerging elite education system and a new educational philosophy - athleticism. In contrast, almost nothing is known about the nature of the game played in Port Elizabeth. The profile of education in Port Elizabeth was quite unlike that of Cape Town, where the elite status and early rivalry of SACS and Diocesan College underpinned the diffusion of Gog's football. Given that the Port Elizabeth match occurred some months before the first recorded adult match in Cape Town, it seems very unlikely that the game played was based on Gog's rules. It rather seems reasonable to assume that the game was based on rules imported by British immigrants newly arrived in the town. There is no evidence of football codification in the 1860s; the establishment of distinct codes in the 1880s and 1890s coincided with the introduction of an English public school tradition and the concomitant commitment to athleticism. During this period it is difficult to establish a causal relationship between school and adult football. It seems very likely that both levels were influenced by powerful trends in Cape Town, Durban and Johannesburg. Developments in the major urban centres also provide clues to the social significance of the 'colonial' versus 'home-born' division evident in the Port Elizabeth match. Sport played a significant role in fostering a domestic sense of 'whiteness' and the Port Elizabeth 'colonial' side would seem to be the first white proto-national distinction of this kind to be manifested in football. The Anglophone colonial sporting environment would subsequently be extended to include 'white Dutch speakers.' This process began in the Cape, where Babrow and Stent (1963) note the "Colonial-Born versus Mother Country" competitive ethos that preceded the introduction of football to Stellenbosch.

Competition between proximate towns also played a significant role in bridging the language divide, particularly after the construction of railways. The linking of Port Elizabeth and Uitenhage – in 1873 – was therefore significant, but not as significant as the sporting rivalries that developed between Cape Town and Stellenbosch, Durban and Pietermaritzburg and Johannesburg and Pretoria. Railways did, however, have another important role to play in the development of a colonial-born white identity in Port Elizabeth. Bull (1991) observes that the Ninth and final Frontier War in 1877 and "the increasing number of blacks employed on the railways had an adverse effect on immigration." British immigration resumed in the 1880s, but this coincided with the gradual in-migration of Xhosa workers. The desire to contain 'them' resulted in the Native Reserve Location Act of 1902, which established New Brighton (in Port Elizabeth) and Ndabeni (in Cape Town) as the first urban 'locations' (Mamdani, 1995). The frontier had entered the city.

CONCLUSION

In this article the author has explored the evidence available for the match played in Port Elizabeth on 24 May 1862. While there is no doubt that the match took place and that it is consequently the oldest recorded 'football' game in South Africa, the key questions that remain relate to its wider sporting and social significance. The author's analysis has sought to interpret the available evidence by way of a discussion of sporting trends in the wider

regional and colonial environment.

The surviving evidence provides no indication of the type of 'football' played on this occasion. Given the unstandardised nature of 'football' during this period, the evidence provided by the team photographs (e.g., ball shape and team size) therefore provide no clues to the rules used in this game. It is nonetheless highly probable that the game was a 'hybrid' variant – combining rules associated with the subsequent 'codes', notably 'rugby' and 'soccer' – imported by the 'home born' players or other recent British immigrants to Port Elizabeth. A variant in this sense is, however, not 'a code.' 'Codification' involves more than the establishment of rules and clubs; it also refers to the institutionalisation of 'a sport' through its association with other social institutions and conventions. Particular attention was given to educational institutions. As in the UK, the crystallisation of distinct South African football codes formed part of a broader process; the introduction of an increasingly stratified Anglophone education system in which a new educational philosophy called 'athleticism' emphasised the importance of specific sports in the training of relatively wealthy boys. The discussion of football codification in the Cape Colony therefore paid particular attention to the contrasting status that sport enjoyed in the socially stratified education systems of Cape Town and Port Elizabeth during the 19th century. At the heart of the matter is the process of codification that gave rise to distinct football codes: 'Gog's football'; 'rugby'; and 'soccer.

While the 1862 game in Port Elizabeth has been cited as the earliest manifestation of 'soccer', there is no evidence to support this claim. The Port Elizabeth game was played a year before the establishment of the Football Association and a good 10 years before the soccer/rugby distinction became socially significant in the UK and South Africa. It is possible that this match was based on 'Gog's game' (or the Winchester code), which had been introduced to schools in Cape Town three years earlier, but this seems very unlikely. The Port Elizabeth match therefore does not fit into the dominant narrative of rugby codification that has traditionally focused on the western region of the Cape Colony. It is within the context of the early educational dominance of this region – and the wider educational significance of 'carrying codes' – that Gog's game is commonly interpreted as the predecessor to rugby in South Africa.

In this article it was argued that the key difference between the adult football games played in Port Elizabeth and Cape Town in 1862 relates to their contrasting positions within the emerging educational class structure of the Cape Colony. The Cape Town game manifested a code – Gog's game – and as such represented continuity with elite school football and the philosophy of athleticism that underpinned it. In Port Elizabeth the post-1857 arrival of a new artisanal class probably explains the growth in the popularity of sporting events, but in a predominantly working-class town it would take another 30 years before football was institutionalised as 'a sport.' This process coincided with the introduction of the English public school model at the Grey Institute and the concomitant commitment to athleticism. And it is in this context (c. 1880) that 'rugby' and 'soccer' first began to emerge as distinct adult sporting codes in Port Elizabeth.

In a rapidly growing English settler town, the 1862 'game on the Hill' probably manifested the growing influence of the UK – vis-à-vis Cape Town – on life in Port Elizabeth. The game also provides evidence of what, at the time, was a more widespread social cleavage: the division between 'home' and the 'colonial-born' settlers of British descent. This is therefore the earliest football manifestation of a more general trend; the significant role played by sport

in fostering social interaction *and* gradual social closure among 'white' immigrants. The game is therefore more interesting as a socially situated study of the emergence of 'sport' – as opposed to 'a sport'. The fact that the Port Elizabeth game cannot easily be classified as 'a code' and thereby slotted into prevailing South African code historiographies is no doubt an important reason for the relative obscurity of this game in the existing literature. The relatively unknown Port Elizabeth match is therefore "the dog that didn't bark"[25] in the history of South African football (both Rugby and Association), which is to say a frequently-ignored event that tells us more about the early social significance of a relatively amorphous 'football' than it does about the genealogy of a specific football code.

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[25] The well-known reference is to "Silver Blaze", one of Arthur Conan Doyle's Sherlock Holmes mysteries. The phrase is now commonly used to indicate the potential explanatory significance of 'non-events' or rather, minor events misrecognised as insignificant.

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DIE GESKIEDENIS VAN DIE US-DAMESHOKKIEKLUB: 1903-1992

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ABSTRACT

What started as a social game on a farm in Stellenbosch developed into a sport in which both men (since 1901) and women (since 1903) participated. The purpose of this study was to document the origin, formation and development of Maties women's hockey. The club was founded in 1903 and all possible resources were used to reconstruct the activities of the club until 1992, before the men's and women's hockey clubs merged. The club had a lot of ups and downs through the years, but that did not dampen the members' enthusiasm for the sport. Between World Wars I and II all sport participation was suspended and from 1971-1992 South Africa could not participate internationally because of the political situation. This article focuses on the club activities, tours, achievements, hostel hockey and indoor hockey.

Key words: Hockey; Stellenbosch; South Africa; Maties; Women's hockey club

INLEIDING

Hokkie word reeds vanaf 4000 v.C. deur mans in Egipte beoefen (Van der Merwe, 1999). Vroeë variasies van die spel was *la soule* wat deur die Franse in die twaalfde eeu beoefen is (Craven, 1978: 178), *knappan* wat halfnaak gespeel is (Henderson, 1947: 87-98), *shinty* wat in Skotland tussen twee dorpe plaasgevind het (Calder, 1990: 7-8), asook *bandy* wat identies aan shinty was behalwe dat die stok verskil het (Henderson, 1947: 90). Daar word beweer dat die eerste "bal" 'n klip was en die eerste stok van hout of been gemaak is. Die moderne hokkiestok wat van hout gemaak word, is eers in die vroeë 1800's bekendgestel en het teen die 1980's verbeter na stokke wat van metaal gemaak word (Arlott, 1975: 485). Aan die einde van die 20ste eeu was daar drie tipes stokke, naamlik van hout, veselglas en aluminium (Connolly, 2005: 17).

Vroulike deelname aan hokkie is van die vroegste tye af gekritiseer. Soos die spel deur die jare ontwikkel het, het vroue wel die spel begin speel en in sommige lande was die vroue selfs meer suksesvol as die mans (Levinson & Christensen, 1996). Vrouehokkie het in verskeie lande vinnig ontwikkel en in 1930 is die Internasionale Federasie vir Vrouehokkieverenigings (IFWHA) gestig, waarvan Suid-Afrika 'n stigterslid is (*Standard Encyclopedia of South Africa*, 1972).

Met afrigting onder die damestudente wat by verskeie kolleges soos Oxford en Cambridge (Costa & Guthrie, 1994) asook by Vassar Kollege en Harvard Universiteit (Hickok, 1977) aangebied is, het die sport vinnig gewildheid verwerf en so ook na vroue in ander lande

versprei. Die uiteinde was dat die eerste vrouespan in 1980 aan die Olimpiese Spele in Moskou kon deelneem, wat die spel nóg meer stukrag gegee het (Wikipedia, 2009).

PROBLEEMSTELLING

Alhoewel sport 'n baie belangrike deel van die Suid-Afrikaanse kultuur en spesifiek ook Stellenbosch s'n uitmaak, is dit kommerwekkend dat daar oor die algemeen so min gedoen word om belangrike dokumente te bewaar (RGN-sportondersoek, 1982). Die Universiteit Stellenbosch (US) poog in hierdie opsig om sy sportgeskiedenis sistematies te dokumenteer sodat dit vir die nageslag bewaar kan bly. Die geskiedenis van rugby (Craven & Jordaan, 1955; Craven 1980; Van der Merwe, 2007), atletiek (Van der Merwe, 1984), boks (Martheze, 1988), manshokkie (Calder, 1990), krieket (Stander, 2000) en koshuisrugby (Huys, 2008) is reeds nagevors en het ook 'n waardevolle bydrae tot hierdie studie gelewer.

In 1963 is daar vir die eerste keer 'n poging aangewend om die geskiedenis van die dameshokkieklub op Stellenbosch te dokumenteer (US-dameshokkieklub, 1963). Die resultaat was dat dié geskiedenis later daardie jaar in boekvorm aan die komitee voorgelê is. Hierdie "boek" het egter tydens die verskuiwing van die hokkiekantoor verlore geraak (Snyman, 2010). Die onderhawige studie ondervang dus daardie verlore geskiedenis.

Hierdie studie strek vanaf 1903, die jaar waarin die klub gestig is, tot 1992, die jaar waarin die mans- en dameshokkieklubs saamgesmelt het om een nuwe klub te vorm (US-dameshokkieklub, 1992-2002). Binne hierdie afbakening is aspekte soos die internasionale geskiedenis van die spel (ter inleiding) asook die geskiedenis van vrouehokkie in Suid-Afrika gedek. Ander afdelings dek die ontstaan van die US-dameshokkieklub, koshuishokkie, inter-universitêre toernooie, binnenshuise hokkie, algemene klubbedrywighede en toppresteerders van die dameshokkieklub.

METODOLOGIE

Navorsing is volgens die histories-wetenskaplike metode gedoen en daarom is dit kwalitatief van aard. Groot klem is op primêre bronne gelê wat hoofsaaklik notules, bestuurdersverslae, voorsittersverslae, jaarverslae en onderhoude met oud-spelers was. Onder notules het dié van die klub, Sportkantoor en Raad- en Senaatsnotules van die Universiteit Stellenbosch getel.

Die Repertorium van Suid-Afrikaanse tydskrifartikels, Universiteitspublikasies, koerante, tydskrifte, boeke en ongepubliseerde dokumente is as sekondêre bronne gebruik. Dit sluit in publikasies soos *Die Stellenbosse Student*, die *Stellenbosch Students' Quarterly*, die *Stellenbosch Universiteitsblad* en die *Stellenbosse Oud-student*.

Inligting van primêre bronne het voorkeur geniet omdat dit betroubaar en geldig is.

BESPREKING

Vrouehokkie in Suid-Afrika

Sover bekend het die eerste georganiseerde vrouehokkiewedstryd in 1899 in Kaapstad plaasgevind. Die gewildheid van die sport het vinnig onder die dames toegeneem, sodat die eerste vrouehokkieklub in die land alreeds in 1901 in Kaapstad tot stand gekom het. Die eerste provinsiale unie vir vroue, naamlik Westelike Provinsie, is daarna in 1907 gestig (Myburgh, 1981).

Op 21 Julie 1923 is die "All South African and Rhodesia Women's Hockey Association" (ASA & RWHA) gestig (Horwood & Goldhawk, 1978: 103). Die affiliasie van die Rhodesiese mans en dames is in 1976 beëindig, nadat Rhodesië onafhanklike Zimbabwe geword het (Donaldson, 2000). Dit het gelei tot die naamsverandering na "The South African Women's Hockey Association" (ASAWHA) (Horwood & Goldhawk, 1978: 103).

In 1926 het die eerste amptelike interprovinsiale vrouehokkietoernooi in Johannesburg plaasgevind. Die spanne van die mans en dames is deur die "South African University Men's Hockey Union" (SAUMHU) en die "South African University Women's Hockey Union" (SAUWHU) onderskeidelik beheer (*Standard Encyclopedia of South Africa*, 1972: 547-548). In 1980 was daar reeds 15 000 vroulike spelers, alhoewel nog geen internasionale kompetisies teen daardie tyd gespeel is nie (RGN-sportondersoek, 1982).

Die Suid-Afrikaanse Hokkievereniging (SAHV) is in Februarie 1979 gestig en het die oorkoepelende liggaam vir beide mans- en vrouehokkie in Suid-Afrika geword (Horwood & Goldhawk, 1978). Daar het baie toere na en van die buiteland plaasgevind, alhoewel die politieke situasie in Suid-Afrika dit later negatief beïnvloed het. Suid-Afrika het vanaf 1925 tot 1980 ongeveer 120 toerwedstryde oorsee en op eie bodem gespeel waarvan hulle 94 gewen het.

Vroeë geskiedenis van die US-dameshokkieklub: 1903-1958

Alhoewel 'n mate van onsekerheid bestaan oor die presiese jaar waarin die US-dameshokkieklub gestig is, kan volstaan word met 1903 aangesien genoeg bewyse gevind is om dit te bevestig (Snyman, 2010). 'n Artikel in die *Stellenbosch Students' Quarterly* verwys pertinent na 1903 as die jaar waarin die klub gestig is (*Stellenbosch Students' Quarterly*, 1906a). Dit word ook bevestig in die Jaarverslag van 1992-2002 waarin die damesklub se stigtingsdatum as 1903 aangegee word (US-dameshokkieklub, 1992-2002). Daar is egter in 1962 verwys na die hokkieklub wat 60 jaar oud was en dat dit saam met die opening van die nuwe klubhuis gevier sou word (US-dameshokkieklub, 1962). Indien die klub wel 60 jaar oud was, dui dit daarop dat die klub in 1902 gestig is. Hier kon dalk 'n berekeningsfout ingesluip het.

Nie baie mense is daarvan bewus dat 'n dameshokkieklub in die vroeë 1900's op Stellenbosch bestaan het nie, maar die sport is nietemin met entoesiasme deur 'n handjievol dames beoefen (*Stellenbosch Students' Quarterly*, 1906a).

In die beginjare het Maties slegs een span gehad en boonop ook gesukkel om 'n gereelde afrigter te kry (*Stellenbosch Students' Quarterly*, 1906b). Aangesien hokkie by die plaaslike meisieskole afgekeur is omdat hokkie as 'n onvroulike sport bestempel is, was daar min meisies wat werklik hokkie kon speel. Daar was ook 'n tekort aan velde en daarom moes die dames die mans se veld gebruik wanneer dit beskikbaar was (*Stellenbosch Universiteitsblad*, 1923).

Intervarsity tussen die Universiteite van Stellenbosch (Maties) en Kaapstad (Ikeys) is 'n belangrike jaarlikse gebeurtenis, maar weens onvoldoende notulering van die Intervarsity-gebeure het baie van die uitslae verlore gegaan (*Stellenbosch Students' Quarterly*, 1920c).

Vroeër jare het Maties jaarliks die meeste van hulle wedstryde verloor en het hulle posisie in die liga tussen laaste en tweede laaste gewissel (*Stellenbosse Oud-Student*, 1940). Teen 1943 het Maties vier spanne gehad (*Matie*, 1943), maar tussen 1944 en 1946 het die ledetal met die helfte verminder en moes twee spanne geskrap word (*Stellenbosch Oud-Student*, 1946). Ten

spyte van die gebrek aan voldoende velde, kleedkamers en afrigters wat die ontwikkeling van dameshokkie voor 1950 aan die US benadeel het, asook die dalende spelersgetal, het die Matiedames gemotiveerd gebly om hulle geliefde sport te beoefen (*Stellenbosch Student*, 1952).

In 1956 is ses spanne in die WP-liga ingeskryf en die sewende- en agstespanne het hulle eie liga gestig waar hulle teen tuisspanne kon meeding. Daardie jaar is daar ook 'n toer na die Skiereiland onderneem waarvan die Maties onoorwonne teruggekeer het. Maties het slegs drie wedstryde verloor en al hulle vriendskaplike wedstryde gewen. Teen 1957 het Maties sewe spanne in die onderskeie WP-ligas gehad en het Maties heelbo aan die puntelys geëindig. Daardie jaar het al ses spanne van Maties die Ikeys geklop (*Stellenbosse Student*, 1957). In 1958 was me. Shirley Grace Maties se eerste Springbokspeler (US-dameshokkieklub, 1958).

Velde

Die eerste speelterrein vir mans en dames was 'n ou krieketveld wat vanaf 1886 deur krieket-, rugby- en hokkiespelers op die sogenaamde Vlakteveld gebruik is. Hierdie veld was vir 25 jaar die enigste hokkieveld op Stellenbosch. Later, tussen 1910 en 1920, is 'n ou voetbalveld wat geleë was waar die JS Gericke biblioteek tans is, in 'n hokkieveld omskep. In 1928 is 'n nuwe veld bokant Dagbreek-koshuis aangelê (Universiteit van Stellenbosch, 1939).

Nadat die manshokkieklub in 1928 bogenoemde nuwe veld gekry het, is 'n veld vir die dames sewe jaar later (1935) langs daardie veld aangelê. In 1938 is 'n derde veld geskep en drie jaar later 'n vierde een.

In 1960 het twee van die velde in die slag gebly omdat dit vir die manskoshuis, Eendrag, moes plek maak (Lombard, 1960). In April 1962 is besluit om drie grasvelde en twee gruisvelde op die Coetzenburg-sportterrein aan te lê. 'n Jaar later is die klubhuis ook voltooi. In 1967 het die mans- en dameshokkieklubs gesamentlik agt velde gehad, waarvan die dames vyf gebruik het (Calder, 1990). Die gruisvelde is in 1978 met grasvelde vervang. Teen 1988

het die dameshokkieklub sewe grasvelde gehad, waarvan twee spreiligte gehad het, asook 'n binnenshuise baan in die DF Malan Gedenksentrum (*Matie*, 1988).

Koshuishokkie

Terwyl Dr Danie Craven onderwys gegee het aan St Andrew's College in Grahamstad het hy bekend geraak met die interhuiskompetisie wat jaarliks by die skool plaasgevind het. Kort na sy aanstelling as lektor op Stellenbosch in 1947 het hy dié stelsel ingevoer. Hy het dit koshuisrugby genoem. Dit was hoofsaaklik vir spelers wat nie plek in die boonste klubspanne kon haal nie en so het die fenomeen van koshuisrugby in 1949 begin. Die spelers het dit met groot entoesiasme aangedurf en wou net hul beste vir hulle onderskeie koshuise gee. Dit het tot 'n sterk band tussen die spelers en hul koshuise asook 'n verbetering in gees gelei. Hierdie gebeurtenisse het tot die begin van koshuissport aanleiding gegee (Huys, 2008).

Die koshuisliga vir hokkie het in die vroeë vyftigerjare (Wiid, 2010) begin deurdat Maties se vierde tot sesde spanne as 'n proefneming in die WP se tweede liga ingeskryf is (US-dameshokkieklub, 1958). Die jaar is afgeskop met 'n eerstejaarstoernooi, gevolg deur 'n interkoshuistoernooi (wat slegs een dag geduur het) en 'n interkoshuisliga (wat oor 'n paar maande gestrek het) (US-dameshokkieklub, 1964). Die jaar is met die Prestige-toernooi afgesluit en dit was ook die enigste toernooi waar klubspelers ook vir 'n koshuisspan kon speel (US-dameshokkieklub, 1976). Die deelnemende koshuise was Harmonie, Monica, Heemstede, Huis Ten Bosch, Huis van Niekerk (Sonop), Huis de Villiers, Lydia, Greylock, Minerva, Irene, Erica, Serruria, Nemesia, Huis Francie van Zijl, Nerina, PSO (Privaatstudente-organisasie) en die twee dameskoshuise van Boland Kollege, naamlik Rozenhof en Denneoord. Koshuise wat gedurende die jare goed vertoon het tydens die verskeie toernooie was Huis Francie van Zyl wat tussen 1962 en 1992 altesaam 10 toernooie gewen het en Nerina en Huis Ten Bosch wat elkeen vyf toernooie agter hul naam geskryf het. Ten opsigte van die koshuisligas wat tussen 1962 en 1992 plaasgevind het, het Heemstede agt ligas gewen, terwyl Denneoord en Lydia albei vyf verower het (Laubscher, 2010).

Inter-universitêre toernooie

Dames het vanaf 1948 aan die interuniversitêre toernooie begin deelneem, wat ook tot gevolg gehad dat die Suid-Afrikaanse Universitêre (SAU) hokkievereniging vir dames in 1949 gestig is (Myburgh 1981). Na afloop van elke toernooi is ’n gekombineerde SAU-span (Proteas) gekies wat uit die beste spelers van die deelnemende universiteite bestaan het (*Stellenbosse Student*, 1956). Vanaf 1952 tot 1991 het Stellenbosch 10 toernooie gewen, 10 keer die tweede plek behaal en drie keer derde geëindig. Die swakste jare was in die vroeë vyftiger- en sestigerjare. Meer as 100 Matiespelers het tussen 1950 en 1991 in die SAU-span gespeel (Laubscher, 2010).

Binnenshuise hokkie

Binnenshuise hokkie het in 1976 op Stellenbosch posgevat (*Matie*, 1977) en die eerste interprovinsiale toernooi is in 1981 in Kaapstad aangebied (*Stellenbosse Student*, 1981). In 1988 het die eerste SAU binnenshuise hokkietoernooi in Bloemfontein plaasgevind en Maties was die trotse wenners van dié toernooi (US-dameshokkieklub, 1988). Volgens beskikbare inligting het Maties die liga agt keer gewen, twee maal tweede gekom en vyf keer in die

derde plek geëindig. Die klub se aantal provinsiale spelers het jaarliks gegroei en daar was selfs ’n paar spelers wat kaptein of onderkaptein van die provinsiale span was.

Klub- en ligabedrywighede: 1959-1992

Vanweë ’n gebrek aan velde en swak organisasie het daar aanvanklik ’n negatiewe atmosfeer onder die spelers geheers (US-dameshokkieklub, 1959). Omstandighede het egter so verbeter dat die klub in 1965, 250 lede gehad het, wat dit daardie jaar die grootste hokkieklub in die land gemaak het (*Stellenbosse Student*, 1963).

Moeite is gedoen om spelers se vaardighede te verbeter deur verskeie beginnerskursusse en klinieke aan te bied (US-dameshokkieklub, 1969) en ook buiteafrigters soos me Cadell van Engeland (US-dameshokkieklub, 1973) en die Duitse klubafrigter, Willig (US-dameshokkieklub, 1978) wat waardevolle bydraes gelewer het.

Al die harde werk is beloon toe Maties in 1986 die Klub van die Jaar-toekenning ontvang het, nadat hulle ook as die nuwe Suid-Afrikaanse kampioen tydens die Allied-klubtoernooi gekroon is (*Matie*, 1986). Stellenbosch se vrouehokkieklub was vanaf 1988 tot 1992 (waar hierdie studie eindig) die nasionale klubkampioen (*Stellenbosse Student*, 1992).

SAMEVATTING

Alhoewel ’n poging al in 1965 aangewend is om die geskiedenis van Maties dameshokkieklub te dokumenteer, het hierdie inligting egter verlore geraak. Die volle geskiedenis van die klub kom met hierdie studie vir die eerste keer tot sy reg. Die Maties het ten spyte van al die terugslae, soos byvoorbeeld ’n tekort aan spelers, velde en afrigters, nooit gaan lê nie.

Van die hoogtepunte van die klub was beslis 1983, toe Maties die Westelike Provinsie (WP) binnenshuise liga (US-dameshokkieklub, 1983) en WP-veldhokkieliga gewen het (US-dameshokkieklub, 1983). Maties het ook nege Springbokspelers soos Shirley du Toit (née Grace), Lauretta Maree (née Boshoff), Arlene Wiley (née Coates), Claire Nicholson, Rennie Rose-Innes (née Basson), Debbie Jordaan (née Cromhout), Annemarie Meyer, Sherylle Calder en Annalette Luttig opgelewer. Me Sherylle Calder het Suid-Afrika 10 keer tussen 1982 en 1992 verteenwoordig en was vanaf 1988 tot 1992 ook kaptein van dié span.

Die skolekamp het in 1982 ’n jaarlikse instelling by die damesklub geword (US-dameshokkieklub, 1992) en verskeie toere en toernooie is ook deur die jare onderneem, soos Maties se toer na Rhodesië (vandag Zimbabwe) (US-dameshokkieklub, 1969), Namibië (US-dameshokkieklub, 1982) en Mosselbaai (*Matie*, 1984) om slegs ’n paar te noem.

Op 16 Oktober 1992 het die mans- en dameshokkieklub saamgesmelt (*Matie*, 1992) en sou dit voortaan as die US Hokkieklub bekend staan (US-dameshokkieklub, 1992).

SUMMARY

The history of Maties Women's Hockey Club: 1903-1992

What started as a social game on a farm in Stellenbosch developed into a sport in which both men (1901) and women (1903) participated. The purpose of this study was to document the origin, formation and development of Maties women's hockey. The club was founded in 1903 and all possible resources were used to reconstruct the activities of the club until 1992, before the men's and women's hockey clubs merged.

Since this study is sport-historically orientated, the historic-scientific method was implemented and preference was given to primary sources of information, such as minutes of the Maties women's hockey club, Sport Committee, Colours Committee, and hostel league. University publications such as the *Stellenbosch Students' Quarterly*, *Stellenbosse Oud-Student*, *Stellenbosse Student* and the *Stellenbosse Universiteitsblad* also proved to be of great value. Interviews with former players and coaches filled some of the gaps left by missing documents. Secondary sources of information included newspapers, internet and books.

A brief introduction focuses on the origin of the game and development of the game from ancient times. Attention was then given to the history of women's hockey specifically in South Africa and all the associations that were founded.

From 1903 to 1958 only secondary sources had to be relied upon owing to the loss of documents. Maties only had one team and there was no regular coach, nor were there enough fields. With a lot of determination and hard work the women's club started to become more competitive and also had a few provincial players. In 1958 one of the Matie players, Miss Shirley Grace, was selected for the South African team. She was the first of many.

The Maties women's hockey club also had a hostel league that started in the fifties and included a first-year tournament, an inter-hostel league, an inter-hostel tournament and a Prestige tournament to end each season every year. More than 17 hostels participated in the league. Heemstede won the most hostel leagues. Huis Francie van Zyl won the most tournaments between 1962 and 1992.

Indoor hockey started at Stellenbosch in 1976 and quickly grew into a very popular sport. Maties won the first South African Universities (SAU) Indoor hockey tournament in 1988. According to the available results Maties won the indoor league eight times until 1992 and also had a growing number of provincial players.

After the SAU Hockey Association for women was founded in 1949, the SAU tournament took place every year. The SAU team consisted of players from different universities all over South Africa. From 1952 to 1991 Maties won ten of the tournaments and had more than a 100 players in the SAU team between 1950 to 1991.

Some of the highlights from 1959 to 1992 included when Maties won the Western Province (WP) first league and WP indoor league in 1983, as well as receiving the Club of the Year

award in 1986 after winning the Allied club tournament. Maties were also the national club champions from 1988 to 1992.

On Friday 16 October 1992 the men's and women's hockey clubs merged and became known as the US Hockey Club.

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MOTIVES FOR ATTENDING THE CULTIVARIA ARTS FESTIVAL

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ABSTRACT

Festivals are becoming a key feature on the tourism calendar of many towns and cities. Cultivaria is one of South Africa's newest arts festivals and is held at Paarl annually. The festival is one combining the arts, wine and food. The purpose of this research is to determine the reasons (motives) for visitors attending the festival. This information is needed so that a marketing plan can be developed, as well as to be able to ensure that visitors' needs are fulfilled. In order to do this, the organisers' need to know the reasons why people attend the festival. In order to achieve the goal of the research, a survey (N=450) was conducted where 409 questionnaires were successfully retrieved for use in a factor analysis. The results showed the three main motives for attendance were the event attraction, cultural exploration and escape. Escape was found to be the main motive, which contradicted similar research done in other parts of the world. The results also indicated that, even though Cultivaria is an Afrikaans-language festival, language did not play a significant role as a motivator to the event. This contradicted similar research conducted at Aardklop National Arts Festival, also primarily an Afrikaans-language festival. From the results, recommendations are made that will contribute to a more sustainable event.

Key words: Arts festival; Food and wine; Travel motives; Factor analysis; Travel behaviour

INTRODUCTION

Visser (2005: 155) refers to festival tourism as an 'emerging giant' and states that festivals today have indeed become a key feature for many towns, cities and destinations. An indication of their growth and importance is reflected in the number of festivals (currently more than 300 *per annum*) staged in South Africa; each with its own unique feel, production and visitors (Saayman & Rossouw, 2009). One such festival is Cultivaria that takes place annually at Paarl, located in the Western Cape Province of South Africa. This festival, which is held in the month of September made its first appearance on the Cape tourism calendar in 2006. It is primarily an Afrikaans cultural festival that combines the arts, food and wine and, according to Crompton and McKay (1997: 427), Cultivaria complies with the goal of a festival, which is to fulfil (i) physical, (ii) interpersonal and (iii) personal needs. Furthermore, Yuan *et al*. (2005) discovered that the kind of festival attended by tourists/visitors serves as a good prediction of travel motives. Thus, by studying the travel motives of visitors to Cultivaria, the needs travellers are seeking to fulfil may be determined. Knowledge of these needs may ensure a more accurate approach in marketing and the effective future development of this festival. Formica and Uysal (1998) believe that arts festivals are an

indispensable feature of cultural tourism. Therefore, arts festivals have been labelled as

cultural events and, in order to ensure growth, effective marketing of these festivals remains paramount. However, Kruger (2009) states that the foundation of a marketing plan or strategy lies in the answers to the issues of why people travel or, in this case, attend the festival. Such knowledge is essential to the organisers of Cultivaria as the uniqueness of each festival forms an important factor in ensuring the success and sustainability of such a festival (Oaks, as cited in Bowen & Daniels, 2005: 156).

LITERATURE REVIEW

According to Iso-Ahola (1980) a motive is an internal factor that arouses, directs and integrates a person's behaviour. Kreitner (1989) adds that motive is often the main indicator of the action to be taken in order to satisfy a need. The realisation of a need that has to be satisfied can be seen as the action that motivates visitors to attend a festival. In this regard, Prentice and Anderson (2003: 9) state that not everyone that attends a festival can be assumed a festivalgoer or *festino*. They caution about assuming that all festival visitors are motivated to visit the destination or to participate in the festival. In support of the latter point, Kruger (2009) found that travel motives differ from festival to festival. This concurs with the finding of Scott (1996), Rachael and Douglas (2001) and Kruger and Saayman (2010). Streicher and Saayman (2010) state that motives can be either intrinsic, extrinsic or a combination of both. Crompton and McKay (1997) further argue that visitors' motives for visiting a festival are the starting point that triggers the decision-making process and, thereby, highlights the importance of determining motives.

It is therefore clear that festivals and special events cannot be seen as homogenous, as they vary in terms of place, objectives, program contents and purposes. According to Kim *et al*. (2002) it is for this reason that different motives will emerge leading to attendance at different festivals. This further demonstrates the necessity for this type of research. The literature review showed that knowledge of travel motives help event managers to respond to the following: changing needs and trends in the festival market (Ferrell *et al*., 2002); more effective planning and promotion of festivals (Kim *et al.*, 2002; Kruger *et al*., 2010); the identification of different markets (Kruger, 2009); the prediction of visitor travel patterns (Cha *et al*., 1995); positioning the festival (Scott, 1996); the design of better products and services (Crompton & McKay, 1997); ways to increase visitor satisfaction and build loyalty (Dewar *et al*., 2001); the adaptation of festival programs based on specific needs (Marais, 2010); and to achieve clarity and greater insight into visitors' decision-making processes (Crompton & McKay, 1997). Added advantages of the understanding of travel motives include identifying strengths and opportunities, thus being able to initiate improvements for increased numbers of visits and revenues. De Guzman *et al*. (2006) believe that such an understanding strengthens both management and product development. The literature review also revealed a wide variety of studies (see Table 1), all conducted on travel motives to festivals. It seems that escape, socialisation, novelty and family togetherness are the most usual motives. The fact that so many studies confirmed these common motives underlines the importance of this type of research, as event managers have to be able to very accurately

identify unique motives for visiting a particular festival in order to better position their respective festivals.

TABLE 1: **PREVIOUS RESEARCH ON FESTIVAL MOTIVATIONS**

Author	Year	Name of festival	Identified dimensions
Uysal *et al.*	1993	County Corn Festival, South Carolina, USA	Escape, Excitement, Event novelty, Socialisation, Family togetherness.
Mohr *et al.*	1993	Freedom Weekend Aloft Festival in Greenville, South Carolina, USA	Socialisation, Family togetherness, Excitement, Escape, Event novelty.
Backman *et al*.	1995	Festivals and events attended by pleasure travellers from the US	Excitement, External, Family, Socialising, Relaxation.
Scott	1996	Bug Fest, Holiday Lights Festival and Maple Sugaring Festival in Cleveland, Ohio, USA	Nature appreciation, Event excitement, Sociability, Family togetherness, Curiosity, Escape from routine.
Formica & Uysal	1996	Umbria Jazz Festival, Italy	Excitement/thrill, Socialisation, Entertainment, Event novelty, Family togetherness.
Schneider & Backman	1996	Arabic cultural festival in Jordan (Jerash Festival for Culture and Arts), Jordan	Family togetherness/socialization, Social/leisure, Festival attributes, Escape, Event excitement.
Crompton &	1997	Fiesta Festival in San Antonio,	Cultural exploration, Novelty/regression,

McKay		Texas, USA	Recovery of equilibrium, Known-group socialization, External interaction/socialisation.
Formica & Uysal	1998	Spoleto Festival, Italy	Socialisation and entertainment, Event attractions/excitement, Group togetherness, Cultural/historical, Family togetherness, Site novelty.
Ali-Knight & Charters	1999	Western Australia winery	No dimensions identified.
Lee	2000	98 Kyongju World Expo, South Korea	Cultural exploration, Family togetherness, Escape, Novelty, External group socialisation, Event attractions, Group socialisation.
Kim *et al.*	2002	Various festivals and events in Virginia, USA	Social/leisure, Event novelty, Family togetherness, Escape, Curiosity.
Prentice & Anderson	2003	Edinburgh Festival, UK	Festival atmosphere, Socialisation, Specific and generic utilitarian activities (e.g., to see new experimental performances, enjoy plays and musicals, learn about Scottish cultural traditions).
Van Zyl & Botha	2003	Aardklop National Arts Festival in Potchefstroom, SA	Push dimensions: Family togetherness, Socialisation, Escape, Event novelty, Community pride, Self-esteem. Pull dimensions: Entertainment, Food and Beverages, Information and marketing, Transport.
Lee *et al*.	2004	2000 Kyongju World Expo, South Korea	Cultural exploration, Family togetherness, Novelty, Escape, Event attractions, Socialisation.
Yuan *et al.*	2005	Vintage Indiana Wine and Food Festival in Indianapolis, Indiana, USA	Escape, Wine, Socialisation, Family togetherness.

Dodd *et al.*	2006	Texas GrapeFest in Grapevine, Texas, USA; Vintage Indiana Wine and Food Festival in Indianapolis, Indiana, USA Aboriginal cultural festivals South Beach food and wine festival, Florida	No dimensions identified.
Chang	2006	Aboriginal cultural festivals	Equilibrium recovery, Festival participation and learning, Novelty, Socialisation, Cultural exploration.
Park *et al.*	2008	South Beach food and wine festival, Florida	Taste, Enjoyment, Social Status, Change, Meeting people, Family, Meeting experts.
Kruger *et al.*	2010	Aardklop National Arts Festival, SA	Festival products/shows, Family togetherness, Exploration, Escape, Festival Attractiveness.
Saayman & Krugell	2010	Wacky Wine festival, Robertson, SA	*Festinos*, Epicureans, Social adventures.
Kruger & Saayman	2010	Oppikoppi arts festival, SA	Group togetherness, Escape, Cultural exploration, Event novelty and regression, Unexpectedness, Socialisation.

Source: Adapted from Park *et al*. (2008: p.166-168)

Kim *et al*. (2006) state that festival attendance motivation is closely related to tourism motivation as festival attendance is an important aspect of tourism. The most frequently used theoretical frameworks to explain tourism motivation include: (i) Maslow's need hierarchy; (ii) Iso-Ahola's escape seeking dichotomy; (iii) push-pull theory; and (iv) the notion of disequilibrium (Crompton, 1979; Crompton & McKay, 1997; Kim *et al.*, 2006; Swanson & Horridge, 2006). These frameworks provide a basis for travel motivation studies although it appears that travel motives in tourism lean more towards a combination of extrinsic and intrinsic motives. The theory that best distinguishes between intrinsic and extrinsic motives is the push and pull theory (Van Zyl & Botha, 2003). Van Zyl (2005) states that the primary goal of festival managers should be the enhancement and maintenance of visitors' central motivations since they are the key ingredients in understanding visitors' decision processes. Research by Marais (2010) showed that visitors have primary and secondary motives regardless of whether the motives are intrinsic or extrinsic. From a management point of

view, this revealed that once the primary motives were fulfilled, visitors were satisfied with the festival. This latter, therefore, not only shows a direct correlation between motives and satisfaction, but also highlights the complexity of travel motives.

Figure 1 is a schematic presentation of the relationship between needs, motives and decision-making. It demonstrates the important role that knowledge of travel motives plays in the decision making process, which therefore have a direct impact on the marketing approach, as well as on the management of a successful event. Given the importance of travel motivation, the purpose of this research was to determine the travel motives of visitors to the Cultivaria Festival. The rationale behind this research was that even though a few similar studies have

been conducted in South Africa, none was conducted on small arts festivals. Therefore, this type of research can help in growing and sustaining events of this nature.

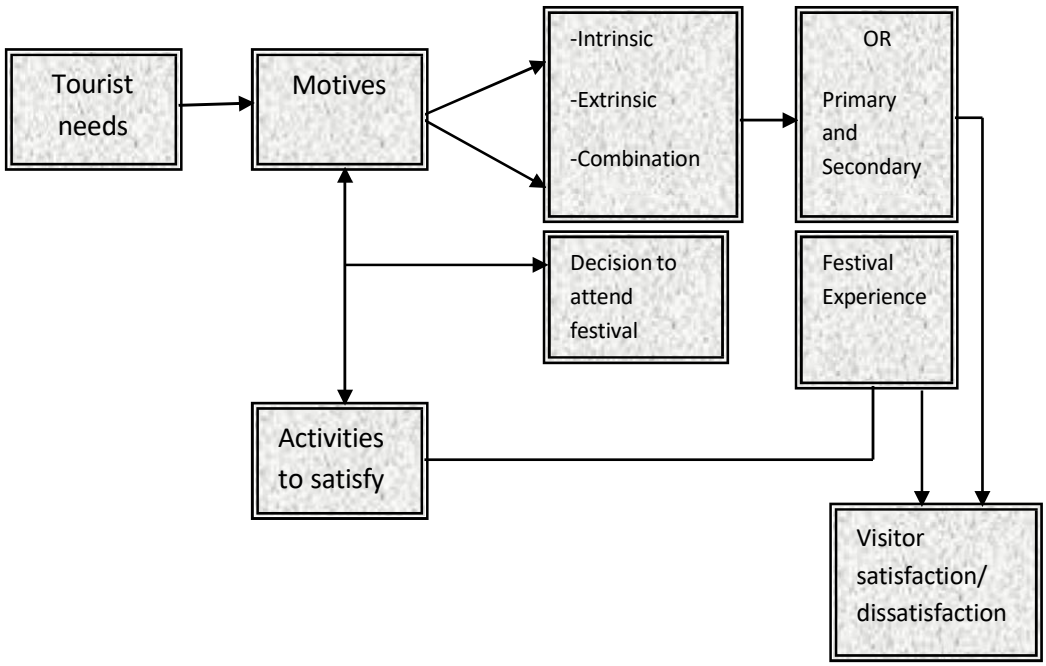

FIGURE 1: ***RELATIONSHIP BETWEEN NEEDS, MOTIVES AND DECISIONS TO ATTEND***

METHODOLOGY

The discussion of the methodology is divided into the following categories: the research design and method of collecting data; sampling techniques and theory; the questionnaire development; and the analysis of data.

Research design and data collection

Quantitative research was applied by means of a structured questionnaire. Questionnaires were distributed between 24-27 September 2009, during the festival at the main festival venue by six fieldworkers.

Sampling

A non-probability sampling technique was applied based on the willingness of visitors to complete the questionnaire. Hence, from an ethical point of view respondents had the freedom of choice to participate or not to participate in the survey. Respondents also

remained anonymous. Cooper and Emory (1995) state that for a population of 100 000, 384 completed questionnaires are sufficient. Since the festival was expected to attract

approximately 18 000 visitors, 450 questionnaires were distributed of which 409 completed questionnaires were returned and used.

Development of the questionnaire

The questionnaire used was similar to the questionnaires used for festivals such as *Aardklop, Klein Karoo National Arts Festival* and *Oppikoppi* (see Pissoort, 2007*).* The questionnaire consisted of three sections:

- Section A described demographic details (gender, home language, age, province and country of residence);
- Section B focused on economic details (spending, length of stay, size of travel party); and
- Section C dealt with the motivational factors where 21 statements were used making use of a 5 point Likert scale where 1 = not at all important and 5 = very important. An example of a statement is as follows: Respondents attend the festival to meet new people.

Information drawn from Sections A and C will form the basis of this article.

Data Analysis

Microsoft™ Excel™ was used for data capturing and data analysis. The Statistical Package for Social Sciences software was used to apply a principal component factor analysis using an Oblimin rotation with Kaiser Normalisation. The pattern matrix of the principal component factor analysis identified three factors that were labelled according to similar characteristics (Table 2). These three factors accounted for 54.57% of the total variance. All factors had high reliability coefficients ranging from 0.7 (the lowest) to 0.9 (the highest).

TABLE 2: **FACTOR ANALYSIS RESULTS OF CULTIVARIA VISITORS' MOTIVATIONS**

Motivation factors and items	Factor loading	Mean value	Cronbach alpha
Factor 1: Event Attraction		3.30	.895
Cultivaria is different	.702		
Variety of productions	.881		
Quality productions	.877		
Sociable Festivals	.601		
Value for money	.643		
Closest festival	.242		
Well-known artists	.608		
Annual commitment	.514		
Primarily an Afrikaans festival	.372		
Useful combinations	.768		
Unique Experience	.733		

Factor 2: Cultural exploration		2.39	.817
Meet new people	.542		
Benefit my children	.669		
Support art exhibitions	.672		
Buy Art	.764		
Explore	.601		
Cooking Demonstrations	.659		
Factor 3: Escape		3.54	.706
Get away	.735		
Relax	.865		
Time with family	.364		
Time with friends	.403		

RESULTS

The results will be discussed in two sections. Firstly, an overview of the profile of visitors to the Cultivaria Festival will be presented. Thereafter, the results of the factor analysis (visitor motives) will be discussed. The research revealed the following profile: most respondents

were female; 85% were Afrikaans speaking; 15% English speaking; respondents were approximately 40 years old; originated mostly from the Western Cape Province; visitors travelled in groups of three to four people; and stayed an average of one night in Paarl. The majority (51%) of the respondents were first time visitors and the number of previous visits for those who have attended before was averaged at two.

Results from the factor analysis

The results of the factor correlation matrix as displayed in Table 3, shows that the motives were specific and well defined even though respondents did not rate one factor significantly more important than another.

TABLE 3: **FACTOR CORRELATION MATRIX**

Factor	1	2	3
1 Event attractions	1.000	.575	.558
2 Cultural exploration	.575	1.000	.478
3 Escape	.558	.478	1.000

Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalisation

Factor scores were calculated as the average of all items contributing to a specific factor so that it can be interpreted on the original 5-point Likert scale of measurement. The mean values were close and reasons for this could be that since the questionnaire has been used and adapted at several festivals, it measured motives that were important to respondents. Another

reason could be that respondents did not rate one motive as being significantly more important than another. As shown in Table 2, the following motives were identified:

- **Factor 1: *Event attractions***

Event attractions (Factor 1) had the second highest mean value of 3.30 and a reliability coefficient of 0.895. This factor included statements such as *Quality productions, Variety of productions* and *Value for money.* This factor was also identified in studies completed by Formica and Uysal (1998), Lee (2000), Lee *et al.* (2004) and by Kruger *et al.* (2010).

- **Factor 2: *Cultural exploration***

Cultural exploration (Factor 2) received the lowest mean value (2.39) and the reliability coefficient was 0.817. Factor 2 included *Support art exhibitions, Buy art* and *Cooking demonstrations.* Other researchers such as Crompton and McKay (1997), Lee (2000), Lee *et al*. (2004), Chang (2006), De Guzman *et al*. (2006) and Kruger and Saayman (2010) have also confirmed this motive. It is noteworthy that in their study, Crompton and McKay (1997) discovered that visitors attending food festivals were less motivated by cultural exploration. Since food forms a significant part of the Cultivaria Festival, this could serve as an explanation of the low mean value obtained for this factor.

- **Factor 3: *Escape***

Escape (Factor 3) was the most important motive for visitors to attend the Cultivaria Festival and had the highest mean value (3.54). The reliability coefficient was 0.706. This factor consisted of the following aspects: *Get away; Relax; Time with family;* and *Time with friends. Escape* is considered the most common travel motive in tourism literature and is therefore also confirmed by research (see Uysal *et al.*, 1994; Lee *et al.*, 2004; De Guzman *et al.*, 2006; Beh & Bruyere, 2007; Saayman & Saayman, 2008; Kruger & Saayman, 2010).

DISCUSSION

The following findings and implications can be drawn from the results shown in Table 2:

Firstly, the results showed that a combination of intrinsic (escape and cultural exploration) and extrinsic (event attraction) motives played a role in the decision to visit Cultivaria. This

finding confirms those of Streicher and Saayman (2010). The results, however, also support Crompton and McKay's (1997) position that motivation varies depending on visitor segment, type of festival and region visited, as well as the socio demographic and cultural variables (Yuan *et al.,* 2005). Of these motives, *Escape* was the most significant, which implied that visitors attended this festival as a way to escape their daily routines. Once again, this research confirms findings by various researchers such as Uysal *et al*. (1994), Scott (1996), Kim *et al.* (2002), Lee *et al.* (2004) and that of Kruger and Saayman (2010) who all indicated that escape remains the most common travel motive in tourism. This conclusion, however, contradicts the findings of Park *et al*. (2008) who indicated that escape (or change as they referred to it) was a lower order motive at a wine and food festival. Even so, Park *et al.*

*(*2008) did find tasting wine at the food and wine festival as the primary motive. Yuan *et al*. (2005) found escape to be the primary motive of attendance at a wine and food festival held in Indianapolis. From a marketing point of view, this research highlights the fact that this festival has to position its unique selling features in the marketing campaign since most destinations and attractions offer "an escape". It therefore would make sense that the focus of the marketing campaign should address the opportunity to escape whilst simultaneously enjoying a variety of quality art productions, together with good food and wine. Currently the marketing campaign centres around the artist that will perform at the festival rather than what the festival is all about. Furthermore, as there are so many first-time visitors, it would be prudent to follow a diversified strategy in order not only to attract new visitors but also to retain the repeat visitors. This strategy is supported by Park *et al.* (2008) and could readily be achieved by ensuring quality and variety productions. Additionally, it would make sense to evaluate visitor levels of satisfaction as a tool that could be used to assure quality service. From the point of view of the organisers, this implies that marketers have to be more focused, as the concept of escape is not evident in any of the current marketing material.

Secondly, it is interesting to note the fact that visitors are least motivated to attend the festival because it is primarily an Afrikaans festival. This motive had a very low factor loading (0.372), despite the fact that the Afrikaans language monument is a major attraction in Paarl. This finding contradicts research by Kruger *et al*. (2010) who indicated that visitors to Aardklop National Arts festival, which is also primarily an Afrikaans arts festival, rates the fact that it is an Afrikaans festival very highly. One reason for this lack of correlation between motivation and language could be that respondents take this for granted, hence it does not play a significant role in their decision making process. It could also imply that, as the marketing campaign does not focus much on this aspect when compared to Aardklop or the Klein Karoo National Arts Festival, it is not considered as being important. Marketing and information dissemination should therefore communicate these aspects clearly. These results also show that since language is not a major motive the festival could explore other markets such as the 15% English speaking visitors currently attending Cultivaria.

Thirdly, cultural exploration received the lowest rating. This could be explained by findings from Marais (2010) who indicated that visitors with a special interest in food and wine tend to be a niche market. These visitors are very specific in what they require and do not necessarily attend other shows. Confusingly, many other studies contradict this finding by indicating cultural exploration as the most important motive in their respective studies (see Crompton & McKay, 1997; Lee, 2000; Lee *et al*., 2004). This implies that the organisers should develop a special food and wine program for the food visitors that could include, amongst other things, cooking demonstrations, wine tasting and food tasting and preparation. Event organisers have to approach the food visitors as a separate market. This also includes having special marketing activities in order to attract them.

IMPLICATIONS FOR FURTHER RESEARCH

Based on the results of this research, further analysis should be done to get a better understanding of the motives and profile of first time visitors versus the repeat visitors. The

needs and motives of the English speaking visitors also requires further investigation as indicated above. It would also be interesting to differentiate between arts, wine and food markets, since these aspects could contribute not only to the literature on smaller arts

festivals, but also be useful information for the event organisers.

CONCLUSIONS

The findings of the study revealed that knowledge of travel motives is essential when determining the different needs of various visitors, to enable marketing of the festival accordingly. This is the first time that such research has been undertaken for the Cultivaria Festival and confirmed *Escape* as the primary motive for attending the festival that caters particularly to arts, food and wine lovers. This study supports the fact that different festivals have different motives.

From the results, it is clear that although the festival offers arts, food and wine, the latter two components do not seem to be well promoted from a marketing point of view. Similar research at other festivals shows that visitors who attend food and wine festivals can themselves be regarded as a niche market. In order for this festival to grow, it will have to cater for all three market components; otherwise it should only target visitors with an interest in arts. The combination of all three factors, however, gives this festival a unique selling feature that needs to be further explored and developed. Finally, it must be remembered that Cultivaria is still a young festival and therefore has the opportunity to grow and develop its own unique features.

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120

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RELATION AND INFLUENCES OF SPORT CLIMBERS' SPECIFIC STRENGTH ON SUCCESS IN SPORT CLIMBING

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ABSTRACT

The aim of this research was to determine relations to, and influences of the specific strength of sport climbers on success in sport climbing. Research was conducted on a sample of sport climbers (N=32), participants in the Balkan championships "Naissus Route Climbing Challenge 03", competing on national and international level, by the application of nine tests for the estimation of sport climbers' specific strength and three variables for the estimation of success in sport climbing. Relations were determined by means of canonical correlation analysis and the influences by means of a regression analysis. The results of the research show that success in sport climbing depends on specific strength, mostly specific static strength. All variables have statistically significant projections on the canonic factor, most of all variables of specific static strength − block under 90˚ angle (BL90), block under 90˚ angle on left hand (B90L) and block under 90˚ angle on right hand (B90R) and variables of the situational-motor explosive strength − maximal reach with left hand (MRLH), maximal reach with right hand (MRRH) and maximal reach with both hands (MRBH) and pull-ups with two fingers (PU2F). Also, it can be concluded that specific strength significantly influences the success in all three criteria − the most difficult climbed route up to now (MDCR), the most difficult climbed route this season (MDDS) and competition standings (COST). However, none of the variables individually significantly influenced the most difficult climbed route up to now (MDCR); two variables − maximal reach with right hand (MRRH) and block under 90˚ angle (BL90) − influenced the most difficult route climbed this season (MDDS); and two variables for the estimation of static strength – block under 90˚ angle (BL90) and block under 90˚ angle on left hand (B90L) − influenced competition standings (COST). The obtained results can be utilised for the selection and direction of young talent towards sport climbing.

Key words: Specific strength; Sport climbing; Competition standing

INTRODUCTION

Sport climbing today is a complex sport, complete with its own vocabulary and equipment that have come about over decades of experimentation. For many years it has been one of the fastest-growing leisure activities, involving millions of people worldwide (Creasey *et al*., 1999). For example, according to the annual report in the Recreation Participation Study by the Outdoor Industry Association (2002), the United States of America (USA) can boast over 8.8 million climbers over the age of 16 years (i.e. 4.1% of the USA's population) and in Great

Britain the number of climbers increased by 40% in the period between 1989 and 1993

(Wright *et al.*, 2001; Davis, 2004; Mihailov, 2008). The diverse pursuits that make up the forms of the sport all require dedication from their participants and tend to evoke admiration from, and inspiration in, others (Davis, 2004).

According to the sport classification, sport climbing belongs to a group of combined (complex) sport. They are characterised by a large variety of movements in compensated fatigue and changing intensity of work (Verhosanski *et al.*, 1992). An important characteristic of these sport is a changeable competition situation and a need to preserve a high level of working capacity in compensated fatigue conditions. Acyclic and cyclic types of sport include features of organisation of movement activities and energy provision. Bearing in mind the changing intensity of the competitions' activity, alteration of high movement activities and total rest, the energy work of muscles has aerobic-anaerobic features and a specific weight of glycolitic reaction (Verhosanski *et al.*, 1992).

Performing in the vertical plane requires physical capabilities such as strength, power and endurance. It also demands the development of technical skills such as balance and economic movement while gripping and stepping in an infinite variety of ways, positions and angles. Most important, the inherent stress of climbing away from the safety of the ground requires acute control of one's thoughts, focus, anxiety and fears. In total, the above factors combine into what may be one of the most complex sporting activities on this "third rock from the sun" (Horst, 2003).

All climbing disciplines demand strength, endurance and skills acquired during long systematic training. Physical preparation for sport climbing implies increased volume and specificity of the training as progression towards the elite athlete's form. Since most sport climbers do not follow any expert training plan (Twight & Martin, 1999) but utilize their 'feelings', it is assumed that more advanced climbing formula could be obtained by the administration of systematic and documented sport climbing principles. These include frequency, intensity, duration and types of training (Wilmore & Costill, 1999), which are to be selected considering the specific motor abilities of each climber.

"Strength, or muscular strength, is the ability to generate maximum external force" (Zatsiorski & Kraemer, 2006: 21). In the world of sport most disciplines require some degree of both strength and motor skill for the athlete to be successful (Jensen *et al.*, 2005; Rahimi & Bephur, 2005).

Specific motor abilities are acquired in life and specifically in some sport and are the result of specific training, i.e. particular motor training. During the training process in a specific sport basic motor abilities are modified according to the demands of the given sport. These are basics used to build on specific motor abilities. Success in sport largely depends on numerous specific motor and other abilities (Nićin, 2000).

Rock climbing movements require following a pattern that mostly exerts severe pressure on the musculoskeletal system of the upper limbs. Total body weight is placed on the hand and one finger or more, many times during the performance. Active limbs, such as the hand and

fingers in particular, acting as support and connection points between a climber's body and the wall, are susceptible to movement injuries (Shahram *et al.*, 2007).

There is a lack of research in the area of success prediction in sport climbing regarding general and specific strength (Stanković, 2009). Since fitness depends exclusively on the choice of adequate training models, athletes should be aware of the winning abilities they can develop (Binney & Cochrane, 2003a). Some researchers tried to use biomechanical analyses to predict success in sport climbing (Quaine *et al.*, 1997a,b; Binney & Cochrane, 2003b). However, a body of research on success in sport climbing is connected with physiological responses of the body during this sport (Booth *et al.*, 1999; Meimer *et al.*, 2000; Davis, 2004; Sheel, 2004; Macleod *et al.*, 2007). As for strength, high prediction values for the success in sport climbing are attributed to a specific climbing endurance in the lower-arm muscle strength (Binney & Cochrane, 2003a). The following factors have also been researched: muscle endurance and strength of the upper body (Watts, 2004); and relative strength and concentric flexion of hand wrist muscles (Schweizer & Furrer, 2007).

Bearing in mind that success in sport depends on specific motor abilities, the aim of this research was to determine relations to and influences of the specific strength of sport climbers on success in sport climbing.

METHOD

Sample of subjects

The sample (N=32) for this research was drawn from a population of sport climbing competitors, all competing on federal and international level. The sample comprised voluntary competitors who took part in the "Naissus route climbing challenge 03", a Balkan competition held in May 2009.

The average height of sport climbers was 179.94 ± 5.19 cm, body mass 69.72 ± 6.53 kg and body mass index 21.53 ± 1.84. The research sample was around 27.47 ± 4.76 years of age, with an average climbing experience of 7.02 ± 4.34 years.

Variable sample

Following specific strength tests, the climbers were divided into three groups: specific explosive strength, specific repetitive strength and specific static strength tests (Stanković, 2009). Specific explosive strength tests were: maximal reach with left hand (MRLH); maximal reach with right hand (MRRH); and maximal reach with both hands (MRBH). Specific repetitive strength tests were: pull-ups with two fingers (PU2F); horizontal pull-ups on left hand (HPLH); and horizontal pull-ups on right hand (HPRH). Specific static strength tests were: block under 90˚ angle (BL90); block under 90˚ angle on left hand (B90L); and block under 90˚ angle on right hand (B90R). Success in sport climbing was assessed by means of three variables (Stanković, 2009): the most difficult route climbed up to now (MDCR); the most difficult route climbed this season (MDDS); and competition standings (COST).

The most difficult route climbed up to now is a grade given for the most difficult route climbed by the subject in his/her overall climbing career. The most difficult route climbed this season is a grade given for the most difficult route climbed by the subject in that season (up to the competition date). This grade is displayed in numerical value according to the international assessment table for route scoring (Table 1). Competition standing is a sum of the best 10 routes a competitor climbed in three days of the competition. In case a climber does not climb 10 routes all climbed routes are graded.

TABLE 1. **GRADING SYSTEM OF WORLD RATING LIST OF NATURAL ROCK CLIMBING[1]**

GRADE	POINTS	BONUS POINTS
X+ (8b+)	1150	On Sight (O.S.) – points are awarded for 3 grades more - 5 points (+145 points)
X (8b)	1100	
X- (8a+)	1050	Flash (F) – points are awarded for 1 grade more +3 points (+53 points)
IX+/X- (8a)	1000	
IX+ (7c+)	950	Second Go (2Go) – one assigns +2 points
IX (7c)	900	First ascent (F.A.) – one assigns +10 points
IX- (7b+)	850	NOTE: At the start of the competition a list of unclimbed routes is given (projects) that could be climbed. (F.A.)
VIII+/IX- (7b)	800	
VIII+ (7a+)	750	
VIII (7a)	700	
VIII- (6c+)	650	
VII+/VIII- (6c)	600	
VII+ (6b+)	550	
VII (6b)	500	
VIII- (6a+)	450	
VI+/VII- (6a)	400	
VI+ (5c+)	350	

VI (5c)	300
VI-	250
V+	200
V	150

DATA ANALYSIS

Results of this research were processed in order to obtain information on the central and dispersion parameters for all manifest variables: number of subjects (N); mean value (Mean); minimum (Min) and maximum (Max) numeric results; range (Range); standard deviation (Std. Dev.); and standard error for the mean value (Error).

Discrimination of the measurement in this research was performed by two procedures:

[1]Grade conversion (2008)

- Skewness (Skew.) that explains the symmetry of the distribution of results around the arithmetic mean. If it is normal, the skewness value will be zero. A great number of weak results will be represented by a negative sign and a great number of good results will be represented by a positive sign. Skewness values range from minus three to plus three. All results over 1.00 indicate too light a task and all results below minus one denote too difficult a task.
- Kurtosis (Kurt.) denotes length or flatness of the distribution. When the observed distribution is not statistically different from the normal one (mesokurtic distribution), the value of this test is about 2.75. If the result of Kurtosis is remarkably higher than 2.75 (leptokurtic distribution) it means the results are very close and if the result is smaller than 2.75 (platikurtic distribution) it means the results are highly scattered.

To determine the relation of specific strength to success in sport climbing a canonic correlation analysis was used. This analysis explains the relation structure for the two sets of variables. The following was computed:

- size of canonic correlation (Can. R), which denotes maximal correlation between the two sets of predicting variables and a set of criterion variables;
- canonic power of determination (Can. R^2), which represents a percentage of the common variability of the researched area;
- Bartlett Lambda test (Chi-sqr), which represents a testing of the statistical significance of the canonic correlation coefficient;
- degree of freedom (df);
- degree of significance (p) representing a level of the significance of canonic factor pairs; and
- in the column (Root) a structure of isolated canonic factors was shown.

To determine the influence of the predicting variables (tests of specific strength) on each criterion variable a regression analysis was used. It contained the following parameters: coefficient of correlation (R); coefficient of the partial correlation (PART–R); standardised regression coefficient (BETA); vector of the standardised regression coefficient (t); significance of beta coefficient (p-level); coefficient of the multiple correlation (R); coefficient of the determination (R^2); and the level of the significance of regression connection on a multivariate level (p). Raw data were processed by means of the Statistica 8.0 software package. Statistical significance was determined at a level of $p<0.05$.

RESULTS AND DISCUSSION

By analysing Table 2, which depicts basic statistical parameters of the specific strength of sport climbers, it can be seen that the tests of specific explosive strength (MRLH, MRRH and MRBH**)**, as well as the tests of specific repetitive strength (PU2F, HPLH and HPRH) showed excellent discrimination for their standard deviation was about 3 to 3.5 times smaller than their mean value. On the other hand, somewhat weaker variability was shown by variables for the estimation of specific static strength (BL90, B90L and B90R**)** because their standard deviation was about 2 to 2.5 times smaller than their mean value. From their Skewness

(Skew.) it could be seen that there was a normal symmetry of distribution around the arithmetic mean in all tests. However, kurtosis showed that results in all variables were

scattered (platikurtic distribution of data). This did not come as a surprise since the competitors were of different ages, climbing experience and level of fitness.

TABLE 2: **BASIC STATISTICAL PARAMETER-PREDICTING VARIABLES**

Variables	N	Mean	Min	Max	Range	SD	Error	Skew	Kurt
MRLH	32.000	72.000	38.000	102.000	64.000	18.639	3.295	-0.204	-1.181
MRRH	32.000	69.656	35.000	97.000	62.000	18.606	3.289	-0.261	-1.097
MRBH	32.000	56.594	28.000	77.000	49.000	14.659	2.591	-0.462	-1.010
PU2F	32.000	12.906	7.000	20.000	13.000	3.577	0.632	0.095	-0.966
HPLH	32.000	14.031	3.000	23.000	20.000	4.816	0.851	-0.209	-0.527
HPRH	32.000	14.781	3.000	25.000	22.000	5.179	0.916	-0.098	-0.265
BL90	32.000	52.303	15.400	100.300	84.900	27.082	4.788	0.154	-1.288
B90L	32.000	8.181	1.200	18.600	17.400	5.947	1.051	0.286	-1.548
B90R	32.000	9.094	1.300	18.800	17.500	6.201	1.096	0.170	-1.628

As expected (Table 3) canonic correlation analysis showed the existence of only one statistically significant canonical factor, i.e. one significant correlation of the variable for the estimation of specific strength and success in sport climbing (second and third factors were not statistically significant). That one significant function explained 94% of the total variability of these two sets of variables, which was considered a highly significant level of correlation. Significance of correlation is p = 0.000000.

TABLE 3: **CANONIC FACTORS OF SPECIFIC STRENGTH AND SUCCESS IN SPORT CLIMBING AND THEIR SIGNIFICANCE**

	Canonical-R	Canonicl-R-sqr.	Chi-sqr.	df	P
1	**0.970**	**0.941**	**85.404**	**27.000**	**0.000000**
2	0.638	0.406	15.861	16.000	0.463000
3	0.344	0.118	03.077	07.000	0.878000

Table 4 depicts coefficients of correlations of the manifest variables in both sets (specific strength and success in sport climbing) with the isolated canonic function.

In the area of specific strength function was mostly defined by the variables of specific static strength (BL90, B90L and B90R) with coefficients over 0.930 and variables of situational-motor explosive strength (MRLH, MRRH and MRBH) and pull-ups with two fingers (PU2F) with coefficients over 0.840. Also, all other variables showed statistically significant projections on canonic factor, but with somewhat lower, yet high values of the coefficient of correlation. This factor could be defined as a factor of specific strength.

In the other set of data function was defined by all variables for the estimation of success in sport climbing. The biggest projection on canonic factor had a variable competition standing (COST = 0.985), followed by the most difficult route climbed this season (MDDS = 0.886) and ultimately the most difficult route climbed up to that moment (MDCR = 0.775).

TABLE 4: **FACTOR STRUCTURE OF SPECIFIC STRENGTH AND SUCCESS IN SPORT CLIMBING**

Variables	Root 1	Variables	Root 1
MRLH	**0.854**	**MDCR**	**0.775**
MRRH	**0.848**	**MDDS**	**0.886**
MRBH	**0.844**	**COST**	**0.985**
PU2F	**0.851**		
HPLH	**0.591**		
HPRH	**0.586**		
BL90	**0.978**		

B90L	**0.932**
B90R	**0.948**

Analysis of the corresponding canonic functions points to the assumption that success in sport climbing depends on specific strength, mostly on specific static strength. Since all measures of specific strength were in direct proportion with the measures of success in sport climbing, it could be concluded that the subjects with greater specific strength will be more successful in sport climbing.

Relatedness of the whole system of specific strength and the most difficult route climbed up to now (MDCR), i.e. coefficient of multiple correlation, was 0.82 (R = 0.825), which explains common variability between the system and criterion variable with about 68% (R^2 = 0.681). When explaining the total variability of the most difficult route climbed up to now the remaining 32% could be ascribed to other characteristics and abilities of the subjects, which were not taken into account (other motor abilities, morphological characteristics, etc.) and the testing conditions. These results provided a statistically significant explanation of the criterion variable by means of the system of specific strength ($p < 0.001$), thus it could be concluded that the system of specific strength had a statistically significant influence on the most difficult route climbed up to now (Table 5).

By analysing single regression coefficients it could be concluded that none of the coefficients was statistically significantly related to the criterion variable MDCR.

TABLE 5: **REGRESSION ANALYSIS OF VARIABLE MDCR BY MEANS OF THE SYSTEM OF VARIABLES OF SPECIFIC STRENGTH**

Variables	R	Part-R	Beta	Std.Err. of Beta	t(13)	p-level
MRLH	0.678	-0.237	-1.469	1.282	-1.146	0.264
MRRH	0.692	0.342	2.134	1.249	1.709	0.102
MRBH	0.666	-0.157	-0.418	0.559	-0.747	0.463
PU2F	0.742	-0.005	-0.011	0.424	-0.026	0.980
HPLH	0.591	0.137	0.528	0.811	0.651	0.522
HPRH	0.574	-0.040	-0.150	0.810	-0.186	0.854
BL90	0.718	0.246	0.749	0.630	1.190	0.247
B90L	0.679	0.118	0.784	1.410	0.556	0.584
B90R	0.680	-0.162	-1.191	1.548	-0.769	0.450
R = 0.825	**R^2 = 0.681**	**F(9,22) = 5.219**		**p < 0.001**		

By analysing Table 6, showing the results of relatedness of the system of specific strength and the most difficult route climbed this season, it could be said that there was a statistically

significant correlation of the system on a multivariate level $p < 0.000$. This explains the high coefficient of multiple correlation R = 0.908, as well as a coefficient of determination R^2 = 0.825, which explains the correlation of the whole system of motor abilities and criterion variables with about 82%. Consequently it could be concluded that the system of specific strength had a statistically significant influence on the most difficult route climbed this season.

Analysing single regression coefficients it could be concluded that two variables had a statistically significant correlation with the criterion maximal right-hand reach (MRRH = 0.0395) and block under 90° (BL90 = 0.023). This corroborated the fact that maximal right-hand reach and block under 90° heavily influenced the most difficult route climbed this season. Other coefficients were not statistically significant.

TABLE 6: **REGRESSION ANALYSIS OF VARIABLE MDDS BY MEANS OF THE SYSTEM OF VARIABLE SPECIFIC STRENGTH**

Variables	R	Part-R	Beta	Std.Err. of Beta	t(13)	p-level
MRLH	0.737	-0.353	-1.682	0.949	-1.772	0.090
MRRH	0.744	0.423	2.024	0.925	2.189	**0.039**
MRBH	0.746	-0.086	-0.168	0.414	-0.406	0.689
PU2F	0.829	-0.023	-0.034	0.314	-0.110	0.914
HPLH	0.659	-0.065	-0.184	0.600	-0.307	0.762
HPRH	0.662	0.190	0.545	0.600	0.908	0.374
BL90	0.834	0.462	1.140	0.466	2.446	**0.023**
B90L	0.781	-0.010	-0.050	1.044	-0.048	0.962

B90R	0.786	-0.103	-0.557	1.146	-0.486	0.632
R = 0.908	**R^2 = 0.825**	**F(9,22) = 11.538**	**p < 0.000**			

Correlation of the whole system of specific strength and competition standing (COST), i.e. coefficient of multiple correlation, was 0.96 (R = 0.962), which explains common variability between the system and criterion variable with about 92% (R^2 = 0.925). The remaining 8% in the explanation of the total variability of competition standing can be ascribed to other characteristics and abilities of subjects, which were not considered in this research (other motor abilities, morphological characteristics, etc.) and the conditions during testing. These results provide a statistically significant explanation of the criterion variable by means of specific strength (p < 0.000). Thus, it could be concluded that the system of specific strength had a statistically significant influence on competition standing (Table 7).

By analysing single regression coefficients it was observed that a statistically significant correlation with the criterion had only two variables for the estimation of specific static strength: block under 90° (BL90 = 0.015); and block under 90° on left hand (B90L = 0.049). Also, it is clear that the variable block less than 90° on right hand (B90R), was just below the level of significance. This led to the conclusion that block under 90° and block under 90° on left hand had a statistically significant influence on competition standing. Other coefficients were not statistically significantly correlated with the criterion variable COST (Table 7).

TABLE 7: **REGRESSION ANALYSIS OF VARIABLE COST BY MEANS OF THE SYSTEM OF VARIABLE OF SPECIFIC STRENGTH**

Variables	R	Part-R	Beta	Std.Err. of Beta	t(13)	p-level
MRLH	0.814	-0.144	-0.422	0.620	-0.681	0.503
MRRH	0.803	0.179	0.515	0.604	0.852	0.403
MRBH	0.798	0.054	0.068	0.270	0.252	0.803
PU2F	0.777	-0.009	-0.008	0.205	-0.040	0.968
HPLH	0.509	-0.049	-0.090	0.392	-0.230	0.820
HPRH	0.502	-0.012	-0.022	0.392	-0.055	0.956
BL90	0.938	0.490	0.803	0.305	2.637	**0.015**
B90L	0.898	-0.406	-1.420	0.682	-2.083	**0.049**
B90R	0.917	0.395	1.512	0.749	2.019	0.056
R = 0.962	**R^2 = 0.925**	**F(9,22) = 30.325**	**p < 0.000**			

CONCLUSION

Based on the obtained results the following conclusions were drawn:

Success in sport climbing depends on specific strength, mostly on specific static/isometric strength. All variables had statistically significant projections on canonic factor, in particular variables of specific static strength - block under 90˚ angle (BL90), block under 90˚ angle on left hand (B90L) and block under 90˚ angle on right hand (B90R) and variable of the situational-motor explosive strength − maximal reach with left hand (MRLH), maximal reach with right hand (MRRH), maximal reach with both hands (MRBH) and pull-ups with two fingers (PU2F). Since all measures of specific strength were in direct proportion with measures of success in sport climbing it could be concluded that the subjects with greater specific strength will be more successful in sport climbing.

Analysing single criterion variables it could be concluded that specific strength significantly influences the success in all three criteria − the most difficult route climbed up to now (MDCR), the most difficult route climbed this season (MDDS) and competition standings (COST). However, none of the variables individually significantly influenced the most difficult climbed route up to now (MDCR), two variables − maximal reach with right hand (MRRH) and block under 90˚ angle (BL90) − influenced the most difficult route climbed this season (MDDS). Two variables for the estimation of static strength − block under 90˚ angle (BL90) and block under 90˚ angle on left hand (B90L) − influenced competition standings (COST). Bearing in mind that the criteria, the most difficult route climbed this season (MDDS) and competition standings (COST), were responsible for the estimation of the current sport climbing fitness, it could be concluded that the tests for maximal reach with

right hand (MRRH), block under 90˚ angle (BL90) and block under 90˚ angle on left hand (B90L) were the best predictors of success in sport climbing. These results could be utilised for the selection and direction of young talents towards sport climbing.

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SOMATIESE EN SEKSUELE KARAKTERISTIEKE SE VERMOË OM RYPHEIDSTATUS BY RUGBYSPELERS TE BEPAAL

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ABSTRACT

The aim of this study was to determine the utility of a self administered questionnaire on maturity status (MSQ) (which also included questions on somatic development) by comparing it with biological age (as determined by the Greulich-Pyle x-ray [GP]

method). The MSQ was compiled based on the sexual maturity stages developed by Tanner in 1962, while biological age was determined by the Greulich-Pyle (GP) method. Rugby players (N=18) were tested over a period of three years (15.9 – 17.9 years old). The GP method classified the players into early developers (ED) (n=4), average developers (AD) (n=13) and one (n=1) late developer. Discriminant function analysis identified seven from 10 questions at the mean age of 15.7 years regarding sexual and somatic maturity to discriminate between ED and AD. Only 25% of the ED and 61% of the AD could, however, be classified back into their original groups by making use of the Jackknife statistical method. A further stepwise discriminant analysis indicated that three of the seven questions had better discriminative ability, although cross validation by means of the Jackknife method indicated that only 75% of the ED and 38.5% of the AD could be classified correctly by means of these three variables. It was concluded that the discriminality of the MSQ was not adequate, but that some variables have more potential for classification purposes than others. Refinement of the instrument is recommended.

Key words: Biological age; Greulich-Pyle-method; Sexual maturity; Early developers; Late developers; Maturity status; Questionnaire

INLEIDING

Navorsing dui daarop dat die duidelikste variasies in grootte, fisieke vermoëns, liggaamsamestelling, krag en motoriese prestasie tussen die ouderdomme nege en 16 jaar voorkom wanneer dié ouderdomstydperk geassosieer word met biologiese rypheidstatus (Docherty, 1996; Pienaar, 2000; Malina *et al.*, 2005). Dit is gevolglik belangrik dat navorsing wat oor groei en ryping handel, oor ’n lang termyn gedoen moet word en dat dit gerig moet wees op ouderdomme in bogenoemde tydperk ten einde sinvolle gevolgtrekkings te kan maak (Faulkner, 1996; Hare, 1999; Adendorff, 2002; Malina *et al.*, 2004).

Die bepaling van rypheidstatus hang in ’n mate af van die biologiese sisteem waarop gefokus word (Faulkner, 1996; Malina *et al.*, 2004). Die algemeenste aanduiders van biologiese rypheidstatus wat in studies oor groei en ryping handel gebruik word, is skeletale ryping,

seksuele ryping en somatiese ryping (Faulkner, 1996; Malina *et al.*, 2004). Faulkner (1996) en Rowland (2005) is van mening dat skeletale ouderdom die beste van die drie metodes is om biologiese rypheidstatus te bepaal en verskillende metodes het reeds in dié verband die lig gesien (Faulkner, 1996; Lenthe *et al.*, 1998).

Bogenoemde metodes hou met mekaar verband deurdat ’n handgewrig x-straalplaat van ’n individu vergelyk word met standaardeienskappe van die bene in dié spesifieke area (Castriota-Scanderberg *et al.*, 1998; Malina *et al.*, 2004). Uit die literatuur blyk dit dat die Tanner-Whitehouse- (TW) en die Greulich-Pyle- (GP) metode die algemeenste tegnieke vir die bepaling van skeletale ouderdom is (Beunen *et al.*, 1991; Groell *et al.*, 1999). Dit blyk egter ook uit die literatuur dat blootstelling aan radiasie, die koste daaraan verbonde en die feit dat evaluerings slegs deur opgeleide personeel soos radioloë gedoen kan word, enkele van die nadele is wat aan hierdie tegnieke gekoppel word. Daar is reeds studies gedoen ten einde alternatiewe metodes te probeer vind (Docherty, 1996).

Volgens Malina en Bouchard (1991), Bloomfield *et al.* (1994), Docherty (1996), Noakes en Du Plessis (1996) en Malina *et al.*, (2004) is die Tanner-skaal van liggaamlike en seksuele rypwording, wat deur die kind self geëvalueer word, ’n effektiewe manier om die tempo van liggaamlike rypwording te bepaal. Dit is verder ook ’n goeie bepaler van ’n seun se vroeë sukses in ’n sportsoort soos rugby waar krag belangrik is (Noakes & Du Plessis, 1996). Faulkner (1996) beskryf die Tanner-stadiums (soos ontwikkel deur Tanner, 1962) as ’n vyf-punt evalueringskaal ten opsigte van bors- (meisies), genitale (seuns) en skaamhaar-ontwikkeling vir seuns en meisies onderskeidelik. Dié evalueringskaal word in vyf vlakke verdeel (vlak een: die prepuberteitstadium; vlak twee: die eerste ontwikkeling van bogenoemde geslagseienskappe; vlakke drie en vier verdere ontwikkeling; en vlak vyf die volwasse stadium van die ontwikkeling van die geslagseienskappe).

Foto’s en lyndiagramme van die vyf Tanner-stadiums is reeds in verskillende studies aangewend om seksuele ryping op verskillende ouderdomme vas te stel (Duke *et al.*, 1980; Ricky *et al.*, 1988; Leone & Comtois, 2007). In hierdie studies is seuns gevra om deur middel

van foto's en lyndiagramme van die vyf Tanner-stadia die mees verteenwoordigende stadium te kies van eie genitale en skaamhaarontwikkeling. Rickey *et al.* (1988) se studie bevestig dat adolessente hulle eie stadia van seksuele ryping akkuraat kan aandui deur gebruik te maak van foto's/prentjies, lyndiagramme en selfrapporteringsvraelyste. Die navorsing van Leone en Comtois (2007) dui hoë korrelasies tussen evaluering wat deur 'n medikus gedoen is en selfevaluering van elite adolessent seunsatlete aan (0.79 vir skaamhaarontwikkeling en 0.69 vir genitale onwikkeling). Volgens Naokes en Du Plessis (1996) lê die waarde van die Tanner-skaal daarin dat dit 'n betroubare norm vir die biologiese ouderdom van die speler, in teenstelling met sy chronologiese ouderdom bied.

Malina *et al.* (2004) wys daarop dat somatiese ryping, wat die ontwikkeling van liggaamslengte en liggaamsmassa aandui, nie op sigself antwoorde kan verskaf oor verskillende groeitendense by dieselfde groep kinders nie. Volgens hierdie navorsers is longitudinale navorsing hieroor nodig, waaruit afleidings oor piekgroeiversnelling gemaak kan word en wat weer inligting oor vroeë en laat onwikkeling kan verskaf (Faulkner, 1996; Malina *et al.*, 2004). Navorsers wys egter in hierdie verband op die gebruikswaarde van die skatting van persentasie volwasse lengte (Malina *et al.*, 2004). Navorsing dui aan dat die

persentasie volwasse lengte wat 'n kind op 'n sekere ouderdom bereik, sinvolle riglyne rakende sy rypingstatus kan verskaf aangesien daar aanvaar kan word dat 'n kind wat 'n groter persentasie volwasse lengte op 'n spesifieke ouderdom bereik het, verder gevorderd in die rypwordingsproses sal wees (Malina *et al.*, 2004).

Deelname aan en prestasie in skolerugby word veral deur rypingsverskille tussen spelers, veral in die hoërskooljare geraak. Volgens Upton *et al.* (1996) dui bevindinge in dié verband daarop dat skoolseuns in A-spanne swaarder en langer as hul eweknieë in laer spanne is en dat elite skolerugbyspelers van alle ouderdomme nog groter is. Hierdie bevindinge word ook deur Noakes en Du Plessis (1996) beklemtoon en hulle noem verder dat hierdie spelers ook 'n hoër biologiese ouderdom het en 'n meer gevorderde Tanner ontwikkelingstadium van ontwikkeling bereik het. Hieruit kan die afleiding gemaak word dat suksesvolle skolerugbyspelers hul liggaamlike rypwording die vroegste bereik (Noakes & Du Plessis, 1996). 'n Geskikte metode om rypingsverskille tussen spelers te kan beoordeel blyk dus belangrik te wees.

Alhoewel verskeie studies die geldigheid van die selfevalueringsvraelys-metode ondersoek het, is daar tot dusver geen studies onderneem wat die geldigheid van hierdie metode wat op die GP-metode gebaseer is, ondersoek het nie. Die doel van hierdie studie was gevolglik om die gebruikswaarde van 'n vraelysmetode wat onder andere op die Tanner-skaal gebaseer is, om seksuele rypingstatus by talentvolle rugbyspelers vas te stel, te vergelyk met biologiese ouderdom, soos deur die GP-metode bepaal. Tweedens wou bepaal word watter van die vraelysvrae die geskikste is om rypingstatus mee vas te stel.

METODE

Navorsingsontwerp

Die etiekkomitee van die Noordwes-Universiteit het die studie goedgekeur (01M12). 'n Inligtingsbrief wat die doel van die projek verduidelik het en na aanleiding waarvan ingeligte toestemming deur die speler/ouer aangedui moes word, is vooraf aan elke speler oorhandig. Slegs spelers wat toestemming verleen het, is by die studie betrek. Die navorsing was longitudinaal van aard met drie herhaalde metings oor 'n tydperk van drie jaar heen.

Proefpersone

Seuns uit skole in die Noordwes Provinsie is op 15- of 16-jarige ouderdom deur verskeie rugbykeurders as talentvolle rugbyspelers geïdentifiseer. Hierdie spelers (N=23) is op 'n chronologiese ouderdom van 15-16 jaar geïdentifiseer en is vervolgens vir 'n tydperk van drie jaar aan topvlak-afrigting blootgestel ten einde in 2005 'n goed gekondisioneerde span in die provinsie op te lewer teen die tyd dat hulle 18 jaar oud is. Uit die groep spelers (N=23) wat in 2003 geïdentifiseer is, het vyf (n=5) teen 2005 nie meer deel van die groep uitgemaak nie. Die algemeenste rede vir die uitval van spelers was beserings in die loop van die drie jaar wat tot onvolledige data aanleiding gegee het. Die oorblywende 18 spelers is oor 'n tydperk van drie jaar heen aan herhaalde metings onderwerp, waar toetsgeleenthede een maal per jaar

plaasgevind het. Skeletale sowel as seksuele rypheidstatus, antropometriese eienskappe, motoriese en fisieke vermoëns, asook sportspesifieke en psigologiese vaardighede is tydens

hierdie toetsgeleenthede bepaal. Die 18 spelers is verdeel in vier vroeë ontwikkelaars, 13 gemiddelde ontwikkelaars en een laatontwikkelaar (sien metode hieronder). Aangesien daar slegs een laatontwikkelaar in die groep was, moes die proefpersoon vir ontledings van hierdie artikel weggelaat word; gevolglik is die data van slegs 17 spelers vir die studie gebruik.

Bepaling van skeletale ouderdom

'n X-straalplaat van die linker handgewrig van elke proefpersoon is een keer per jaar van 2003 tot 2005 geneem. Skeletale ouderdom, soos deur die GP-metode beskryf, is deur 'n radioloog bepaal en dié evalueerder is vir die volle duur van die studie gebruik. Die radioloog het die uitslag van die x-straalplate volgens die GP atlasmetode (gebaseer op halfjaarintervalle) ontleed en die ouderdom wat die meeste daarmee ooreengestem het is genoteer as die proefpersoon se beenouderdom. Volgens die resultate van die beenouderdom is die groep in vroeë, middel- en laatonwikkelaars verdeel. Die proefpersone met 'n beenouderdom wat meer as een jaar hoër as die chronlogiese ouderdom was, is as vroeë ontwikkelaars (VO's) geklassifiseer (n=4), terwyl dié wat met minder as een jaar (groter of kleiner) van die chronologiese ouderdom verskil het, in die middel ontwikkelaarsgroep (MO's) geklassifiseer is (n=13). Die proefpersone met 'n beenouderom wat meer as een jaar laer as die chronologiese ouderdom was, is as laat ontwikkelaars (LO) (n=1) geklassifiseer (Malina *et al.*, 2004).

Liggaamsrypingsvraelys: bepaling van somatiese en seksuele ryping

Die liggaamsrypingsvraelys (LRV) het uit 15 vrae bestaan waaruit die seuns se rypheidstatus van 2003 tot 2005 vasgestel kon word. Vrae een tot vyf het inligting rakende somatiese rypingsfaktore ingewin. Vrae een, twee en drie samel inligting in aangaande lengtegroei. In vraag een moes die proefpersone 'n spesifieke ouderdom (in jare) aandui waarop hulle gemeen het die meeste lengtegroei plaasgevind het, terwyl vraag twee lengte in verhouding tot die portuurgroep geëvalueer het deurdat die speler moes aandui of hy vroeër (een), dieselfde tyd (twee) of later (drie) as sy portuurgroep ontwikkel het. Daar is aan hulle verduidelik dat seuns van dieselfde ouderdom as hulle, as hulle portuurgroep beskou moet word. Die spelers is ook gevra om 'n beskrywing te kies van hul liggaamslengte in verhouding tot dié van hul ouers. In die kriteria (vraag drie) is 'n puntewaarde toegeken aan die volgende beskrywings ten opsigte van die ouers: "Langer as my Pa en Ma" (een); "korter as my Pa maar langer as my Ma" (twee); "korter as my Pa en Ma" (drie); en "korter as my Ma, maar langer as my Pa" (vier). Vir statistiekdoeleindes is 'n waarde van 1 toegeken aan proefpersone wat langer as beide ouers was, terwyl 'n zero-waarde toegeken is aan enige van die ander beskrywings. Die speler moes ook sy liggaamsmassa (vraag vier) beoordeel ten opsigte daarvan of dit konstant bly (een) en of dit steeds toeneem (twee).

Op grond van die studies van Duke *et al.* (1980) en Rickey *et al.* (1988), asook aanbevelings van Docherty (1996), is 'n vraelys wat onder andere op die vyf Tanner-stadia gebaseer is opgestel ten einde seksuele rypheidstatus vas te stel. Literatuur dui daarop dat selfbeantwoorde evaluering van seksuele ryping geldig is (Duke *et al.*, 1980; Ricky *et al.*, 1988). Vrae vyf tot 15 in die vraelys was gemik op die bepaling van seksuele ryping.

In vraag vyf moes met "ja" (een) of "nee" (twee) aangedui word of daar tekens is dat die stem besig is om te verander, terwyl 'n spesifieke ouderdom (in jare) in vraag ses aan hierdie

eienskap toegeken moes word. In vraag sewe is 'n spesifieke ouderdom gevra waarop die seun seker was dat die stem definitief gebreek het, terwyl daar in vraag agt aangedui moes word of die seun vroeër (een), dieselfde tyd (twee) of later (drie) as sy portuurgroep met betrekking tot hierdie eienskap ontwikkel het. Vraag nege het inligting bekom oor die skooljaar waarin die respondent begin skeer het, terwyl vraag 10 die evaluering van hierdie komponent in verhouding tot die portuurgroep bepaal het deur die keuse of ontwikkeling vroeër (een) dieselfde tyd (twee) of later (drie) plaasgevind het.

In die vrae wat handel oor die vorming van gesigshare, skaamhare en genitale ontwikkeling is die seuns gevra om een van vyf verskillende kategorieë (aangedui op sketse) te kies wat sy ontwikkelingstadium die beste weerspieël. Die sketse is vervolgens van een tot vyf genommer, waar een op die prepuberteitstadium dui, twee op die eerste ontwikkeling van spesifieke geslagseienskappe, twee, drie en vier op ontwikkeling wat steeds plaasvind, terwyl die laaste beskrywing, naamlik vyf, die volwasse ontwikkeling van die eienskappe verteenwoordig. In vrae wat gehandel het oor skaamhaar- en genitale ontwikkeling in verhouding tot die res was daar vyf kategorieë waaruit gekies moes word, naamlik baie vroeër (een), effens vroeër (twee), dieselfde tyd (drie), effens later (vier) en baie later (vyf). Na elkeen van hierdie vrae moes die speler ook in 'n volgende vraag sy eie ontwikkeling evalueer ten opsigte van sy portuurgroep. Hierdie evaluering het vroeër (een), dieselfde tyd (twee) of later (drie) as die portuurgroep behels.

Statistiese verwerkings

Die STATISTICA 2006-pakket vir Windows (Statsoft, 2006) is vir die statistiese analise van die data gebruik. Daar is eerstens van beskrywende statistiek gebruik gemaak en minimum en maksimum waardes, standaardafwykings en gemiddelde waardes is bepaal. Daar is ook van korrelasies gebruik gemaak om te bepaal watter van die vrae 'n sterk verband met skeletale of chronologiese ouderdom toon. Tweedens is diskriminantanalises met SAS (2000-2003) uitgevoer om te bepaal watter van die 10 vrae in 2003 die grootste bydrae daartoe gelewer het om tussen vroeë en middelontwikkelaars te onderskei. Die *Jackknife*–metode is hierna gebruik as 'n terugklassifiseringsmetode om te bepaal hoeveel van die proefpersone in hulle oorspronklike groepe teruggeklassifiseer kon word.

RESULTATE

Tabel 1 bied die beskrywende inligting van die chronologiese asook biologiese ouderdom van elke proefpersoon soos uit die x-straalplate (GP-metode) oor 'n driejaartydperk vasgestel. Hieruit blyk dit dat die groep se biologiese ouderdom telkens hoër was as die chronologiese ouderdom oor die driejaartydperk. Ter aanvulling van Tabel 1 is 'n opsomming in Tabel 2 gemaak wat 'n aanduiding gee van hoeveel proefpersone 'n skeletale ouderdom kleiner of groter as hulle chronologiese ouderdom oor die drie jaar gehad het.

TABEL 1: **BESKRYWENDE STATISTIEK VAN CHRONOLOGIESE EN BIOLOGIESE OUDERDOM VAN DIE SPELERS VAN 2003 TOT 2005**

Veranderlikes	2003 (n=17)				2004 (n=17)				2005 (n=17)			
	x	mi	ma	sa	x	mi	ma	sa	x	mi	ma	sa
Chronologiese ouderdom	15.9	15	16	0.32	16.9	16	17	0.32	17.9	17	18	0.32
Biologiese ouderdom	16.8	14	18	0.84	17.3	16.5	18	0.46	18.1	17.5	18.5	0.25

Nota: x = gemiddeld; mi = minimum; ma = maksimum; sa = standaardafwyking

Dit blyk uit Tabel 1 dat daar groter verskille tussen chronologiese en biologiese ouderdom in 2003 op 15.9-jarige ouderdom (± 12 maande) voorgekom het as in 2004 op 16.9-jarige ouderdom (± 6 maande) en in 2005 op 17.9-jarige ouderdom (± 4 maande). Hieruit, sowel as uit Tabel 2, is dit duidelik dat namate die seuns ouer geword het, die verskil tussen chronologiese en biologiese ouderdom gekrimp het en in die laaste jaar (op 17.9-jarige ouderdom) feitlik uitgewis was.

TABEL 2: **DIE AANTAL PROEFPERSONE IN 2003, 2004 EN 2005 WAARVAN SKELETALE OUDERDOM ONDERSKEIDELIK KLEINER EN GROTER AS CHRONOLOGIESE OUDERDOM WAS**

Jaar	SO ≤ CO	SO ≥ CO
2003	11	6
2004	6	11
2005	0	17

Nota: SO= Skeletale Ouderdom; CO = Chronologiese Ouderdom

Volgens Tabel 2 was daar in 2003, 11 spelers van wie die skeletale ouderdom laer en gelyk aan chronologiese ouderdom was en slegs ses wat ’n hoër skeletale ouderdom as chronologiese ouderdom getoon het. In 2004 was 11 seuns se skeletale ouderdom hoër as chronologiese ouderdom en in 2005 was daar geen speler van wie die skeletale ouderdom laer as chronologiese ouderdom was nie.

Hierdie bevindinge korreleer met dié wat in die literatuur gerapporteer is en daarop dui dat seuns wat vroeë ontwikkelaars is, op ’n vroeë ouderdom (16-jarige ouderdom) ophou groei (Woodman, 1985; Noakes & Du Plessis, 1996; St-Aubin & Sidney, 1996). As die onderskeie minimum en maksimum waardes in Tabel 1 ontleed word, is dit duidelik dat die maksimum waarde van biologiese ouderdom oor die drie jaar heen dieselfde gebly het, terwyl die minimumwaarde (wat op die later ontwikkelaar dui) stelselmatig verhoog het van ’n verskil van ± vier jaar tot ’n verskil van slegs een jaar. Hieruit kan die moontlike aanname gemaak word dat die sogenaamde laatontwikkelaars in die groep, wat skeletale ouderdom betref, die vroeë ontwikkelaars oor die driejaartydperk stelselmatig “ingehaal” het.

Vervolgens is ’n diskriminantanalise op die 2003-data uitgevoer ten einde te bepaal of van die vrae, asook watter van die vrae, die beste tussen verskillende rypingsgroepe (middel en laat ontwikkelaars) sal kan diskrimineer. Slegs die 2003 data is vir hierdie analise gebruik aangesien dit blyk dat die Chronologiese ouderdom en (CO) en Skeletale ouderdom (SO) gedurende die tydperk 2003-2004 (Tabel 1) die grootste verskille getoon het. Ten einde ’n geheelbeeld van die seksuele en somatiese rypingsvrae van die groep oor die drie jaar periode

te kan vorm, is dié inligting eerstens in Tabel 3 as beskrywende statistiek oor die driejaartydperk aangebied en word dit daarna beskryf.

TABEL 3: **BESKRYWENDE STATISTIEK VIR GROEI- EN RYPINGSVRAE VAN 2003 TOT 2005**

No	Vraag	2003			2004			2005		
		X, sa	Min	mak	X, sa	min	mak	X, sa	min	mak
1	Jaar van die meeste groei	13.5 1.2	11	15	13.8 1.4	11	16	14.4 1.5	12	16
2	Jaar van die meeste groei in verhouding tot die res	1.9 0.8	1	3	1.9 0.8	1	3	1.6 0.7	1	3
3	Lengte in verhouding tot Pa en Ma	0.5 0.5	0	1	0.4 0.5	0	1	0.5 0.5	0	1
4	Bly liggaamsmassa konstant of neem dit toe?	1.3 0.5	1	2	1.4 0.5	1	2	1.4 0.5	1	2
5	Is daar al tekens dat stem besig is om te verander				1.8 0.4	1	2	1.1 0.3	1	2
6	Ouderdom (jare) waarop stem begin verander het				13.1 1.3	11	15	13.7 1.3	11	16
7	Ouderdom (in jare) waarop stem gebreek het	13.2 1.2	11	15	14.1 1.3	11	17	14.7 1.1	13	17
8	Stem gebreek in verhouding tot die res	2.3 0.9	1	3	1.8 0.8	1	3	1.5 0.5	1	2
9	Graad waarin begin skeer het	8.3 1.0	7	10	8.8 1.4	7	11	9.5 1.7	6	11
10	Graad waarin begin skeer het, in verhouding tot die res	2.5 1.2	1	4	1.9 0.9	1	3	2.1 0.8	1	3
11	Vorming van gesigshare (skets en beskrywing)				2.7 1.3	1	4	2.7 1.2	1	5
12	Vorming van skaamhare (skets en beskrywing)				4.3 0.5	4	5	4.4 0.5	4	5
13	Vorming van skaamhare in verhouding tot die res				2.6 0.5	2	3	2.7 0.7	2	4
14	Genitale ontwikkeling (skets)	4.4 0.5	4	5	4.1 0.6	3	5	4.3 0.8	3	5
15	Genitale ontwikkeling in verhouding tot die res	2.7 0.8	1	4	2.7 0.6	2	4	2.8 0.6	2	4

Die grys gedeeltes dui op ontbrekende inligting vir die spesifieke vrae gedurende 2003

Oor die tydperk 2003–2005 blyk dit uit vraag 1 wat gehandel het oor die jaar (uitgedruk as ouderdom) waarin die meeste groei plaasgevind het, dat 13.5, 13.8 en 14.4 jaar die gemiddelde ouderdomme was waarop die groep in elk van die drie jaar aangedui het dat die meeste groei by hulle plaasgevind het. Hierdie gemiddelde ouderdomme wat aangedui is, verskil van jaar tot jaar, alhoewel korrelasies wat bepaal is goeie verbande tussen die onderskeie jare aandui. Minimum en maksimum waardes wat vir hierdie vraag gerapporteer word, bevestig dat daar vroeë en laat ontwikkelaars in die groep was. Vraag twee wat groei in verhouding tot die res aandui, dui in die onderskeie jaartydperke daarop dat die groep hulle groei as effens vroeër of as op dieselfde ouderdom as hulle portuurgroep geëvalueer het, maar

soos blyk uit die gemiddelde waardes op 17 jaar, die sekerste was dat hulle eerder vroeër as ander seuns gegroei het. Minimum en maksimum waardes wat wissel tussen 11 en 16 jaar dui weereens, uit die oogpunt van die speler, vroeë en later ontwikkeling aan in verhouding tot die res, wat die uitslag van die GP-metode bevestig.

Uit die vraag wat handel oor groei in verhouding tot die ouers wil dit voorkom of van die spelers in die groep in 2003 (± 16-jarige ouderdom), 2004 (± 17-jarige ouderdom) en 2005 (± 18-jarige ouderdom) korter was as ten minste een van die ouers. Uit die maksimum waardes kan die afleiding gemaak word dat sommige van die seuns langer as beide ouers was. Aangesien finale liggaamslengte grootliks deur genetika bepaal word (Malina *et al*., 2004), kan die afleiding gemaak word dat van hulle steeds in die tydperk gegroei het en dat hulle waarskynlik na aan die volwasse stadium was wat liggaamslengte betref. Uit die gemiddelde waarde vir liggaamsmassa (vraag vier) blyk dit dat die meerderheid spelers meestal eers van 17-jarige ouderdom af (2004) ’n toename in massa ondergaan het. Hierdie bevindinge is in ooreenstemming met dit wat gevind is ten opsigte van liggaamslengte aangesien die literatuur weergee dat ’n seun eers in lengte toeneem (Malina *et al*., 2004) voordat spiermassa (wat in massa weerspieël word) begin toeneem. Hieruit kan die moontlike afleiding gemaak word dat van die seuns reeds na aan die volwasse stadium in die onderskeie jare was rakende liggaamslengte, maar nog nie met betrekking tot spiermassa en liggaamsmassa nie.

Vrae vyf tot agt dui stemverandering op verskillende ouderdomme aan. Uit die gemiddelde waarde in vraag vyf (x=1.8) blyk dit dat daar in 2004 heelwat seuns was wat nog geen tekens van stemveranderding ondergaan het nie, 2005 se resultate toon egter dat die meeste seuns ontwikkeling getoon het ten opsigte van stemverandering (x=1.1). Antwoorde uit vrae ses en sewe hou verband met die bevindinge in vraag vyf waaruit dit blyk dat daar steeds ontwikkeling plaasgevind het ten opsigte van stemverandering tot op 16-jarige ouderdom. Met die selfevaluering van die res met betrekking tot stemverandering dui die groep in 2003 en 2004 aan dat hulle op dieselfde tyd (x=2.3, x=1.8) en in 2005 (x=1.5) vroeër ontwikkel het as hulle portuurgroep. Uit die gemiddelde waardes blyk dit ook rakende hierdie aspek van hulle ontwikkeling dat die groep op ’n latere ouderdom ’n duideliker persepsie gehad het dat hulle dalk eerder vroeër as hulle portuurgroep ontwikkel het.

Vrae nege tot 11 gee die resultate weer van die groep se ontwikkeling met betrekking tot die vorming van gesigshare. Wat hierdie vrae betref, kon ’n tydstip (soos ’n ouderdom) waarop die persoon begin skeer het dalk makliker gewees het om te onthou as ’n tydstip vir die vorming van gesigshare (kyk vraag 11). Antwoorde op vraag nege dui daarop dat sommige proefpersone nog nie begin skeer het nie; derhalwe is ’n zero-waarde ten opsigte hiervan aan hierdie proefpersone toegeken ten einde die resultate beter te kon ontleed. As die standaardafwyking ontleed word, blyk daar groot verskille te wees in die groep rakende wanneer elke seun begin skeer het. Navorsing in hierdie verband dui daarop dat daar verskille tussen verskillende rassegroepe voorkom wat betref die beginouderdom van puberteit asook rakende die ontwikkeling van sekere rypingseienskappe soos skaamhare, onderarmhare en gesigshare (Bhalla, 2003). In hierdie verband toon navorsing ook dat selfassessering van groei en rypingseienskappe by sommige rassegroepe minder akkuraat is as by ander (Styne, 2004). Aangesien daar tot dusver nog nie werklik ondersoek ingestel is na verskille in die vorming van sekondêre geslagseienskappe by wit en swart kinders in Suid-Afrika spesifiek nie, kan die afleiding gemaak word dat daar dalk verskille kan voorkom rakende hierdie

eienskappe. Die vorming van gesigshare kon dus in hierdie groep wat uit kinders van

verskillende rassegroepe bestaan, 'n ander tendens gevolg het wat die vorming daarvan betref en sodoende 'n effek op die resultate gehad het.

Met betrekking tot skaamhaar- en genitale ontwikkeling oor die driejaartydperk heen (vrae 12-14) (Tabel 3) blyk dit dat die gemiddelde groepswaarde deurgaans dieselfde was met 'n effense verhoging oor die driejaartydperk heen. Die proefpersone het hulle ontwikkeling as redelik ver gevorderd in beide kategorieë oor die driejaartydperk heen aangedui (met skaamhaarontwikkeling effens verder). Hulle het ook hulle ontwikkeling met betrekking tot hierdie aspek as meestal dieselfde of effens vroeër as die portuurgroep geëvalueer.

Ter aanvulling van die beskrywende statistiek is daar vervolgens korrelasies bepaal (Tabel 4) tussen die verskillende vrae van 2003 en chronologiese en biologiese (skeletale) ouderdom voorgekom het. Hierdie analise het dit moontlik gemaak om die moontlike verband tussen chronologiese ouderdom en biologiese ouderdom enersyds en elkeen van die 10 vrae andersyds te bepaal.

TABEL 4: **KORRELASIEKOËFFISIËNTE TUSSEN DIE VERSKILLENDE VRAE EN SKELETALE EN CHRONOLOGIESE OUDERDOM (2003 VRAE)**

Veranderlikes	Skeletale ouderdom R	Chronologiese ouderdom R	Verskil S0 – CO
1	-0.55	-0.23	0.32
2	-0.01	0.18	0.17
3	0.19	-0.03	0.16
4	-0.23	0.00	-0.23
7	-0.30	-0.15	-0.15
8	0.02	0.11	-0.09
9	-0.38	-0.16	-0.22
10	-0.03	-0.11	-0.08
14	0.05	-0.14	-0.09
15	0.14	0.31	0.17

R = korreksiekoëffisiënt > 0.3*betekenisvol

Tabel 4 dui daarop dat van die 10 vrae wat in 2003 beantwoord is, drie met skeletale ouderdom verband hou, vrae een (jare van die meeste groei), sewe (ouderdom waarop stem gebreek het) en nege (graad waarin begin skeer het) was die vrae wat die sterkste verband met skeletale ouderdom getoon het. Die verband in vraag een dui aan dat hoe hoër die skeletale ouderdom was, hoe vroeër was die jare van die meeste groei. Van hierdie drie vrae hou slegs jare van die meeste groei verband met die vrae wat deur die diskriminantanalise as vrae uitgewys is wat seuns in onderskeie groepe kon terugklassifiseer (sien Tabel 5). Met betrekking tot chronologiese ouderdom is vrae een (jare van die meeste groei), en 15 (genitale ontwikkeling in verhouding tot die res) die vrae wat die hoogste verbande met chronologiese ouderdom toon. Ten opsigte van die verskil tussen skeletale en chronologiese ouderdom het vrae een (jare van die meeste groei), vier (bly liggaamsmassa konstant of neem dit toe?) en nege (graad waarin begin skeer het) die hoogste verbande met die verskil getoon.

Uit die beskrywende statistiek, soos bespreek, is dit duidelik dat 2003 die enigste jaar was waarin verskille tussen MO's en VO's van so 'n aard was dat dit moontlik gebruik kon word

om spelers in hierdie verskillende ontwikkelingskategorieë van mekaar te kon onderskei. Verskille tussen MO's en VO's was in 2004 en 2005 minimaal en het dus verdere ontledings op die groepe nie geregverdig nie.

Op grond van hierdie resultate is 'n diskriminantanalise (Tabel 5) vervolgens op die 2003 data uitgevoer om te bepaal of van die vrae 'n groter bydrae as ander daartoe kan lewer om tussen verskillende rypingsgroepe te onderskei. Tabel 6 dui die terugklassifiseringsmatriks van die diskriminantanalises aan soos deur die *Jackknife*-metode bepaal.

TABEL 5: **RESULTATE VAN DIE DISKRIMINANTANALISE OM DIE VRAE TE BEPAAL WAT DIE GROOTSTE BYDRAE DAARTOE GELEWER HET OM PROEFPERSONE TE KLASSIFISEER**

Veranderlike		*F-to-remove*
Jaar van die meeste groei	(V1)	0.019722
Jaar van die meeste groei in verhouding tot die res	(V2)	0.019781
Lengte in verhouding tot die Pa en Ma	(V3)	2.575484

Bly liggaamsmassa konstant of neem dit toe?	(V4)	1.280422
Ouderdom – Stem gebreek in verhouding tot die res	(V8)	0.070649
Genitale ontwikkeling (skets)	(V14)	0.093891
Genitale ontwikkeling in verhouding tot die res	(V15)	0.000004

Nota: V= vraag

Die diskriminantanalise (Tabel 5) het sewe van die 10 veranderlikes uitgewys as moontlike vrae wat spelers in VO- en MO-groepe kan terugplaas. Die vrae wat oor stemverandering (vrae vyf tot sewe) gehandel het, is volgens die analise as minder betroubaar uitgewys en statisties uit die ontleding weggelaat. 'n Ontleding met betrekking tot die terugklassifiseringsvermoë van die sewe gekose veranderlikes toon dat een (25%) van die vier vroeë ontwikkelaars en agt (61.5%) van die 13 middelontwikkelaars korrek in hulle onderskeie groepe teruggeklassifiseer kon word (Tabel 6). Uit die hoogste *F-to-remove*-waardes (Tabel 5) blyk dit dat vrae drie, vier en 14, die grootste bydrae daartoe gelewer het om spelers in onderskeie rypingsgroepe terug te plaas.

Uit 'n ontleding van die antwoorde van die spelers wat verkeerdelik teruggeklassifiseer is (dit wil sê VO's as MO's of MO's as VO's), wil dit voorkom of dié spelers se persepsie van hulle eie ontwikkeling (vrae twee, agt, 15) in verhouding tot hul portuurgroep die grootste rol hierin gespeel het en verantwoordelik was vir die foutiewe klassifisering. Uit die spelers wat verkeerd geklassifiseer is, was vier wit, twee swart en twee bruin.

TABEL 6: **KRUISGELDIGHEID SOOS BEPAAL DEUR DIE *JACKKNIFE*-METODE DEUR GEBRUIK TE MAAK VAN SEWE VERANDERLIKES**

	Groep 1	**Groep 2**	**Totaal**
Groep 1	1	3	4
Persentasie	25.00	75.00	100
Groep 2	5	8	13
Persentasie	38.46	61.54	100

'n Verdere diskriminantanalise (Tabel 7) wat stapsgewys op die sewe veranderlikes uitgevoer is, het hoër *F-to-remove*-waardes vir drie van die sewe vrae getoon. In hierdie statistiese

ontleding is die vrae in volgorde van belangrikheid geplaas en kan vrae met *F-to-remove* ≥ 3.00 as statisties betekenisvol beskou word. Twee van die vrae, naamlik bly liggaamsmassa konstant of neem dit toe? en lengte in verhouding tot die ouers het in hierdie geval statisties betekenisvolle waardes aangedui. Die *F-to-remove*-waardes van die onderskeie veranderlikes in hierdie diskriminantanalise dui op 'n groter bydra tot terugklassifisering. Tabel 8 dui vervolgens die terugklassifisering soos bereken deur die *Jackknife*-metode vir die drie veranderlikes aan (Tabel 7). Hieruit blyk dit dat die drie vrae 75% (drie uit die vier) van die VO's korrek kon klassifiseer, alhoewel agt van die MO's as VO's geklassifiseer is.

TABEL 7: **STAPSGEWYSE DISKRIMINANT ANALISE**

Stap	**Veranderlikes**		**F to remove**
1.	Bly liggaamsmassa konstant of neem dit toe?	(V4)	4.791000*
2.	Lengte in verhouding tot die Pa en Ma	(V3)	4.299990*
3.	Jaar van die meeste groei in verhouding tot die res	(V2)	1.247738

Nota: r-remove ≥ 3.00* V= vraag

TABEL 8: **KRUISGELDIGHEID SOOS BEPAAL DEUR DIE *JACKKNIFE*-METODE DEUR GEBRUIK TE MAAK VAN DRIE VERANDERLIKES (TABEL 5)**

	Groep 1	**Groep 2**	**Totaal**
Groep 1	3	1	4
Persentasie	75.00	25.00	100
Groep 2	8	5	13
Persentasie	61.54	38.46	100

As die antwoorde van die foutief geklassifiseerde spelers ontleed word, blyk dit dat die meeste spelers tydens jare van die meeste groei in verhouding tot die res aangedui het dat hulle vroeër as hul portuurgroep ontwikkel het. Die meeste het ook aangedui dat hulle langer as albei ouers was. Uit hierdie ontleding van die spelers wat verkeerd geklassifiseer is, was sewe wit, een swart en een bruin.

BESPREKING VAN RESULTATE

Die doel van hierdie studie was om te bepaal of vrae oor die rypingsgeskiedenis van rugbyspelers onderskeid kan tref tussen verkillende fases van liggaamlike ontwikkeling in die ouderdomstydperk van 15 tot 17 jaar. Die navorsingsgroep was 'n beskikbaarheidsteekproef bestaande uit 'n geselekteerde groep rugbyspelers wat oor 'n driejaartydperk gevolg is en slegs een laatontwikkelaar opgelewer het. Hierdie implikasie kon egter nie vooraf voorsien word nie. Dit het die analise van die resultate bemoeilik aangesien literatuur aandui dat die grootste verskille tussen ontwikkelingsgroepe op ouderomme nege tot 16 jaar by VO's en LO's sal voorkom. Die ontleding vir hierdie studie moes gevolglik tussen gemiddelde- en vroeë ontwikkelaars gedoen word waar die verskille op die ouderdomme waarop die studie uitgevoer is, nie meer so groot sal wees soos op jonger ouderdomme nie, aangesien die meeste van hierdie spelers reeds in 'n redelik gevorderde ontwikkelingstadium verkeer het. Die resultate het ook heelwat oorvleueling met die antwoorde van die vrae by die MO's en VO's getoon, wat die onderskeid tussen die ontwikkelinggroepe verder bemoeilik het. In hierdie verband dui studies waarin adolessente in sport gevra is om hulle eie seksuele ryping te evalueer wel goeie korrelasies aan (Duke *et al.*, 1980; Ricky *et al.*, 1988; Leone &

Comtois, 2007) wat bevestig dat kinders wel hulle eie seksuele ryping kan evalueer. Uit hierdie tipes studies kom dit egter ook na vore dat in die gevalle waar seuns in vergelyking met 'n medikus se evaluering, eie ontwikkeling verkeerdelik geëvalueer het, dit in fases vier en vyf van genitale en skaamhaarontwikkeling voorgekom het. Die literatuur benadruk dat 'n seun wat aan die begin van fase vier en 'n seun wat aan die einde daarvan staan, duidelik in verskillende fases van ryping verkeer en dat metodes soos in hierdie studie gebruik nie voorsiening maak vir hierdie tipe onderskeid nie. Leoni en Comtios (2007) dui ook in hulle studie aan dat 'n duideliker onderskeid tussen verskillende fases, asook binne elke fase, nodig is ten einde die inligting effektiewer in toekomstige evaluasies te kan aanwend. Literatuur dui ook aan dat die ontwikkeling van geslagspesifieke eienskappe van verskillende rassegroepe verskillend kan wees (Malina *et al.*, 2004), wat ook die resultate van hierdie studie bemoeilik het, aangesien drie verskillende rassegroepe in die steekproef opgeneem is. Die feit dat die groep verder ook relatief klein was (byvoorbeeld net vier vroeë ontwikkelaars ingesluit het), kon meegebring het dat hierdie invloede 'n groter rol as normaalweg kon gespeel het.

Die diskriminantanalises wat uitgevoer is, het gevolglik swak diskriminerende waardes getoon. Uit die statistiek blyk dit dat die diskriminantanalise met sewe veranderlikes 'n beter klassifisering van die MO's (61.5%) gemaak het, terwyl die stapsgewyse klassifisering van drie veranderlikes weer die VO's (75%) beter teruggeklassifiseer het, alhoewel agt van die MO's ook as VO's geklassifiseer is.

Die swak terugklassifisering van die MO's kan daaraan toegeskryf word dat die meeste MO's hulle lengtegroei in verhouding tot hulle portuurgroep as vroeër, eerder as soortgelyk/dieselfde bestempel het en die antwoorde dus 'n groter rol tydens foutiewe terugklassifisering gespeel het. Vrae rakende die speler se evaluering van sy groei in verhouding tot anders kinders het gevolglik minder goeie gebruikswaarde in hierdie spesifieke situasie getoon en word derhalwe nie by hierdie ouderdom speler aanbeveel vir insluiting by soortgelyke vraelyste nie. Wat ook al die redes was vir die swak klassifiserings, blyk dit dat geen van die klassifiserings wat met hierdie studie gevind is, gebruikswaarde in die praktyk het nie.

Dit is egter soos reeds aangedui eerder belangrik om laat ontwikkelaars van die vroeë ontwikkelaars te kan onderskei in 'n sportsoort soos rugby, gevolglik word aanbeveel dat soortgelyke studies op jonger spelers uitgevoer moet word, of dat groter groepe gebruik moet word wat laatontwikkelaars by die analise insluit. Verfyning van die Tanner-stadia, veral fases vier en vyf, word ook aanbeveel om beter onderskeid tussen verskillende ontwikkelingsgroepe te kan tref. Die gebruik van kontrolegroepe kan ook oorweeg word.

Uit die resultate van die diskriminantanalises blyk dit egter dat inligting oor lengte en massa en hoe dit verander, vergeleke met ander van dieselfde ouderdom, die grootste diskriminerende waarde tussen MO's en VO's op 16-jarige ouderdom getoon het. Die gebruikswaarde van hierdie tipes veranderlikes in die bepaling van ontwikkelingsverskille by rugbyspelers kan gevolglik verder in soortgelyke studies ondersoek word. In beide diskriminantanalises het die vraag met betrekking tot lengte in verhouding tot die ouers goeie diskriminerende waarde getoon. Lengte word deur die literatuur uitgewys as 'n eienskap wat

'n aanduiding kan wees van hoe ver gevorderd 'n seun in sy groeifase is (Malina *et al.*, 2004). Wanneer liggaamslengte van kinders in vroeë, gemiddelde en laat ontwikkelaars as 'n

persentasie van volwasse liggaamslengte op verskillende ouderdomme uitgedruk word, het vroeë ontwikkelaars in elke stadium 'n groter persentasie van sy volwasse lengte bereik. Die afleiding wat Malina *et al.* (2004) hieruit maak, is dat vroeë ontwikkelaars nader aan hulle volwasse stadium van liggaamslengte is as kinders in gemiddelde en laat ontwikkelende groepe. As voorbeeld word twee kinders gebruik wat dieselfde lengte op 'n spesifieke ouderdom het, maar die een het reeds 'n groter persentasie van sy volwasse lengte bereik en is gevolglik nader aan sy volwasse stadium (Malina *et al.*, 2004). Aangesien lengte 'n hoë genetiese faktor het (Malina *et al.*, 2004), kan lengte in verhouding tot die Pa en Ma (vraag drie) gevolglik 'n aanduiding gee van hoe naby 'n seun aan sy volwasse liggaamslengte is aangesien 'n afleiding hieruit gemaak kan word dat een wat reeds langer as een of beide sy ouers is, nader aan sy volwasse lengte gevorder het en verder gevorderd sal wees in die rypwordingsproses as een wat korter as beide ouers is. Literatuur bevestig dat 'n betroubare afleiding gemaak kan word oor die persentasie volwasse lengte wat reeds bereik is indien die volwasse lengte van die ouers beskikbaar is (Malina *et al.*, 2005). Die jare wat die seun aangedui het waarin hy die meeste gegroei het in verhouding tot die res, het ook diskriminasiewaarde getoon, alhoewel in 'n geringer mate as die vraag ten opsigte van ouers se lengte.

Die vraag wat gehandel het oor die jaar van die meeste groei gee 'n aanduiding van wanneer die meeste groei in lengte (piekgroeiversnelling [PGV]) plaasgevind het en is volgens die literatuur 'n metode wat gebruik kan word om seuns en dogters in vroeë, gemiddelde en laat ontwikkelaars in te deel (Malina *et al.*, 2004). Volgens hierdie navorsers vind PGV op 'n gemiddelde ouderdom van 14.2 jaar by seuns plaas met 'n standaardafwyking van een jaar. Seuns met 'n PGV wat voor 13-jarige ouderdom plaasvind sal dus geklassifiseer word as 'n vroeë ontwikkelaar en na 15-jarige ouderdom as 'n laat ontwikkelaar. Alhoewel die literatuur geen aanduiding gee van hoe vrae wat handel oor hoe 'n kind hom met sy portuurgroep vergelyk met betrekking tot sekere groei-aspekte nie, blyk dit tog waardevol te wees in sekere gevalle. Dit wil voorkom of seuns se perspektief van die spesifieke ouderdom waarop die meeste groei in liggaamslengte plaasgevind het, verbeter het namate hulle ouer geword het en op hulle groeifase kon terug kyk. Uit die gemiddelde minimum en maksimum waardes van hierdie vraag (vraag twee) kan die afleiding gemaak word dat die proefpersone min of meer dieselfde en vroeër as hul portuurgroep ontwikkel het. Hierdie resultate hou verband met die skeletale evaluerings deurdat die meeste proefpersone as middel en laat ontwikkelaars volgens hul skeletouderdom geklassifiseer is.

Dit is verder duidelik uit die resultate van die studie dat dit tot op die ouderdom van 15 jaar veral belangrik is om 'n seun se ontwikkelingsouderdom te kan bepaal aangesien daar soveel as vier jaar verskil in biologiese ontwikkeling van seuns met dieselfde chronologiese ouderdom kan voorkom.

Die vraag wat die tweede beste onderskeidingsvermoë tussen VO's en MO's getoon het, was ten opsigte daarvan of toename in massa steeds plaasvind. Volgens Malina *et al.* (2004) het VO's meer gewig-vir-lengte op enige ouderdom en toon VO's ook hoër gemiddelde waardes vir die Liggaamsmassa Indeks (LMI). In 2003 het al vier VO's aangedui dat hulle liggaamsgewig konstant gebly het. Nege van die MO's het aangedui dat hulle liggaamsmassa konstant was, terwyl vier aangedui het dat hulle gewig steeds toeneem. In 2004 het drie VO's aangedui dat hulle gewig konstant gebly het en een het aangedui dat sy gewig steeds

toegeneem het. Agt van die MO's het aangedui dat hulle massa konstant gebly het en vyf dat hulle gewig steeds toegeneem het. In 2005 het al vier die VO's aangedui dat hulle liggaamsmassa konstant gebly het, terwyl ses van die MO's aangedui het dat hulle liggaamsmassa konstant gebly het, terwyl sewe aangedui het dat hulle massa steeds toeneem. Hieruit blyk dit ook dat individuele verskille tussen die spelers in die verskillende ontwikkelingskategorieë na vore te kom het en vereis die vraag gevolglik ook verdere verfyning.

SAMEVATTING

Die doel van hierdie studie was om die gebruikswaarde van 'n vraelysmetode wat op somatiese ryping gebaseer is, asook om die Tanner-skaal van seksuele rypingstatus, by talentvolle rugbyspelers te bepaal deur dit met biologiese ouderdom, soos vasgestel aan die hand van die GP-metode te vergelyk. Hoewel hierdie studie swak onderskeidingsvermoë van die veranderlikes aangedui het, kan die afleiding samevattend gemaak word dat vrae wat inligting oor somatiese ryping inwin (lengte en massa) die grootste moontlikhede inhou om as aanduiders van rypheidstatus op 16-jarige ouderdom aangewend te kan word. Seksuele eienskappe kan aangewend word om die geheelbeeld vollediger te maak, veral met betrekking tot gemiddelde ontwikkelaars. Meer navorsing in hierdie verband is egter nodig en word gevolglik aanbeveel en die tekortkominge wat in hierdie studie uitgewys is, moet ook aangespreek word.

SUMMARY

The ability of somatic and maturity characteristics to determine maturity status of rugbyplayers

Malina *et al.* (2004) and other researchers indicate that growth and maturation will affect sport performance. They report that boys with an advantage in biological maturity status will have an advantage over boys who develop at a slower rate, especially between ages nine and 16 years.

Different indicators such as skeletal maturity, sexual maturity and somatic maturity have been used in studies to determine biological maturity status (Faulkner, 1996; Malina *et al.*, 2004). Researchers are of opinion that skeletal age (SA) is the best method by which to determine biological maturity status and different methods have been developed in this regard (Faulkner, 1996; Lenth *et al.*, 1998). Due to the cost of determining SA, methods such as determining sexual maturity (as developed by Tanner, 1962) and somatic maturity (stature and body mass) have been used more widely.

Although studies have been done to determine the reliability of a self-administered questionnaire on maturity status (MSQ) based on the Tanner stages, no studies have been undertaken to determine the reliability of this method in relation to the Greulich-Pyle (GP) method for determining SA. The aim of this study was therefore to analyse the utilitarian value of a MSQ by comparing it with biological age as determined by the GP method.

A total of 18 boys (identified as talented rugby players to play for the North West Province) were selected and tested from 2003–2005, with a mean age of 15.9 years in the first year. SA (determined by means of x-rays), sexual maturity, motor and physical abilities, motor skills, anthropometric characteristics and psychological characteristics were evaluated over a period of three years.

X-rays of the wrist of the left hand were taken for each subject once every year from 2003-2005. The analysis was done by a radiologist making use of the Greulich-Pyle (GP) method. The MSQ was used to evaluate sexual maturity status from 2003-2005 and consisted of 15 questions. The questions gained information regarding growth in stature, body mass and stature in relation to that of the parents. Questions five to 15 gained information regarding voice changes, forming of facial hair, pubic hair as well as genital development. For each of these characteristics, subjects were asked to evaluate their status compared to that of their peers by indicating whether their development had taken place earlier (one), at the same time (two) or later (three). Pubic hair and genital development were evaluated on a five-point scale, indicating whether their development had taken place much earlier (one), slightly earlier (two), at the same time (three), slightly later (four) or much later (five) than their peer group.

The GP method was used to classify the 18 players into early (ED) (n=4), average (AD) (n=13) and late developers (LD) (n=1). The single LD had to be left out of the analysis for purposes of this article.

A discriminant function analysis was used to analyze the data and seven out of the possible 10 questions asked in 2003 regarding sexual and somatic maturity had been identified to discriminate between EDs and ADs. Only 25% of the EDs and 61% of the ADs could, however, be classified back into their original groups by making use of the Jackknife statistical method. A further stepwise discriminant analysis indicated that three of the seven questions had made a larger contribution to discriminating between the two groups. However, cross validation according to the Jackknife method indicated that only 75% of the EDs and 38.5% of the ADs could be reclassified correctly.

The conclusion can be drawn from this study is that somatic characteristics have better potential of categorising rugby players as early and average developers than sexual characteristics and more research is recommended in this regard. However, none of the analyses in this research could discriminate between players in different developmental groups effectively and different reasons can be provided for this. Differences in the development of different racial groups and refinement of the description within the later stages of the Tanner questionnaire are also recommended.

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(Vakredakteur: Prof. P.E. Krüger)

RELEVANCE OF THE KÜBLER-ROSS MODEL TO THE POST-INJURY RESPONSES OF COMPETITIVE ATHLETES

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ABSTRACT

Attempts to explain and/or predict the post-injury responses of competitive athletes have relied upon current models of grief. Kübler-Ross's stage model (1969) has been particularly popular among sports psychologists and is cited frequently in sports psychology literature. Since the model was based upon a very different subject population, its relevance to the post-injury responses of competitive athletes has been questioned. This study evaluated the relevance of the model to the post-injury responses of competitive athletes. An existing database was utilised; the sample consisted of athletes (N=21) who, through injury, could not participate in sport for a minimum duration of two months. The sample represented various ethnic groups, with ages ranging from 12 to 35 years. Participation levels ranged from provincial to international. Through qualitative analysis, post-injury responses most similar to Kübler-Ross's (1969) grief responses were identified. Results indicate the frequent existence of post-injury responses similar to the grief responses proposed by Kübler-Ross (1969), with the exception of the bargaining response. The model also proved to be relevant in the identification of underlying tendencies occurring during the post-injury rehabilitation period.

Key words: Kübler-Ross; Post-injury responses; Sport injuries; Professional athletes; Grief stage model

INTRODUCTION

Athletic injury is essentially a negative experience with potentially far-reaching personal and financial implications. There is a tendency among medical and paramedical personnel to dwell upon the physical dimensions of an injury. As of late, medical professionals have come to realise the importance of incorporating psychological strategies into rehabilitation (Wagman & Khelifa, 1996; Crossman, 1997; Walker *et al.*, 2007).

Attempts to comprehend and eventually predict the nature of post-injury responses in athletes have relied heavily on existing theoretical models of grief. Among these, the stage theory of Kübler-Ross (1969) has been a popular frame of reference among sport psychologists, perhaps due to the fact that it remains one of the better-known theories on grief (Walker *et al.*, 2007).

The application of a theory of grief to the experience and consequences of athletic injury affords the opportunity to ask relevant questions. Does athletic injury constitute a loss and can post-injury responses be regarded as responses of grief? Bowlby's (1991) attachment theory offers a framework for understanding loss through injury. Bowlby (1991) suggests that injury threatens important attachments in terms of bodily function, self-image, self-esteem, the context of important relationships and the basis of many forms of gratification. In terms of this theory, athletic injury may pose a likely threat to the healthy equilibrium of these concepts.

In terms of the equation of post-injury responses to grief-like responses, Engel (1964) suggested that grief occurs as a result of the loss of anything that a person has come to consider as part of his or her natural environment and a source of psychological gratification.

The current research therefore focused on the extent to which the post-injury responses of

athletes are similar to responses proposed by Kübler-Ross (1969) during stages of grief and on the resulting implications for the applicability of this model.

Models of grief within sport-related literature

The importance of psychological factors in the rehabilitation of injured athletes has become an increasingly relevant topic in sport-related literature (Evans & Hardy, 1995; Johnson, 1997; Brewer, 1999.) In the past, several studies have focused on the athlete's post-injury reactions. Chan and Grossman (1988) found that when comparing injured runners with non-injured runners, injured runners presented with significantly more depression, confusion and tension as well as lower self-esteem on various measurement instruments. Results of a study by Pearson and Jones (1992) suggested a significantly higher incidence of depression and anger among injured athletes. Depression scores for athletes with severe injuries were also 13 times higher than for athletes with minor injuries.

In a comparison between injured athletes and a control group, Leddy *et al*. (1994) found injured athletes to have significantly higher levels of state anxiety (tension) and that injured athletes had higher levels of depression and lower self-esteem scores than non-injured and recovered athletes.

Attempts to explain or predict the post-injury responses of athletes have led to the application of grief response models to the post-injury and rehabilitation phase (Quackenbush & Crossman, 1994). Kübler-Ross's (1969) five-stage model of the grief process, the results of which were drawn from over 200 interviews with terminally ill patients, is one upon which sport psychologists appear to have based their comparisons and assessments of the nature of grief responses during the post-injury phase (Evans & Hardy, 1995). Some of the first authors to contemplate the application of grief-related models to sport psychology were Gordon (1986) and Pederson (1986). They discussed the hypothesis that athletes may exhibit grief responses subsequent to sports injury.

The work of Kübler-Ross (1969) has been popularised since its inception, proposing a sequence of five stages of grief that are supposedly widely encountered among the bereaved.

The first stage is characterised by denial and isolation, during which patients may deny the reality of the diagnosis and/or prognosis of their condition. Kübler-Ross (1969) reports the function of denial as that of serving as a buffer, which affords the patient time for recollection and for the possible mobilisation of other psychological defences. As part of this first stage, isolation was strongly related to the extent to which patients subjectively experienced a lack of empathy and support from significant others.

Anger seems to be the predominant response in the second stage, where patients often direct their anger toward the clinician, hospital staff, family and friends, or at themselves. During the subsequent stage there is a tendency for patients to bargain, wanting to fulfil several pledges in return for a possible cure. Bargaining may often have a religious focus and is mostly kept secret or disclosed only to those deemed trustworthy. According to Kübler-Ross (1969) the postponement of accepting the inevitable supplies the highest level of energy to the bargaining process.

Depression follows as the fourth stage in the bereavement process. During this stage Kübler-Ross (1969) differentiates between an initial reactionary depression, followed by a preparatory kind of depression, with the latter serving as a tool to facilitate the acceptance of the impending losses, be it of loved objects or loved ones. Although Kübler-Ross (1969) does not explicitly elaborate on the symptoms of depression, these could be implied as being the manifestation of several clinical signs of depression, including social withdrawal, psychomotor agitation, hopelessness, tearfulness, insomnia and even suicidal ideation (Kaplan & Sadock, 1998).

The final stage constitutes the acceptance of the prognosis and eventual outcome of the illness.

The stage model proposed by Kübler-Ross (1969) seems to display contextual similarities with other models of grief referred to by sport psychologists. Averill (1968) and Karl (1987)

proposed stage models of their own, essentially differing from Kübler-Ross's (1969) five-stage model only in the number and inclusiveness of their stages.

Loss through injury in the context of grief-related literature

For athletes who diligently invest in training and professional participation, any event which threatens their ability to function in an athletic role may constitute a significant personal loss (Brewer, 1999). In this respect Kübler-Ross's (1969) model affords a means by which loss through injury could be contextualised.

Malt (1992) verified the occurrence of emotion focused adjustment after an injury, a tendency confirmed by Smith (1996), who suggests that injury in athletes is often accompanied by depressive symptoms, low self-esteem, tension and anger – representing at least two of the stages proposed by Kübler-Ross (1969). According to Smith (1996) there also seems to be a relation between the incidence of mood disturbances in athletes and their personal progress in rehabilitation, with mood being inversely related to attendance of rehabilitation sessions. This evidence supports the relation between post-injury mood state in athletes and their perceived

loss of control, possibly lending support to the hypothesis of Kübler-Ross (1969) that anger might serve to regain a subjective feeling of control.

The tendency for post-injury responses to resemble grief-like responses was elaborated upon in an earlier study by Blinde and Stratta (1992), who undertook an in-depth investigation into the psychological reactions of athletes following an involuntary and unexpected exit from participation in sport at professional level. Athletes in this sample of 20 experienced the exit as traumatic and reported emotional experiences similar to the loss of someone with whom they had a close relationship.

Blinde and Stratta (1992) also equated post-injury responses to the stage theory of Kübler-Ross (1969), making specific mention that, among other factors that could lead to an early career exit, athletic injury remains one of the causative factors related to the existence of grief-like emotional reactions. Blinde and Stratta (1992) also argue that despite criticism against the application of the Kübler-Ross (1969) model, her stage theory could still be instrumental as a frame of reference for a better understanding of the psychological factors at play during the exit process. They also indicated that depression, i.e. stage four in the Kübler-Ross (1969) model, seems to be the most prolonged stage experienced by athletes after an unexpected exit from professional participation.

Injury and the loss of athletic identity

The loss of athletic identity seems to be a primary consequence of athletic injury, especially when retirement from professional participation is indicated. Webb *et al*. (1998) argue that the nature of the reaction to retirement from participation seems to be dependent on two variables: the strength of the participant's athletic identity; and secondly, the circumstances that prevailed when retirement occurred.

Webb *et al.* (1998) also indicated that the post-injury athletic identity among the studied athletes was strongly associated with a sense of vagueness, reiterating the functional nature of an intact identity dependent on optimal physical condition. Whatever the underlying process, injury-related retirements seem more problematic to individuals with strong athletic identities.

RESEARCH DESIGN AND METHODOLOGY

Nel (1999) approached several sportsmen and women in collaboration with the sport bureaus of the University of the Free State and Central University of Technology, as well as local schools and sport clubs. The sample consisted of 21 participants who, as a result of injury, could not participate in sport for a minimum duration of two months. The participants were involved in different kinds of sport: a) low risk, no contact, individual or team; b) high risk, contact, individual; and c) team, contact. Ages ranged from 12 to 35 years, (average age = 21.67, SD = 6.24), representing different levels of competition, i.e. provincial, national and international. Eight females and 13 males were included in the study and various ethnic

groups were represented.

Semi-structured interviews were conducted, affording the athletes the opportunity to elaborate retrospectively on their post-injury experiences throughout different phases of rehabilitation. The phases were identified as: 1) injury phase; 2) treatment decision-making and planning phase; 3) early rehabilitation phase; 4) late rehabilitation phase; and 5) return-to-competition phase (Nel, 1999).

The authors coded and analysed transcribed interviews to isolate the cognitive, emotional and behavioural responses of athletes during the different phases of rehabilitation. The latter was performed with the QSR NUD*ST software programme, designed specifically for the purpose of analysing and coding qualitative data.

Further qualitative exploration of these cognitive, emotional and behavioural responses was undertaken. The purpose was to isolate the post-injury responses most similar to the grief responses proposed by the Kübler-Ross (1969) model. Inferences made were verified by two independent researchers through triangulation, crediting the process with a higher degree of objectivity.

RESULTS AND DISCUSSION

Figure 1 highlights the distribution of post-injury responses for all athletes across all phases of rehabilitation. Eighty-one percent (81.0%) of all athletes experienced some form of denial, whilst 90.5% of the subjects experienced isolation during these phases. Post-injury responses of anger existed among a third (33.3%) of the subjects, whereas only one subject reported some form of bargaining. Indications of depression were found in two thirds (66.7%) of the subjects. Responses of acceptance were reported by 85.7% of the subjects. Although denial and isolation are noted separately, it should be taken into account that both still form part of the first stage proposed by Kübler-Ross (1969).

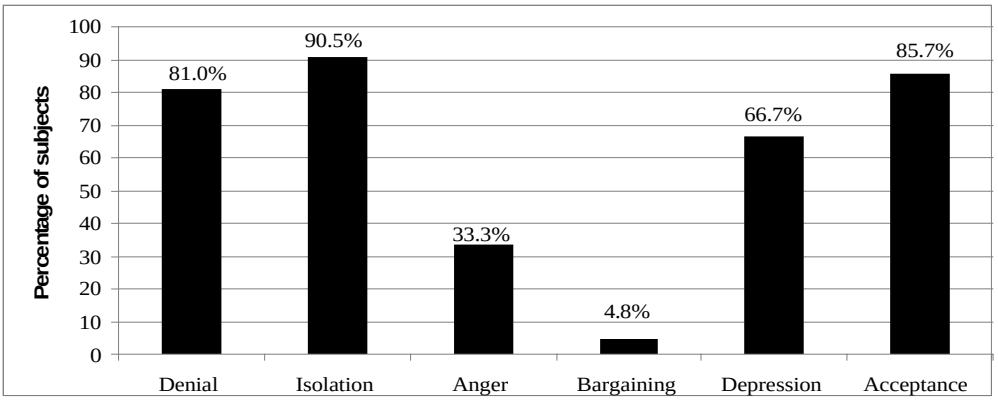

FIGURE 1: **POST-INJURY RESPONSES FOR ALL PHASES OF INJURY**

Injury phase

During the injury phase (Figure 2), the predominant post-injury responses were denial (38.1%) and depression (33.3%). No bargaining was reported and only one subject (4.8%) gave an indication of experiencing isolation. Three (14.3%) of the subjects reported acceptance during this early phase. Depression was indicated by responses such as the withdrawal from interpersonal contact, pronounced sadness and feelings of worthlessness, inappropriate guilt and feelings of dysphoria (unpleasant mood). None of the subjects who

experienced anger (9.5%) in the injury phase reported any indications of acceptance in the same phase.

FIGURE 2: **POST-INJURY RESPONSES FOR THE INJURY PHASE**

Treatment decision-making and planning phase

Post-injury responses during the decision-making and planning phase (Figure 3) seem to differ significantly from the injury phase. None of the subjects reported anger and depression and there was also an absence of bargaining. There was an increase in reported acceptance (from 14.3% to 42.9%) and a decrease in denial. Athletes accepted medical and paramedical interventions considered (by them) to be appropriate for the type of injury, along with a professional opinion on the diagnosis. They also accepted time as a crucial factor in the rehabilitation process.

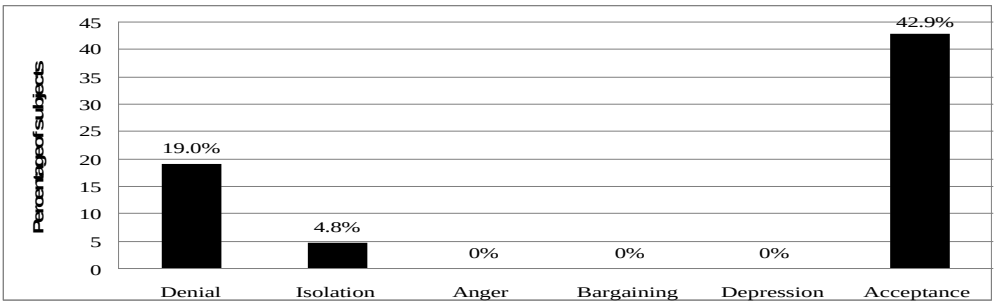

FIGURE 3: **POST-INJURY RESPONSES FOR THE TREATMENT DECISION-MAKING AND PLANNING PHASE**

A possible explanation for the absence of anger during this phase could coincide with the function ascribed to anger by Kübler-Ross (1969). Anger is often present in the individual who subjectively experiences a loss of control over his/her circumstances, as anger serves the function of regaining control. Involvement in the treatment decision-making and planning phase might afford the athlete a sense of regaining control within the rehabilitation process.

Early rehabilitation phase

The subsequent early rehabilitation phase (Figure 4) had the highest incidence of depression (52.4%). This phase also had the highest occurrence of anger (28.6%), possibly indicating a rise in the subjective loss of perceived control among athletes. Athletes reported experiencing anger due to a lack of understanding and empathy from significant others, e.g. immediate family and coaches. Some of them also experienced anger towards medical professionals for not being decisive enough in dealing with the injury.

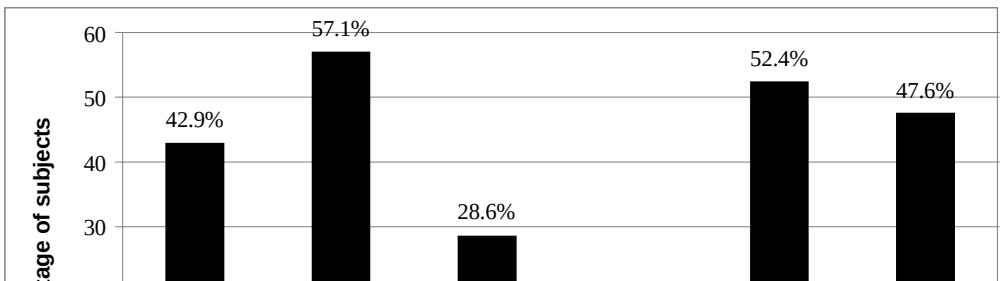

FIGURE 4: **POST-INJURY RESPONSES FOR THE EARLY REHABILITATION PHASE**

Reports of isolation increased considerably when compared to the previous phase in the rehabilitation process. More than half (57.1%) of the athletes reported feeling isolated during the early rehabilitation phase, compared to only one subject reporting feelings of isolation during the treatment decision-making and planning phase. This tendency continued into the late rehabilitation phase, indicating that athletes may experience these two phases as particularly difficult.

The incidence of acceptance is highest during the early rehabilitation phase. Nearly a third (28.6%) of the subjects accepted that rehabilitation was a gradual process and that adherence to the prescribed rehabilitation programme would yield the best results. The same percentage of subjects (28.6%) accepted the nature of the prognosis and that the pre- and post-injury performance levels might differ. There proved to be a rise in denial during the early rehabilitation phase. Similarly, almost a third (28.6%) of the subjects denied the existence of

emotional turmoil during early rehabilitation, with 14.3% denying the reality of the prognosis, or the probability that the injury would have a significant influence on future athletic performance.

Late rehabilitation phase

The late rehabilitation phase (Figure 5) was the only phase with a reported incidence of bargaining (4.8%), the nature of which was religious. The low incidence of bargaining could be explained in terms of the documented observation of Kübler-Ross (1969) that bargaining is rarely, if ever, disclosed, and then usually only acknowledged to trusted individuals. The possibility exists, therefore, that more subjects could have bargained during any of the phases of rehabilitation. As mentioned before, the incidence of isolation was still relatively high during the late rehabilitation phase (52.4%). The incidence of denial, anger and acceptance were significantly lower (roughly 50% less compared to the previous phase), whereas the incidence of depression decreased by 33% compared to the early rehabilitation phase. Since more than half of the athletes still experienced isolation, it is suggested that particular attention should be paid to the reported reasons for this tendency. More than a third (38.1%) of the subjects felt isolated from their training partners and experienced a lack of support from team management and coaches. They also reported insufficient support from their primary support structures (friends and family).

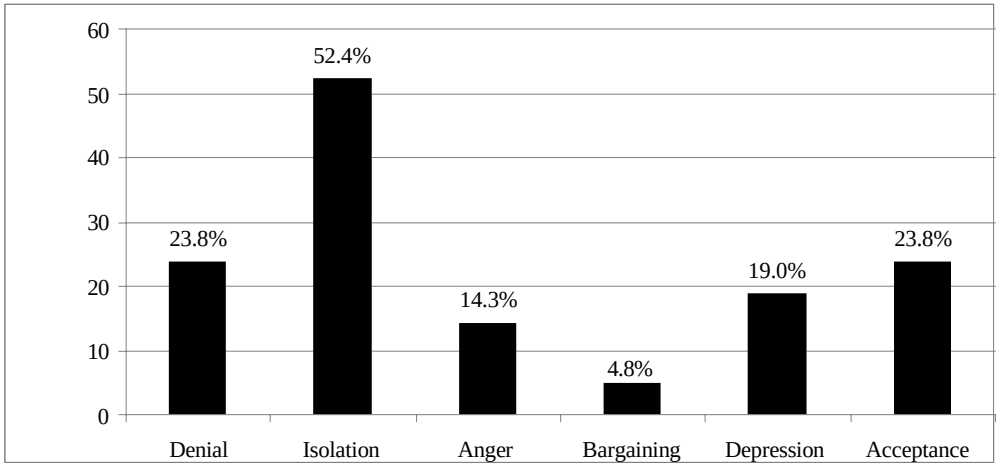

FIGURE 5: **POST-INJURY RESPONSES FOR THE LATE REHABILITATION PHASE**

Return-to-competition phase

The return-to-competition phase (Figure 6) differs significantly from the phases of early and late rehabilitation. There were no incidences of anger, bargaining or depression and there was a significant reduction in the incidence of isolation, probably indicative of the strong positive influence of becoming part of a joint exercise programme and the resulting higher frequency of social interaction. One athlete still indicated feelings of isolation, reporting that he felt

estranged from training partners and team members due to the loss of previous (pre-injury) levels of performance.

Acceptance during this phase of rehabilitation was related to two areas: 1) level of performance; and 2) rehabilitation of injury. Approximately a quarter (23.8%) of the athletes accepted that the level of performance would be at a significantly lower level than the pre-injury performance and one athlete (4.8%) accepted that the injury might not be fully rehabilitated and was still latent. Two athletes (9.5%) denied the severity of the initial injury and wanted a return to pre-injury levels of performance after rehabilitation.

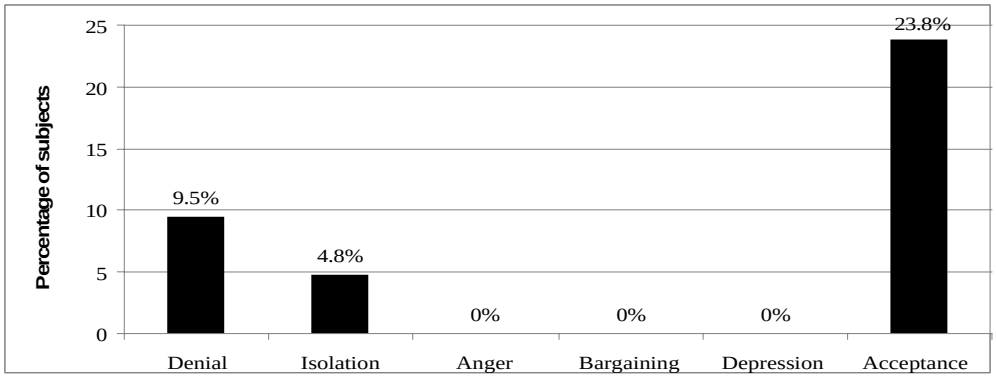

FIGURE 6: **POST-INJURY RESPONSES FOR THE RETURN-TO-COMPETITION PHASE**

Results are further illuminated when specific post-injury responses are viewed in terms of the different phases of injury (Figures 7 to 9). Responses of denial (Figure 7) were prevalent throughout all the phases and reached a peak (42.9%) during the early rehabilitation phase, whereas the lowest incidence rate occurred when the athletes returned to competition.

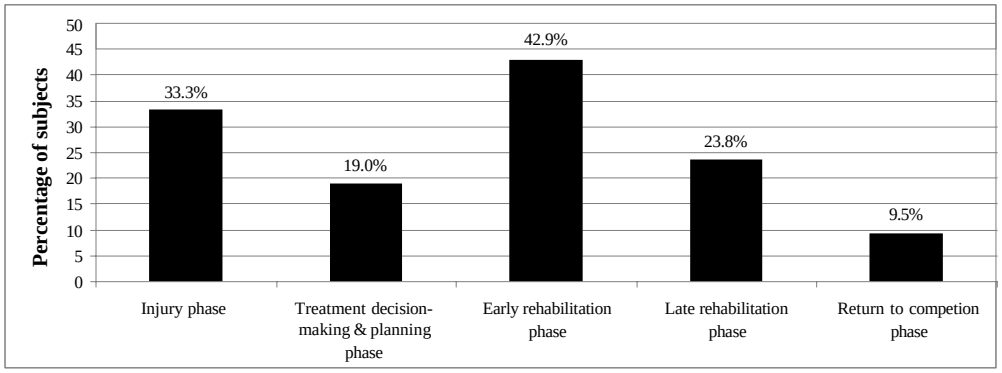

FIGURE 7: **RESPONSES OF DENIAL FOR ALL PHASES OF REHABILITATION**

Subjects reported the highest incidence of isolation during the early (57.1%) and late rehabilitation (52.4%) phases respectively (Figure 8). It could be hypothesised that factors accounting for isolation (i.e. support and empathy from team members, immediate family, friends and coaches) were still sufficiently present during the injury as well as the treatment decision-making and planning phases.

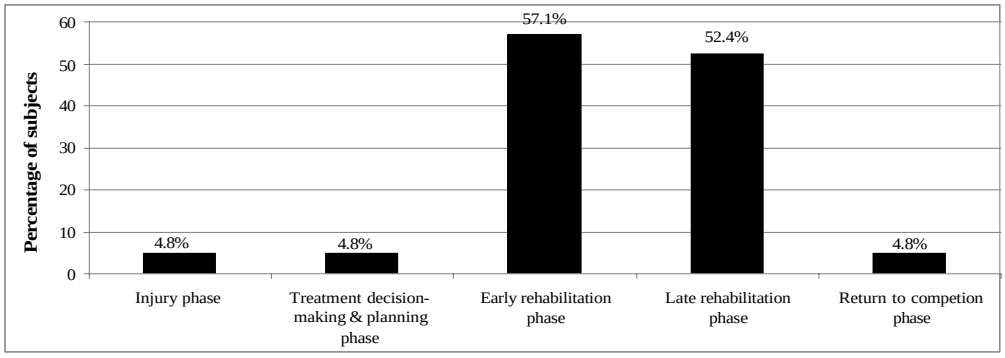

FIGURE 8: **RESPONSES OF ISOLATION FOR ALL PHASES OF REHABILITATION**

Depression (see Figure 9) existed across the span of three injury phases with a third (33.3%) of the athletes experiencing depression during the injury phase and approximately half of them (52.4%) feeling depressed during early rehabilitation. Almost a fifth of the subjects (19.0%) were still experiencing depression in the late rehabilitation phase. These results tend to confirm the findings of Blinde and Stratta (1992) who indicated that depression seems to be the most prolonged mood state experienced by athletes after an unexpected exit from professional sport.

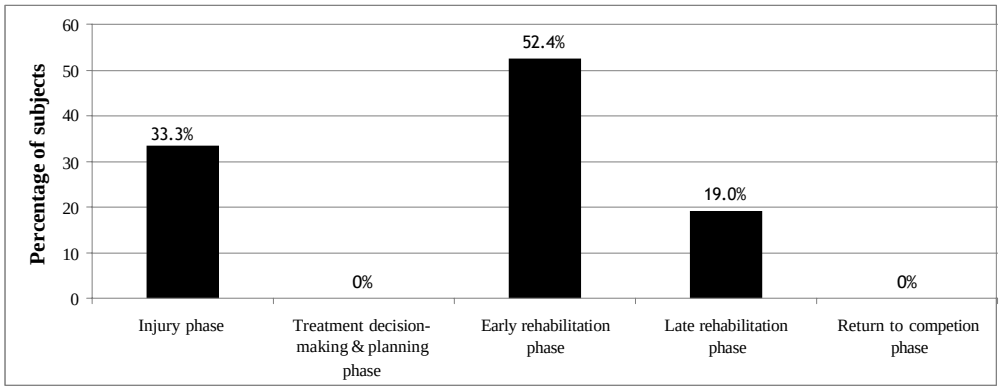

FIGURE 9: **RESPONSES OF DEPRESSION FOR ALL PHASES OF REHABILITATION**

SUMMARY

The highest incidence of isolation occurred during the phases of early rehabilitation and late rehabilitation respectively. The incidence of isolation during these phases was also considerably greater (approximately 10 times higher) than during any other phase of injury. The incidence of depression and anger peaked during the early rehabilitation phase. The simultaneous occurrence of isolation and depression accentuates athletes' susceptibility to mood instabilities during this period, especially in the absence of sufficient primary support.

The highest incidence of acceptance was also reported during the early rehabilitation phase. It should be noted, however, that the content of the reported acceptance was in relation to the nature of the rehabilitation process and not to the injury itself. Therefore, it cannot be inferred that athletes accepted the injury, but rather certain inevitable implications thereof.

The incidence of anger displays a gradual decline across the last three phases of rehabilitation, with its peak during early rehabilitation. This phenomenon might reflect a manifestation of Kübler-Ross's (1969) hypothesis that anger serves to compensate for a loss of control, thus indicating that the athlete might regain a sense of control during the final two phases of rehabilitation.

Depression similarly displays a diminishing incidence across the last three phases of rehabilitation (52.4% during the early rehabilitation phase to 0% during the return-to-competition phase). This tendency could represent the differentiation that Kübler-Ross (1969) makes between reactionary depression and depression over impending losses. The incidence of 33.3% during the injury phase might represent the reactionary kind of depression with its buffering function, affording the athlete time to recollect and mobilise other psychological mechanisms or sources of coping. The subsequent phase has no incidence of depression, with a high incidence again during early rehabilitation, when the athlete may realise the full impact of the loss. The depression then subsides as the progress of the rehabilitation process puts the losses into context, or as the athlete regains a sense of control.

The role of an intact athletic identity cannot be underestimated, as many of the subjects indicated that the loss of that identity contributed to the experience of isolation. Only one subject reported engaging in bargaining. Kübler-Ross (1969) indicated that bargaining is a rarely disclosed phenomenon.

CONCLUSIONS

The results of the study necessitate several suggestions to professionals involved in the post-injury rehabilitation of athletes. As evidenced by the study, the majority of injured athletes demonstrated pre-morbid mental health functioning within normal limits. The sudden loss of athletic ability and athletic identity will in many cases have a significant impact on the athlete's personal well-being and mental state functions.

The study indicates that the most difficult time for athletes was during the early and late rehabilitation phases, when they experienced a greater sense of isolation and had to anticipate or envisage their level of post-rehabilitation performance. It was also during this time when

follow-up support and interest from a coach and/or team manager/former training partner was most appreciated, as well as continued empathy from treating clinicians like physiotherapists, biokineticists and rehabilitation physicians. A lack of primary support during this time had been indicated to precipitate mood disturbances in this group of athletes.

The existence of an athletic identity relies heavily on optimal physique and athletic performance. An injury affects the foundation of that identity with a resulting demand on the athlete's ability to recollect and focus on the gradual restoration of athletic identity. This attempt can be especially difficult without the necessary empathy and professional support. Athletes often reported feelings of vagueness and worthlessness due to a sudden loss of athletic identity. Moreover, athletes who were part of a team often felt isolated and marginalised due to a sudden lack of any significant contribution to that team. When this coincided with financial loss, it often culminated in low mood and anxiety. Particular interest should be taken in the establishment of some form of continuity and follow-up with athletes in this category.

The post-injury responses of professional athletes bear resemblance to grief-like responses. The model of Kübler-Ross (1969) can, therefore, not be discarded as irrelevant, despite being originally based upon a very different subject population.

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