

## SPORT PSYCHOLOGICAL SKILLS AND NETBALL PERFORMANCE

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### SUMMARY

The purpose of this study was to compare junior netball players, from successful and less successful provincial teams, regarding their sport psychological skill (SPS) levels. One hundred and forty four female South African provincial netball players ( $19.08 \pm 1.68$  years) completed three sport psychological questionnaires (CSAI-2, ACSI-28 and PSI). The results show that the successful players obtained better results than their less successful counterparts in 13 of the 19 tested sport psychological variables. Moderate practically significant differences were found between the groups for peaking under pressure ( $d = 0.44$ ), cognitive state anxiety direction ( $d = 0.35$ ) and state self-confidence direction ( $d = 0.47$ ). A forward stepwise discriminant analysis identified eight of the tested 19 variables as discriminators between the two groups with self-confidence intensity, mental rehearsal and peaking under pressure reported as significant discriminators. The developed prediction functions further proved to be 69.44% effective in classifying the players into their original groups. The important role of physiological conditioning, morphological attributes, technical and tactical abilities etc. should also be taken into account when comparing more and less successful netball players as it plays a major part in the performance outcome of netball teams. The results of this study clearly highlight the important contribution of sport psychological skills to netball performance.

## INTRODUCTION

Performance improvement in sport can largely be attributed to the application of sport scientific enhancement principles from the areas of sport physiology, biomechanics, morphology and psychology (Rushall, 1989). Psychological aspects are fast being recognized as the most significant contributing factor to success during the preparation and execution phases of competitions (Czech et al, 2004), especially in cases where athletes already dispose of optimal physiological, technical and morphological qualities. The identification and development of

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### ABBREVIATIONS:

ACSI-28	athletic coping skills inventory
CSAI-2	competitive state anxiety inventory
PSI	psychological skills inventory
SPS	sport psychological skills

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### KEY WORDS:

netball  
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sport psychological skills (SPS) have subsequently become of great interest to players, coaches, administrators and researchers, due to the relationship between these skills and the resulting performance, as well as the development of the athlete (Golby and Sheard, 2004).

Despite being the most popular woman's sport in South Africa (with 649,820 participants in 1997 (SISA, 1997)), very little research has been conducted on the influence of SPS on netball performance. Therefore, research findings pertaining to the important relationship between SPS and sporting performance in other sports will be highlighted. Researchers studying this relationship often compare players from different competitive levels and/or players from successful teams with players from less successful teams. Gould et al (1993) concluded that successful athletes exhibit less anxiety immediately before and during competition than their less successful counterparts. Mental rehearsal, concentration, peaking under pressure, goal-setting, achievement motivation and activation control were shown by Coetzee et al (2006) to effectively discriminate between more and less successful soccer players. In a similar vein, the research by Andrew et al (2007) on u/19 rugby union players from a leading tertiary institution showed more successful rugby players to have significantly better self-confidence, coping with adversity, activation control as well as achievement motivation levels than less successful rugby players.

Although various SPS appear to be related to optimal sport performance, only one study of SPS of netball players and its relationship with performance could be found. This study by Bock Jonathan et al (2004) concluded that a players' mental toughness is not guaranteed through SPST alone, but that factors such as the coaching style etc. should also be taken into account. Still, it is believed that mental toughness can be improved to a certain extent by acquiring various sport psychological skills (Pompei, 2004). It is, therefore, the purpose of this study to compare junior netball players from successful and less successful provincial netball teams, regarding their SPS levels. Information of this nature is expected to emphasise the importance of developing sound SPS, similarly to what is done in terms of the physical, technical and tactical preparation of players (Thiese and Huddleston, 1999; Bock Jonathan et al, 2004).

## METHODS

### *Sample Population*

The sample population used in this study consisted of 144 female junior provincial netball players (u/19 = 81 players from eight teams; u/21 = 63 players from six teams), all of whom participated in the A-section of the South African Inter-Provincial Netball Tournaments (u/19 and u/21 respectively) hosted by North-West South Netball during 2004 (Table 1). Seventy-nine players (seven teams) were included in the more successful group and 65 players (seven teams) were included in the less successful group. The two groups were chosen and classified as being successful or less successful based on their performances during the above-mentioned tournaments. The more successful group was made up of the top four u/19 and the top three ranked u/21 teams following the tournaments, while the less successful group consisted of the lower four u/19 and lower three ranked u/21 teams.

### *Procedures of Testing*

Permission for the study was granted by the Council of Netball South Africa and the Presidents of the various provinces were informed. The testing procedure was communicated to the managers and coaches during the meetings held on the evenings prior to the commencement of the 2004 South African Inter Provincial Netball tournaments. On the day of testing the subjects were informed about the nature and purpose of the research and were under no obligation to participate in

TABLE 1: Demographical information of the 144 subjects.

	Total tested group (144 players from 14 teams)	More successful group (79 players from 7 teams)	Less successful group (65 players from 7 teams)
Average age and standard deviation	19.1 ± 1.7 years	19.4 ± 1.1 years	18.6 ± 2.1 years
Race	White	71 (49.3%)	43 (54.4%)
	Black	20 (13.9%)	13 (16.5%)
	Coloured	53 (36.8%)	23 (29.1%)
Average amount of years playing	10.1 ± 3.2 years	10.8 ± 3.1 years	9.1 ± 3.2 years

the study. All of the 144 subjects completed informed consent forms and confidentiality was guaranteed. The questionnaires were completed by the participants under supervision of the first two authors of this article and took approximately 45 minutes.

### *Questionnaires*

The players' demographic information (name, surname, race, date of birth and age) was collected by means of a questionnaire. In addition, a total of nineteen sport psychological variables were measured by means of the following three questionnaires.

The Competitive State Anxiety Inventory (CSAI-2) of Martens et al (1990) is a self-report questionnaire consisting of three nine-item subscales measuring the intensity of somatic state anxiety, cognitive state anxiety and state self-confidence. Individual items are rated on a 4-point Likert scale from 1 (not at all) to 4 (very much so). Subscale scoring is additive, although one somatic anxiety item has reverse scoring, yielding subscale totals ranging from 9 to 36. In addition, Jones and Swain (1992) added the directional modification to the CSAI-2 in order to differentiate further between facilitative and debilitating perceptions of these psychological outcomes towards performance. In this section each of the 27 items were also answered according to a 7-point Likert scale that ranged from 0 (very debilitating) to 7 (very facilitative). The modified CSAI-2 is considered to be a reliable ( $r = 0.82 - 0.83$  for somatic state anxiety,  $r = 0.79 - 0.83$  for the cognitive state anxiety and  $r = 0.87 - 0.90$  for the state self-confidence scale) and valid instrument to determine the intensity (levels) and direction (perceived effect) of cognitive state anxiety, somatic state anxiety and state self-confidence (Ostrow, 1996).

The Athletic Coping Skills Inventory-2 (ACSI-28) of Smith et al (1995) provides a trait-like measure of psychological coping skills thought to be instrumental in improved sporting performance. It is composed of seven underlying SPS factors with subscales measuring coping with adversity, peaking under pressure, goal-setting and mental preparation, concentration, freedom from worry, confidence and achievement motivation, as well as coachability. The subjects were asked to read the statements on the ACSI-28 that describe experiences of elite athletes and to recall how often they experience similar thought and feelings. Each subscale is composed of four items measured on a 4 point Likert scale from 0 (almost never) to 3 (almost always). Each of the subscales

can, therefore, range from 0 to 12. The results are converted to a percentage score with higher values reflecting better skill levels. Test-retest reliability of the ACSI-28 subscales were found to be  $r = 0.87$  over a one week period for a sample of 97 college athletes. Internal consistency reliability of the ACSI-28 total score was  $r = 0.86$  (Crocker et al, 1998). Preliminary concurrent validity evidence was reported as the subscales were shown to be related to various sport psychological questionnaires (Crocker et al, 1998).

The Psychological Skills Inventory (PSI) of Wheaton (1998)\* consists of 64 items, measuring six SPS (achievement motivation, goal directedness, activation control, maintaining self-confidence, concentration and mental rehearsal). Each subscale comprises of ten items measured on a 5 point Likert scale from 0 (never) to 4 (always). Reverse scoring applies in some cases with the subscale scores expressed as percentages. Higher scores reflect better SPS levels. Test, retest reliability on the PSI was reported to range from  $r = 0.84$  to  $r = 0.97$  (Wheaton, 1998).

Somatic state anxiety, cognitive state anxiety and state self-confidence (as measured by the CSAI-2) are psychological outcomes and not psychological skills. Subsequently, all of the SPS and outcomes reported in this study will collectively be referred to as sport psychological variables in the remainder of this article.

#### Statistical Analysis

The Statistical Data Processing package (StatSoft Inc., 2004) was used to process the data. The descriptive statistics (average and standard deviation) for each of the 19 variables of both groups were calculated. Practically significant differences between the two groups (for the various sport psychological variables) were determined by means of effect sizes (ES). ES were used, since the subject group was not randomly selected. Caution should, therefore, be taken when generalizing the results of this study to other netball groups. ES are determined as follows:

$$ES = (M_1 - M_2)/s$$

Here,  $M_1$  = the mean of the first group in the comparison,  $M_2$  = the mean of the second group in the comparison, and  $s$  = the standard deviation. Thomas and Nelson (2001) recommend that the pooled

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standard deviation ( $S_p$ ) be used in research designs such as the present one:

$$S_p = \sqrt{\frac{s_1^2(n_1-1) + s_2^2(n_2-1)}{n_1+n_2-2}}$$

Here  $s_1^2$  = the variance of the players in the first group,  $s_2^2$  = the variance of the players in the second group,  $n_1$  = the number of players in the first group and  $n_2$  = the number of players in the second group. Effect sizes are expressed as Cohen's d-value and can be interpreted as follows: an ES of more or less 0.8 is large, an ES of more or less 0.5 is moderate, and an ES of more or less 0.2 is small (Thomas and Nelson, 2001).

Next, a forward stepwise discriminant analysis was performed to determine the sport psychological variables that discriminate best between the successful and less successful groups of players. From this a classification matrix was compiled to calculate which percentage of the players could be classified into their original respective groups by means of the developed prediction functions. The level of significance was set at  $p < 0.05$  throughout.

## RESULTS AND DISCUSSION

The descriptive statistics (averages and standard deviations) and the effect size results (practical significance) of the more and less successful netball groups are presented in Table 2. From this table it is clear that the more successful group obtained better results than the less successful group in 13 of the 19 (68.42%) sport psychological variables measured in this study. Furthermore, the effect size results revealed moderately significant differences between the two groups for three of the sport psychological variables (peaking under pressure ( $d = 0.44$ ) and the directional influence of perceived cognitive state anxiety ( $d = 0.35$ ) and perceived state self-confidence ( $d = 0.47$ ) towards performance). In all three cases the more successful players showed better results than the less successful group. Roteller and Lerner (1993) previously noted that high levels of pressure develop when players perceive an event as being important. It, therefore, seems as if better players are more effective at delivering peak performance under high-pressure situations such as national championships. Coetzee et al (2006) also reported peaking under pressure as an important discriminator between successful and less successful soccer players, with the more

TABLE 2: Descriptive statistics (average and standard deviation) and effect size results of the 19 tested sport psychological variables for the two respective netball groups.

Questionnaire and psychological variables	Average and standard deviation (M±SD)		Practical significance (Cohen's d-value)
	More successful group (n=79)	Less successful group (n=65)	
<b>Competitive State Anxiety Inventory -2 (Martens et al 1990)</b>			
Cognitive state anxiety intensity**	22.2±5.5	22.9±4.9	-0.14
Somatic state anxiety intensity	26.2±5.3	25.9±5.2	0.22
State self-confidence intensity	20.3±6.2	19.1±5.1	0.06
Cognitive state anxiety direction	41.5±8.5	39.7±9.4	0.35*
Somatic state anxiety direction	39.5±8.4	36.4±9.4	0.19
State self-confidence direction	47.8±8.8	43.3±10.5	0.47*
<b>Athletic Coping Skills Inventory -28 (Smith et al 1995)</b>			
Coping with adversity	60.7±10.1%	61.1±20.3%	-0.02
Peaking under pressure	53.9±20.1%	45.1±19.5%	0.44*
Goal-setting/mental preparation	55.0±26.4%	56.7±23.5%	-0.07
Concentration	67.1±16.2%	61.7±21.6%	0.29
Freedom from worry	47.6±24.3%	52.1±24.8%	-0.18
Confidence and achievement motivation	50.7±13.9%	49.4±12.0%	0.11
Coachability	60.9±15.3%	57.1±17.0%	0.24
<b>Psychological Skills Inventory (Wheaton, 1998)</b>			
Achievement motivation	77.2±12.5%	75.8±11.9%	0.11
Goal directedness	63.8±18.9%	67.1±16.4%	-0.19
Activation control	58.5±15.3%	58.9±15.3%	-0.03
Maintaining self-confidence	62.6±15.6%	60.5±14.7%	0.13
Concentration	64.02±13.2%	63.1±15.3%	0.07
Mental rehearsal	57.2±19.6%	62.0±14.5%	-0.28

\* Moderately significant practical differences (d-values more or less 0.5)

\*\* Lower values reflect better scores.

Remaining variables: Higher values reflect better results.

successful players showing greater skill levels than their less successful counterparts. In addition to the above findings, competitive situations may result in high levels of anxiety and tension, which may affect performance negatively. Jones (1995), however, showed that an individuals' interpretation of anxiety and self-confidence (their perception thereof as either being facilitative or debilitating) plays an even more important role in the resulting performance than the anxiety and self-confidence levels itself. This is highlighted by the current research findings showing more successful netball players to have significantly greater facilitative perceptions of their cognitive state anxiety and state self-confidence levels than the less successful netball players.

It is interesting to note that the less successful group had slightly better (not-significantly so) coping with adversity and activation control scores, experienced less worries, were more goal-directed (and better at goal-setting) and had better mental rehearsal/ mental preparation scores than the successful group.

Past research by Thelwell and Maynard (2000) found that most participants in ball sports rank mental rehearsal as an important contributor to optimal performances, while Murphy (1994) indicated that successful athletes are more likely to engage in mental processes and the use thereof as a problem solving strategy than their less successful counterparts. Contrary to these findings, and inexplicably so, our results shows the opposite, in that the less successful players make more effective use of mental rehearsal. Callow and Hardy (as quoted by Cumming and Hall, 2002) argued that both novice and professional netball players would actually benefit from using motivational specific imagery. Despite these results, mental rehearsal remains an important SPS.

Goal-setting and directing one's efforts to reach the developed goals, has also been shown to be highly effective and important for increased performance (Weinberg and Gould, 2003). Inexplicably, two of the questionnaires used in this study showed the less successful players to be more effective at setting goals and be more goal-directed than the more successful players, albeit not-significantly so. However, reviewers have concluded that goal-setting works and works extremely well when implemented with thought, understanding of the process and thorough planning (Locke and Latham, 1985; Locke, 1991; Locke, 1995). Weinberg and Gould (2003) further proved goal-setting to be effective, as the effect thereof has remained consistent in research with

over 40,000 participants, using over 90 different tasks and across ten different countries. Despite the results in our study goal-setting is believed to be a powerful performance enhancing technique.

The forward stepwise discriminant analysis was performed in order to determine which sport psychological variables discriminate between successful and less successful groups of netball players. From table 3 it is clear that three variables (self-confidence intensity, mental rehearsal and peaking under pressure) are significant discriminators between successful and less successful netball players. Self-confidence is considered by many to be the key factor in successful performance and, as a result, one of the most frequently cited sport psychological factors related to performance (Covassin and Pero, 2005). Treasure et al (1996) suggested that athletes who enter competitions with higher self-confidence are more likely to be successful, possibly because they believe in their own ability to perform well. According to Covassin and Pero (2005), creating a positive mental outlook or expectation for success may contribute strongly to the overall success. These researchers also suggested that self-confidence can be linked to creating a self-fulfilling prophecy or mindset that enhances the player's ability to either profit from positive events and/or reduce the impact of negative

TABLE 3: Results of the forward stepwise, discriminant analysis. (N=144)

Questionnaire	Variables	F-value	p-value
CSAI-2	Self-confidence intensity	5.38	0.02*
PSI	Mental Rehearsal	6.39	0.01*
ACSI-28	Peaking under pressure	6.03	0.02*
PSI	Activation control	3.41	0.07
ACSI-28	Concentration	2.50	0.12
CSAI-2	Somatic anxiety intensity	2.35	0.13
CSAI-2	Cognitive anxiety intensity	2.35	0.13
ACSI-28	Freedom from worry	1.41	0.24

\*P<0.05

events during the competition. The role of the player's ability to peak under pressure, and their use of mental rehearsal as variables that discriminate between the two groups (although contradictingly so in the case of mental rehearsal), have already been addressed.

After identifying the various discriminating variables, the following prediction functions were compiled.

•More successful netball players =  $0.4689(\text{state self-confidence intensity (CSAI -2)}) + 0.1053(\text{mental rehearsal (PSI)}) - 0.0277(\text{peaking under pressure (ACSI -28)}) + 0.3531(\text{activation control (PSI)}) + 0.0828(\text{concentration (ACSI -28)}) + 0.3890(\text{somatic state anxiety intensity (CSAI -2)}) + 1.9576(\text{cognitive state anxiety intensity (CSAI -2)}) + 0.1011(\text{freedom from worry (ACSI -28)}) - 55.2616.$

•Less successful netball players =  $0.4160(\text{state self-confidence intensity (CSAI -2)}) + 0.1345(\text{mental rehearsal (PSI)}) - 0.0580(\text{peaking under pressure (ACSI -28)}) + 0.3929(\text{activation control (PSI)}) + 0.0636(\text{concentration (ACSI -28)}) + 0.3355(\text{somatic state anxiety intensity (CSAI -2)}) + 2.0308(\text{cognitive state anxiety intensity (CSAI -2)}) + 0.1141(\text{freedom from worry (ACSI -28)}) - 55.6275.$

The players' results were then placed in each of the formulas. The classification matrix in Table 4 shows that 69.44% of the total tested players could be accurately classified back into their original

TABLE 4: The classification matrix of the two groups to indicate which percentage of the players could be classified into their original respective groups by means of the prediction functions.

Group	Group 1	Group 2	Percentage correct
Group 1: More successful netball players	61	18	77.2%
Group 2: Less successful netball players	26	39	60.0%
Total:	87	57	69.4%

groups. Therefore, it is evident that the identified sport psychological variables used in the prediction functions are accurate discriminators between more and less successful netball players.

### CONCLUSIONS AND RECOMMENDATIONS

The comparison between the two groups (more successful and less successful players) showed that three of the tested sport psychological variables (i.e. peaking under pressure, cognitive state anxiety direction and state self-confidence direction) yielded moderate practical significance between the two groups. In total, the more successful group had better average values than the less successful group for 13 of the 19 tested variables. Furthermore, eight of the 19 tested variables were identified as discriminators between successful and less successful netball players, while the prediction functions proved to be 69.44% effective in classifying the players into their original groups.

The importance of SPS is stressed by the finding of this study that certain sport psychological variables are effective in distinguishing between more successful and less successful netball players or teams. Despite this finding, Weinberg and Gould (2003) stated that players should not be selected for certain teams based solely on their sport psychological profiles. Physique, strength, speed and skill levels should remain the primary selection criteria (Cox and Yoo, 1995). However, once a player has received a favourable evaluation of the above factors, investment in the development of SPS should prove to be beneficial to enhance performance and allow for the full development of the player. The results, therefore, warrant the development and implementation of netball-specific SPST programme to address certain shortcomings and aimed at improving of netball performance.

In the present study, sport psychological variables were tested (as independent variables) on an individual level, while team results were used (as the dependent variable) to classify players into a more successful or less successful group. This study, therefore, highlights how individual sport psychological skills contribute to the team's performance. It is, however, strongly recommended that other variables should also be included in future studies, in order to identify on different levels, those factors that contribute to performance in this sport. Group factors, such as team cohesion, team dynamics, social interaction, etc. should be investigated as they also strongly relate to the teams'

performance. The role of physiological condition, morphological attributes, technical and tactical abilities, etc. also plays a major part and should thus be included in order to obtain a more holistic picture of this particular population. The present study does, however, provide an indication of the importance of sport psychological variables, and thus provides a basis for further research aimed at determining the contribution of various other factors to the resulting performance of netball players.

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### APPENDIX

*JHMS 1221 Questionnaire 1.* A pdf of this questionnaire may be obtained from the publisher by e-mailing the following address: editor@teviotsscientific.com and quote JHMS 1221 Q1

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