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Development of the Ottawa Mental Skills
Assessment Tool (OMSAT).

By

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School of Human Kinetics
University of Ottawa

A thesis

presented to the University of Ottawa
for fulfilment of the thesis requirement for the degree
of Master of Arts in
Sport Studies

Ottawa, Ontario. 1993

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ISBN 0-315-89598-5

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Acknowledgements

I would like to thank all the athletes that have contributed and have freely participated in this experiment.

I would also like to thank Dr. Terry Orlick, Dr. Bruno Zumbo, Sean Draper and Yoshinory Okazawa for their help and input in the analysis process.

For his guidance, friendship, inspiration, and numerous hours spent proofreading, I owe Dr. John Salmela many thanks.

Last, but not least, I would like to thank my two best friends Jocelyn and Sebastian for their unconditional love and understanding.

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Abstract

The purpose of this study was to develop and validate a psychometric instrument called the Ottawa Mental Skills Assessment Tool (OMSAT), which attempted to determine the relative importance of mental skills required to achieve levels of excellence in sport performance. A review of the literature of sport psychology experts Anshel, (1987); Mahoney, (1989); Mahoney, Gabriel & Perkins, (1987); Orlick (1980, 1986, 1992); Seiler, (1992) and Vealey, (1988) was completed and served as the basis for the creation of the OMSAT questionnaire. The questionnaire was initially comprised of 14 scales including a total of 113 questions. The 14 scales were further divided into five major areas: 1. Foundation Skills (commitment, belief); 2. Affective Skills (stress reactions, fear, relaxing, energizing); 3. Cognitive Skills (goal-setting, imagery, mental practice, focus, refocus); 4. Competition Skills (simulation, competition planning); and 5. Team dynamics. The OMSAT questionnaire was distributed to a sample of 486 subjects who were divided into three groups based on their gender, sport discipline and athletic level of achievement.

Following statistical analyses (i.e., internal consistency, frequency item distribution) of every question, a new condensed version of the OMSAT was formulated. This new version was comprised of 71 questions within 12 scales.

Results of the condensed version of the OMSAT demonstrated high levels of internal consistency (alpha levels above .78), and acceptable levels of test-retest reliability (r levels above .63). Mean score differences indicated that elite athletes scored higher

than competitive athletes, who in turn, scored higher than recreational athletes in nearly all of the OMSAT scales. Overall, the OMSAT appears to provide a potentially useful assessment and diagnostic tool for both understanding, and potentially, counselling athletes of different ability levels.

Keys Words - Foundation Skills, Affective Skills, Cognitive Skills, Competition Skills, Team Dynamics, Goal-Setting, Commitment, Belief, Stress Reactions, Fear, Relaxing, Energizing, Imagery, Mental Practice, Focus, Refocus, Simulation, Competition Planning.

CHAPTER I

INTRODUCTION

People have always been intrigued by the complexities of the mind and the power that it can exert over the body. Although much information about the brain and its anatomical structures has been gleaned from research, there remains many unanswered questions about how the mind actually works.

It is generally believed that a part of the brain called the cerebrum is responsible for consciousness, thought, conceptual processing, and abstract problem solving (Mader, 1988). However, the overall functioning of the brain is still not fully understood and controversy continues over whether it operates as a whole unit, or as a series of "centres" or mechanisms (Dickson & Maue-Dickson, 1982). A clear picture of how, and to what extent, the mind influences the body and vice versa has also remained elusive.

In attempt to understand the scope of the relationship between the mind and body, many tools and approaches from a variety of disciplines have been utilised in the past. In general, these tools and/or approaches have offered a very limited explanation as to how the mind and body interact (Mahoney 1989, Orlick 1986). As yet, no tool or approach has been successful in providing a global explanation of mind-body interaction. In addition, when practically applied, most theories about mind-body

interactions have been found to be inadequate or inaccurate (Orlick 1980).

One particular area of psychology, sport psychology, has been keenly interested in investigating the interaction of the mind and body. This relatively new discipline has addressed the need of helping athletes and coaches solve mental (i.e., cognitive, emotional and behavioral) problems within the realm of sport. One question that has frequently been brought up by both athletes and coaches is: "Why do some very talented athletes whose performance is consistently outstanding in practice, perform poorly in competitions?" (Vealey, 1988) It has been frustrating for athletes and coaches alike to see that skilled and talented athletes lose to those whom they perceive to be less skilled. This has led sport psychologists to theorise that it is essential for both the mind and body to work as a cohesive unit in sport competitions (Orlick, 1986). If one of these components fails to keep up with the demands of a competition, the result could well be a poor performance. The success or lack of success of performance outcome also reflects the degree to which the mind and body are trained (Orlick 1986). That is, if both the mind and body are addressed in training, the performance outcome is greatly enhanced.

Over the past 20 years, sport psychologists have carried out extensive research to identify mental components believed to be essential to successful performance in sport. They have sought to identify the most effective strategies and techniques that have been used by "elite athletes" in the process of mental training for sport (Orlick & Partington, 1988). One of the early findings

was that there are differences between individuals in terms of mental skill levels, just as there are physical differences in terms of strength, power, speed, endurance and skill level (Orlick & Partington 1988, Seiler 1992). Since high levels of mental abilities have often been correlated with outstanding sport performances, most sport psychology consultants agree that mental abilities affect or direct the level of sport performance responses.

The intent of some sport psychologists in the past has been to develop a psychometric measuring device that can accurately identify one's strengths and weaknesses in mental abilities. The belief was that if one's mental skill level can be identified, then intervention in the form of additional remedial mental training can be undertaken to enhance one's performance.

Psychological inventories have been considered by some sport psychologists to be useful instruments because they provide practitioners with a tool for applying theory to practice (Nideffer, 1987). Many psychological tests designed to assess individual mental skills abilities have been devised. Anshel (1987) has identified over 128 psychological inventories used by sport psychologists in the last 20 years. Even though these psychometric measuring tools have been used extensively, and have demonstrated various degrees of reliability and validity, they have been questioned by practitioners in terms of general utility and predictive validity (Grove & Hanrahan 1988; Orlick 1990).

The heterogeneous nature of both athletes, in terms of differences in levels of mental skill abilities, and sport psychology researchers, in terms of differences in approaches

applied to research, have historically made systematic analyses of the mind-body relationship difficult. Seiler (1992) indicated that a more systematic approach by sport psychologists to this subject of enquiry may provide a better understanding of issues related to mental training. Seiler proposed that researchers develop universal terminology and concepts specific to the area of mental skill training in sports.

In response to Seiler's recommendation, researchers from the University of Ottawa (Salmela, Barbour, Cox, Howlett, Imai and Wang, 1992) analysed research by Orlick (1992); Mahoney, Gabriel & Perkins (1987); and Grove & Hanrahan (1988) on the subject of models for mental skills training for sport. The findings of this analysis were summarized in Appendix A and indicate that sport psychology researchers do indeed use different terminology while addressing the same psychological concepts.

A number of sport specific assessment devices designed to measure mental aspects of athletic performance were analysed by Salmela et al. 1992. A wide range of terms and concepts were found to be utilized in these assessment devices. The devices analysed included: The Athletic Motivation Inventory (AMI), Test of Attention and Interpersonal Style (TAIS), Sport Competition Anxiety Test (SCAT), Competitive State Anxiety Inventory (CSAI), The Sport Pressure Checklist, The Psychological Skills Inventory for Sport (PSIS), The Sport Confidence Inventory, and The Self-Analysis of Mental Skills (SAMS). Salmela et al. concluded that there were a number of common elements in these psychological instruments even though the terminology used was very different. Fourteen mental components were addressed frequently in the

majority of these instruments. The mental components identified by Salmela et al. as being important for successful performance were: goal-setting, belief, commitment, stress reactions, fear, relaxing, energizing, imagery, mental practice, focus, refocus, simulation, competition planning, and team dynamics.

These 14 mental components identified as being important for successful performance were used by Salmela et al. 1992, to make up the framework of a psychological inventory for sport entitled the "Ottawa Mental Skills Assessment Tool" (OMSAT). The final form of the OMSAT questionnaire also reflects the work of Orlick (1980, 1986, 1992) and some other North American sport psychologists (Mahoney, 1989; Mahoney, Gabriel & Perkins, 1987; Vealey, 1988) and European sport psychologists (Seiler, 1992).

The main focus of this research project was to assess the validity and reliability of the OMSAT questionnaire. Several statistical procedures to determine validity and reliability were used, including test-retest reliability, internal consistency, and discriminant analysis.

CHAPTER II

REVIEW OF LITERATURE

Future Directions In Psychological Skills Training

Vealey (1988) reviewed 27 out of 29 current sport psychology books published in North America from 1980 to 1988. Her main goal was to identify the issues and directions upon which the area of sport psychology were focussed over the past 10 years. The analysis and evaluation of these books has indicated the following: (a) most of the books targeted elite athletes; (b) only eight books were written for both the athletes and coaches; (c) the emphasis has been placed on teaching athletes psychological skills needed during performances as opposed to psychological skills for personal development (self-esteem, or lifestyle management). Vealey recommended that, in the future, psychological skill training should target populations other than elite athletes, move beyond education to implementation, and nurture "the theory/research/practice relationship." (p. 332)

Mental links to excellence

Orlick and Partington (1988) studied 235 Canadian Olympic athletes for the purpose of identifying "from the source" what were the mental components used most frequently by these athletes. The authors concluded that top athletes: a) were highly committed to their sport; b) had clearly established short-term and long-term goals; and c) had an established mental training plan that

was used and refined throughout the season of training. Elite athletes were often engaged in imagery training, focus, refocus and simulation training. Furthermore, most of these athletes had a systematic plan to mentally prepare for competition which included: a precompetition mental training plan, a competition mental plan, a distraction control plan, and a constructive evaluation plan.

The Psychology Of Personal Excellence

Orlick (1993), developed a heuristic conceptual model called "Wheel of Human Excellence" made up of seven components believed to be central to performance in sport and other achievement domains. The two most important components of the wheel were considered to be belief and commitment. These two components were complemented by five other (independent units) with which they were interdependently linked: full focus; positive images; mental readiness; distraction control; and constructive evaluation. This model was the result of the integration of extensive consultation and field experience. It has not yet been assessed by independent investigators in terms of using items which could differentiate between the relative importance of each component and their statistical properties.

Performance Enhancement - A Psychological Approach

Seiler (1992) reviewed several English and German applied sport psychology journals. He found that there was confusion over terminology employed by sport psychologists. Even when discussing or assessing the same behavior, sport psychology

specialists used different psychological constructs. Seiler believes that these constructs may have a negative impact in the translation process of the newly acquired knowledge. He recommended that sport psychologists should: a) clarify the terminology by using a "more systematic action theoretical approach"; b) use a more cooperative approach between practitioner and researcher for the purpose of gaining adequate knowledge about the immediate and long-term effects of psychological interventions; and c) use a language that consumers could understand when explaining the possibilities and limitations of performance enhancement training.

Psychological Inventories Used In Sport Psychology Research

Six major sport psychology research journals published from 1970 to 1987 were analysed by Anshel (1987). He surveyed all psychological inventories used over this interval. Anshel believed that a compendium of psychological inventories could help researchers determine future needs in the area of inventory measurement. He believed that this could also invite researchers to "undertake long term commitment toward creating new tools for better understanding, explaining and predicting sport behavior". (p.331) Anshel identified 128 psychological inventories which were designed to assess over 30 mental components related to sport.

Test of Attentional and Interpersonal Style

A test that has been used extensively in the past is Nideffer's (1976) "Test of Attentional and Interpersonal Style"

(TAIS). Nideffer defended criticisms that such tests like the TAIS lack a sound theoretical base and did not offer predictive utility (Nideffer 1976). The main premise of the TAIS was that attention was related to performance. Once an athlete's attentional style was identified, the prediction of performance in a variety of situations became possible. After being tested and retested for over 16 years in a variety of sport settings, the TAIS was still considered to be a valid instrument by some sport psychology researchers (e.g., De Palma & Nideffer, 1977; Nideffer, 1991), Some other sport psychology researchers however, (e.g., Dewey, Brawley & Allard, 1989; Ford & Summers, 1992; Vallerand, 1983; Van Schoyck & Grasha, 1981) questioned the predictive and factorial validity of the TAIS instrument.

Psychological Skills Inventory For Sport

Another psychometric measure that has received recent attention is the "Psychological Skills Inventory for Sport" (PSIS) which was developed by Mahoney, Gabriel and Perkins (1987). The main objective of this instrument was to identify mental skills which reliably differentiate elite from non-elite athletes. In addition, the test also aspired to compare the psychological profile of an ideal athlete depicted by 16 sport psychologists to the obtained psychological profiles of elite athletes.

A 51 item true-false questionnaire was administered to a sample of 713 male and female athletes representing 23 sports. The questionnaire was also administered to 16 leading sport psychologists. The results of this test indicated that mental preparation, motivation, anxiety management and self-confidence

were the most important mental components in skill level differentiation between elite and non-elite athletes. Furthermore, the ideal profile chosen by the sport psychologists closely resembled that of the elite athletes' profiles. The sport psychologists did however severely overestimate the importance of all mental skills. Mahoney et al. had provided a sound departure point for more research in this area. Even though they achieved their stated objectives, they felt that their research actually led to more questions than answers. Mahoney et al. indicated that the major drawback of this investigation was associated with PSIP's "dichotomous (true/false) format and the absence of formal evaluations of its psychometric properties". (p. 195)

Chartrand, Jowdy, and Danish (1992) criticized the PSIS from a psychometric perspective in that five of the six scales indicated a poor internal consistency. Furthermore, a confirmatory factor analysis did not support the six factor structure of the PSIS instrument.

Conclusion

The review of literature has shown different approaches used by sport psychologists to identify mental skills important in sport. Various approaches to intervention and training of mental abilities have also been presented. With the exception of Mahoney et al. (1987) and Nideffer (1991) psychological assessment tools designed to measure and then predict athletic performance are not evident in the literature. In both cases, serious reserves from a psychometric perspective have been directed by independent assessment of the instruments.

Purpose of the Study

The "Ottawa Mental Skills Assessment Tool." (Appendix B) was originally developed in 1992 by a group of researchers from the University of Ottawa (Salmela et. al, 1992). It was intended to yield comparative information of elite, competitive and amateur athletes. It was also intended to provide personal psychological profiles of individual athletes. The purpose of this study was to determine the psychometric properties of the OMSAT by considering both its reliability and validity. The process of analysis addressed three main areas:

1. Item analysis of the OMSAT questionnaire.
2. Construction of a condensed version of the OMSAT
by removing items identified as lacking in significance
and/or meaningfulness.
3. Analysis of reliability and validity of the condensed
version of the OMSAT.

Definition of terms

- Elite athletes - athletes who are or were members of the national team or who have competed internationally in their respective sport.
- Competitive athletes - athletes who are or were ranked second, third, or fourth in the national ranking, and have not competed internationally; or
- athletes representing the province in interprovincial games; or

-athletes representing universities in
interuniversity teams.

Recreational athletes - individuals who participate in sport but
have not met any of the above mentioned
levels.

CHAPTER III

RESEARCH METHODS

Instrument

The instrument used in this study was the OMSAT questionnaire. This questionnaire attempted to initially assess 14 psychological components, namely: Foundation Skills (belief, commitment); Affective Skills (stress reactions, fear, relaxing, energizing); Cognitive Components (goal-setting, imagery, mental practice, focus, refocus); Competition Skills (simulation training, competition planning); and a Team Dynamics Component. In the preliminary form, 113 questions were developed. Each question was answered on a 5 point Likert-like scale which rated items from strongly agree to strongly disagree. A "don't know" option was also included. (Appendix B)

Subjects

Table 1 presents a detailed description of the sample. The data was collected from a sample of 486 athletes, both male (n = 205) and female (n = 181), representing three levels of competition: elite (n = 110), competitive (n = 238), and recreational athletes (n = 138). This sample included: a) undergraduate students registered in the School of Human Kinetics at the University of Ottawa; b) five major sport clubs from the Ottawa area (i.e., The Ottawa Beaver Boxing Club, The Ottawa Beaver Rugby Club, The Ottawa Irish Rugby Club, Carleton University Rugby Club, The Ottawa University "Gee Gee" Club; c)

Table 1

Sample Description

Sport	Mean Age	Elite		Competitiv		Recreatio.		Total
		M	F	M	F	M	F	
Badminton	21.50			2			2	4
Baseball	22.39			2			3	5
Basketball	21.31		1	4	6	2	6	19
Body building	20.66			2		1		3
Boxing	23.12	47		11		6		64
X-Country Skiing	23.88	2		3	2		2	9
Cycling	25.80			2	1	1	1	5
Downhill skiing	21.75			1	1	2		4
Field hockey	21.33				1		2	3
Figure skating	21.50				2			2
Football	22.33	2		58		6		66
Golf	25.80			1		4		5
Gymnastics	20.50	1	1					2
Hockey	22.04	1		13		8	1	23
Karate	22.20			3	1	1		5
Rowing	20.50	1					1	2
Rugby	25.52	5		48	1	14		68
Running	24.87			3	3	1	1	8
Soccer	24.40	2	35	3	22	5	25	92
Swimming	23.84	1	4	7	10		3	25
Tennis	23.33					1	2	3
Track and field	21.85	1	2	1	2	1		7
Triathlon	26.00		1	1		1		3
Volleyball	21.39			2	6	2	14	25
Weightlifting	21.00			1	1	1		3
Wrestling	22.00					2		2
Other sports	22.61	2	1	7	4	5	10	29
Total		65	45	175	63	65	73	486

Canadian national teams (women's soccer team, men's gymnastic team, men's boxing team); and d) international teams that were competing in Ottawa area [i.e., members of the national boxing teams of Australia (n = 8), England (n = 1), Finland (n = 4), Jamaica (n = 2), Nigeria (n = 6), Scotland (n = 7), and United States (n = 3)].

Over 30 different sports were represented. The greatest number of athletes came from the following eight sports: a) soccer (n = 92), b) rugby (n = 68), c) football (n = 66), d) boxing (n = 64), e) volleyball (n = 25), f) swimming (n = 25), g) hockey (n = 23), h) basketball (n = 19). The largest sample (n = 175) was the "Competitive" male sample. (Table 1)

Recruitment

The tester and other collaborators contacted authorities (coaches and administrators) from national teams, and sports' clubs. The purpose of the project was explained, and the participation of the students'/athletes' was requested. A signed letter of approval by the appropriate authority was required before the questionnaire was administered. (see Appendix D) In addition, undergraduate students registered in the Human Kinetics programme of the University of Ottawa were asked to take part and complete this instrument. The tester approached professors teaching undergraduate courses and explained the purpose of the project. He requested permission to administer the questionnaire during class time at the professor's convenience.

Procedure

Subjects willing to participate were given a "Letter of Introduction" (see Appendix C) which explained the following: a) purpose of the test, b) issues related to the confidentiality of the results, and, c) issues related to the process of assessing validity and reliability of the OMSAT. Upon reading the Letter of Introduction, subjects were asked if they had any questions. Once all questions were addressed, subjects were handed the OMSAT questionnaire for completion.

A class of 64 undergraduate students from the School of Human Kinetics, University of Ottawa was also asked to participate in a re-test portion of this study. The re-test was necessary for the evaluation of test-retest reliability. Subjects were re-tested nine days after the initial administration of the test.

CHAPTER IV

RESULTS

The analysis portion of this study is divided into two sections. Section A analyses every item of the questionnaire in terms of statistical properties and meaningfulness i.e., clarity of its questions. This section concludes its findings by recommending a condensed version of the OMSAT questionnaire. Section B, analyses the reliability and validity of the revised OMSAT instrument. This section is concluded with an explanation of why the condensed OMSAT version is the better instrument for measuring mental skills abilities in athletes.

SECTION A

The main purpose of this section was to report the results of item analysis from each question on the OMSAT. In order to do this task, a number of statistical analyses were performed.

1. correlation matrix between the 14 independent OMSAT scales.
2. frequency distribution of the scores within each scale.
3. item total correlation for each scale, and
4. internal consistency of each scale.

Each of these will be discussed separately.

Correlation Matrix - 14 Scales

Table 2 was constructed for the purpose of indicating the

Table 2

Correlation Matrix - 14 scales

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	1	0.45	0.69	-.15	-.28			0.47	0.55	-.03			0.49	
2	0.45	1	0.45		-.25	0.42				-.05				
3	0.69	0.45	1		-.14		0.45		0.42					
4	-.15	0.07	0.03	1	0.72			-.06	-.04	0.72	0.56			-.08
5	-.28	-.25	-.14	0.72	1	-.06		-.15	-.07	0.65		-.02	-.14	
6	0.39	0.42	0.37	0.21	-.06	1		0.51	0.51		0.41			
7	0.27	0.25	0.45	0.31	0.16	0.39	1							
8	0.47	0.33	0.37	-.06	-.15	0.51	0.35	1	0.79					0.52
9	0.55	0.33	0.42	-.04	-.07	0.51	0.38	0.79	1			0.42	0.65	
10	-.03	-.05	0.16	0.72	0.65	0.23	0.38	0.07	0.12	1	0.46			
11	0.12	0.37	0.26	0.56	0.28	0.41	0.36	0.21	0.16	0.46	1			
12	0.37	0.27	0.32	0.05	-.02	0.32	0.33	0.39	0.42	0.05	0.31	1	0.49	
13	0.49	0.16	0.31	-.08	-.14	0.29	0.29	0.52	0.65	0.09	0.09	0.49	1	
14	0.18	0.16	0.19	0.06	0.01	0.35	0.38	0.28	0.31	0.15	0.22	0.19	0.18	1

Boldface: scales strongly correlated (larger numbers)

scales negatively correlated (smaller numbers).

correlation matrix for the 14 independent scales of the OMSAT questionnaire. This analysis indicated patterns of strong correlation, no correlation and negative correlation between the scales. The most significant of the correlated items were Stress Reaction scale with Fear and Focus scales. The reason for this strong correlation is due to all three of these scales being negatively correlated to their scores. After analysing every question, it was found that some scales were constructed such that items were negatively correlated to the scores within that scale. For example, in Q51. "There are a number of things in my sport which are potentially dangerous and make me afraid", a low score was desirable. The remaining scales had items positively correlated to their scores within the scale. For example, in questions like Q12 "I believe that I have the personal capacity to reach my goals", a high score was desirable.

Four other strongly correlated scales are Competition Planning, Mental Practice, Imagery, and Goal-setting scales. This could have been expected given that all four of these components deal with issues related to planning or mentally preparing for an athletic competition. Commitment, Belief and Goal-setting scales were also strongly correlated, which gives support to the theoretical framework of the OMSAT. Other scales exhibiting a lesser degree of correlation can be found in Table 2.

The purpose of this analysis was to verify if there were any inconsistencies between the theoretical framework employed in developing the OMSAT, and results obtained from statistical analysis. In conclusion, correlation analysis provided good support for the theoretical framework and concepts upon which the

OMSAT questionnaire was developed. It demonstrated empirically that the items were developed in a manner consistent with Orlick's (1992) heuristic model of excellence. It was likely however, that out of the 113 questions there were some items which did not meaningfully contribute to the OMSAT questionnaire. Further analysis was needed to identify such questions. This analysis was initiated by completing a frequency distribution of each item, followed by an item analysis of each question.

Frequency Distribution of Each Item

The frequency distribution of scores for each item of the questionnaire were analysed from the data obtained from the 486 subjects that participated in this study (Annex 1). Questions with normally distributed scores were regarded as statistically meaningful. A normal distribution of scores was preferred to a skewed one because it reflected the pattern expected by the researchers. The researchers opted for a Likert-like scale and expected a normal distribution of scores because in that way it was possible to assess a broad range of ability levels of athletes. Questions exhibiting a normal distribution of scores are represented in boldface numbers in Annex 1.

Ex: Question 4 has a normal distribution of scores, while Question 6 has scores very positively skewed.

This annex also shows the frequency with which subjects chose a "don't know" option. This was a helpful index because it provided information about the clarity of a question. Questions with high scores on this option indicated one of two things. First, subjects had difficulties with these questions because they

were unclear and therefore hard to answer. Second, the subjects were unfamiliar with the concepts addressed in these questions.

Item Analysis

Nunally (1978), indicated that some items of the questionnaire contribute to the reliability of the questionnaire, while others do not. The purpose of item analysis was therefore, to identify items of the questionnaire which exhibited low degrees of reliability. In order to identify such questions with low reliability, scores obtained from the 486 subjects were further analysed in the following procedures:

1. item-total correlation for each scale, and
2. internal consistency estimate of reliability

The results obtained from the above analyses were tabulated and entered into Annex 3.

Internal Consistency of Each Scale

Internal consistency (alpha) is an estimate of reliability and refers to the degree to which questions within a given scale correlate. If questions from a scale are correlated, that scale indicates high levels of internal consistency. An alpha level of .80 is considered to be meaningful statistically (Nunally, 1978). However, alpha is also affected by the number of items. As Nunally stated, if the measure of internal consistency proves to be very low then either the scale is too short or the items have very little in common. To investigate whether the items have much in common, the item-total correlation needs be computed. An item with a small item-total correlation shares little in common with the

other items.

Annex 3 summarises information on internal consistency and item-total correlation for each question separately. The "Alpha if item deleted" column identifies questions that were less correlated to other questions within their given scales. Removing poorly correlated items increases alpha levels for these scales. The "Item-total correlation" column indicates items that share little in common with other items from their respective scales.

Each of the 113 questions was thus analysed for contribution to the overall alpha level of their scales. The 14 scales indicated the following:

- Scale 1 - Goal-Setting. All items of this scale were well correlated. The questions indicating the lowest item-total correlation were Q2, and Q8.
- Scale 2 - Belief. Alpha levels of this scale were very low, indicating that questions making up this scale did not exhibit good internal consistency. The item-total correlation indicated that Q16, Q20, Q21, Q22, and Q24 had very little in common with the other questions of this scale.
- Scale 3 - Commitment. Correlation on the majority of these items was high. Two questions (i. e., Q29 and Q32) were identified as sharing little in common with the other items of this scale.
- Scale 4 - Stress Reactions. Overall, this scale indicated an acceptable internal consistency. Three questions Q39, Q40, and Q47, were identified as sharing

little in common with the other items of the scale.

- Scales 5 - Fear; Scale 6 - Relaxing; Scale 7 - Energizing; and Scale 9 - Mental Practice. In each of these scales, there was one question which did not correlate with the others questions in their respective scales. These questions were: Q55 on scale 5; Q60 on scale 6; Q61 on scale 7; and Q80 on scale 9
- Scale 8 - Imagery. This scale indicated a high degree of correlation among items.
- Scales 10 - Focus; and Scale 12 - Simulation. These scales showed a low internal consistency because there were too few items in each scale (i.e. five items in scale 10, and three items in scale 12). The items with the least in common with other items from their scales were Q82 in scale 10, and Q93 in scale 12.
- Scale 13 - Competition Planning. Items of this scale indicated an acceptable level of internal consistency. Question 99 exhibited the least in common with other items.
- Scale 14 - Team Dynamics. This scale exhibited a low degree of internal consistency. The values which appear in the item-total correlation column ranged from $-.29$ to $+.52$ which indicated little in common between items making up this scale. Questions that had the least in common with the other items were Q106, Q107, and Q114.

In conclusion, Annex 3 provided specific statistical information of the OMSAT questionnaire in terms of item-total correlation and internal consistency estimates of reliability. Internal consistency estimates of reliability examined the intercorrelation of items within each scale. The item-total correlation examined if items from a given scale were correlated.

Criteria Analysis

The information obtained from Annexes 1 and 3 was further analysed by three different researchers. The researchers discussed and analysed every question separately and developed a criterion for additional analysis of the results. More specifically, data was analysed from five different perspectives which were: a) clarity and meaningfulness of the question; b) frequency distribution of each item; c) frequency of "don't know" responses for every question; d) logical "don't know"; and e) internal consistency estimates of reliability. The decision to eliminate a question was reached by three researchers, after having analysed a question from each of these five different prospective. As a result, 43 of the original 113 questions were dropped. The largest cut was made in scale 14 where the whole scale was eliminated for the reason that it addressed four different concepts. Another scale, Scale 12 (Simulation) was combined with Scale 9 (Mental Practice) because they both appeared to address related concepts. The conclusions of these analyses are also summarised in Annex 4. It is recommended however, that Annexes 1, 2, and 3, be reviewed for pertinent information before going on to Annex 4. Annex 4 contains specific information and indicates the steps taken to

analyse every question individually.

The first column of Annex 4 assessed clarity and meaningfulness of every question. Each question was reviewed and analysed for both meaning and clarity by the three researchers. At least two of them had to agree that a question was unclear or lacked meaning before it was designated as unclear. Annex 2 was developed in part to provide further explanation as to why some questions were dropped. Questions with apparently acceptable statistical properties were eliminated from the questionnaire if they did not add new information. An analysis of each question is provided in Annex 2.

The second column of Annex 4 summarises Annex 1 in that it provides a general description of the distribution of scores for each question. Abbreviations were used to describe the distribution of scores for each item. An explanation of the abbreviations are provided at the bottom of Annex 4.

The third column indicates the number of times that a question was answered as "don't know". This column was further analysed and discussed in reference to the next column. Questions that had a five percent or greater average of "don't know" responses were considered for elimination from the questionnaire. The higher the percentage of "don't know" responses, the more likely it was that a particular question would be eliminated.

The fourth column indicates questions that were consistently responded with "don't know". In further analyses, it was found that some questions were worded in such a way that a "don't know" answer was appropriate. Ex: Q14 "I believe that the persons who are working with me to achieve my goals are as committed as I am."

Forty-three subjects scored "don't know". It appears realistic to believe that subjects truly did not know, or could not be certain of knowing, whether people helping them were as committed as the athletes were themselves. Therefore, a "yes" response to questions that could have logically been answered with "don't know", were regarded as possible misinterpretations and were recorded in this column.

"Low" responses in the fifth column represents items which have low internal consistency. If removed, the alpha level increases for that scale. By increasing the alpha level of a scale, the internal consistency also improved.

The sixth column of this annex summarises the analysis and specifies which of the 113 questions are retained in the questionnaire. The criteria for removing a question was if it exhibited two or more weaknesses in any of the five different prospective from which it was analysed in Annex 4. Two or more of the researchers had to recommend that a question be eliminated before it was dropped. Annex 2 provides more information about the elimination or retention of all questions.

The last column indicates questions that were regarded as problematic and needed to be further analysed. These questions did not meet all requirements and further analysis of the results obtained would indicate whether their presence is warranted in the OMSAT.

SECTION B

The new version of OMSAT is made up of 12 scales and 71 questions (Appendix E). The following analyses were performed on the new condensed version:

1. item-total correlation for each of the 12 scales.
2. test-retest reliability.
3. mean scores and standard deviations of each item.
4. correlation matrix of the 12 scales
5. stepwise discriminant analyses.

To summarise the above analyses, four tables were constructed. These tables are Table 3, 4, 5, and 6.

Reliability

Table 3 summarises specific information regarding the reliability of the condensed version of the OMSAT questionnaire. It addresses the following: a) internal consistency of each scale if individual items were removed, b) item-total correlation within scales, c) internal consistency coefficients for each scale, and d) test-retest reliability coefficients for each scale. The first column indicates which of the questions were kept in the new version of OMSAT. It also provides information about the number of items in each scale.

The second column of Table 3 indicates internal consistency if individual questions were removed from a given scale. Questions that had less internal consistency than the other questions of their scale received high values in this column. For example, the question exhibiting the lowest internal consistency of scale 1 was

Table 3
Internal consistency estimate and Test-retest reliability

Scale & Question number	Alpha level if item deleted	Item-total correlation within scale	Internal Consistency/ Scale alpha	Test-retest reliability for scale
Scale 1				
Q1	.77	.58	ALPHA = .8080	r = .819
Q4	.77	.58		
Q5	.79	.50		
Q7	.77	.61		
Q8	.82	.47		
Q9	.75	.67		
Scale 2				
Q11	.77	.58	ALPHA = .8059	r = .784
Q12	.77	.60		
Q13	.79	.44		
Q15	.77	.54		
Q17	.76	.61		
Q18	.76	.60		
Q19	.80	.40		
Scale 3				
Q25	.84	.60	ALPHA = .8635	r = .894
Q26	.83	.71		
Q27	.83	.72		
Q28	.84	.68		
Q30	.86	.38		
Q31	.86	.44		
Q33	.85	.44		
Q35	.85	.48		
Q36	.85	.54		
Q37	.84	.67		
Scale 4				
Q41	.86	.43	ALPHA = .8666	r = .806
Q42	.83	.74		
Q43	.84	.70		
Q44	.85	.56		
Q45	.83	.70		
Q48	.86	.51		
Q49	.84	.66		
Q50	.84	.63		
Scale 5				
Q51	.84	.63	ALPHA = .8591	r = .704
Q52	.79	.80		
Q53	.79	.80		
Q55	.89	.40		
Q56	.80	.76		

Scale 6				
Q57	.76	.70	ALPHA = .8366	r = .673
Q58	.72	.75		
Q59	.83	.63		
Scale 7				
Q62	.79	.46	ALPHA = .7992	r = .761
Q63	.75	.60		
Q64	.71	.72		
Q65	.76	.57		
Q66	.77	.55		
Scale 8				
Q67	.80	.68	ALPHA = .8444	r = .853
Q69	.80	.69		
Q72	.82	.62		
Q73	.79	.70		
Q74	.83	.56		
Scale 9				
Q76	.80	.57	ALPHA = .8303	r = .834
Q77	.80	.61		
Q78	.79	.63		
Q79	.80	.63		
Q80	.82	.45		
Q91	.81	.56		
Q92	.81	.51		
Q93	.82	.47		
Scale 10				
Q81	.73	.60	ALPHA = .7843	r = .687
Q82	.78	.42		
Q83	.72	.62		
Q84	.70	.65		
Q85	.76	.50		
Scale 11				
Q86	.77	.62	ALPHA = .8183	r = .753
Q87	.74	.69		
Q88	.78	.61		
Q89	.77	.62		
Scale 12				
Q94	.74	.63	ALPHA = .8004	r = .739
Q95	.72	.71		
Q96	.77	.54		
Q98	.76	.58		
Q99	.79	.46		
Legend. Scales (from 1 to 12): 1 = (Goal Setting); 2 = Belief; 3 = Commitment; 4 = Stress Reactions; 5 = Fear; 6 = Relaxing; 7 = Energising; 8 = Imagery; 9 = Mental Practice; 10 = Focus; 11 = Refocus; and 12=Competition planning				

Q8. If this question was eliminated, the internal consistency of this scale (the alpha level) would increase to .82. The question indicating the lowest level of internal consistency of scale 2 was Q19. If this question was deleted from the scale, the alpha level would increase to .80. More information regarding internal consistency of the remaining scales is provided in the second column of Table 3.

The third column indicates the correlation, or relatedness of questions that make up a given scale. A low value of individual items in this column indicates that these items have little in common with all the other items from their respective scales. For example, Q8 of scale 1; Q 13 and 19 of scale 2, have lower values than other items within their scales, which means that these items have little in common with all other items of their scales.

The fourth column was computed to provide an overall internal consistency estimate of reliability (alpha level) for each of the 12 scales separately. The resultant alpha level coefficients for each of these scales indicates high values in almost all scales. The highest alpha levels were obtained on scale 4 (alpha = .8666), scale 3 (alpha = .8635), and scale 5 (alpha = .8591). The lowest level of alpha was obtained in scale 10 (alpha = .7843), and scale 7 (alpha = .7992). The remaining scales had alpha levels ranging between .8004 to .8444.

The last column provides information regarding the results obtained for each of the 12 scales following test-retest reliability analysis of 64 subjects. The smallest coefficients of reliability values were obtained on Scale 6 (Relaxing) and Scale 10 (Focus). The obtained coefficients of reliability were $r =$

.673. and $r = .687$ respectively. All other scales indicated a correlation coefficient of above .70. Five of the 10 remaining scales had a correlation coefficient above .80.

Mean Score Differences Between Levels of Athletes

Table 4 was developed to assess whether the condensed version of the OMSAT differentiated between elite, competitive, and recreational athletes in terms of mean scores. It provided specific information about how the different levels of athletes scored on each of the 12 scales. The first column of the table represented the 12 mental components that were addressed. The following three columns provide the mean scores that were obtained from elite (column 2), competitive (column 3), and recreational (column 4) athletes. Column 5 indicates the average mean obtained from all of the three levels. Column 6 provides the results obtained from performing a one-way analysis of variance (ANOVA) on the three different levels of athletes.

Column 7 indicates the results obtained from performing a Tukey-HSD test to assess whether differences between the three levels of athletes were statistically significant at $p < .05$ level. The differences identified as being statistically significant are entered in this column. For example on the goal-setting scale, elite athletes scores were statistically higher than competitive athletes scores, which in turn were statistically higher than recreational athletes scores. Overall this table provides comparative ratings of the probability of each scale for differentiating between elite, competitive and recreational athletes.

Table 4

Mean Scores Differences Between Elite, Competitive
and Recreational Athletes.

	SCALES	ATHLETIC LEVEL				ANOVA level	TUKEY-HSD p < .05
		Elite	Compet.	Recreat.	T.mean		
	A	B	C	D	E	F	G
1	Goal-setting	3.84	3.33	3.06	3.41	< .0000	E > C > R
2	Belief	4.17	3.88	3.76	3.94	< .0000	E > C & R
3	Commitment	4.1	3.65	3.22	3.66	< .0000	E > C > R
4	Stress React.	3.35	3.49	3.41	3.42	< .3781	---
5	Fear	4.23	4.03	3.61	3.96	< .0000	E > C > R
6	Relaxing	3.27	3.16	3.17	3.2	< .4896	---
7	Energising	3.69	3.57	3.47	3.58	< .0590	E > R
8	Imagery	3.63	3.53	3.29	3.48	< .0116	E & C > R
9	Mental Pract.	3.33	3.21	2.89	3.14	< .0000	E & C > R
10	Focus	3.33	3.31	3.17	3.27	< .1866	---
11	Refocus	3.32	3.27	3.17	3.25	< .2844	---
12	Competition Pl.	3.38	3.13	2.81	3.11	< .0000	E > C > R

Correlation Matrix - 12 Scales

The correlation matrix performed on the new version of the OMSAT questionnaire reveals information related to the level of significance between the correlation of the 12 scales. In addition, it pinpoints major correlations between scales which appears in the upper part of Table 5.

Goal-setting scale is shown to correlate strongly with Belief, Commitment, Mental Practice, and Competition Planning scales. It is logical that these scales are correlated because if athletes are committed to their sport, and plan the competition by using mental techniques, then they also have to set goals for implementing these techniques. Two other scales which indicate a strong correlation are Imagery and Mental Practice scales. Since Mental Practice is a component of Imagery, it was therefore logical that these two scales were strongly correlated. One scale that is negatively correlated with almost all other scales is the Fear scale. The reason for this is that this scale has items negatively correlated to their scores. Additional results of the correlation matrix appear in Table 5.

Table 5

Correlation Matrix - 12 Scales

	1	2	3	4	5	6	7	8	9	10	11	12
	A	B	C	D	E	F	G	H	I	J	K	L
1	1	0.51	0.61		-.099				0.55			0.49
2	0.51	1	0.59				0.51		0.41			
3	0.61	0.59	1		-.108		0.49		0.53			0.43
4	-.030	0.24	0.095	1	0.64					0.61	0.55	
5	-0.099	-.011	-.108	0.64	1					0.47		
6	0.21	0.37	0.22	0.36	0.091	1						
7	0.39	0.51	0.49	0.24	0.099	0.35	1		0.47			
8	0.38	0.38	0.36	0.114	0.084	0.18	0.36	1	0.64			0.42
9	0.55	0.41	0.53	0.066	0.023	0.25	0.47	0.64	1			0.59
10	0.092	0.22	0.17	0.61	0.47	0.24	0.32	0.15	0.16	1	0.49	
11	0.091	0.31	0.15	0.55	0.39	0.36	0.26	0.19	0.126	0.49	1	
12	0.49	0.32	0.43	0.012	-.059	0.14	0.39	0.42	0.59	0.097	0.17	1

Bolface. Top: Strongly (large numbers), and negatively correlated (small numbers) scales

Bottom: Significance level .01 (large numbers)

Significance level .05 (small numbers). Two - tailed.

Discriminant Analysis Between Levels of Athletes

Table 6 indicates which of the scales are responsible for differentiating between the three different levels of athletes. The stepwise discriminant analysis was performed for the purpose of identifying the scales that were most significant in differentiating between the three levels of athletes. Analyses were performed on the following groupings:

a) Elite vs. Recreational Athletes.

Scales were rated in terms of significance in differentiating between elite and recreational athletes. As indicated in Table 6, the Commitment scale was the most significant factor in distinguishing between these two categories. Goal-setting appeared as the second most significant distinguishing factor followed by the remaining scales in this order of significance: Belief, Mental Practice, Fear Imagery, Competition Planning, Energizing, Refocus, Relaxing, Focus and Stress Reactions (Wilks lambda = .5497, $p < 0.001$).

b) Elite vs. Competitive Athletes.

Scales were rated in terms of significance in differentiating between elite and competitive athletes. Once again, the Commitment scale was the most significant factor in distinguishing between these two categories. This was followed by Goal-setting, Belief, Energizing, Fear, Relaxing, Mental Practice, Refocus, Stress Reaction, Competition Planning, Imagery, and Focus in this order. (Wilks lambda = 0.7930, $p < 0.001$).

Table 6

Discriminant analysis for elite, competitive, and recreational athletes

LEVELS

SCALES		ELITE vs RECREATIONAL	ELITE vs COMPETITIVE	COMPETITIVE vs RECREATIONAL
	A	B	C	D
1	GOAL-SETTING	2	2	3
2	BELIEF	3	3	6
3	COMMITMENT	1	1	1
4	STRESS REACTIONS	12	9	10
5	FEAR	5	5	7
6	RELAXING	10	6	12
7	ENERGIZING	8	4	11
8	IMAGERY	6	11	2
9	MENTAL PRACTICE	4	7	4
10	FOCUS	11	12	8
11	REFOCUS	9	8	9
12	COMPETITION PL.	7	10	5

Boldface: order in which the first five mental components (scales) differentiated between elite, recreational, and competitive athletes.

c) Competitive vs Recreational Athletes.

Scales were rated in terms of significance in differentiating between recreational and competitive athletes. As in the previous two comparisons, the Commitment scale was the most significant factor in distinguishing between these two categories. This was followed by Imagery, Goal-setting, Mental Practice, Competition Planning, Belief, Fear, Focus, Refocus, Stress Reaction, Energizing, and Relaxing in this specified order. (Wilks lambda = 0.8227, $p < 0.001$).

Two interesting findings were observed as the result of this analysis. First, it was found that the level of commitment was the most important component for differentiation between elite, competitive, and recreational athletes and was chosen by the discriminant model as the first component of discrimination. The second finding relates to the order in which goal-setting, belief, and commitment scales were entered in this discrimination analysis. These three components were entered early on for the first two comparisons (elite vs competitive, and elite vs recreational athletes). However, for the third comparison (competitive vs recreational), commitment and goal-setting were entered early, but belief was entered much later.

CHAPTER V

DISCUSSION

The OMSAT is a result of extensive research carried out at the University of Ottawa by a group of researchers working in the area of mental training in sport. The project was initiated two years ago and the questionnaire since that time has continuously been refined. Originally, several well known psychometric measurement devices reported by Seiler (1992), and used in the area of sport over the past decade (i.e., TAIS, PSIS, AMI, SCAT, CSAI) were analysed and the best features were incorporated into the OMSAT. A review of the literature was conducted (Orlick 1980, 1986, 1993; Mahoney 1989; Mahoney, Gabriel & Perkins 1987; Nideffer 1976, 1987; Seiler 1992; Vealey 1988), and pertinent findings relative to mental skill training for sport were also considered in developing the OMSAT. In conclusion, it is felt that the OMSAT questionnaire is based upon a strong theoretical foundation and is worthy of further investigation as a psychometric measuring device for mental skills in sport.

Results of this investigation indicated that a shorter version of the OMSAT would be advantageous. Section A of the Analysis focused on identifying questions deemed to be "poor" by the researchers. These were considered to be questions that: a) were unclear, b) were comprised of multiple questions, c) did not add any new information to the questionnaire, and d) were frequently responded to with "don't know". A total of 42

items were eliminated.

Section B of the Analysis section focused on analysing the condensed version of the OMSAT. The correlation matrix performed indicates that the scales empirically supported the theoretical model of essential mental components upon which the OMSAT was based. The following statistical procedures were used to assess reliability: internal consistency estimates of reliability and test-retest reliability. All of the 12 scales demonstrated acceptable levels of test-retest reliability. The coefficients of test-retest reliability range from .673 to .894. This is considered to be a good indicator that the OMSAT questionnaire was reliable. The other statistical procedure used to assess reliability was internal consistency (alpha) estimates of reliability. The values obtained for internal consistency range from .784 to .866. These values are considered to be good indicators of reliability (Nunnally 1978).

From the results obtained from the analysis, it can be stated that this questionnaire is a reliable psychometric measurement tool. Thomas and Nelson (1990) stated, "a test can be reliable but not valid, but it could never be valid if it were not reliable" (p. 343). However, as Bruno and Hubley (in press) suggested "reliability and validity should not be considered distinct concepts", and that "reliability is not a precursor of validity, but an integral aspect of it" (p. 23). Therefore the reliability obtained on the OMSAT questionnaire does not guarantee validity but provides support to it. Since validity is a more complex concept to measure, a discussion of the OMSAT's validity would be premature at this stage. A comprehensive assessment of validity

would require adequate testing over time and a larger sample of subjects than was utilised in this investigation. One step in the assessment of validity of the OMSAT was to look at mean score differences between elite, competitive and recreational athletes to verify if these groups exhibited any significant statistical differences. The one way analysis of variance ANOVA indicated that the elite athletes scored higher than the recreational athletes who in turn scored higher than recreational athletes in six of the twelve scales. The Tukey-HSD test found significant differences ($p < .05$) in eight of the twelve scales.

The last statistical procedure employed with the new version of the OMSAT was a stepwise discriminant analysis. The results of this analysis indicated which of the OMSAT's scales were the most significant in terms of differentiating between athletes of different levels.

Overall the last two statistical investigations indicated that the new version of the OMSAT has the potential to differentiate between the three levels of athletes (elite, recreational and competitive). Furthermore, as the subjects used in this investigation were further classified in terms of age, sport, gender, and nationality, another possible use of the OMSAT is to obtain a comparison of an individual personal profile with any of these different groups. What was somewhat more perplexing was the inability of certain well documented skills, such as reaction to stress, relaxing, focusing and refocusing, to discriminate between ability levels in sport. More research is required to examine the nature of these items on the OMSAT.

In conclusion, use of the condensed version of the OMSAT

questionnaire may be helpful in the assessment and implementation of mental skills training in sport. More specifically, it may be useful for: a) obtaining individual psychological profiles of athletes; and b) determining individual athletes areas of need which may warrant additional or remedial mental skills training.

Limitations

The results of this investigation revealed both areas of strength, and areas of weakness with the OMSAT questionnaire. One area of weakness relates to the sampling employed in this project. The sample did not contain equal numbers of elite, competitive and recreational athletes. In addition, it did not have equal representation of all sports (i.e., equal number of athletes in each sport, equal number of elite, competitive, and recreational athletes in each individual sport). Given these limitations, the results obtained in the comparative analyses should be interpreted with caution.

Another major area of concern pertains to the method of data collection. Questionnaires are used to obtain information by asking subjects to respond to questions. They are by nature, subjective in that questionnaires indicate only "what people say they do, or what they say they believe, or like or dislike" (Thomas & Nelson, 1990 p. 263). It is difficult to determine whether subjects have answered honestly. Subjects may also have a tendency to purposefully or unconsciously answer questions in a manner that will make themselves appear more favourable. Another possibility that exists is that subjects may complete the questionnaire without giving it adequate thought and attention,

their purpose being just to "get it done" to please the researcher. Assumptions of validity of inferences concluded from questionnaires are therefore limited. As the OMSAT makes use of a questionnaire type of format, results must be interpreted with caution.

After having administered the questionnaire to 486 subjects, some subjects reported that the OMSAT was too long. It was suspected that many subjects found that it took too much of their time to complete, and in fact several comments of this nature were received by the researcher. Due to its length, it was possible that subjects were rushing through the questionnaire and answering items haphazardly. Even if subjects intended to answer all questions carefully, it is plausible that they could have lost their focus towards the latter part of the questionnaire. This in turn could have a strong influence on the results, swaying the outcomes one way or another.

Some questions on the OMSAT were found to actually be comprised of several questions. For example, Q34 was, "I put in extra time for mental and physical preparation before, after, or between regular practice sessions. This question addressed both mental and physical preparation, yet forced subjects to respond to them as the same thing. In addition, the question also addressed three separate time frames (i.e., before, after and between practice sessions) which should be addressed separately. It is quite possible that subjects became confused and even frustrated when attempting to respond to single questions which actually contained multiple questions.

Two major changes were undertaken to enhance the overall

objectivity of the OMSAT questionnaire. First, in response to the lengthiness of the original OMSAT, based upon an item analysis a condensed version was constructed. This has helped to eliminate the major problems identified with the length of the original version. Second, questions actually comprised of multiple questions were removed in attempt to make the questionnaire straightforward to answer and less confusing for subjects.

As already alluded to, there are some limitations of using a questionnaire as a method of measurement. One of the primary limitations is that information gleaned from such sources is only what subjects say they do, believe, like or dislike. On the other hand, "there is certain information which can only be obtained in this manner" (Thomas & Nelson, 1990, p. 263). This is true of the OMSAT questionnaire which attempted to gain information about the way in which athletes perceived their own mental skill abilities.

Conceptual Utility

The assessment of mental skills has been central to research in sport psychology (Mahoney, Gabriel & Perkins, 1987, Nideffer, 1976, Orlick, 1992). Orlick has perhaps provided the most conceptually coherent overview of the necessary mental skills used by athletes. His overview is based upon over 20 years of consultation with elite performers, not just in sport but also in other fields of achievement.

The OMSAT was created using this conceptual base and has expanded upon certain underlying assumptions. One example is Orlick's contention that belief and commitment were core skills which formed the central hub of five other spokes which were more

peripheral, and presumably less important for successful performance.

The concepts of belief and commitment implicitly assume that these skills are directed to a target behavior. Belief in what? and commitment to what? can be made explicit by introducing goal-setting as another mental skill component. For this reason, goal-setting was created as another skill with the intent of assessing its conceptual nature as related to Orlick's core mental skills.

Discriminant analysis revealed that goal-setting was an independent factor from belief and commitment, and was not as good a discriminator of athletes of different skills as was the commitment. It was found, however, that the goal-setting component was better than the belief component as a discriminator between different levels of athletes. Thus, the OMSAT empirically supported Orlick's contention of belief and commitment but suggested that other factors such as goal-setting should be made explicit in such a model.

A generally accepted view in psychology is that human beings are made up of three major components, i.e., behavioral, affective and cognitive. These three components are also reflected in the OMSAT. For example Mahoney, Gabriel and Perkins, 1987, referred to an affective modulating component such as relaxation which was implicit in Orlick's (1993) full focus component. Not only did OMSAT include the downward modulation of affect through relaxation, but also an upward directed component of energizing. Both skills were relatively important in differentiating athletic ability levels. It is also of some interest that factors such as fear and competition planning which do not appear on most

instruments are also good predictors of athletic ability. More research on these factors is needed. In regards to the criticism by Chartrand et. al's (1992) to the psychometric nature of the PSIS, the OMSAT's internal consistency of the reduced scales is acceptable. However, the factor structure requires further study.

CONCLUSION AND RECOMMENDATIONS

The answer to the question "how does the mind interact with the body?" remains elusive. This project however, integrated knowledge from a large number of sport psychology experts (i.e., Anshel 1987; Grove & Manrahan 1988; Mahoney 1989; Mahoney, Gabriel & Perkins 1987; Orlick 1980, 1986, 1992; Seiler 1992; and Valey 1988) on the topic of mind-body interaction. The knowledge provided by these researchers was assimilated and used to help answer the following questions. Which terms in reference to mind-body interactions were most frequently used by researchers? Which of the mental components frequently alluded to in the literature were considered to be essential to excellence in performance?

Throughout the development of the OMSAT, terminology was employed that was consistent with the majority of sport psychology researchers reviewed in the literature. Mental components previously identified as essential to excellence in performance were included in the original version of the OMSAT. Each mental component was assessed to determine whether it significantly contributed to athletes overall athletic profiles. Fourteen mental components were considered to be essential for successful performance in sport. These components were utilized to make up the framework of the OMSAT questionnaire. The questionnaire has

indicated good psychometric results and is further expected to help researchers understand more about the interactions between the mind and the body.

The revised version of the OMSAT has potential to be a useful measuring device for assessing mental skill levels for athletes. The analyses performed have indicated meaningful and consistent statistical results. Even though additional subjects need to be tested before firm conclusions about the questionnaire can be reached, these preliminary findings indicate the following: a) partial support for Orlick's heuristic model of excellence; and b) new orientations for a theoretical framework of other components advanced in the OMSAT questionnaire.

At present, use of the condensed version of the OMSAT is limited to comparing one athlete's personal profile to the personal profiles of other athletes. This comparison is useful for athletes who want to rate themselves against others in terms of mental skills. This can yield information about an athlete's mental skill strengths and needs in comparison to other athletes, and provide direction for further mental skills training.

Development of additional versions of the OMSAT may be warranted. Two new versions may address the following: a) aspects of psychological training that have not been addressed in the present version (i.e., team dynamics); b) use of specific questionnaires as teaching tools to help athletes self-identify and remediate areas of mental weakness. (i.e., the don't know option kept, and used to obtain measures of how familiar individuals are with specific psychological concepts).

The OMSAT instrument was constructed on a solid foundation

which will allow for expansion of additional approaches to be used in mental skill assessment. In the future, the OMSAT has potential to be used not only as a diagnostic tool, but also as a teaching/training tool for athletes.

The "don't know" option used in the OMSAT questionnaire has proven to have some unexpected benefits. More specifically, it provides sport psychologists with information regarding the extent to which athletes are familiar with specific psychological concepts. It also identifies areas which may need to be addressed in remedial mental skills training. For these reasons then, it is important for the "don't know" option to be retained in the questionnaire.

This investigation raises an interesting question. As already indicated, there are three mental components that are highly correlated and are identified as being essential in differentiating between elite, competitive and recreational athletes. These three components are Commitment, Goal-setting and Belief. From this investigation alone, it is impossible to determine whether there is an order of importance among these three mental components, or if they are equally important and work together as a whole unit. Greater understanding of the inter-relationships between these components could be helpful and have some potential practical application in the mental skill training of athletes. This is an area of mental skill training that future research could address.

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ANNEX 1

Frequency Distribution of Each Item

SCALES	A	"D. K."	"Never"	"Sometimes"			"Always"
		0	1	2	3	4	5
		B	C	D	E	F	G
1		1	10	67	145	133	130
2		24	4	19	102	177	160
3		46	42	83	136	106	73
4		5	43	111	161	98	68
5	SCALE 1	3	16	40	136	177	114
6	GOAL SETTING	4	222	85	83	47	45
7		6	7	32	108	171	162
8		5	83	121	130	82	65
9		9	48	118	154	101	56
10		10	96	120	121	89	50
11		5	8	23	96	203	151
12		3	1	12	46	203	221
13		5	9	41	104	167	160
14		43	12	45	145	134	107
15		4	3	30	108	202	139
16		8	37	40	67	123	211
17	SCALE 2	0	3	27	117	237	102
18	BELIEF	2	3	32	137	223	89
19		2	8	24	162	185	105
20		16	50	131	122	113	54
21		10	93	175	124	62	22
22		3	86	200	127	45	25
23		7	41	111	207	99	21
24		4	106	122	127	87	40
25		1	54	121	133	130	47
26		0	38	105	137	129	77
27		2	19	60	111	154	140
28		7	12	46	86	165	170
29		5	60	105	138	116	62
30		2	2	19	95	195	173
31	SCALE 3	4	3	32	145	202	100
32	COMMITMENT	10	24	81	183	144	44
33		6	0	15	88	192	185
34		10	36	97	165	118	60
35		4	7	51	148	187	89
36		1	8	19	109	202	147
37		4	55	121	142	111	53
38		3	44	109	141	124	65
39		3	37	122	207	96	21
40		6	53	122	188	100	17

ANNEX 1

Frequency Distribution of Each Item

SCALES	"D. K."	"Never"	"Sometimes"			"Always"
	0	1	2	3	4	5
A	B	C	D	E	F	G
41	10	47	133	162	95	39
42	3	32	78	146	172	55
43 SCALE 4	13	34	59	115	168	97
44 STRESS REACT.	15	41	63	127	148	92
45	11	43	56	82	170	124
46	24	34	36	84	166	142
47	22	24	68	125	153	94
48	23	33	27	46	95	262
49	6	42	66	130	168	74
50	10	29	62	148	166	71
51	10	20	42	96	161	157
52	9	32	23	23	113	286
53 SCALE 5	18	27	32	40	127	242
54 FEAR	35	29	34	77	124	187
55	6	24	66	125	125	140
56	11	25	27	44	143	236
57	5	20	93	197	132	39
58 SCALE 6	12	18	93	194	128	41
59 RELAXING	11	16	80	193	147	39
60	11	88	101	129	97	60
61	6	16	40	196	169	59
62	15	9	45	142	196	79
63 SCALE 7	13	18	104	170	137	44
64 ENERGIZING	17	11	60	130	192	76
65	5	14	52	194	177	44
66	5	7	12	78	197	187
67	10	9	32	131	163	141
68	38	25	93	168	110	52
69	16	13	68	126	180	83
70 SCALE 8	31	15	68	159	141	72
71 IMAGERY	29	22	55	132	157	91
72	18	31	66	107	147	117
73	20	35	59	103	169	100
74	21	63	110	130	105	57
75	47	28	73	101	139	98
76	14	96	139	155	60	22
77 SCALE 9	2	126	162	107	54	35
78 MENTAL PRACT.	7	53	87	109	120	110
79	16	44	59	135	147	85
80	19	29	72	148	135	83

ANNEX 1

Frequency Distribution of Each Item

SCALES	"D. K."	"Never"	"Sometimes"			"Always"	
	0	1	2	3	4	5	
A	B	C	D	E	F	G	
81	8	27	62	146	171	72	
82	8	17	75	223	132	31	
83	SCALE 10	5	22	88	212	134	25
84	FOCUS	16	21	64	122	171	92
85		6	34	92	200	126	28
86		5	17	83	178	141	62
87		4	22	87	170	159	44
88	SCALE 11	6	190	75	196	159	31
89	REFOCUS	4	23	82	170	163	44
90		26	17	65	215	142	21
91		13	12	31	151	197	82
92	SCALE 12	20	40	87	157	135	47
93	SIMULATION	23	39	84	136	157	47
94		7	39	80	148	129	83
95		8	46	87	131	146	68
96	SCALE 13	14	96	116	108	96	56
97	COMPETITION P.	17	74	152	157	59	27
98		21	68	103	140	119	35
99		6	53	70	124	132	101
100		18	14	10	47	139	258
101		26	7	18	66	185	184
102		30	9	19	94	178	156
103							
104		25	10	20	76	192	163
105		39	18	31	128	162	108
106	SCALE 14	28	30	89	124	144	71
107	TEAM DYNAMICS	34	44	122	130	116	40
108		41	28	47	129	171	70
109		31	20	39	134	179	83
110		29	2	14	62	169	210
111		24	2	5	40	174	241
112		26	5	9	25	151	270
113		24	3	18	107	170	164
114		28	30	39	111	158	120
115							
116							
117							
118							
119							
120							

ANNEX 2

Theoretical analysis of OMSAT

After reading and analysing the questionnaire, the three researchers have addressed the following comments:

A) Goal-setting:

- Q1. Good in most aspects. It is skewed (negatively).
- Q2. a) Unclear: - Don't know may mean "sometimes"
 - i.e. My goals in sport may or may not be achievable, and therefore "I don't know".
 b) Strongly skewed (negatively).
 c) High number of "don't know" (n = 24).
- Q3. a) Unclear: -I may have an idea of when I want to achieve those goals, but I may not necessary know the exact time in which I will achieve them.
 - "Don't know" may mean "sometimes"
 b) High number of "don't know" (n = 46).
- Q4. Good in all aspects.
- Q5. Negatively skewed.
- Q6. a) Unclear: - It doesn't make conceptual sense.
 - It is similar to Q8.
 b) Strongly positively skewed.
- Q7. Strongly skewed (negatively).
- Q8. Good in all aspects.
- Q9. Good in all aspects.
10. a) Unclear: - It may measure more than one thing.
 b) Redundant (similar to Q9)

B) Belief scale:

- Q11. Strongly skewed (negatively)
- Q12. a) Very skewed (negatively).
 b) Unclear: - It makes no conceptual sense since many subjects indicated that they aren't setting any goals.

- Q13. a) Unclear: - It is not specific enough.
b) Strongly skewed (negatively).
- Q14. a) Unclear: - Refers to another person's behaviour
and not necessary to one's own belief.
- It addresses a different type of belief.
b) Large "don't know" may mean that a subject may not
know if his/her coach is committed.
- Q15. Strongly skewed (negatively).
- Q16. a) Unclear: - It correlates negatively to the scale.
- It deals with a different type of belief
as the one discussed in the scale.
b) Eliminating the question, increases the alpha level
of the scale, as well as the factor level.
- Q17. Strongly skewed (negatively).
- Q18. Strongly skewed (negatively).
- Q19. Strongly skewed (negatively).
- Q20. Unclear: - Does not deal with our definition of belief.
- It may be measuring a different
concept/belief similar to the one assessed by
Q14, Q22, Q23, and Q24.
- It deals with a "need" rather than a belief.
- Q21. Same as Q20.
- Q22. a) Same as above.
b) It deals with a cognitive skill and not "belief".
- Q23. a) Same as Q20.
b) Deals with worrying rather than "belief".
- Q24. a) Same as Q20.
b) Unclear: - It deals with more than one concept.
- * Note: If Q:20, 21, 22, 23, and 24 are eliminated, the alpha
level would increase above .8.

C) Commitment scale:

- Q25. Very good in all aspects.
Q26. Very good in all aspects.
Q27. Negatively skewed.
Q28. Negatively skewed.

- Q29. a) Unclear: It is negatively correlated to the scale.
b) It lowers the alpha level for the scale.
- Q30. Strongly skewed (negatively).
- Q31. Strongly skewed (negatively).
- Q32. a) Unclear: - It is negatively correlated to commitment.
b) It lowers the alpha level for the scale.
- Q33. a) No new information gathered: - Similar to Q31.
b) Very skewed (negatively).
- Q34. Unclear: - It may deal with more than one component.
i.e. "I put in extra time for mental preparation"
"I put in extra time for physical preparation"
"I put in extra time before?/ after? /or between.?"
- Q35. a) Unclear: - The word "something" may not be specific
enough.
b) Negatively skewed.
- Q36. Strongly skewed (negatively).
- Q37. Very good in all aspects.
- Q38. Unclear: - It does not deal with commitment.

D) Stress Reaction scale:

- * Note: This scale is negatively correlated with its scores.
- Q39. a) Unclear: - One my fall behind in a sport, without
making any mistakes
b) Eliminating the question, the alpha level increases.
- Q40. Unclear: - One's anger and frustration may be
addressed towards himself, towards opponents,
or towards the sport he plays.
- Q41. Good in all aspects.
- Q42. Good in all aspects.
- Q43. Negatively skewed.
- Q44. Unclear: - "don't know" may mean "sometimes".
- Q45. Negatively skewed.
- Q46. a) No new information added - Similar to Q48 and Q50.
b) High numbers of "don't know" (n = 24).
- Q47. Unclear concept: - Subjects (recreational) may not
know what "burned out" in sport means.

- Q48. a) Unclear: - Similar to Q50.
 - It adds no new information.
 b) Strongly skewed (negatively).
- Q49. Very good in all aspects.
- Q50. Unclear: - It measures the same psychological component
 as do Q46, and Q48.

E) Fear scale:

- * Note: This scale is negatively correlated with its scores.
- Q51. Unclear: - It may deal with more than one component.
 i.e. "What things are dangerous?"
 "How many things?"
 "What makes me afraid?"
- Q52. a) Unclear: - It deals with more than one concept.
 i.e. "I find it difficult to train".
 "I find it difficult to compete".
 - What type of fear is involved in my sport?
- b) The scores are not normally distributed on the
 obtained frequency distribution (see Table 2A).
- Q53. a) Unclear: It is confusingly worded.
 b) Strongly skewed (negatively).
- Q54. a) Unclear:
 b) High numbers of "don't know".
- Q55. a) Unclear: - "What type/sort of things make me afraid
 if I lose?".
 b) Negatively skewed.
- Q56. a) Unclear: - It could be more specific.
 b) Strongly skewed (negatively).

F) Relaxing scale:

- Q57. Very good in all aspects.
- Q58. Unclear: - It may be measuring two different components:
 "Is it easily?"
 "Is it consciously?"
- Q59. Unclear: - What sort of moments?
 - It could be more specific as to the exact
 moments that one needs to relax.

- Q60. a) Unclear: It belongs to the "mental practice" scale.
 b) It lowers the alpha level of the scale.

G) Energising scale:

- Q61. a) Unclear: - It refers to one's feelings, and not to how one gets energised.
 b) It lowers the alpha level for the scale.
- Q62. Negatively skewed.
- Q63. Good in all aspects.
- Q64. a) Unclear: - No new information added (similar to Q63).
 b) Negatively skewed.
- Q65. Unclear: It needs be more specific:
 i.e. "Is it physically tired?"
 "Is it mentally tired?"
 "Is it both, mentally and physically tired?".
- Q66. a) Unclear: It does not relate to energising.
 b) Strongly skewed (negatively).

H) Imagery scale:

- Q67. Negatively skewed.
- Q68. a) Unclear: - Measuring this mental ability in some athletes can be problematic if these athletes have not used any mental training.
 - Athletes may not know exactly since they haven't thought about it.
 - "Don't know" may mean "sometimes".
 b) High numbers of "don't know".
- Q69. Negatively skewed.
- Q70. a) Unclear: - It applies only to athletes that have used imagery before.
 - Some other athletes were not aware of imagery's potential (for that reason, they may "don't know").
 b) High numbers of "don't know".

- Q71. a) Unclear: - Could be confusing for athletes who don't know what imagery is.
 b) High number of "don't know".
- Q72. Unclear: - If an athlete "knows" what imagery is, and if he uses imagery regularly, then he is aware of using imagery for many other purposes.
 - If he doesn't know, then he cannot answer this question.
- Q73. Unclear: - Only athletes that use imagery can answer this question.
- Q74. Unclear: - Applies only to athletes that use "imagery" as part of their "mental training".
- Q75. a) Unclear: - Some athletes may not know what adrenaline is or what it means.
 b) High frequency of "don't know".

H) Mental practice scale:

- Q76. Good in most aspects. It could be more specific:
 i.e. "What does the 'mental practice' consists of?"
 "What things, and how many things is the mental practice being made out of?"
- Q77. Positively skewed.
- Q78. Unclear: - What exactly I do in terms of mental practice (while at the same time keeping maximum performance in mind).
- Q79. Very good in all aspects.
- Q80. Unclear: - It is more of a cognitive component than a "mental practice" component.

I) Focus scale:

- * This scale is negatively correlated to the scores.
- Q81. Good in all aspects.
- Q82. Good in all aspects.
- Q83. Unclear: What sort of "certain situations" are meant?
 - There are all sorts of critical situations within a sporting event: some may require more concentration than others. It is the specific situations (also called

critical situations) which require the most "focus" that should be addressed by this question.

Q84. Negatively skewed.

Q85. Good in all aspects.

J) Refocussing scale:

* Note: This scale has two positively correlated questions (Q86 and Q90), and three negatively correlated questions (Q87, Q88, and Q89) with the scores. As a result of this, the scale has a low alpha level and more than one factor levels for its items.

Q86. Positively correlated. - Good in all other aspects.

Q87. Negatively correlated. - Good in all other aspects.

Q88. a) Negatively correlated.

b) Unclear: - It deals with two or more components:

i.e. "Unexpected mistakes lead to other mistakes during training".

"Unexpected events lead to other events (or mistakes) during training (or competition).

Q89. Negatively correlated. - Good in all other aspects.

Q90. a) Positively correlated.

b) Unclear: No new information added (similar to Q85).

c) It lowers the alpha level of the scale.

K) Simulation scale:

*Note: This scale was made up of only three questions. This low number of questions (3), affects our internal consistency (alpha level) for the scale. To correct for this, "Simulation" needs be dropped, or added to another scale. The one scale that deals with the same concept as Simulation is the Mental Practice scale. These two scales will thus be combined.

Q91. Negatively skewed.

Q92. Good in all aspects.

Q93. Good in all aspects.

L) Competition planning scale:

- Q94. Good in all aspects.
- Q95. Unclear: It provide no new information (similar to Q94).
- Q96. Good in all aspects.
- Q97. Unclear: No new information added (similar to Q91, Q93).
- Q98. Unclear: The word "also" needs be eliminated from this question.
- Q99. Good in most aspects. - It lowers the alpha level.

M) Team dynamics scale:

* Note: This scale is removed from the questionnaire for the following reasons:

1. It deals with four different concepts:

- a) Team player information (Q100, Q101, Q113 and Q114).
- b) Accepting the team (Q102, Q110, Q111 and Q112).
- c) Issues related to the coach (Q104, Q105 and Q106).
- d) Team performances (Q107, Q108 and Q109).

2. Many athletes that are involved in individual sports have chosen not to answer any question of this scale. As a result the frequency of "don't know" in this scale is very high.

ANNEX 3

OMSAT - Internal Consistency and Item-Total Correlation.

Item num.	Scales	Alpha if item deleted	Item-total correl.	Item num.	Scales	Alpha if item deleted	Item-total correl.	
	A	B	C	D	E	F	G	H
1		0.83	0.66		31	SCALE 3	0.83	0.43
2		0.85	0.41		32	COMMITMENT	0.85	0.04
3		0.84	0.58		33		0.83	0.42
4	SCALE 1	0.84	0.61		34		0.83	0.48
5	GOAL-SETTING	0.85	0.51		35		0.83	0.51
6		0.85	0.51		36		0.83	0.54
7		0.84	0.58		37		0.81	0.69
8		0.85	0.48		38		0.82	0.54
9		0.83	0.71		39		0.86	0.35
10		0.83	0.63		40		0.87	0.26
11		0.51	0.41		41		0.86	0.51
12		0.52	0.43		42		0.84	0.73
13		0.54	0.27		43		0.85	0.67
14		0.53	0.31		44	SCALE 4	0.86	0.53
15		0.51	0.47		45	STRESS REACT.	0.85	0.68
16	SCALE 2	0.63	-0.09		46		0.85	0.59
17	BELIEF	0.51	0.52		47		0.86	0.41
18		0.51	0.48		48		0.86	0.53
19		0.51	0.42		49		0.85	0.67
20		0.57	0.11		50		0.85	0.64
21		0.57	0.11		51		0.87	0.62
22		0.62	-0.17		52		0.83	0.81
23		0.55	0.23		53	SCALE 5	0.84	0.79
24		0.59	0.05		54	FEAR	0.85	0.71
25		0.82	0.63		55		0.89	0.45
26		0.81	0.72		56		0.84	0.77
27		0.81	0.71		57		0.63	0.61
28		0.82	0.68		58	SCALE 6	0.57	0.71
29		0.86	-0.01		59	RELAXING	0.63	0.61
30		0.83	0.42		60		0.83	0.29

Boldface: Items uncorrelated to their scales.

OMSAT - Internal Consistency and Item-Total Correlation.

Item num.	Scales	Alpha if item deleted	Item-total correl.	Item num.	Scales	Alpha if item deleted	Item-total correl.	
	A	B	C	D	E	F	G	H
61		0.81	0.13		91	SCALE 12	0.71	0.56
62		0.72	0.48		92	SIMULATION	0.57	0.65
63	SCALE 7	0.69	0.58		93		0.72	0.54
64	ENERGIZING	0.66	0.69		94		0.79	0.64
65		0.69	0.57		95		0.77	0.71
66		0.71	0.52		96	SCALE 13	0.81	0.55
67		0.91	0.77		97	COMPETITION PL.	0.81	0.61
68		0.91	0.63		98		0.79	0.62
69		0.89	0.79		99		0.82	0.48
70	SCALE 8	0.91	0.72		100		0.61	0.41
71	IMAGERY	0.91	0.71		101		0.61	0.41
72		0.91	0.68		102		0.62	0.36
73		0.91	0.74		103			
74		0.91	0.61		104		0.61	0.45
75		0.91	0.66		105	SCALE 14	0.62	0.31
76		0.79	0.58		106	TEAM DYNAMICS	0.69	-0.09
77	SCALE 9	0.78	0.61		107		0.71	-0.26
78	MENTAL PRACT.	0.76	0.68		108		0.61	0.38
79		0.77	0.66		109		0.61	0.36
80		0.81	0.52		110		0.62	0.36
81		0.73	0.61		111		0.61	0.52
82		0.78	0.43		112		0.62	0.31
83	SCALE 10	0.72	0.61		113		0.61	0.39
84	FOCUS	0.71	0.65		114		0.64	0.22
85		0.76	0.51					
86		0.63	0.56					
87	SCALE 11	0.58	0.67					
88	REFOCUS	0.62	0.61					
89		0.61	0.62					
90		0.82	-0.01					

Boldface: Items uncorrelated to their scales.

ANNEX 4

CRITERIA ANALYSIS

Ques. num.	Clarity	Freq. distrib.	Freq. of D.K	Logical D.K.	Internal consistency	Decision	Further evaluation
	A	B	C	D	E	F	G
1	g	sns	1			keep	
2	unclear	sns	24	yes	low		yes
3	unclear	g	46	yes			yes
4	g	g	5			keep	
5	g	ns	3			keep	
6	unclear	sps	4		low		yes
7	g	sns	6			keep	
8	g	g	5			keep	
9	g	g	9			keep	
10	unclear	g	10				yes
11	g	sns	5			keep	
12	g	ssns	3			keep	
13	unclear	sns	5			keep	yes
14	unclear	ns	43	yes			yes
15	g	sns	4			keep	
16	new conc.	sns	8		low		yes
17	g	sns	0			keep	yes
18	g	sns	2			keep	
19	g	sns	2			keep	
20	new conc.	g	16		low		yes
21	new conc.	g	10		low		yes
22	new conc.	g	3		low		yes
23	new conc.	g	7		low		yes
24	new conc.	g	4		low		yes
25	g	g	1			keep	
26	g	g	0			keep	
27	g	ns	2			keep	
28	g	ns	7			keep	
29	neg/corr.	g	5		low		yes
30	g	sns	2			keep	
31	g	sns	4			keep	
32	neg/corr.	g	10		low		yes
33	unclear	ssns	6			keep	yes
34	3 comp.	g	10	yes			yes
35	unclear	ns	4	yes		keep	yes
36	g	sns	1			keep	
37	g	g	4			keep	
38	unclear	g	3	yes			yes

Legend: ns (negatively skewed); sns (strongly ns); ssns (very sns);
ps (positively skewed); g (good, or normaly distributed)

ANNEX 4

CRITERIA ANALYSIS

Ques. num.	Clarity	Freq. distrib.	Freq. of D.K	Logical D.K.	Internal consistency	Decision	Further evaluation
	A	B	C	D	E	F	G
39	neg/uncl.	g	3	yes	low		yes
40	neg/uncl.	g	6	yes	low		yes
41	neg/g.	g	10	yes		keep	yes
42	neg/g.	g	3			keep	
43	neg/g.	ns	13	yes		keep	
44	neg/uncl.	g	15	yes		keep	yes
45	neg/g.	g	11			keep	
46	neg/uncl.	ns	24	yes			yes
47	neg/uncl.	ns	22				yes
48	neg/uncl.	sns	23			keep	yes
49	neg/g.	g	6			keep	
50	neg/uncl.	g	10			keep	yes
51	neg/uncl.	ns	10			keep	yes
52	neg/uncl.	bad	9			keep	yes
53	neg/uncl.	sns	18			keep	yes
54	neg/uncl.	sns	35				yes
55	neg/uncl.	ns	6		low	keep	yes
56	neg/corr.	sns	11			keep	yes
57	g	g	5			keep	
58	unclear	g	12			keep	yes
59	unclear	g	11			keep	yes
60	g	g	11		low		yes
61	unclear	ns	6		low		yes
62	g	ns	15			keep	
63	g	g	13			keep	
64	g	ns	17			keep	
65	unclear	g	5			keep	yes
66	unclear	sns	5			keep	yes
67	g	ns	10			keep	
68	unclear	g	38	yes	low		yes
69	g	ns	16			keep	
70	uncl./g	ns	31				yes
71	uncl./g	g	29				yes
72	unclear	g	18			keep	yes
73	unclear	g	20			keep	yes
74	unclear	g	21			keep	yes
75	unclear	g	47	yes			yes
76	g	g	14			keep	

Legend: ns (negatively skewed); sns (strongly ns); ssns (very sns);
ps (positively skewed); g (good, or normally distributed)

ANNEX 4

CRITERIA ANALYSIS

Ques. num.	Clarity	Freq. distrib.	Freq. of D.K	Logical D.K.	Internal consistency	Decision	Further evaluation
	A	B	C	D	E	F	G
77	g	ps	2			keep	
78	unclear	g	7			keep	yes
79	g	g	16			keep	
80	unclear	g	19			keep	yes
81	g	g	8			keep	
82	g	g	8		low	keep	yes
83	unclear	g	5			keep	yes
84	g	ns	16			keep	
85	g	g	6		low	keep	yes
86	g	g	5			keep	
87	neg. corr	g	4			keep	yes
88	2 co./neg		6			keep	yes
89	neg/g.	g	4			keep	yes
90	pos/corr	g	26				yes
91	g	ns	13		low	keep	yes
92	g	g	20			keep	yes
93	g	g	23		low	keep	yes
94	g	g	7			keep	
95	unclear	g	8			keep	yes
96	g	g	14			keep	
97	unclear	g	17		low		yes
98	unclear	g	21			keep	yes
99	g	g	6		low	keep	
100	g	sns	18				
101	g	sns	26				team only
102	g	sns	30				team only
103							
104	g	sns	25				team only
105	g	ns	39				team only
106	g	g	28				
107	g	g	34		low		
108	unclear	g	41	yes			yes
109	g	ns	31	yes			yes
110	g	ssns	29				
111	g	ssns	24				
112	g	ssns	26				
113	g	sns	24				yes
114	unclear	ns	28				

Legend: ns (negatively skewed); sns (strongly ns); ssns (very sns);
ps (positively skewed); g (good, or normaly distributed)

APPENDIX A

Overview of Models for Mental Skills Training Components.

<u>Orlick (1992)</u>	<u>Mahoney et al (1987)</u>	<u>Grove & Hanrahan (1988)</u>
Commitment	Motivation	*
Belief	Self-confidence	Self-confidence
Full Focus	Concentration	Concentration
Positive Images	*	Imagery
Mental Readiness	Mental Preparation	*
Distraction Control	*	*
Constructive Eval.	*	Planning & Analysis
*	Anxiety Control	Nervousness/Tension Control

From Salmela, J. H., Barbour, S., Cox, J., Howlett, S., Imai, K., & Ping, W. R., (1992). Assessing mental skills in elite athletes. Paper presented at the First International Congress in Behaviorism. October, Guadalajara.

APPENDIX B

Ottawa Mental Skills Assessment Tool (OMSAT)*

Subject number: _____

Sport _____

Think of your most recent performance in this sport while responding to this questionnaire.

Age _____

Sex _____

Highest Sport Level Achieved _____

Just as different athletes have various strengths and weaknesses in technical ability and physical capacity, they also differ in their mental skills. One athlete may be extremely dedicated to sport training but may be affected more by the stress of competition. Another may be extremely good at maintaining a clear focus during training, but gets distracted during competition.

The OMSAT is a diagnostic tool which allows us to help you better understand your relative strengths and weaknesses in the area of mental training for sport and will help us propose a tailor-made mental skills training program for you. Please indicate the degree to which each of these statements applies to your recent training and competitions.

On the following pages are a number of statements related to mental skills found to be important in the performance of high level athletes. Rate each of the statements in terms of your present state of mental skills and practices. Be brutally honest since the OMSAT is only of use if you really wish to benefit from the results.

Use the five point scale below and circle the appropriate number for each of the following statements:

Never		Sometimes		Always	
1	2	3	4	5	Don't know

* The OMSAT was created and validated by John H. Salmela, Stuart Barbour, Jennifer Cox, Steve Howlett, Kyoko Imaij and Wang Run Ping, School of Human Kinetics, University of Ottawa, 1992.

Never		Sometimes		Always	
1	2	3	4	5	Don't know

A. Goal-Setting

Read this first! In this section, we want to find out what do you do to plan the goals that you have set in your sport.

- | | | | | | | |
|---|---|---|---|---|---|------------|
| 1. I set long term goals in my sport. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 2. My long-term goals in sport are achievable. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 3. I know by what date I want to achieve these goals. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 4. I set daily training goals. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 5. I set short-term performance goals. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 6. My goals in sport have been written down on paper. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 7. My goals push me to work harder. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 8. I have told others my exact goals. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 9. I have a specific plan which I use to achieve my goals. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 10. I have a way of recording my progress for the achievement of my goals and measuring my improvement. | 1 | 2 | 3 | 4 | 5 | Don't know |

B. Beliefs

Read this first! In this section we want to find out what you do that makes you believe you can do well in your sport.

- | | | | | | | |
|--|---|---|---|---|---|------------|
| 11. I believe that I am a mentally tough competitor. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 12. I believe that I have the personal capacity to reach my goals. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 13. I believe that the sport goals that I have set are very significant and meaningful in my life. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 14. I believe that the persons who are working with me to achieve my goals are as committed as I am. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 15. I believe that I can succeed in my chosen activity in spite of any obstacles I encounter. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 16. I feel more like loser than a winner. | 1 | 2 | 3 | 4 | 5 | Don't know |
| 17. I am confident in most aspects of my performance. | 1 | 2 | 3 | 4 | 5 | Don't know |

Never 1	2	Sometimes 3	4	Always 5	Don't know	
18. I act confidently even in difficult sport situations.	1	2	3	4	5	Don't know
19. After a poor performance, I still believe in myself.	1	2	3	4	5	Don't know
20. I must always have the love and approval from significant people in my sport life.	1	2	3	4	5	Don't know
21. I must always prove to be thoroughly competent, adequate and achieving in sport.	1	2	3	4	5	Don't know
22. I have the ability to control or change my thoughts and feelings.	1	2	3	4	5	Don't know
23. If something seems worrisome in sport, it preoccupies me and makes me anxious.	1	2	3	4	5	Don't know
24. My past history in sport remains all important and continues to affect my thoughts and feelings today.	1	2	3	4	5	Don't know

C. Commitment

Read this first! In this section, we want to find out what you do that demonstrates commitment in your sport.

25. Sport is my whole life.	1	2	3	4	5	Don't know
26. I am willing to sacrifice most other things to excel in my sport.	1	2	3	4	5	Don't know
27. I am committed to becoming an outstanding performer.	1	2	3	4	5	Don't know
28. I am determined to never let up or give up in my sport.	1	2	3	4	5	Don't know
29. I need someone to push me to practice and play hard.	1	2	3	4	5	Don't know
30. I take personal responsibility for mistakes and work hard to correct them.	1	2	3	4	5	Don't know
31. I give 100 percent, whether my practice is going well or not so well.	1	2	3	4	5	Don't know
32. I get bored during training.	1	2	3	4	5	Don't know
33. I give 100 percent effort in performing whether ahead or behind.	1	2	3	4	5	Don't know
34. I put in extra time for mental and physical preparation before, after or between regular practice sessions.	1	2	3	4	5	Don't know

Never		Sometimes		Always		
1	2	3	4	5	Don't know	
35. I make sure that I get something from every training.	1	2	3	4	5	Don't know
36. I push hard even if it hurts.	1	2	3	4	5	Don't know
37. I feel more committed to improvement in my sport than to anything else in my life.	1	2	3	4	5	Don't know
38. I get more enjoyment and fulfilment from my sport than in anything else in my life.	1	2	3	4	5	Don't know

D. Stress Reactions.

Read this first! In this section, we want to find out what causes particularly high levels of stress.

39. When I fall behind or make an error in my performance, I become very anxious.	1	2	3	4	5	Don't know
40. I experience anger and frustration during competition.	1	2	3	4	5	Don't know
41. Being evaluated by others makes me very anxious.	1	2	3	4	5	Don't know
42. I experience performance problems because I am too nervous.	1	2	3	4	5	Don't know
43. My body tightens unnecessarily in competition.	1	2	3	4	5	Don't know
44. I compete better in practice than I do in competition.	1	2	3	4	5	Don't know
45. I find that big crowds get me worried and nervous.	1	2	3	4	5	Don't know
46. My coach makes me anxious and nervous in competition.	1	2	3	4	5	Don't know
47. During a competition season I get burned out.	1	2	3	4	5	Don't know
48. My parents make me anxious and nervous in competition.	1	2	3	4	5	Don't know
49. I find it difficult to control my stress level.	1	2	3	4	5	Don't know
50. My competitors make me anxious and nervous in competition.	1	2	3	4	5	Don't know

Never		Sometimes		Always	
1	2	3	4	5	Don't know

E. Fear

Read this first! In this section, we want to find out how fear affect you in your sport.

51. There are a number of things in my sport which are potentially dangerous and make me afraid.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

52. I find it difficult to train and compete because of the fear involved in my sport.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

53. I find it hard to gain control of things to reduce my fears.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

54. There are certain things about being number one which make me afraid.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

55. There are certain things about losing which make me afraid.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

56. Fear arises no matter what I do.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

F. Relaxing.

Read this first! In this section, we want to find out what you do to relax in your sport.

57. I find it easy to relax quickly.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

58. I can easily and consciously lower my level of stress.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

59. I can easily relax during appropriate moments in a competition.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

60. I practice some form of relaxation away from training.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

G. Energizing.

61. I feel flat during training and competition.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

62. I can easily activate myself before a competition if I find myself too relaxed.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

Never		Sometimes		Always		
1	2	3	4	5	Don't know	
<hr/>						
63. I have an effective method of getting my energy level up when I am tired in training.	1	2	3	4	5	Don't know
64. I have an effective method of getting my energy level up when I am tired in competition.	1	2	3	4	5	Don't know
65. I can maintain high levels of performance when I am tired.	1	2	3	4	5	Don't know
66. Tough situations inspire and challenge me.	1	2	3	4	5	Don't know

H. Imagery.

Read this first! In this section, we want to find out the nature of your mental pictures or images in your sport.

67. I find it easy to create mental images.	1	2	3	4	5	Don't know
68. My mental images occur at the same speed as my performance.	1	2	3	4	5	Don't know
69. My mental images are vivid and clear.	1	2	3	4	5	Don't know
70. I can change my mental images quickly.	1	2	3	4	5	Don't know
71. I can correct poor performances in my imagery.	1	2	3	4	5	Don't know
72. I can imagine myself warming up before a big competition.	1	2	3	4	5	Don't know
73. I can feel the movements that I make when I am using imagery.	1	2	3	4	5	Don't know
74. I can hear the various sounds around me in competition when I am imaging my performances.	1	2	3	4	5	Don't know
75. I can feel the pump of adrenaline when I am imaging my performances.	1	2	3	4	5	Don't know

I. Mental Practice.

Read this first! In this section, we want to find out how you use your images to mentally practice your sport.

76. My mental practice is planned.	1	2	3	4	5	Don't know
77. I mentally practice my sport on a daily basis.	1	2	3	4	5	Don't know

Never		Sometimes		Always	
1	2	3	4	5	Don't know

-
78. I mentally practice my sport with maximum performance in mind.
 1 2 3 4 5 Don't know
79. I mentally practice for critical situations in competition.
 1 2 3 4 5 Don't know
80. I am relaxed when I mentally practice.
 1 2 3 4 5 Don't know

J. Focus.

Read this first! In this section, we want to find out what you do to concentrate or focus to do well in your sport.

81. I lose my focus during important competitions.
 1 2 3 4 5 Don't know
82. I lose my focus during daily training.
 1 2 3 4 5 Don't know
83. I find it difficult to concentrate in certain situations.
 1 2 3 4 5 Don't know
84. During critical situations, my thoughts become a blur.
 1 2 3 4 5 Don't know
85. When fatigued, I find it difficult to focus.
 1 2 3 4 5 Don't know

K. Refocussing.

Read this first! In this section, we want to find out what you do to refocus or get back on track, after a setback or a mistake.

86. I dwell upon mistakes during training.
 1 2 3 4 5 Don't know
87. I find it hard to get a mistake or a bad call off my mind.
 1 2 3 4 5 Don't know
88. Unexpected events or mistakes lead to other mistakes during training or competition.
 1 2 3 4 5 Don't know
89. I find it hard to refocus my attention after a setback.
 1 2 3 4 5 Don't know
90. When tired I can switch my thoughts to something else.
 1 2 3 4 5 Don't know

Never		Sometimes		Always	
1	2	3	4	5	Don't know

L. Simulation.

Read this first! In this section, we want to find out what you do to simulate or recreate conditions that are similar to those which occur in competition.

91. In training, I put myself into situations which could occur in competition.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

92. In training, I like to provoke high levels of stress similar to competition.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

93. I like to create situations in practice in which I have to come from behind to win.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

M. Competition Planning.

Read this first! In this section, we want to find out what you do to plan for possible events in competition.

94. I plan a regular set of things that I do before a competition.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

95. I plan a regular set of things that I think about before a competition.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

96. My plan includes certain cue words which I say to myself in competition.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

97. When things do not go wright in competition, I have a back-up plan.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

98. I also plan for reactions to positive situations which could occur during competition.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

99. After a competition, I draw out lessons from my performance for planning my next competition.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

Team Dynamics

Read this first! In this section, we want to find out how you relate to your coach and teammates in your sport.

100. I consider myself a team player.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

101. I am fully involved in team meetings and discussions.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

Never		Sometimes		Always	
1	2	3	4	5	Don't know
102. I accept and leave by team decisions even if I disagree with them.					
1	2	3	4	5	Don't know
104. I relate well to the coach.					
1	2	3	4	5	Don't know
105. My coach's actions during competitions help me perform well.					
1	2	3	4	5	Don't know
106. In competition, I concentrate more on myself than on the performance of the team.					
1	2	3	4	5	Don't know
107. I am concerned about how teammates prepare for competition.					
1	2	3	4	5	Don't know
108. In the days leading up to a competition, discussions with my teammates help my performance.					
1	2	3	4	5	Don't know
109. On the day of the competition, discussion with my teammates help my performance.					
1	2	3	4	5	Don't know
110. I accept the individual differences of my teammates.					
1	2	3	4	5	Don't know
111. When things are going poorly, I still encourage my teammates.					
1	2	3	4	5	Don't know
112. I avoid putting down my teammates.					
1	2	3	4	5	Don't know
113. I like to include my teammates in activities outside of the sport setting.					
1	2	3	4	5	Don't know
114. I enjoy team achievements more than individual achievements.					
1	2	3	4	5	Don't know

Thank you for your collaboration. you shall be receiving feedback on your OMSAT profile.

APPENDIX C

LETTER OF INTRODUCTION

Dear Athletes,

We are in the process of developing a mental skills inventory profile for sport entitled "The Ottawa Mental Skills Assessment Tool (OMSAT)". A questionnaire made up of 114 questions was devised with the intent of addressing a variety of mental abilities (i.e. commitment to one's sport, belief in oneself, stress reactions during competition, focusing on the task etc.). This questionnaire is intended to measure these mental skills levels in athletes.

Our intent is to verify the nature of mental skills in sport by administering this questionnaire to a sample of about 500 male and female athletes representing various sports and various levels of participation (beginners, intermediates and experts). The information obtained from this group data would enable us to reach our research objectives. As you can see the questionnaire has been developed for the purpose of ensuring confidentiality and anonymity to all participants since numbers are being used for represent names. The front page of the questionnaire has a "subject number" section. That is the place where numbers starting from 0001 up to about 0500 are inserted to represent all subjects participating in this study. If a participant wishes a feedback on his/hers personal profile after the completion of this study, than the subject should express his/her request to the researcher. The researcher would then take the number and the name for that person on a separate piece of paper for later matching purposes. In accordance with the ethical procedures the results of this questionnaire would be kept confidential. All raw data will be kept in locked files and codes identifying these respondents who request later feedback will be kept separately from the data. Inferences would be made on the results obtained from the group data only, and not on individual differences. In that way we would be able to offer full confidentiality and anonymity to all

participants. The thesis will be written in such a way as to conceal the identity of individuals. After the thesis has been accepted the raw data will be destroyed. At the end of the study, a summary report will be made available to any participant who requests it.

We believe that the questionnaire would be regarded as an educational experience by the respondents. It has been our experience that the completion of the questionnaire is a pleasant and revealing task which takes 20-30 minutes, and is often beneficial in improving one's understanding of their sport performances. In no way is this questionnaire discomforting.

We believe that this extensive project would help the research area of sport psychology. We believe that many athletes would benefit from your help. If this questionnaire would show reliability and validity then, it could be a very useful tool to consultants during their interventions. Furthermore, it could help athletes assess their present level of mental abilities (mental skills) while in the same time providing guidelines to consultants about how much and/or what type of mental training is required for any individual athlete.

All scores obtained from the filled questionnaire would then be entered into a computer for the purpose of statistical analyses. Your data input into this test would then enable us to analyse the validity and reliability of this instrument.

We believe that you will find this questionnaire interesting and worth completing. Your participation in this study is voluntary, but your responses would be extremely helpful. That would help us to come to the best possible understanding of how mental skills relate to performance. Filling out this questionnaire would be considered by me that you freely consent to participate in this study.

Should you wish further information, please contact us at the following addresses:

School of Human Kinetics,
University of Ottawa, Tel.564-5920,

or

Dr. M. A. Loyer
Chair, Faculty of Health Science,
Human Research Ethics Committee, Room 2009,
451 Smyth Road, Ottawa, Ont. K1H 8M5.
Tel: 787-6550 (or leave message at 787-6707).

Thank you for your cooperation and help.

sincerely,

Dr. John Salmela

Jordache Bota

APPENDIX D

INFORMED CONSENT

We, _____, consent to have our athletes/students participate
(name of the institution)

in the development of the "Ottawa Mental Skills Assessment Tool (OMSAT)".

We understood that participation in the development of the OMSAT is voluntary, non-
evasive and will involve completing a 114 item questionnaire. We have read an
accompanying letter of information and are aware that all questionnaires will remain
completely confidential.

I therefore sign this consent form today _____, day of _____, 1993, at
Ottawa in the province of Ontario.

(name of the authority responsible
for the athletes/students)

(Signature)

APPENDIX E

OTTAWA MENTAL SKILLS ASSESSMENT TOOL (OMSAT)*

Name _____

Address _____

Sport _____

Think of your most recent performance in this sport while responding to this questionnaire.

Age _____ Sex _____

Highest Sport Level Achieved _____

Just as different athletes have various strengths and weaknesses in technical ability and physical capacity, they also differ in their mental skills. One athlete may be extremely dedicated to sport training but may be affected more by the stress of competition. Another may be extremely good at maintaining a clear focus during training, but gets distracted during competition.

The OMSAT is a diagnostic tool which allows us to help you better understand your relative strengths and weaknesses in the area of mental training for sport and will help us propose a tailor-made mental skills training programme for you. Please indicate the degree to which each of these statements applies to your recent training and competitions.

On the following pages are a number of statements related to mental skills found to be important in the performance of high level athletes. Rate each of the statements in terms of your present state of mental skills and practices. Be brutally honest since the OMSAT is only of use if you really wish to benefit from the results.

Use the five point scale below and circle the appropriate number for each of the following statements:

Never		Sometimes		Always		Don't know
1	2	3	4	5		

* The OMSAT was created by John H. Salmela, Stuart Barbour, Jennifer Cox, Steve Howlett, Kyoko Imaj and Wang Run Ping, School of Human Kinetics, University of Ottawa, 1992. It was validated by John H. Salmela and Jordache Bota, University of Ottawa, 1993.

1	2	Never 3	4	Sometimes 5	Always Don't know
---	---	------------	---	----------------	----------------------

A. Goal-Setting

Read this first! In this section, we want to find out what you do to plan the goals that you have set in your sport.

1. I set long term goals in my sport.
1 2 3 4 5 Don't know
2. I set daily training goals.
1 2 3 4 5 Don't know
3. I set short term performance goals.
1 2 3 4 5 Don't know
4. My goals push me to work harder.
1 2 3 4 5 Don't know
5. I have told others my exact goals.
1 2 3 4 5 Don't know
6. I have a specific plan which I use to achieve my goals.
1 2 3 4 5 Don't know

B. Beliefs

Read this first! In this section, we want to find out what you do that makes you believe you can do well in your sport.

7. I believe that I am a mentally tough competitor.
1 2 3 4 5 Don't know
8. I believe that I have the personal capacity to reach my goals.
1 2 3 4 5 Don't know
9. I believe that the sport goals that I have set are very significant and meaningful in my life.
1 2 3 4 5 Don't know
10. I believe that I can succeed in my chosen activity in spite of any obstacles I encounter.
1 2 3 4 5 Don't know
11. I am confident in most aspects of my performance.
1 2 3 4 5 Don't know
12. I act confidently even in difficult sport situations.
1 2 3 4 5 Don't know
13. After a poor performance, I still believe in myself.
1 2 3 4 5 Don't know

C. Commitment

Read this first! In this section, we want to find out what you do that demonstrates commitment in your sport.

14. Sport is my whole life.
1 2 3 4 5 Don't know
15. I am willing to sacrifice most other things to excel in my sport.
1 2 3 4 5 Don't know

Never		Sometimes		Always		
1	2	3	4	5	Don't know	
16. I am committed to becoming an outstanding performer.	1	2	3	4	5	Don't know
17. I am determined to never let up or give up in my sport.	1	2	3	4	5	Don't know
18. I take personal responsibility for mistakes and work hard to correct them.	1	2	3	4	5	Don't know
19. I give 100 percent, whether my practice is going well or not so well.	1	2	3	4	5	Don't know
20. I give 100 percent effort in performing whether ahead or behind.	1	2	3	4	5	Don't know
21. I make sure that I get something from every training.	1	2	3	4	5	Don't know
22. I push hard even if it hurts.	1	2	3	4	5	Don't know
23. I feel more committed to improvement in my sport than to anything else in my life.	1	2	3	4	5	Don't know

D. Stress Reactions.

Read this first! In this section, we want to find out what causes particularly high levels of stress.

24. Being evaluated by others makes me very anxious.	1	2	3	4	5	Don't know
25. I experience performance problems because I am too nervous.	1	2	3	4	5	Don't know
26. My body tightens unnecessarily in competition.	1	2	3	4	5	Don't know
27. I compete better in practice than I do in competition.	1	2	3	4	5	Don't know
28. I find that big crowds get me worried and nervous.	1	2	3	4	5	Don't know
29. My parents make me anxious and nervous in competition.	1	2	3	4	5	Don't know
30. I find it difficult to control my stress level.	1	2	3	4	5	Don't know
31. My competitors make me anxious and nervous in competition.	1	2	3	4	5	Don't know

E. Fear

Read this first! In this section, we want to find out how fears affect you in your sport.

32. There are a number of things in my sport which are potentially dangerous and make me afraid.	1	2	3	4	5	Don't know
--	---	---	---	---	---	------------

Never		Sometimes		Always	
1	2	3	4	5	Don't know

33. I find it difficult to train and compete because of the fear involved in my sport.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

34. I find it hard to gain control of things to reduce my fears.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

35. There are certain things about losing which make me afraid.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

36. Fear arises no matter what I do.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

F. Relaxing.

Read this first! In this section, we want to find out what you do to relax in your sport.

37. I find it easy to relax quickly.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

38. I can easily and consciously lower my level of stress.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

39. I can easily relax during appropriate moments in a competition.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

G. Energising.

Read this first! In this section, we want to find out how you control your energy levels in your sport.

40. I can easily activate myself before a competition if I find myself too relaxed.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

41. I have an effective method of getting my energy level up when I am tired in training.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

42. I have an effective method of getting my energy level up when I am tired in competition.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

43. I can maintain high levels of performance when I am tired.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

44. Tough situations inspire and challenge me.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

H. Imagery.

Read this first! In this section, we want to find out the nature of your mental pictures or imagery in your sport.

45. I find it easy to create mental images.

1	2	3	4	5	Don't know
---	---	---	---	---	------------

Never		Sometimes		Always		
1	2	3	4	5	Don't know	
46. My mental images are vivid and clear.	1	2	3	4	5	Don't know
47. I can imagine myself worming up before a big competition.	1	2	3	4	5	Don't know
48. I can feel the movements that I make when I am using imagery.	1	2	3	4	5	Don't know
49. I can hear the various sounds around me in competition when I am imagining my performances.	1	2	3	4	5	Don't know

I. Mental Practice.

Read this first! In this section, we want to find out how you use your images to mentally practice your sport.

50. My mental practice is planned.	1	2	3	4	5	Don't know
51. I mentally practice my sport on a daily basis.	1	2	3	4	5	Don't know
52. I mentally practice my sport with maximum performance in mind.	1	2	3	4	5	Don't know
53. I mentally practice for critical situations in competition.	1	2	3	4	5	Don't know
54. I am relaxed when I mentally practice.	1	2	3	4	5	Don't know
55. In training, I put myself into situations which could occur in competition.	1	2	3	4	5	Don't know
56. In training I like to provoke high levels of stress similar to competition.	1	2	3	4	5	Don't know
57. I like to create situations in practice in which I have to come from behind to win.	1	2	3	4	5	Don't know

J. Focus.

Read this first! In this section, we want to find out what you do to concentrate or focus to do well in your sport.

58. I lose my focus during important competitions.	1	2	3	4	5	Don't know
59. I lose my focus during daily training.	1	2	3	4	5	Don't know
60. I find it difficult to concentrate in certain situations.	1	2	3	4	5	Don't know
61. During critical situations, my thoughts become a blur.	1	2	3	4	5	Don't know
62. When fatigued, I find it difficult to focus.	1	2	3	4	5	Don't know

Never		Sometimes		Always	
1	2	3	4	5	Don't know

K. Refocussing.

Read this first! In this section, we want to find out what you do to refocus or get back on track, after a setback or a mistake.

63. I dwell upon mistakes during training.
 1 2 3 4 5 Don't know
64. I find it hard to get a mistake or a bad call off my mind.
 1 2 3 4 5 Don't know
65. Unexpected events or mistakes lead to other mistakes during training or competition.
 1 2 3 4 5 Don't know
66. I find it hard to refocus my attention after a setback.
 1 2 3 4 5 Don't know

M. Competition Planning.

Read this first! In this section, we want to find out what you do to plan for possible events in competition.

67. I plan a regular set of things that I do before a competition.
 1 2 3 4 5 Don't know
68. I plan a regular set of things that I think about before a competition.
 1 2 3 4 5 Don't know
69. My plan includes certain cue words which I say to myself in competition.
 1 2 3 4 5 Don't know
70. I plan for reactions to positive situations which occur during competition
 1 2 3 4 5 Don't know
71. After a competition, I draw out lessons from my performance for planning my next competition.
 1 2 3 4 5 Don't know

Thank you for your collaboration. You shall be receiving feedback on your OMSAT profile.

APPENDIX F

Reliability and Validity of the
Ottawa Mental Skill Assessment Tool (OMSAT)

Jordache Bota

523735

APA 6998. Thesis Proposal.

School of Human Kinetics.

University of Ottawa.

April 15, 1993.

Introduction

Since the evolution of mankind, people have been intrigued by the hidden powers of the mind. Elements such as courage, intelligence, personal sacrifice, commitment and belief, were believed to be controlled by the mind, but the complete mechanism underlying the mind's functioning was never fully understood. People have long tried to discover, understand and unveil the mechanisms that govern, direct and control complex mind-body interactions. In other words, they have tried to identify the "powers of the mind". Much research has addressed this issue in the past, yet people are still far from fully understanding, predicting and explaining mind-body interactions.

Many theories have been developed throughout the years, and several disciplines have emerged throughout this process of enquiry. One discipline that has supported this area of research is sport psychology. Sport psychology specialists have addressed a need to help athletes and coaches solve problems within the realm of sport. One question that was frequently brought up by both athletes and coaches was - Why some very talented athletes whose performance was consistently outstanding in practices, perform poorly in competitions (Vealey, 1988). It was frustrating for athletes and coaches to see that skillful and talented athletes would very often lose to those less skillful and talented ones. This phenomenon led sport psychologists to theorise that in sport competitions the mind plays a very important role. It was essential that both the mind and body be at work. If one of these elements fails to keep up with the demands of a competition, the result will be a poor performance. The degree of performance outcome will reflect the degree to which these two units have been trained. That is, if both the mind and body have been addressed in training, the performance outcome will be greatly enhanced (Orlick 1986). It is well known that physical abilities (i.e., power, force) improve through physical training. Most sport psychologists agree that mental abilities also improve through mental training.

Sport psychologists have carried out extensive research to find strategies and techniques that are effective in the process of mental training. One of their early discoveries was that, just as there are physical differences between individuals in terms of strength, power, speed, endurance and skill level, there are also differences in terms of mental skill levels. Similarly, there are also differences between sport psychology specialists in the

methods that they use to collect, analyse and interpret data obtained from their research.

The heterogeneous nature of both athletes (in terms of differences in level of mental skill abilities) and sport psychology researchers (in terms of differences in approach to research) have historically made systematic analysis of the mind/body relationship difficult and confusing. The challenge over the past 20 years has been to identify components essential to successful performance in sport. Since high levels of mental abilities have often been correlated with high sport performances, most sport psychology consultants agree that mental abilities affect or direct the level of sport performance responses. The intent of sport psychologists in the past was to develop a psychometric measuring device that can accurately identify one's strengths and weaknesses in mental abilities. The belief was that if one's mental skill level was identified, then intervention in the form of additional mental training could be applied if necessary to enhance one's performance.

Psychological inventories have been considered by many sport psychologists to be useful tools in the area of sport psychology because they: (a) are designed to be used for the testing of theories, (Anshel, 1987); (b) are designed on the basis of sound theoretical constructs, (Rotter, 1973); and (c) provide practitioners with a tool for applying theory to practice, (Nideffer, 1987). Many psychological tests to assess individual mental skills abilities have been devised. Anshel (1987), has identified over 128 psychological inventories used by sport psychologists in the last 20 years. Even though those psychometric measures have been used extensively, and have shown certain degrees of reliability and validity, they have been questioned by "experts" (Orlick, 1990; Scheller, 1990) in terms of general utility and predictive validity.

The Ottawa Mental Skill Assessment Tool (OMSAT) questionnaire was initially conceptualised at the University of Ottawa by Dr. John Salmela. Under his guidance a group of graduate students including Stuart Barbour, Jennifer Cox, Steve Howlett, Kyoko Imaji and Wang Run Ping have developed this questionnaire. This questionnaire was designed to evaluate individual differences of athletes and other performers in 14 mental skills. The backbone of this questionnaire reflects the work of Orlick (1980, 1986, 1992) and his conceptual heuristic model of excellence as well as active sport psychology experts in North America (Mahoney, Gabriel &

Perkins, 1987; Anshel, 1987; Vealey, 1988; Mahoney, 1989) and in Europe (Seiler, 1992). Fourteen components have been developed in the first version of the OMSAT based upon this literature review. They include: Foundations Skills (belief, commitment, goal-setting); Affective Skills (stress reactions, fear, relaxing, energising); Cognitive Skills (imagery, mental practice, focus, refocus); Competition Skills (simulation, competition planning); and Team Dynamics. A 114 item questionnaire was created and was used to assess those 14 mental training components.

Purpose

The purpose of this study is to determine the degree of test-retest reliability, internal consistency and construct validity of the OMSAT questionnaire. Results would allow us to infer whether the OMSAT is a valid and reliable tool for evaluating athletes' strengths and weaknesses in the area of mental training for sport.

Review of Literature

Vealey (1988) performed a content analysis on nearly all (27 out of 29 books) in sport psychology that have been published in North America from 1980 to 1988. Her main reason for this work was to look at the several approaches used by sport psychology specialists in regard to psychological skills training. Some findings that have emerged from this research included: (1) most of the books targeted elite athletes; (2) only 8 books were written for both the athletes and coaches; (3) the emphasis has been placed on teaching athletes psychological skills needed during performances as opposed to psychological skills for personal development (self-esteem, lifestyle management, etc.). In conclusion, Vealey recommended that, in the future psychological skill training should: target populations other than elite athletes, move beyond education to implementation, and nurture "the theory/research/practice relationship."

Seiler (1992), has thoroughly reviewed several English and German applied sport psychology journals. He found that there is a confusion over the terminology being employed by the sport psychologists. Even though they may be talking or measuring the same behaviour, sport psychology specialists used different psychological constructs, and these constructs have a negative impact in the translation process of the newly acquired knowledge. Seiler recommended that sport psychologists should: a) Clarify

the terminology by using a "more systematic action theoretical approach". b) Use a more cooperative approach between practitioner and researcher for the purpose of gaining adequate knowledge about the immediate and long-term effects of psychological interventions, and c) Use a language that consumers can understand when explaining the possibilities and limitations on performance enhancement training.

The number of existing psychological tests is overwhelming. Murphy, and Davidshofer, (1988) identified well over 1,000 different psychological tests available commercially in English-speaking countries, and many other hundreds used throughout the world. Despite the fact that these tests measure different psychological features, they all have three common characteristics: (a) they all sample behaviours, (b) all samples are obtained under standardised conditions, and (c) there are rules for obtaining quantitative information from the behaviour sampled.

Six major sport psychology research journals were thoroughly analysed for a period of almost 20 years (1970 to 1987) by Anshel (1987). He looked at all psychological inventories that were being used during this interval. Anshel believed that a list of psychological inventories could, help researchers to determine future needs in the area of inventory measurement and also invite researchers to "undertake long term commitment toward creating new tools for better understanding, explaining and predicting sport behaviour"(p.331). Anshel has identified 128 psychological inventories. These inventories are designed to assess over 30 mental components related to sport.

A test that has been extensively used was Nideffer's (1976) "Test of Attention and Interpersonal Style"(TAIS). He ignored the criticism that such tests are not based on a sound theoretical base, and also they do not offer any predictive utility. The main premise of the TAIS was that attention is related to performance. Once one's attentional style is identified - the prediction of performance in a variety of situations becomes possible. After being tested and retested for over 16 years in a variety of sport settings, the TAIS is still considered reliable and valid by some sport psychologists (De Palma & Nideffer,1977; Nideffer,1991; Salmela & Ndoeye,1986) and unreliable and invalid by some other sport psychologists (Van Schoyck & Grasha,1981; Vallerand,1983; Ford & Summers,1992)

Another psychometric measure that has received recent

attention is the "Psychological Skill Inventory for Sport"(PSIS). which was developed by Mahoney, Gabriel and Perkins (1987). The main objective of this test was to identify mental skills that reliably differentiate elite from non-elite athletes, and also, to compare the psychological profile of an ideal athlete depicted by 16 sport psychologists to the obtained psychological profiles elite athletes. A 51 item true-false questionnaire was administered to a sample of 713 male and female athletes representing 23 sports as well as to 16 leading sport psychologists.

The results of this test have indicated that: mental preparation, motivation, anxiety management and self-confidence were the most important mental components in skill level differentiation between elite and non-elite athletes. Furthermore, the ideal profile chosen by the sport psychologists closely resembled that of the elite athlete profile although severely overestimating the importance of all of the skills. Even though Mahoney et al. had reached their objectives, they felt that their research has led to more questions than answers. They indicated that the major drawback of their investigation was associated with PSIP's "dichotomous (true/false) format and the absence of formal evaluations of its psychometric properties"(p. 195)

Orlick and Partington (1988) interviewed over 235 Canadian Olympic athletes and concluded that top athletes were very committed, and had clearly established short-term and long-term goals. All of these top athletes had a mental training plan that was used and refined throughout the training season. They have engaged in imagery training, simulation training, focus and refocus training, and visualisation training. Furthermore, most of these athletes had a systematic plan to mentally prepare for competition which included: a precompetition mental training plan, a competition mental plan, a distraction control plan, and a constructive evaluation plan.

Salmela and Barbour (1991) identified a number of sport specific assessment devices designed to assess mental aspects of athletic performance: The Athletic Motivation Inventory (AMI), Sport Competition Anxiety Test (SCAT), Competitive State Anxiety Inventory (CSAI), The Sport Pressure Checklist, The Sport Confidence Inventory, and The Self-Analysis of Mental Skills(SAMS). Salmela and Barbour concluded that there are a number of common elements in each of these psychological tests and that the components essential for successful performance should

lie somewhere within these tests. They went a step further to develop the OMSAT in an attempt to identify these essential psychological components.

The review of literature has shown different approaches used by sport psychologists to identify and then to intervene and train mental abilities. With the exception of Mahoney et al. (1987), psychological devices designed to assess and then predict athletic performance accurately do not yet exist. The existing psychometric inventories have been referred to as either valid tests or invalid tests. The present attempt is to develop a better psychometric inventory. We intend to: 1) critically analyse the "most popular" psychological inventories available in the sport psychology field, 2) look at the elements that were criticised on these "most popular" tests and critically analyse whether that particular refutation was appropriate, and 3) develop a new psychometric device that incorporate all strengths and removes all the identified weaknesses of the previous tests.

A large number of existing psychological tests have also been revised and theoretically analysed. The main reason of this review was to look at their validity and reliability from different prospective: (a) how predictive were they of what was measured, (b) how much were they measuring what they were supposed to measure, c) what "statistics" were used in assessing reliability, and what coefficients of reliability were reported, d) how long have they been used in the past, and what has been consistently reported about them, e) how many sport psychologists have used them and/or are still using them today.

Methodology

A sample of 700-1000 subjects will take part in this study. Subjects will be divided into three groups based on their: gender, sport discipline and athletic level of achievement (elite, competitive and recreational).

Subjects

An attempt would be made to administer the OMSAT to the following populations : a) students registered in the School of Human Kinetics at the University of Ottawa; b) major sport clubs and school clubs from the Ottawa-Carleton area; c) national and international teams that are competing in Ottawa and/or surroundings area; and d) national athletes that are being assessed at the "Human Kinetic Assessment Centre " at the

University of Ottawa.

Recruitment

All undergraduate students registered in the Human Kinetics programme would be asked to take part and complete this questionnaire. The tester would approach professors that teach undergraduate courses and explain the project. He would request permission to carry on the answering of questionnaire during a given class at the professor's convenience.

The tester would also contact authorities (coaches, principals, teachers) from national teams, high schools and sports' clubs. He would explain our project, and would request students/athletes participation in our study. A letter of our request would need to be signed by the appropriate authority before we proceed with our questionnaire. (please see Appendix D)

Instrument

The instrument to be used in this study is the OMSAT questionnaire. This questionnaire attempts to obtain measures on 14 psychological components namely: Three Foundation Skills (goal-setting, belief, commitment); Four Affective Skills (stress reactions, fear, relaxing, energising); Four Cognitive Components (imagery, mental practice, focus, refocus); Two Competition Skills (simulation training, competition planning); A Team Dynamics Component. In its preliminary form, 114 questions have been developed in the OMSAT. Each question will be answered on a 5 point Likert scale from strongly agree to strongly disagree, as well as a "don't know" option. (Appendix B)

Procedure

Once all other formalities have been completed (approval from professors, coaches, principals), the above listed subjects will be asked to participate in this study. The subjects that have agreed to participate would be first given a "Letter of Introduction" (Appendix C) which explains the following: a) the purpose of this test. b) issues related to the confidentiality of the results, and, c) issues related to the process that would allow us to assess validity and reliability of this psychometric measure. Following the reading of the Letter of Introduction, subjects will be asked if they have any questions that need to be clarified. Once all questions have been explained, subjects would be handed the OMSAT questionnaire to be completed.

A sample of 100 subjects (undergraduate students of the School of Human Kinetics from the University of Ottawa) would be asked to participate in a re-test portion of this study. This re-test is necessary for the evaluation of test-retest reliability, and would take place a week following their first participation.

Analysis

All scores would be entered into the computer on a FoxPro database programme. Through the use of an SPSS programme we would test this instrument's test-retest reliability, internal consistency and construct validity. Score obtained would also allow us to analyse different patterns including: individual differences, gender differences as well as differences between sports. We feel that we will be able to find trends that consistently differentiate the three elements that were early discussed (gender, individual, and sport differences). We also hope to detect the exact psychological components that are accounting for these differences.