ELSEVIER

Psychology of Sport and Exercise 4 (2003) 377–396

Psychology
OF SPORT AND EXERCISE

www.elsevier.com/locate/psychsport

The effects of a mental skills package on 'repeatable good performance' in cricketers

R.C. Thelwell [a,*], I.W. Maynard [b]

[a] *Department of Sport and Exercise Science, University of Portsmouth, St. Michael's Building, White Swan Road, Portsmouth, PO1 2DT UK*

[b] *Centre for Sport and Exercise Science, Collegiate Hall, Sheffield Hallam University, Sheffield, S10 2BP UK*

Received 19 February 2002; received in revised form 1 June 2002; accepted 28 June 2002

Abstract

Objectives: To examine the efficacy of a mental skills package to both improve consistency and level of performance in cricketers, and to investigate the influence of different performance measures on cricketing performance.

Method: Semi-professional cricketers ($n = 16$) were matched into experimental and control groups. Cricketing performance was monitored subjectively and objectively across two seasons. Prior to the second season, the experimental group were provided with an intervention package consisting of goal-setting, activation regulation, self-talk, mental imagery and concentration.

Results: Data from two, two-way multivariate analyses of variance (MANOVAs) indicated that cricketers in the experimental group experienced improved performance consistency and improved performance when using subjective scoring procedures, but only a performance improvement was recorded using objective measures. Subsequent single-case analysis applied to the data of four of the experimental participants also revealed support for the efficacy of the intervention.

Conclusions: A mental skill package was seen to be beneficial to enhance performance consistency and actual levels of performance. In view of these findings, practitioners and coaches may wish to consider both objective and subjective scoring measures to improve the sensitivity of performance indicators.

Keywords: Repeatable good performance; Mental skills package; Cricket

* Corresponding author.
E-mail addresses: richard.thelwell@port.ac.uk. (R.C. Thelwell); i.w.maynard@shu.ac.uk (I.W. Maynard).

1469-0292/$ - see front matter © 2003 Elsevier Ltd. All rights reserved.
doi:10.1016/S1469-0292(02)00036-5

Introduction

In recent years sport psychology researchers have recognised and researched heightened performance states such as optimal performance (Hanin, 2000), peak experiences (Brewer, Van Raalte, Linder, & Van Raalte, 1991) and flow (Csikszentmihalyi, 1990; Jackson, 1992, 1995) and have indicated such states to be desirable to the performer for the intrinsic reasons, as well as enhanced performance outcome benefits. With this in mind, it seems appropriate for performers to establish how they can systematically access such performance states. Jackson (1992) began this process by identifying the components of flow states in figure skaters reporting that a positive mental attitude, positive pre-competition and competitive affect, appropriate focus, physical readiness, and partner unity (for when skating as a pair) were the significant elements for flow to be experienced. Developing her original work, Jackson (1995) examined the parameters that facilitate, prevent, or disrupt flow in a variety of sports. Via inductive content analysis, Jackson (1995) reported 10 general dimensions that facilitated flow: pre-competitive and competitive plans, confidence and positive attitude, optimal arousal, optimal physical preparation, optimal environmental and situational conditions, focus, motivation, feeling good during performance, and experience.

Thelwell and Maynard (2002), also using inductive content analysis techniques highlighted many of the dimensions identified as antecedents of flow (Jackson, 1995) when asking cricketers to outline factors underpinning repeatable good performance (RGP). The Thelwell and Maynard study produced general dimensions in general and situation-specific self-confidence, optimal activation levels, motivation and appropriate focus, and total mental preparation which included relevant imagery, pre-match routines, and effective multiple goal-setting strategies. RGP, according to cricketers lays between average performance and excellent performance and was produced via the 'triadic process' used within Kelly's (1955) personal construct theory (Thelwell & Maynard, 2002). The cricketers in Thelwell and Maynard's study suggested that RGP is best described as performance of a consistent high standard as demanded by elite or professional sports people involved in sports that require a series of good performances as opposed to one-off peak performances that seldom seem to occur. This interpretation suggests that RGP would be more appropriate for many sports or competitions that require performers to achieve a series of good performances throughout a championship or season, rather than a heightened performance state in one game. Although the research examining heightened performance states has done much to develop our understanding of these concepts, anecdotally, it could be suggested that it appears unrealistic to achieve such states in every competitive situation.

Thus far, the concept of RGP has received little attention in the research literature. In acknowledging the need to develop a theoretical base for the concept, Thelwell & Maynard (2002) attempted to forward the notion that RGP can be a viable construct within sport and more specifically in cricket. Thelwell and Maynard compared findings examining the notion of RGP in professional cricketers across three separate studies. Utilising three different methods (inductive content analysis, cultural content analysis and the repertory grid technique) a triangulation of results highlighted that both batters and bowlers reported similar core element antecedents for RGP. Despite the antecedents being specific to a cricketing population and for RGP, there appear to be many overlaps between the factors required for RGP and flow-like states. Whilst as yet, there is no empirical evidence specifically comparing the two performance states and examining the relationship between them, it could be argued from an intuitive perspective that the RGP state

may be a more readily accessed precursor to heightened performance states. The rationale for this suggestion is based upon 'loss of consciousness' as the only dimension that tended to differentiate between flow and RGP. The current authors propose that systematic cognitive processes may allow the cricketers to access the RGP state which in certain conditions may trigger a flow or heightened performance experience. This trigger or change from one state to the other may be a function of the switch from left to right brain functioning as proposed by Pates, Maynard and Westbury (2001) and Pates, Cummings and Maynard (2002).

Within their preliminary study investigating RGP, Thelwell and Maynard (2002) claimed that cricketers' confidence was enhanced via the integration of the various psychological skills. The study indicated that goal-setting is an essential requirement within an intervention seeking to develop RGP. Goal-setting tends to underpin enhanced perceptions and feelings of control in addition to providing focus onto relevant aspects of the task. More importantly, contemporary research evidence (Filby, Maynard, & Graydon, 1999; Kingston & Hardy, 1997) has suggested that performers should engage in multiple goal-setting strategies, which include a combination of process, performance and outcome driven goals. The benefit of using a variety of goals is that focus is directed towards appropriate aspects of performance rather than a sole reliance on outcome measures. For example, during a performance, a cricketer may wish to focus on controllable process goals such as pre-delivery routines, rather than uncontrollable performance and/or outcome goals such as number of runs scored or number of wickets taken.

The second mental skill recommended for inclusion within an intervention package to increase RGP was activation regulation. The cricketers in the Thelwell and Maynard study reported that the ability to regulate activation was an important antecedent of continual good performance. The players felt they needed to recognise how they felt prior to, and during performance and acknowledged that if they found themselves outside of their optimal performance zone for a match, they felt their chances of achieving RGP were reduced. Although Thelwell and Maynard reported that most batters and bowlers appreciated the benefits of being relaxed, it was also apparent that the cricketers recognised occasions when increased activation was appropriate. Furthermore, it may be construed that the recognition of the need to change activation levels and having the ability to implement successful regulation strategies may further enhance the control skills that provide a vital underpinning for confidence and positive attitude, and in turn RGP.

A third mental skill identified by Thelwell and Maynard (2002) as being required by cricketers to increase the likelihood of RGP was that of self-talk. Whereas research evidence suggests self-talk to be beneficial for general sporting performance (e.g., Hardy, Gammage, & Hall, 2001), cricketers indicated that they used the skill in a variety of ways. Firstly, the positive self-statements allow negative statements to be countered. Secondly, self-talk enabled performers to focus on task-relevant cues, and thirdly, self-talk tended to underpin an appropriate focus on goals. Cricketers also suggested that self-talk could be utilised prior to and during performances to enable them to be in the appropriate 'frame of mind' for competition.

Thelwell and Maynard (2002) further suggested that imagery should be included within an RGP intervention. Again, contemporary literature has suggested imagery can be used for a combination of cognitive and motivational purposes (Munroe, Giacobbi, Hall, & Weinberg, 2000), with one of the main functions being to develop confidence via mastery-oriented motivational images. Mastery imagery involves the performer in imagining themselves being successful, whether from a process or outcome perspective, which allows them to be motivated and experience positive

perceptions of forthcoming performances. Additionally, from a cognitive perspective, imagery benefited the role of skill execution by focusing the performer on technique and making appropriate corrections for enhanced performance. In accord with previous empirical evidence Thelwell and Maynard reported that cricketers used mental imagery in three ways. First, seeing positive mental images prior to performance enabled heightened feelings of confidence regarding the forthcoming match. Second, the use of imagery allowed cricketers to feel totally prepared by having the knowledge of what their responses were going to be in varying situations, with further confidence being developed by seeing themselves cope accordingly. Finally, mental imagery acted as a motivational device. Cricketers reported that by seeing themselves performing well, they tended to be further motivated to achieve more good performances. Additionally, cricketers reported using imagery in combination with other mental skills such as activation regulation and self-talk.

Finally, cricketers also reported (Thelwell & Maynard, 2002) that concentration was necessary to experience RGP. Concentration was vital for both batters and bowlers within cricket for a variety of reasons. For example, batters suggested that when slow bowlers are bowling, the fielders around them could act as potential distracters. Similarly, a bowler may become distracted when a batter scores lots of runs off of their bowling, thus they tend to focus on task-irrelevant cues such as perceiving themselves to be bowling poorly, as opposed to task-relevant cues that would heighten their chances of achieving RGP. Finally, participants reported that when concentration was maintained throughout the duration of the athletic contest perceptions of heightened self-confidence were often generated.

The first aim of the current study was to evaluate a mental skills intervention package designed to enhance RGP in cricketers within a group design comprising pre- and post-intervention phases. The content of the mental skills package was generated by Thelwell and Maynard whilst completing a triangulation of studies designed to understand and elicit the antecedents of RGP.

A further aim of the study was to use both subjective and objective measures in an attempt to produce more sensitive indicators of performance (Raglin, 1992; Raglin & Morgan, 1988). Traditionally, cricketing performance is measured by objective measures alone, which tend to be purely outcome driven. Objective measures alone fail to acknowledge situations in which cricketers may play well yet not score runs or take wickets, or conversely take wickets and score runs, yet feel they have played poorly. Hence, a balance of objective and subjective methods could provide the performer, coach, and/or practitioner with a more sensitive measure that allows the differentiation of performance into a broader spectrum rather than the bipolar win or lose evaluation.

It was subsequently hypothesised that the experimental group would produce significantly smaller variations in their performance in the post-intervention phase compared to their pre-intervention phase, or the control group in the post-intervention phase, thus, indicating RGP. Second, it was hypothesised that the group receiving the intervention would produce significantly greater mean performance scores within the post-intervention phase as compared with their pre-intervention phase, or as compared with the control group scores in the post-intervention phase.

Method

Participants

The sample were all semi-professional male cricketers who played in an English Cricket Board (ECB) League across two complete seasons. The 16 participants all self-reported themselves as being of white-European ethnicity, had a mean age of 20.9 (SD ± 2.4) years, and had played cricket for an average of 11.6 (SD ± 2.5) years prior to the study. The participants included an even distribution between batters and bowlers.

Whilst the participants were aware of mental skills training and sport psychology, none of the participants reported using mental skills training in a systematic manner or had experienced a structured intervention programme. All participants were volunteers and signed informed consent forms prior to participation.

Experimental design

Initially a group design (comprising an experimental and control group) was employed to examine the effects of a mental skills training package on RGP in cricketers. The pre- and post-intervention phases were conducted over two complete cricket seasons with a 12-week intervention being delivered between the two seasons, to the experimental group. Following the group design, four members of the experimental group were randomly selected and had their data subjected to single-case analysis. Specifically, an A–B design was employed to analyse variances in the dependent variables across the pre- and post-intervention phases of the study.

Quantitative data collection

Subjective performance

One qualified club coach and three other qualified cricket coaches (all accredited by the ECB) were asked to evaluate each participants' performance for each match. A subjective method of performance assessment was developed for this study. The experimenters under the guidance of advanced ECB cricket coaches developed the criteria for the intra-individual evaluation of the performers. General performance levels for batters and bowlers were marked on a scale of 1 (poor) to 10 (excellent) as shown in Table 1, with a score of 5 signifying an average performance, relative to that individual's ability. The coaches evaluating performance within the study were familiarised with the performance criteria over a series of competitive training sessions, where competitive environments were simulated and pre-season friendly matches prior to the testing period, until inter-rater reliability was consistently greater than $r = 0.8$.

Objective performance

Players' performances were also assessed on actual achievement in each match. For batters, runs scored were recorded, whilst for bowlers, the number of wickets taken in an innings was deemed as the most appropriate performance measure. Such statistics are readily available following completion of a competitive match and are the most used measures of performance in cricket (Wright, 2001).

Table 1
Subjective criteria for the performance assessment of cricketers

Rating	Cricketers	Description
9/10	Batters	Scored heavily. Never looked like getting out. In total control. (Plus characteristics in 5/6 and 7/8).
	Bowlers	Bowled perfect line and length throughout spell. Made batters work hard for their runs. Took and always looked like taking wickets. (Plus characteristics in 5/6 and 7/8).
7/8	Batters	Looked to dominate the bowling. Timed ball well into gaps. Played ball along ground. Ran well between the wickets. Good communication, i.e. calling etc. (Plus characteristics in 5/6).
	Bowlers	Had batters in trouble on numerous occasions. Bowled aggressively. Looked like taking wickets on regular basis. (Plus characteristics in 5/6).
5/6	Batters	Good shot selection. Timed ball well. Looked comfortable at the crease.
	Bowlers	Bowled good line and length. Bowled tidily but usually one bad ball an over.
3/4	Batters	Timing not as good as normal. Hit the ball in the air more than normal. Shot selection not too good. Gave chances to the fielders.
	Bowlers	Consistently bowled bad balls. Only real chances of taking wickets through bad batting. Failed to see batters weaknesses.
1/2	Batters	Poor shot selection. Played and missed on numerous occasions.
	Bowlers	Failed to bowl line or length. Failed to cause problems for the batters. Bowled plenty of boundary balls.

Use of mental skills

A modified version of the mental skills questionnaire (MSQ) was used to assess each participant's use of five basic mental skills across the two cricket seasons. The modified MSQ has been adapted from Bull, Albinson, and Shambrook's (1996) MSQ for the purposes of this study. The modified MSQ comprised five subscales: imagery ability, mental preparation, self-confidence, concentration and activation regulation, with each subscale being assessed by four questions. The original MSQ was based on the psychological skills in sport questionnaire (PSSQ) as devised by Nelson and Hardy (1990). Whilst Cronbach's α reliability coefficients exceed 0.78 for each of the seven scales of the PSSQ, as yet psychometric properties have not been reported for the MSQ. However, in this study internal reliability for each of the five subscales in the modified MSQ generated Cronbach's α values of 0.88 for imagery ability, 0.91 for mental preparation, 0.91 for self-confidence, and 0.87 and 0.92 for concentration and activation regulation respectively.

Qualitative data collection

Semi-structured interviews

Four participants from the intervention group were randomly selected to participate in a semi-structured interview, at the conclusion of the study. Those selected also had their data subjected to single-case data analysis. The interviews were seen as an important method of gaining personal insights into the appropriateness of format, content and delivery of the intervention strategies, as well as an alternative form of evaluation of the effectiveness of the treatment, or its component parts. All interviews were based on a series of open-ended questions, which included a variety

of probe and elaboration questions to further understand participants responses, and were organised into groups using deductive content analysis methods (Patton, 1990).

Treatment: a mental skills training package

Experimental group

Each of the participants in the experimental group received a 12-week intervention programme where they met with a British Association of Sport and Exercise Science (BASES) accredited sport psychologist once a week for approximately 1 h. Prior to the intervention, participants were provided with workbook diaries, which were designed to develop the topics discussed in each meeting, and to provide the researcher with information on the adherence and progress made by each participant for each area within the intervention.

The first mental skill presented within the package was goal-setting. In accordance with recent research (Filby et al., 1999; Kingston & Hardy, 1997), the participants were also educated about the use of outcome, performance, and process goals and the importance of maintaining a balance between the three styles of goal-setting. The rationale for the inclusion of goal-setting was to enable the cricketers to focus on appropriate goals. For example during competition, players should focus on task-relevant process goals to help maintain concentration (such as relaxation prior to each delivery or feet positioning to enable appropriate kinaesthetic perceptions), with performance (number of runs to be scored/wickets to be taken, or desired economy rate for each match) or outcome-based goals (achieving success) being employed in training and other non-match situations to maintain motivation.

The second and third skills within the intervention were activation regulation strategies and self-talk, respectively. The skills were delivered together as a multi-modal package (Maynard, Hemmings, Greenlees, Warwick-Evans, & Stanton, 1998). Previous research has indicated that mental skills used in combination in a multi-modal package often yield enhanced performance or better adherence to the process. For example Vealey (1988) suggested that applied relaxation and self-talk when used with imagery allowed performers to achieve greater relaxation and hence more productive imagery sessions. Within this study a multi-modal intervention was adopted from that advocated by Maynard et al. (1998) to incorporate physical relaxation, self-talk and activation. The cricketers were informed that on some occasions they may be too relaxed and therefore need to ‘psych-up’ and become more activated. This was achieved by using the cue-controlled element (breathing) of the applied relaxation technique. Specifically, participants focused on inhalation as a cue for activation and exhalation as a cue for relaxation. Hence, to achieve greater activation a series of longer inhalations and short exhalations were advocated.

The fourth skill taught was mental imagery. The sessions were designed and based upon research within sport psychology (Munroe et al., 2000) and included internal and external imagery, timing of images, vividness and controllability, images of competition mastery and physical simulation. The workbook and audio cassettes (including scripts devised by the cricketers) covered all material discussed in the one-to-one sessions. These materials were used to try and enhance general motivational mastery (by underpinning confidence and the maintenance of a positive attitude) and also contained specific motivational strategies, where explicit processes that the individual had identified as being required for successful performance were operationalised, for example, personalised positive self-statements. Additional exercises were also included within the material

to supplement the introductory session with examples of how to use the imagery techniques being provided (Hale, 1998). Participants were also encouraged to use the skills as part of their pre-match routine.

The final psychological element targeted within the intervention was that of concentration with the main emphasis being the employment of triggers to allow focus at the appropriate time (e.g., when walking to the wicket; prior to each ball delivered/faced). The use of concentration triggers was made specific to each participant via discussion of when they perceived concentration to be of most importance to them and then matched to the specific situation. The use of triggers also allowed the performer to combine the self-talk from the previous section of the intervention. Participants also identified when and where they had become distracted and were taught how to use the various mental skills to refocus on task-relevant cues.

Control group

Members of the control group also met the experimenter with the same frequency as the experimental group during the intervention period. During these sessions, tasks not thought to be relevant to the dependent variables were conducted. Typically, team building or fielding activities were completed with the control group, to counteract any form of experimental bias (Maynard et al., 1998). Experimental sessions with the two groups were scheduled at different times and participants within the study were asked not to discuss the nature of their psychology interventions with members of the alternative group in an effort to avoid contamination. At the completion of the study the control group were provided with the opportunity to receive the experimental intervention as was ethically appropriate in this type of experimental design.

Procedure

All participants were informed of the purposes and duration of the study on initial contact with the experimenters. The study was subsequently divided into three phases, namely pre-intervention, intervention and post-intervention. During the pre-intervention and throughout the first season (16 matches), all 16 participants' subjective and objective cricketing performance scores were assessed and recorded. At this stage of the study there was no differentiation between experimental and control groups. The data from the first season provided baseline data on how participants performed prior to any form of intervention. Following data collection, stage two began. During the off-season period between the two league cricket seasons, the 16 participants were matched by performance and divided into the experimental and the control group. Each of the groups contained a total of eight participants and comprised four batters and four bowlers. On completion of the intervention stage, all 16 participants entered the final element or post-intervention stage. Similar to the pre-intervention phase, the 16 participants' performances were assessed via both objective and subjective scoring methods for 16 matches across the second season. The use of mental skills was assessed for each participant by administration of a modified MSQ. The modified MSQ was completed by all participants prior to, and following the 12-week intervention, halfway through season two and post-season two.

Having completed the study, four of the participants from the experimental group were randomly selected for a semi-structured interview to discuss issues such as the format, content, treatment adherence and effectiveness of the intervention. The participants' responses to a series

of open-ended questions formed the qualitative data for this investigation. All interviews were conducted within a week of the completion of the study to enable participants to report their perceptions as to whether the intervention was beneficial to subsequent performance. All data was then analysed by both deductive and inductive content analysis. Deductive analysis was required to ensure that the answers to the questions were assigned to the appropriate questions (e.g., ensuring that answers discussing content were related to the content question). Having matched responses to appropriate questions, the data was then analysed inductively and represented via hierarchical ordering comprising general dimensions, higher order themes and raw data themes. In addition to the semi-structured interviews, social validation procedures to assess participant reactions to treatment protocols and experimental outcomes were also completed by all participants. Specifically, players were asked the following questions: (a) "How important is an improvement in consistency of performance to you?" with responses ranging from 1 (not at all important) to 7 (extremely important); (b) "Do you consider the changes in performance to be significant?" with responses ranging from 1 (not at all significant) to 7 (extremely significant); (c) "How satisfied were you with the mental skills training program?" with responses ranging from 1 (not at all satisfied) to 7 (extremely satisfied); (d) "Has the intervention proved useful to you?" with responses ranging from 1 (not at all useful) to 7 (extremely useful). To elicit information regarding the precise impact of the intervention, participants were also asked to consider potential underlying reasons as to why the intervention procedure was a success or failure. This was assessed via an open-ended question, which read, "If from your perceptions, the procedure has contributed to changing your performance, can you state why you perceive this to be the case?".

Results—group data

Quantitative data

The first phase of data interpretation was via group analysis. Whilst there was a generic scoring system for the subjective data, objective data was analysed via standardisation of each performers data (Raglin, 1992) so that batters and bowlers could be compared in the same analyses. Specifically, for batters, raw data for runs scored was standardised for each of the two seasons, whilst for bowlers, the number of wickets taken was standardised for each season in accordance with the procedures employed in previous literature (Thelwell & Maynard, 1998; Woodman, Albinson, & Hardy, 1997). Whilst it is appreciated that the roles and original data for batters and bowlers contrast, a standardisation of raw data would allow tentative comparisons to be made between the pre- and post-intervention time periods.

Performance consistency

Within the present analysis, performance consistency was calculated by means of standardised standard deviations (Table 2). A 2×2 (group×time) multivariate analysis of variance (MANOVA) demonstrated a significant group by time interaction, $\lambda = 0.01$, ($F_{(2,27)} = 3.61$, $p < 0.05$; effect size $\eta^2 = 0.22$, estimated power at 5% probability=0.62). Observation of the separate univariate ANOVAs revealed a significant interaction effect ($F_{(1,32)} = 7.46$, $p < 0.05$; effect size $\eta^2 = 0.21$, estimated power at 5% probability=0.75) where subjective scores contributed significantly

Table 2
Means and standard deviations for consistency of performance

	Pre-intervention		Post-intervention	
Group	Objective	Subjective	Objective	Subjective
Experimental	0.67 ± 0.15	1.84 ± 0.30	0.70 ± 0.15	1.45 ± 0.30
Control	0.65 ± 0.20	1.93 ± 0.19	0.68 ± 0.25	1.98 ± 0.90

to the result. Tukey post-hoc tests indicated variance in performance to be significantly less in the experimental post-intervention condition than the pre-intervention experimental condition or either of the control group conditions ($p < 0.05$).

Performance improvement

Performance improvement was measured by actual means for subjective scores and means of the standardised scores for objective data (Table 3). A 2 × 2 (group×time) MANOVA demonstrated a significant group by time interaction, $\lambda = 0.01$, ($F_{(2,27)} = 7.84$, $p < 0.05$; effect size $\eta^2 = 0.37$, estimated power at 5% probability=0.93). Observation of the univariate ANOVAs revealed that both subjective and objective scores contributed significantly to the result. More specifically, for subjective scores a significant interaction effect ($F_{(1,32)} = 5.55$, $p < 0.05$; effect size $\eta^2 = 0.17$, estimated power at 5% probability=0.62) was reported. Tukey post-hoc tests indicated that the experimental group mean subjective performance scores were significantly higher in the post-intervention condition than the pre-intervention condition or either of the control group conditions ($p < 0.05$). For the objective scores, a significant interaction effect ($F_{(1,32)} = 8.90$, $p < 0.05$; effect size $\eta^2 = 0.24$, estimated power at 5% probability=0.82) was also recorded. Similar to the subjective scores, Tukey post-hoc tests indicated that the experimental group mean subjective performance scores were significantly higher in the post-intervention condition than the pre-intervention condition or either of the control group conditions ($p < 0.05$).

Use of mental skills

The means and standard deviations for the modified MSQ across the four data collections are presented in Table 4. A total of five two-way ANOVA's (group×time with repeated measures on the second factor) were employed to compare the means between the two groups across the four

Table 3
Means and standard deviations for improvements in performance

	Pre-intervention		Post-intervention	
Group	Objective	Subjective	Objective	Subjective
Experimental	0.15 ± 0.29	5.39 ± 0.63	0.40 ± 0.26	6.33 ± 0.50
Control	0.18 ± 0.25	5.04 ± 0.92	0.16 ± 0.29	4.91 ± 0.38

Table 4
Means and standard deviations for each modified MSQ category across time

Modified MSQ category	Group	Pre-intervention	Post-intervention	Mid-season 2	End season 2
Activation	1	55.0 ± 6.68	73.9 ± 5.33	72.0 ± 9.77	68.5 ± 11.6
Regulation	2	53.8 ± 6.80	58.0 ± 5.66	61.3 ± 10.3	55.1 ± 11.8
Concentration	1	50.0 ± 15.7	65.9 ± 11.4	65.3 ± 10.3	64.8 ± 5.63
	2	45.6 ± 7.46	43.9 ± 6.29	49.4 ± 9.96	47.5 ± 7.39
Confidence	1	57.0 ± 6.68	69.5 ± 7.80	71.1 ± 7.36	68.1 ± 8.43
	2	61.6 ± 10.4	64.4 ± 11.4	65.6 ± 12.9	62.0 ± 10.8
Imagery	1	58.8 ± 12.7	72.6 ± 6.82	72.8 ± 5.97	68.9 ± 7.86
	2	54.0 ± 13.1	54.6 ± 11.4	56.3 ± 10.6	58.6 ± 11.4
Mental	1	62.1 ± 7.94	73.6 ± 7.82	77.0 ± 5.66	77.0 ± 5.24
Preparation	2	61.3 ± 10.1	66.4 ± 11.3	68.8 ± 10.7	66.5 ± 11.6

Note: 1: experimental group; 2: control group.

data collections for each mental skill. In addition to significant interactions being reported for each of the ANOVA's (Table 5), subsequent post hoc Tukey tests ($p < 0.05$) for each mental skill indicated that significant differences were evident for the experimental group with pre-intervention scores being significantly lower than the other conditions. Furthermore, with exception

Table 5
A summary of the series of two-way analyses of variance with one repeated measure

Mental skill	*F*	*p*
Activation regulation		
Group	7.61	0.015
Time	16.9	0.001
Group×time	5.45	0.004
Concentration		
Group	14.9	0.002
Time	16.5	0.001
Group×time	2.88	0.047
Self-confidence		
Group	0.48	0.501
Time	11.1	0.001
Group×time	4.60	0.011
Imagery ability		
Group	7.24	0.018
Time	8.07	0.003
Group×time	5.15	0.016
Mental preparation		
Group	2.41	0.143
Time	39.2	0.001
Group×time	6.49	0.001

of the pre-intervention, scores for the experimental group were significantly higher than the control group, which remained stable over time.

Qualitative data

Each of the responses were matched with the appropriate question by two researchers trained in qualitative techniques. This formed the deductive phase of the data analysis. The data was then analysed inductively and represented via hierarchical ordering of general dimensions, higher order themes and raw data themes. Finally, triangular consensus was sought between the researchers and an independent researcher unconnected to the study, whose role was to confirm that each raw data theme had been allocated to the appropriate general dimension. Whilst it is beyond the scope of this study to present all qualitative data, a sample of the responses to each question will be reported. Raw data themes to emerge from the question on the format of the intervention were based on two main topics. First, the responses reflected the participants' ability to understand the rationale behind the intervention. For example, one participant commented, "I knew what I was trying to achieve and the work that I did helped me to see how different parts of my performance needed to be addressed". Second, raw data suggested that participants could comprehend how the stages of the intervention were encouraging progression towards the development of a range of sport-specific coping strategies. This theme was evident across all interviewees, with one player reporting "we all know that we want to play consistently well, but sometimes we need more guidance to help us get that … over the training period we kind of learnt how we could help ourselves to get that consistency if we worked at it".

The participants also reported that the content of the interventions had been beneficial, and appreciated being aware of future progressions within the intervention. One participant stated, "it was good how we did the skills on their own but were told how they could be linked together at the end of the course". A further comment from a bowler was "it was like a game, we had a kind of plan for what we were going to do, I could see that each week I was gonna add to my performance and gradually piece it together". For this group of participants, it would appear that informing them of the content of the intervention in advance, and how it would fit into their performance was of benefit to their understanding and continued interest in the intervention.

Raw data for the responses to treatment adherence were closely linked to those discussed in the 'content of intervention' question. However, additional comments from the player's indicated that having a session with the experimenter, complimented by having workbook activities facilitated the progression through the intervention and into performance. One of the comments reflecting this was "the workbook definitely helped me cos I was able to remember the stuff from the session and then work through it on my own and see how it would fit into my training and whole game. Then when I went to training I could go back to my book and improve it for the next time".

Finally, raw data theme responses to the effectiveness of the intervention suggested that participants became more comfortable with their performances having completed the intervention. More specifically, the intervention was effective in allowing the performers to accept that there may be variability in performances but as long as they were prepared for the match they knew that they gave themselves every chance of performing more consistently to their potential. Finally, most of the participants seemed to make a causal link between the intervention and RGP. For

example, one player reflected on the intervention by saying "the whole thing helped me focus on what I needed to do rather than be totally focussed on who I was playing against, or how well I was gonna do, I knew how to think and behave which helped me have more confidence to do the job for each game". This type of comment indicates that improvements in subjective perceptions, cognitions and behaviours were witnessed during the intervention as befitted by a more of process-oriented perspective towards performance.

Results—single-case data

Phase two of the results incorporated single-case data analysis for four participants in the experimental group (two batters and two bowlers), who were also subjected to the semi-structured interview. In accord with the recommendations of Wollman (1986) each participant acts as their own control (having not received the intervention until following the first season), with individual changes over time being monitored that may be masked by a more traditional group design. Furthermore, the single-case design method was compared against the group design data as a test of reliability of the findings. Moreover, other researchers (Bryan, 1987) have suggested that these designs are particularly important and appropriate in sport psychology field studies because they help to identify small consistent changes in performance often considered important by athletes, coaches and sport psychologists, that may not prove significant within a group design.

Most of the single-case research has employed an A–B–A design (Pates et al., 2001) which includes monitoring the baseline behaviour (phase A), providing the treatment and monitoring behaviour with the intervention (phase B) and then withdrawing the treatment to examine the behaviour without the intervention (second A phase). Further research has used staggered baselines to isolate treatment effects (Thelwell & Greenlees, 2001). The present study, however employed a simple A–B design, for two reasons. First, an A–B–A design would be inappropriate due to the inability of the researchers to withdraw the treatment from the participants following the intervention. Specifically, within a competitive sporting environment, it is unethical to withdraw potential benefits to performance following their introduction (Hrycaiko & Martin, 1996). Second, with the study taking place over two cricket seasons, the interventions were delivered during the off-season (to allow monitoring of performance behaviours for the whole of each of the pre- and post-intervention seasons), hence a staggering of intervention delivery would not have been possible. Previous researchers (Kazdin, 1982) have identified weaknesses in the A–B design. Reservations include uncertainty that the intervention actually produced the change in behaviour, and secondly, that it is possible to attribute changes to other uncontrolled events during the intervention period. However, in the current study where the single-case element followed a group analysis that had previously established significant differences due to the treatment, an A–B design was considered appropriate to assess more fully, individual changes in behaviour.

Treatment of data

The performance scores obtained from the participants were plotted for all matches across the two seasons in which the players had performed. Through the use of visual inspection of the single-case data, the following criteria were used to examine whether a meaningful experimental

effect had taken place: (a) the number of overlapping data points between the pre-intervention and post-intervention phases; (b) the immediacy that an effect was observed following intervention; (c) the size of an effect after intervention; (d) whether performance in the post-intervention phase was more consistent; and (e) the number of times that effects were replicated across the participants (Martin & Pear, 1996). The objective and subjective scores for each cricketer were established in the same manner as the group analysis of the results.

Intervention effects

Subjective and objective scores across both seasons for each of the four participants are presented in Figs. 1–4. Each figure illustrates the performances for each competitive league fixture across the two seasons. Whilst standardised scores were utilised for the objective data within the group analysis, the raw objective performance data (runs scored or wickets taken) were employed for the single-case analysis to allow for a greater observation of role specific performance variations.

Fig. 1 shows that participant 1 (batter) had an increase in the average subjective performance scores from 5.93 to 6.43. Despite the continual crossover of the data points from both seasons it can also be suggested that an increase in RGP took place due to the reduced performance variability in the second season, even though performances 26 and 32 were poor. A slight increase in

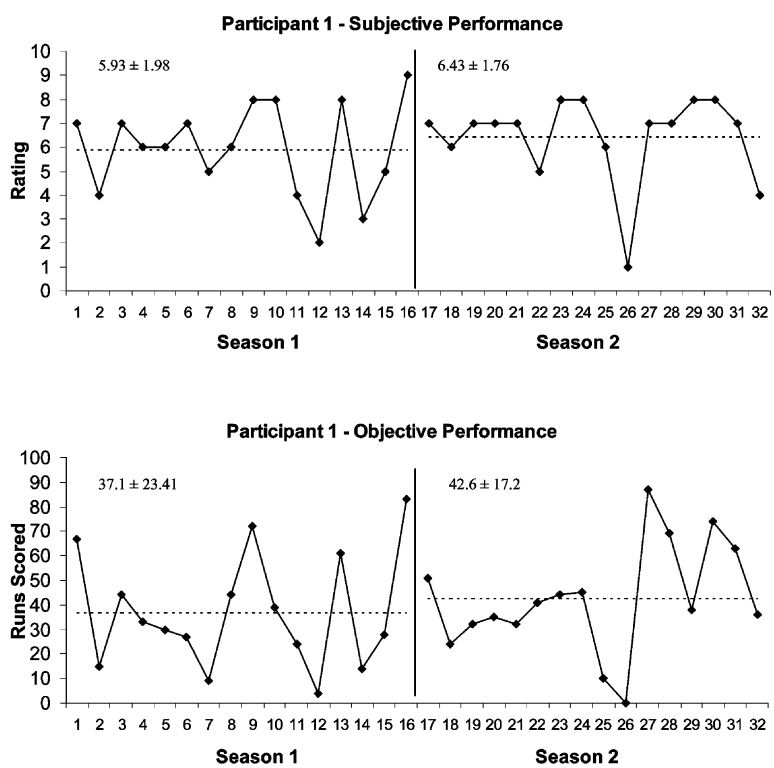

Fig. 1. Participant 1—subjective and objective performance scores across seasons 1 and 2.

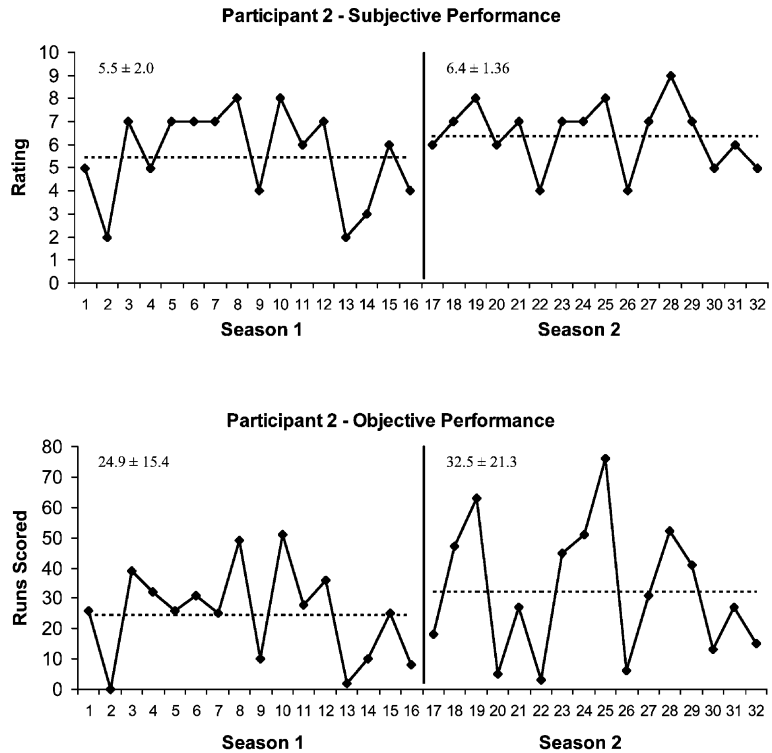

Fig. 2. Participant 2—subjective and objective performance scores across seasons 1 and 2.

objective performance was witnessed following the intervention in addition to slightly reduced performance variability. Performance variability in season two was still high (17.2 as compared to 23.41), so full support for RGP for the objective data remains tenuous.

As mentioned before, there may be occasions whereby the objective scores fail to reflect the subjective scores for the same performance. For participant 1, performance 25 signified a poor objective performance when compared to his mean, whilst the subjective score was relatively good (being placed just beneath the mean for the season. This suggests that whilst runs were not scored, the performer managed to fulfil (to some degree) his subjective perceptions of what was required for the performance.

Fig. 2 illustrates performance increases for participant 2 (batter). Subjective performance increased from 5.5 to 6.4 following the intervention. More importantly, it could be suggested that variability in performance reduced indicating enhanced RGP. Whilst objective performance scores increased from 24.9 to 32.5, RGP was not evident, mainly due to fluctuating performances (both good and poor) throughout the second season. Similar to participant one, participant 2 produced an example of where objective performance was poor (performance 20) whilst the subjective performance evaluation was nearing the season mean. Again this indicates that whilst the actual performance was not high scoring (score of less than 10), the player felt that subjectively he had performed well.

Fig. 3 highlights the findings for participant 3 (bowler) across the two seasons. The subjective

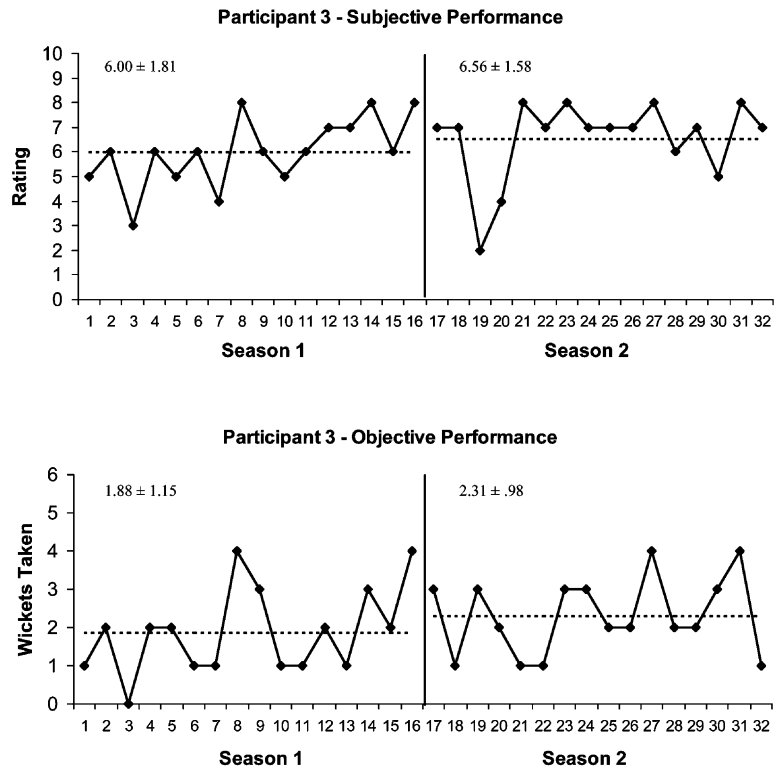

Fig. 3. Participant 3—subjective and objective performance scores across seasons 1 and 2.

scores improved following the intervention (6 to 6.56). More importantly, other than matches 19 and 20, the scores for the post-intervention phase demonstrated RGP. The objective performance analysis scores also improved following the intervention (1.88 to 2.31) with a slight improvement in RGP.

Participant 3 also highlights two examples of where there are contrasts between the subjective and objective performances. First, performance 19 indicates that the player has taken wickets (above the season mean) yet subjectively he deemed himself to have bowled poorly (subjective score of 2). By contrast, performance 32 demonstrates the performer failed to take a large number of wickets, yet subjectively, performance was rated above average. It may have been that the bowler was very economical and/or bowled very tightly, perhaps causing the batter concerns, whilst not actually taking wickets.

The illustrations in Fig. 4 suggest that participant 4 (bowler) experienced increased subjective performance from 6 (pre-intervention) to 7.2 (post-intervention) and more importantly, enhanced RGP (1.21 to 1.00). Visual inspection also indicates that all performances post-intervention were greater than the mean score for the pre-intervention season. Although subjective performance improved, participant four had a slight decrease in objective performance post-intervention (1.51 to 1.63). Despite the mean objective performance scores being marginally lower following the intervention, the variability of the performances was lessened, with the spread of the performances

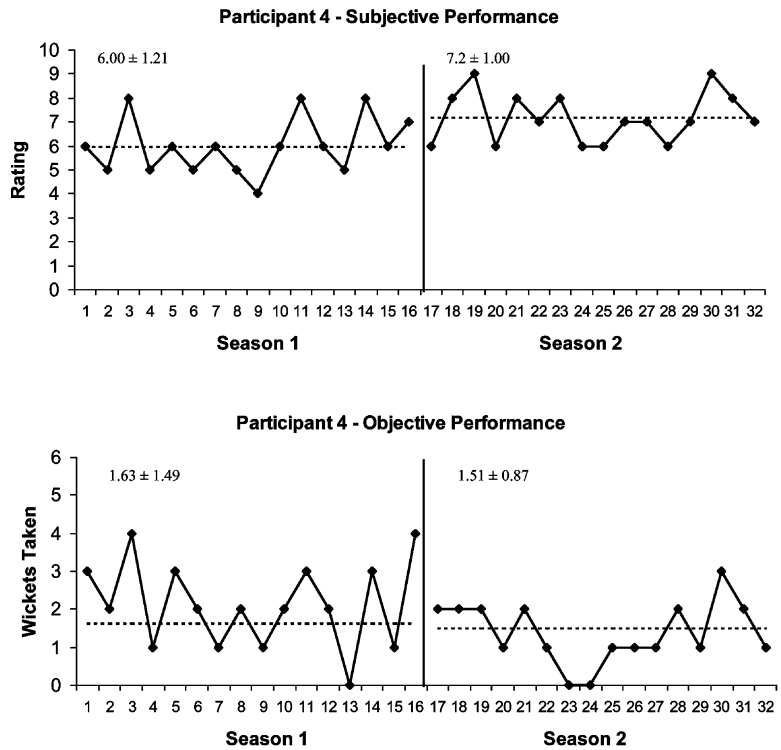

Fig. 4. Participant 4—subjective and objective performance scores across seasons 1 and 2.

being closer to the mean score. However, due to reduced mean performance, it could not be inferred that improvements in RGP had taken place.

Social validation data

Responses indicated that all the participants had been highly committed to improvements in their specific role as cricketers. Feedback suggested that participants saw an improvement in performance consistency as extremely important and reported positive perceptions of their change in performance (all participants rating 5 and above). The responses to participant satisfaction of the mental skills programme were favourable with all participants reporting a value of 7 (extremely satisfied), and possibly most importantly, all participants indicated the intervention to be extremely useful. When asked why the intervention had helped, all participants reported that the treatment seemed to enable them to prepare more consistently. The participants also reported that the repertoire of mental skills enabled them to maintain focus and to be able to cope more efficiently with threatening situations.

Discussion

The major purpose of this study was to evaluate the efficacy of a mental skills package at enhancing performance consistency (RGP) and actual performance in cricketers. The content of

the mental skills package had been developed from the antecedents of RGP as identified in a series of studies by Thelwell and Maynard (2002). A further aim of the study was to examine the use of objective and subjective performance measures within the sport of cricket.

The group data indicated that the cricket specific mental skills training package consisting of goal-setting, activation regulation strategies, self-talk, imagery and concentration was effective at enhancing performance consistency and actual performance. This finding alone is important because it is only when performance consistency and improvements in competition are witnessed that mental skills training can be afforded greater credibility (Patrick & Hrycaiko, 1998). Although the present study provides evidence to suggest that the use of mental skills and subjectively measured performance were positively correlated, it would be inappropriate to imply a cause and effect relationship. In this particular study the mechanisms by which the mental skills specifically influence performance were not examined. This issue is of fundamental importance for applied sports psychology and it is hoped that future researchers will determine the nature of the relationships between the use of mental skills and performance accomplishments in sport. The single-case analysis supported many elements of the group findings. All participants subjected to individual data analysis recorded improved subjective RGP and actual performance. On the whole, the objective data revealed marginal performance improvements, but unfortunately, little evidence of RGP (as measured by runs scored and wickets taken) was apparent.

These results have positive implications for cricket coaches, players and sport psychologists alike. For example, coaches and players need to be aware that objective measurements alone may fail to explain the whole performance. Indeed there are a number of factors that may influence the objective outcome of performance, with the majority of these being uncontrollable (e.g., the opposition, environmental conditions, umpire's decisions). It should be noted that alternative performance measures such as strike rate and economy rate for bowlers, and runs per 100 balls for batters were also considered within the current study. Although potentially more sensitive objective measures, it was concluded that they would also be relatively uncontrollable for the player. For example, a bowler may bowl a very good line and length, yet concede runs due to poor field placing, or fielding errors, which would indicate a poor performance if measured by objective means alone. The findings within this study suggest that cricketers should be encouraged to measure performance via a combination of subjective and objective measures rather than objective criteria alone. Increasing the sensitivity of the performance measure will allow players and coaches to establish more detailed explanations of the preparation and performance relationship. For sport psychologists, the findings further reinforce the importance of monitoring performance in both process and outcome terms for the development and maintenance of confidence, which according to previous research evidence underpins RGP (Thelwell & Maynard, 2002). The present study also provides a framework for sport psychologists who work, or wish to work with cricketers to achieve both performance consistency and improved performance. In the applied situation the combination of objective and subjective performance measures could also be a useful coaching tool. For example an appropriate focus on performance processes may improve awareness of successful performance accomplishment and enhance confidence, which in turn may influence objective cricketing performance. However should players' and/or coaches disregard subjective methods of performance analysis, there remains the potential for unsubstantiated performance variability.

The intervention delivered within the present study enabled cricketers to utilise a variety of

strategies prior to and during competition to positively influence performance when measured by subjective methods. These findings indicate a need to further investigate the use of mental skills packages to enhance RGP in cricket. Contemporary research (Patrick & Hrycaiko, 1998; Thelwell & Greenlees, 2001) suggests that much of the mental skill intervention research has not required the participants to engage in competitive behaviour where anxiety levels, or alternative mental states are affected via interaction with other competitors. Hence, a strength of the current study may be the ecologically valid setting in which base-lines were established, interventions delivered, and effectiveness evaluated.

The researchers acknowledge that the research base examining the concept of RGP is not substantial, hence it is difficult to compare the current findings to previous literature or theory in the area. Despite this, the paper has highlighted several key issues that need to be addressed within future research. Firstly, further empirical evidence is required to establish firmer definitions of RGP and the factors underpinning the concept as opposed to heightened or average performance states. Secondly, there is a need to develop an understanding of RGP in other sports, including both team and individual activities. Whilst this study provides evidence for a mental skill intervention to be beneficial for the attainment of RGP, all implications derived from the study are specific to cricket. Further still, the present study was based on empirical evidence from a triangulation of data within the cricket population. With this in mind, a generalisation of the findings from this study cannot be inferred to other sports. However, the authors would contend that many of the principles of procedure and intervention content within this study, may form a good starting point for research in other sports and activities.

To conclude, the present study indicated that a mental skills package containing goal-setting, activation regulation, self-talk, mental imagery and concentration as advocated by Thelwell & Maynard (2002) was beneficial in enhancing cricketing performance. Specifically, the results suggested that the intervention enhanced RGP and improved performance when using subjective performance measures. However, for objective data, no improvement in RGP could be reported despite improved mean performance being evident. Additionally, it is further suggested that the form of the performance measure may be an important confounding factor in performance-related research. Coaches who typically adopt objective measures of performance alone, should be encouraged to reconsider how they operationalise cricketing performance and perhaps include some subjective forms of assessment in any evaluation.

References

Brewer, B. W., Van Raalte, J. L., Linder, D. E., & Van Raalte, N. S. (1991). Peak performance and the perils of retrospective introspection. *Journal of Sport and Exercise Psychology, 8,* 227–238.

Bryan, A. (1987). Single-subject designs for evaluation of sport psychology interventions. *The Sport Psychologist, 1,* 283–292.

Bull, S. J., Albinson, J. G., & Shambrook, C. J. (1996). *The mental game plan: Getting psyched for sport*. Brighton, UK: Sports Dynamics.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper and Row.

Filby, W. C. D., Maynard, I. W., & Graydon, J. K. (1999). The effect of multiple-goal strategies on performance outcomes in training and competition. *Journal of Applied Sport Psychology, 11,* 230–246.

Hale, B. (1998). *Imagery training*. Leeds, UK: National Coaching Foundation.

Hanin, Y. (2000). *Emotions in sport*. Champaign, IL: Human Kinetics.
Hardy, J., Gammage, K., & Hall, C. (2001). A descriptive study of athlete self-talk. *The Sport Psychologist*, *15*, 306–318.
Hrycaiko, D., & Martin, G. L. (1996). Applied research studies with single-subject designs: why so few? *Journal of Applied Sport Psychology*, *8*, 183–199.
Jackson, S. A. (1992). Athletes in flow: a qualitative investigation of flow states in elite figure skaters. *Journal of Applied Sport Psychology*, *4*, 161–180.
Jackson, S. A. (1995). Factors influencing the occurrences of flow state in elite athletes. *Journal of Applied Sport Psychology*, *7*, 138–166.
Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings*. New York: Oxford.
Kelly, G. (1955). *The psychology of personal constructs*, Vols 1 and 2. New York: Norton.
Kingston, K. M., & Hardy, L. (1997). Effects of different types of goals on the processes that support performance. *The Sport Psychologist*, *11*, 277–293.
Martin, G., & Pear, J. (1996). *Behavior modification: What it is and how to do it*. (5th ed.). Englewood Cliffs, NJ: Prentice-Hall.
Maynard, I. W., Hemmings, B., Greenlees, I. A., Warwick-Evans, L., & Stanton, N. (1998). Stress management in sport: a comparison of unimodal and multimodal interventions. *Anxiety, Stress and Coping*, *11*, 225–246.
Munroe, K. J., Giacobbi, P. R. Jr., Hall, C. R., & Weinberg, R. (2000). The four W's of imagery use: where, when, why, and what. *The Sport Psychologist*, *14*, 119–137.
Nelson, D., & Hardy, L. (1990). The development of an empirically validated tool for measuring psychological skill in sport. *Journal of Sports Sciences*, *8*, 71.
Pates, J., Cummings, A., & Maynard, I. (2002). The effects of hypnosis on flow sates and three-point shooting performance in basketball players. *The Sport Psychologist*, *16*, 34–47.
Pates, J., Maynard, I., & Westbury, T. (2001). An investigation into the effects of hypnosis on basketball performance. *Journal of Applied Sport Psychology*, *13*, 61–84.
Patrick, T. D., & Hrycaiko, D. W. (1998). Effects of a mental training package on an endurance performance. *The Sport Psychologist*, *12*, 283–299.
Patton, M. Q. (1990). *Qualitative evaluation and research methods*. Newbury Park, CA: Sage.
Raglin, J. S. (1992). Anxiety and sport performance. In J. O. Holloszy (Ed.), (pp. 243–274). *Exercise and Sport Sciences Reviews*, Vol. 20. Baltimore, MD: Williams and Wilkins.
Raglin, J. S., & Morgan, W. P. (1988). Predicted and actual levels of pre-competition anxiety in swimmers. *Journal of Swimming Research*, *4*, 5–8.
Thelwell, R. C., & Greenlees, I. A. (2001). The effects of a mental skills training package on gymnasium triathlon performance. *The Sport Psychologist*, *15*, 127–141.
Thelwell, R. C., & Maynard, I. W. (1998). Anxiety–performance relationships in cricketers: testing the zone of optimal functioning hypothesis. *Perceptual and Motor Skills*, *87*, 675–689.
Thelwell, R. C., & Maynard, I. W. (2002). A triangulation of findings of three studies investigating repeatable good performance in professional cricketers. *International Journal of Sport Psychology*, *33*, 247–268.
Vealey, R. (1988). Future directions in psychological skills training. *The Sport Psychologist*, *2*, 318–336.
Wollman, N. (1986). Research on imagery and motor performance: three methodological suggestions. *Journal of Sport Psychology*, *8*, 135–138.
Woodman, T., Albinson, J. G., & Hardy, L. (1997). An investigation of the zones of optimal functioning hypothesis within a multidimensional framework. *Journal of Sport and Exercise Psychology*, *19*, 131–141.
Wright, G. (2001). *Wisden cricketers' almanac*. (138th ed.). London, UK: John Wisden & Co. Ltd.