

## **Sport psychological skills that discriminate between successful and less successful female university field hockey players**

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*(Received: 2 February 2010 Revision Accepted: 6 March 2010)*

### **Abstract**

Sport psychology plays an important and ever-increasing role in competitive sport. The objective of this study was to determine the sport psychological skills that discriminate significantly between successful and less successful female university field hockey players in order to emphasize the characteristics that need to be addressed in sport psychological skills training (SPST) sessions. The subjects consisted of 106 female university hockey players, categorized into a successful (players from the A division) and less successful group (players from the B division). The sport psychological skill (SPS) levels measured with the Psychological Skill Inventory (PSI) and the Ottawa Mental Skills Assessment Tool-3 (OMSAT-3) from the two groups were compared and reported. The results indicated that the successful group had better results in 66.7% of the variables that were measured in the study. Practical significance was found in four of the 18 psychological variables that included achievement motivation, goal directedness, goal-setting and fear control. Furthermore, six variables discriminate significantly between the successful and less successful female hockey players, which included achievement motivation, stress reactions, fear control, self-confidence, mental rehearsal as well as imagery.

**Key words:** Sport psychological skills, field hockey, performance, discrimination.

### **Introduction**

Field hockey is a team game played by millions of male and female adults and youths in more than 118 countries (Anders, Myers & Myers, 2008). It is a team sport that is played with 11 players aside with a hockey stick and hockey ball. Field hockey is characterized by activities such as twisting, turning, never-ending rushes, stopping and movements as well as sprints, starting, break-a-ways, passing and shooting. Field hockey players are faced with many mental and emotional challenges in addition to the physical demands during a match (Anders *et al.*, 2008). It is assumed that these psychological challenges may differ among players of different levels (Junge, Dvorak, Rosch, Graf-Baumann, Chomiak & Peterson, 2000).

The role of sport psychological factors and skills in achieving optimal performance cannot be underestimated (Van den Heever, 2006). According to Cox and Yoo (1995), success in professional sport is not only dependent on the physique of players and tactical aspects but also on psychological skills. Le Roux and Pienaar (2001), as well as Lyons (2001) noted that sport psychology plays an

important and ever-increasing role in competitive sport. The importance of sport psychology is further emphasized by the contention that the knowledge obtained by the study of an athlete's behaviour within a sporting environment could be used to explain, predict and change behaviour (Andrew, Grobbelaar & Potgieter, 2007). Andrew *et al.* (2007) stated that for many years it has been recognized that psychological factors play an important role in competitions and participation in team sports, therefore the identification and development of sport psychological skills (SPS) have subsequently become of great interest to players, coaches, administrators and sport psychology researchers.

Mahoney and Gabriele (1987) identified skills such as anxiety management, concentration, motivation, mental preparation and self-confidence as important components in the ideal psychological skill profile of elite athletes. Furthermore, it has been demonstrated by O'Sullivan, Zuckerman and Kraft (1997) that a basic optimistic self-confidence will be advantageous in sport and that over-sensitivity to criticism can be the downfall of even a competent athlete.

With regards to field hockey, Grove and Hanrahan (1988) observed relatively poor mental imagery and self-confidence levels among field hockey players. More specifically, their ability to visualize their opponents and future performances, as well as forgetting about past mistakes and continuing play after making mistakes were assessed to be poor. More recently, Elferink-Gemser, Visscher and Lemmink (2003), found a significantly higher level of motivation in elite hockey players in comparison with their sub-elite counterparts. These findings highlight the importance of motivation in field hockey. It is in the light of the above-mentioned research findings that the following research question is posed. Which sport psychological skills will discriminate significantly better between successful and less successful female university field hockey players? Information of this nature could possibly assist coaches and often sport related professionals to identify and develop more successful and competent hockey players.

## **Materials and Methods**

### *Subjects*

In June/July 2008, the PUK Hockey Academy hosted the men's and women's South African Students Sport Union (SASSU) tournament. Nineteen women's teams participated in the tournament. All the players had to be registered students at a South African tertiary institution. 106 women participated in the study. Further, the participants were categorized into a successful and less successful group (Table 1). The successful group was made up of the players from teams that participated in the A division, while the less successful group consisted of players from the teams who participated in the B division. The A

division consisted of teams that ended in the top eight positions, while the B division consisted of teams that ended in the bottom eight positions during the previous years' SASSU tournament.

**Testing procedures**

The testing was conducted in the tournament week and all the coaches and managers were informed of the study procedures and asked to participate in the study.

**Table 1:** Demographic information of the subject group

| Variable                           |          | Total subject group<br>(N=79) | Successful group<br>(n=48) | Less successful<br>group (n=31) |
|------------------------------------|----------|-------------------------------|----------------------------|---------------------------------|
| Average age and standard deviation |          | 21.42±1.36                    | 21.67 ± 1.43               | 21.03 ±1.14                     |
| Race                               | Asian    | 0                             | 0                          | 0                               |
|                                    | Black    | 4                             | 2                          | 2                               |
|                                    | Coloured | 5                             | 5                          | 0                               |
|                                    | White    | 70                            | 41                         | 29                              |
| Average number of years playing    |          | 10.29 ±- 2.7                  | 11.56 ±2.31                | 9.94 ± 3.00                     |

The players were informed of the purpose and the nature of the research and an informed consent form was completed by all the players. The players were insured of the confidentiality of their results and that the data will only be used for research purposes. Participants had the right to withdraw from the research project at any time. Two sport psychological questionnaires were completed in 30-45 minutes. The study received ethical approval from the North-West University (Number 05K13). The player's demographic information (name, surname, date of birth, race, and sex) was collected by means of a questionnaire developed by Van den Heever (2006). In addition, a total of 18 sport psychological variables were measured by questionnaires.

**Questionnaires**

*Demographic and general information questionnaire:*

A questionnaire developed by Van den Heever (2006) was used to gather the following:

- Demographic information;
- History as a hockey player and;

- Sport psychological background.

*Sport psychological skills questionnaires:*

The Psychological Skills Inventory (PSI), developed by Wheaton (1998), and the Ottawa Mental Skills Assessment Tool-3 (OMSAT-3) of Durand-Bush, Salmela and Green-Demers (2001) were used to gather the data. The PSI questionnaire is divided into six subscales and has a total of 64 questions. This questionnaire determined the player's achievement motivation, goal directedness, and activation control, maintaining confidence, concentration and mental rehearsal. An overall psychological skills score were then calculated by determining the average value of the six subscales of the questionnaire. Ten items were measured in each subscale on a 5-point Likert scale. The scale ranks from *never* (0) to *always* (4). Reverse scoring were applied to 19 of the 64 questions. The scores were then presented as a percentage, where better psychological skill levels were associated with higher values. The test-retest reliability of the PSI questionnaire ranged between  $r = 0.84$  and  $r = 0.97$  (Wheaton, 1998).

The OMSAT-3 questionnaire by Durand-Bush *et al.* (2001) measures a wide range of mental skills. It consists of 12 mental skills scales. The 12 scales are grouped together in the following three categories:

- Foundation skills – goal-setting, commitment, self-confidence.
- Psychosomatic skills – stress reaction, fear control, relaxation, activation.
- Cognitive skills – imagery, mental rehearsal, focusing, refocusing, competition planning.

The players responded according to a 7-point Likert scale, ranked from *strongly disagree* (1) to *strongly agree* (7). The test-retest reliability of the OMSAT-3 questionnaire ranged between  $r = 0.78$  to  $r = 0.96$  and showed a mean stability score of  $r = 0.86$  (Durand-Bush *et al.*, 2001).

*Statistical analysis*

The Statistical Data Processing package (Statsoft, 2009) was used to process the data. The tests variables (18) for both groups (successful and less successful), as well as the total group were reported through descriptive statistics (averages and standard deviations). The effect size (ES) is determined as follows:

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

$M_1$  represents the mean of the first group whereas  $M_2$  represents the mean of the second group and  $s$  represents the standard deviation. Thomas and Nelson (2001) recommended that the pooled standard deviation ( $Sp$ ) must be used in research designs such as the present one:

$$S_p = \sqrt{\frac{S_1^2(n_1 - 1) + S_2^2(n_2 - 1)}{n_1 + n_2 - 2}}$$

The  $S_1^2$  represents the variance of the players in the first group,  $S_2^2$  represents the variance of players in the second group,  $n_1$  represents the number of players in the first group,  $n_2$  represents the players in the second group. Effect sizes were 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 & Nelson, 2001). A forward stepwise discriminant analysis was used to determine the sport psychological variables that discriminate between the successful and less successful groups of players. The level of significance was set at  $p < 0.05$ .

Results and Discussion

Table 2 reports on the successful and less successful players and questionnaires that were used to determine the effectiveness of psychological factors and skills in achieving optimal performance.

**Table 2:** Descriptive statistics (average and standard deviation) and effect size results of the 79 hockey players

|                                               | Mean and standard deviation<br>(M±SD) |                              |                                             |
|-----------------------------------------------|---------------------------------------|------------------------------|---------------------------------------------|
| Questionnaire and psychological variables     | Successful group (n=48)               | Less successful group (n=31) | Practical significance<br>(Cohen's d-value) |
| <i>Psychological Skills Inventory</i>         |                                       |                              |                                             |
| Achievement motivation                        | 81.46±9.66                            | 75.89±11.45                  | 0.54*                                       |
| Goal directedness                             | 64.17±17.71                           | 56.94±18.71                  | 0.40*                                       |
| Activation control                            | 56.95±15.82                           | 55.81±16.27                  | 0.07                                        |
| Maintaining self-confidence                   | 60.68±18.60                           | 57.42±17.06                  | 0.18                                        |
| Concentration                                 | 60.42±16.04                           | 57.50±13.39                  | 0.19                                        |
| Imagery/Mental rehearsal                      | 53.02±18.51                           | 54.03±18.25                  | -0.05                                       |
| <i>Ottawa Mental Skills Assessment Tool-3</i> |                                       |                              |                                             |
| Goal-setting                                  | 5.55±0.71                             | 5.28±0.85                    | 0.34*                                       |
| Self-confidence                               | 5.43±1.03                             | 5.54±0.70                    | -0.12                                       |
| Commitment                                    | 5.53±1.06                             | 5.52±0.85                    | 0.00                                        |
| Stress reactions                              | 4.22±1.11                             | 4.57±1.27                    | -0.30                                       |
| Fear control                                  | 4.94±0.98                             | 4.49±0.95                    | 0.46*                                       |
| Relaxation                                    | 4.65±1.15                             | 4.79±0.97                    | -0.13                                       |
| Activation                                    | 4.91±0.86                             | 4.83±0.90                    | 0.09                                        |
| Focusing                                      | 4.40±1.08                             | 4.40±1.13                    | 0.00                                        |
| Refocusing                                    | 3.74±1.25                             | 3.86±1.32                    | -0.09                                       |
| Imagery                                       | 5.01±1.10                             | 4.78±0.98                    | 0.22                                        |
| Mental practice                               | 4.44±1.03                             | 4.42±1.18                    | 0.02                                        |
| Competition planning                          | 4.56±1.15                             | 4.52±1.03                    | 0.04                                        |

\* Moderately practical significance

It is clear that the successful group of hockey players obtained better results than the less successful group of hockey players in 12 of the 18 sport psychological variables. Furthermore, the effect size results revealed moderately practical significant differences between the two groups for four of the 18 psychological variables, which includes achievement motivation ( $d = 0.54$ ), goal directedness ( $d = 0.40$ ), goal-setting ( $d = 0.34$ ) and fear control ( $d = 0.46$ ). In all four cases, the successful group showed better results than the less successful group.

According to Mallett and Hanrahan (2004), elite athletes were highly driven by personal goals and achievement, elite athletes had very strong self-belief and that the track and/or the field were central to their lives. Successful hockey players are characterized by self-determined forms of motivation that suggests that goal accomplishment enhances perceptions of competence and consequently promotes self-determined forms of motivation (Mallett & Hanrahan, 2004).

The motivation for athletes to achieve success on the hockey field helps athletes to steer their goals in the right direction. According to Orlick and Partington (1988), only the best athletes (Olympic and world medallists) had clearly established goals for success. Before an important event or competition, everything in the athletes's life revolved around training and competing. Their athletic goal was the most important goal in their life. This supports the findings of the current study which found goal directedness as a SPS.

Zimmerman and Kitsantas (1996) noted that goal-setting did not only improve the subjects' skill development but their self-efficacy perceptions, self-reactions and intrinsic interest. Furthermore, the study also complied that goal-setting is proved to be one of the most simple and effective motivational devices that helps successful athletes in achieving performance. True winners motivate themselves from within and thus, success is directly related to motivation (Pearlman, 2009). Another study by Lee (1989) supports that goal setting attributes mediated the relation of self-efficacy strength and teams' winning percentage. The importance of goal-setting is highlighted by the current research findings showing more successful players to have significantly moderate goal-setting results compared to the less successful group.

The study indicates that fear control is an important psychological skill in field hockey and the ability to cope with pressure and anxiety is an integral part of sports, particularly among elite hockey players (Humera, 1999). When analyzing the game of field hockey, there are a lot of factors that can lead to fear in hockey, some of them are namely the opponents, social support, parents, coaches, mistakes, pressure, failure and anxiety (Waldman, 2004).

One can only imagine why fear control is one of the important psychological aspects to consider when the game of field hockey is analysed. The psychological danger comes in where sports involve risky elements and contact at high speeds (Durand-Bush *et al.*, 2001). One of the most likely factors leading to fear in hockey is injuries. According to Gelinias and Munroe-Chandler (2006), fear is something you can control and it is an important factor for hockey players to be successful and to perform at their best (Waldman, 2004).

Furthermore, a forward stepwise discriminant analysis was performed on the data. Six variables (achievement motivation, stress reactions, fear control, self-confidence, imagery/mental rehearsal and relaxation) are significant discriminators between successful and less successful hockey players (Table 3). Consequently a discussion of each variable follows.

Achievement motivation cannot be described as something that occurs during competition, but mostly as a trait having ‘permanent character,’ - being formed during the preceding weeks, months and years. Players who do not possess high level of achievement motivation do not reach the highest levels of the game despite good results at a young age (Gould, Tuffey, Udry, & Loehr, 1996). The ability to cope with pressure and anxiety is an integral part of sports, particularly among elite hockey players.

**Table 3:** Results of the forward stepwise, discriminant analysis (N = 79)

| Questionnaire | Psychological variables  | F-value  | p-level   |
|---------------|--------------------------|----------|-----------|
| PSI           | Achievement motivation   | 8.49947  | 0.004750* |
| OMSAT-3       | Stress Reactions         | 6.39036  | 0.013701* |
| OMSAT-3       | Fear Control             | 11.19295 | 0.001315* |
| OMSAT-3       | Self-Confidence          | 4.12077  | 0.046108* |
| PSI           | Imagery/Mental rehearsal | 5.53899  | 0.021370* |
| OMSAT-3       | Imagery                  | 5.43480  | 0.022583* |
| OMSAT-3       | Relaxation               | 1.39693  | 0.241182  |

PSI = Psychological skills inventory; OMSAT- 3 questionnaire; \* =  $p < 0.05$ .

The differences observed between successful and less successful athletes may be the result of their cognitive interpretation of their anxiety states and the relationship between cognitive anxiety and performance is negatively linear, i.e., as anxiety increases the performance decreases (Humera, 1999). An athlete who is troubled by events off the field or is worried about performing against a specific opponent may come to the field of play with anxiety and fear. This can lead to below-average play, failure or even choking, a term that all athletes hate. In some rare cases, athletes may use that anxiety in their favour and still find a way to succeed but it is more likely for less successful hockey players to experience anxiety and fear negatively (Carron & Prapavessis, 1996), while more successful athletes tried to use anxiety as a stimulant to better performance (Mahoney & Gabriele, 1987).

International-level elite hockey players identified self-confidence as the most critical mental skill defining mental toughness. Elite athletes state that the key to mental toughness is unshakable self-confidence that is robust and resilient (Horn, 2008). Mahoney and Gabriele (1987) demonstrated that Olympic gymnastics qualifiers were higher in self-confidence than non qualifiers. Spink (1990) found self-confidence to be the factor that most effectively discriminated qualifiers from non-qualifiers in international competition; the qualifiers of course, possessed greater confidence and less self-doubt. The most consistent difference between elite and less successful athletes is that elite athletes possess greater self-confidence (Gould *et al.*, 1996). Generally, success elevates confidence, while failure lowers it. Early achievement lays a solid foundation of confidence which fuels future self-belief and self-expectation of success.

Imagery was important in both questionnaires; this implies the importance of imagery used by all hockey players. Successful athletes use mental strategies like relaxation and mental rehearsal to perform better. Imagery is an effective performance enhancing technique for athletes (Hallman & Munroe-Chandler, 2009). According to Munroe, Giacobbi, Hall and Weinberg (2000), athletes can use imagery for a number of functions and in different situations. Controlling one's emotions is an area where imagery is useful. Athletes can imagine past situations where they lost control over their emotions or 'choked', and instead picture themselves dealing with the situation in a positive manner.

Relaxation is a skill that should be practiced on a regular basis, because it allows athletes to focus, refocus and actualize their game plan (Durand-Bush *et al.*, 2001). A study that discussed arousal regulation strategies included arousal energizing techniques, biofeedback techniques, relaxation response strategies, cognitive behavioural interventions, and mental preparation routines (Gould & Udry, 1994). The study of Gould and Udry (1994) concluded that the above mentioned techniques are effective in influencing arousal and facilitating performance.

## **Conclusion**

When comparing the two groups (successful and less successful players), four of the 18 tested sport psychological variables (achievement motivation, goal directedness, goal-setting and fear control) obtained moderate practical significance as discriminators. The successful group had better average scores than the less successful group in 12 of the 18 sport psychological test variables than the less successful group. Furthermore, six of the tested sport psychological test variables (achievement motivation, stress reactions, fear control, self-confidence, imagery/mental rehearsal and relaxation) were identified as significant discriminators between successful and less successful female field hockey players.

Psychological variables can now be stressed through the findings of this study that six sport psychological variables significantly discriminate between successful and less successful players. Weinberg and Gould (2003) stated that players should not be selected for teams based only on their sport psychological profile results only. Since the subject group was not randomly selected, effect size (ES) was used to determine the practical significant differences between the two groups. Therefore, caution should be taken when generalizing the results of this study to other hockey groups. With this study's results we recommend that the development and implementation of psychological programmes can be used by coaches to address certain shortcomings and thereby improve players' performance. This study tested sport psychological variables as independent variables on an individual level and individual results were used as dependent variables to categorize the players into the successful and less successful groups. In the present study, we highlight how individual sport psychological skills contribute to the successful and less successful performance.

This study gives an indication of the importance of sport psychological variables, and thus provides a basis for further research aimed at investigating the contribution of various factors to the resulting performance of hockey players.

### **Acknowledgement**

Mr. J. Kruger and Miss. J. Volschenk are gratefully acknowledged for their participation in this study.

### **References**

- Anders, E., Myers, S. & Myers, S. (2008). *Field Hockey: Steps to Success* (2<sup>nd</sup> ed.). Champaign, IL: Human Kinetics Publishers.
- Andrew, M., Grobbelaar, H.W. & Potgieter, J.C. (2007). Sport psychological skill levels and related psychosocial factors that distinguish between rugby union players of different participation levels. *South African Journal for Research in Sport, Physical Education and Recreation*, 29(1), 1-14.
- Carron, A.V. & Prapavessis, H. (1996). The effect of group cohesion on competitive state anxiety. *Journal of Sport & Exercise Psychology*, 2(1), 23-30.
- Cox, R.H. & Yoo, H.S. (1995). Playing position and psychological skill in American football. *Journal of Sport Behavior*, 18(3), 183-194.
- Durand-Bush, N., Salmela, J.H. & Green-Demers, I. (2001). The Ottawa Mental Skills Assessment Tool (OMSAT-3). *The Sport Psychologist*, 15, 1-19.
- Elferink-Gemser, M.T., Visscher, C. & Lemmink, K.A.P.M. (2003). Psychological characteristics of talented youth athletes in field hockey, basketball, volleyball, speed skating, and swimming. *The Sports Psychologist*, 1, 88-97.

- Gould, D. & Udry, E. (1994). Psychological skills for enhancing performance: arousal regulation strategies. *Medicine and Science in Sport & Exercise*, 26(4), 403-515.
- Gould, D., Tuffey, S., Udry, E. & Loehr, J. (1996). Burnout in competitive junior tennis players: II. Qualitative analysis. *The Sport Psychologist*, 10(1), 342-366.
- Gelinas, R. & Munroe-Chandler, K. (2006). Psychological skills for successful ice hockey goaltenders. *Athletic Insight*, 8(2), 64-71.
- Grove, R.J. & Hanrahan, S.J. (1988). Perceptions of mental training needs by elite field hockey players and their coaches. *The Sport Psychologist*, 2, 222-230.
- Hallman, T. A. D. & Munroe-Chandler, K. J. (2009). An examination of ice hockey players' imagery use and movement imagery ability. *Journal of Imagery Research in Sport and Physical Activity*, 4(1), 1-3.
- Horn, T. S. (2008). *Advances in Sport Psychology*. Champaign, IL: Human Kinetics.
- Humera, M. (1999). The relationship between anxiety and performance: A cognitive-behavioral perspective. *Athletic Insight*, 1(2), 1-15.
- Junge, A., Dvorak, J., Rosch, D., Graf-Baumann, J., Chomiak, J. & Peterson, L. (2000). Psychological and sport-specific characteristics of football players. *The American Journal of Sports Medicine*, 28(5), 22-28.
- Lee, C. (1989). The relationship between goal setting, self-efficacy, and female field hockey team performance. *International Journal of Sport Psychology*, 20(2), 147-161.
- Le Roux, J.G. & Pienaar, G.E. (2001). Sportsielkunde as komponent in die opleidingsprogram van vakonderwysers. [Sports psychology as component of the training programme for subject teachers.] *Educare*, 30, 185-207.
- Lyons, M. (2001). Commentary: In support of a written curriculum based on sport psychology for high school sports teams. *Athletic Insight: The Online Journal of Sport Psychology*. At <http://www.athleticinsight.com/Vol3Iss2/Commentary.htm>. March, 2009.
- Mahoney, M.J. & Gabriele, T.J. (1987). Psychological skills and exceptional athletic performance. *The Sport Psychologist*, 1, 140-199.
- Mallet, C.J. & Hanrahan, S.J. (2004). Elite athletes: why does the 'fire' burn so brightly? *Psychology of Sport and Exercise*, 5(2), 183-200.
- Munroe, K. J., Giacobbi, P., Hall, C. R. & Weinberg, R. S. (2000). The 4 W's of imagery use: Where, when, why and what. *The Sport Psychologist*, 14, 119-137.
- Orlick, T. & Partington, J. (1988). Mental links to excellence. *The Sport Psychologist*, 2, 105-130.
- O'Sullivan, D. M., Zuckerman, Z. & Kraft, M. (1997). Personality characteristics of male and female participants in team sports. *Personality and Individual Differences*, 25(1), 119-128.
- Pearlman, J. (2009). Winners & Losers. *Psychology Today*, 42(2), 94-97.

Statsoft, Inc. (2009). Statistica (data analysis software system), version 8. [<http://www.statsoft.com>].

Spink, S.K. (1990). Psychological characteristics of male gymnasts: Differences between competitive levels. *Journal of Sport Sciences*, 8(2), 149-157.

Thomas, J.R. & Nelson, J.K. (2001). *Research Methods in Physical Activity* (4<sup>th</sup> ed.). Champaign, IL: Human Kinetics.

Van den Heever, Z. (2006). Sport psychological skills training of South African provincial netball players. Thesis (M.A.) - North-West University.

Waldman, K. (2004). Gaining the mental edge: tips on enhancing self-confidence. *NFHCA*, 1(1), 4-6.

Weinberg, R. & Gould, D. (2003). *Foundations of Sport and Exercise Psychology* (3<sup>rd</sup> ed.). Champaign, IL: Human Kinetics.

Wheaton, K.A. (1998). *A psychological skills inventory for sport*. Thesis (M.A.) - University of Stellenbosch.

Zimmerman, B.J. & Kitsantas, A. (1996). Self-regulated learning of a motoric skill: The role of goal setting and self-monitoring. *Journal of Applied Sport Psychology*, 8(1), 60-75.

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