FEPSAC

Fédération Européenne de Psychologie des Sports et des Activités Corporelles
European Federation of Sports Psychology

IXth EUROPEAN CONGRESS
ON
SPORT PSYCHOLOGY

BRUSSELS - 4/9 JULY 1995

PROCEEDINGS

Part I

Edited by Renée VANFRAECHEM - RAWAY
Yves VANDEN AUWEELE

Integrating laboratory
and
fields studies

BELGIAN FEDERATION OF SPORT PSYCHOLOGY
SOCIETE FRANCOPHONE DE PSYCHOLOGIE DU SPORT
VLAAMSE VERENIGING VOOR SPORTPSYCHOLOGIE

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PREFACE

A **FEPSAC** Congress is always an essential event in European Sportpsychology. This congress should give the opportunity to experts from West and East European countries despite the current difficulties to meet and exchange ideas and experiences in sport and exercise psychology.

The Proceedings of the **9th European Congress on Sport Psychology** through the contributions of the participants reflect day by day current knowledge in laboratory and field research in Europe. As the interactive poster session was the primary presentation format for all participants, most of the published papers refer to these sessions. We hope that these sessions provided the participants more possibilities to compare and exchange their results, and to discuss interpretations.

From this point of view, the impact goes beyond the period of the congress by enhancing participants professional background as well as encouraging collaboration in research. Each paper has been published as it was sent to the congress secretariat before the deadline : key note lectures, poster papers, and most of the symposia papers. Most of them are printed in the format sent to us and the authors are completely responsible for the content.

We hope that this book, a synthesis of the current european research in european sport and exercise psychology, presents the state of the art in our discipline and that it helps to improve your professional activity.

We were happy to meet you in Brussels, the heart of Europe and we enjoyed your presence and your active participation. Without you this book would never have been published.

Thank you and good reading.

The editors

SP : SPORT PSYCHOLOGY

EP : EXERCISE PSYCHOLOGY

ML : MOTOR LEARNING

1ST POSTER SESSIONS

* * *

P. 1.1. METHODS, MODELS, TESTING

CONSTRUCTION OF A FAIRPLAY ATTITUDE SCALE IN SOCCER

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Key Words: fairplay, values, attitude scale, young soccer players

INTRODUCTION

The sport as a social phenomenon has important implications as a behavioral model for children, young and adults. Whithin a competitive society -like the present society- there is a tendency to educate young people toward success. Therefore, the main aspect in sport is the importance given to the results. Since the end of the nineteenth century, however, different authors had pointed out that sport is a positive setting to enhance social and moral education of young people through the development of "desiderable" social values. Simon (1991) suggested that sports, properly conduced, provided values of enduring human significance. Sports can be used to develop and express moral virtues and demostrate the importance of values such as dedication, integrity and courage.

Sportmanship is viewed nowadays as a value which is progressively damaged in young sports. However, this opinion is based only on data of anecdotic nature. Devereux (1978), Underwood (1978) and Palacios (1991), among others, have signalled that professional sports models are implemented in young sports impeding spontaneous child play and enhancing behaviors opposite to fairplay. Thus, according to these authors, young sports would be a negative setting to promote social and moral development in childhood. However, whether sport experience can really contribute to the development of participant morality or not has received little empirical investigation, as Bredemeier and Shields (1993) had pointed out.

There is also a lack of empirical studies about fairplay in our country, although some articles about this subject have been written recently (Cruz, Boixadós, Valiente, and Capdevila, in press). Thus, the aim of this research is to develop an attitude scale to identify the dominant attitudes about fairplay in young soccer players. Soccer is appropiate for the explorative purpose of the study mainly because of its international popularity and social character as well as for the wide range of behaviours and attitudes that it offers.

METHOD AND PROCEDURE

Figure 1, shows the procedure followed in the construction of attitude scale:

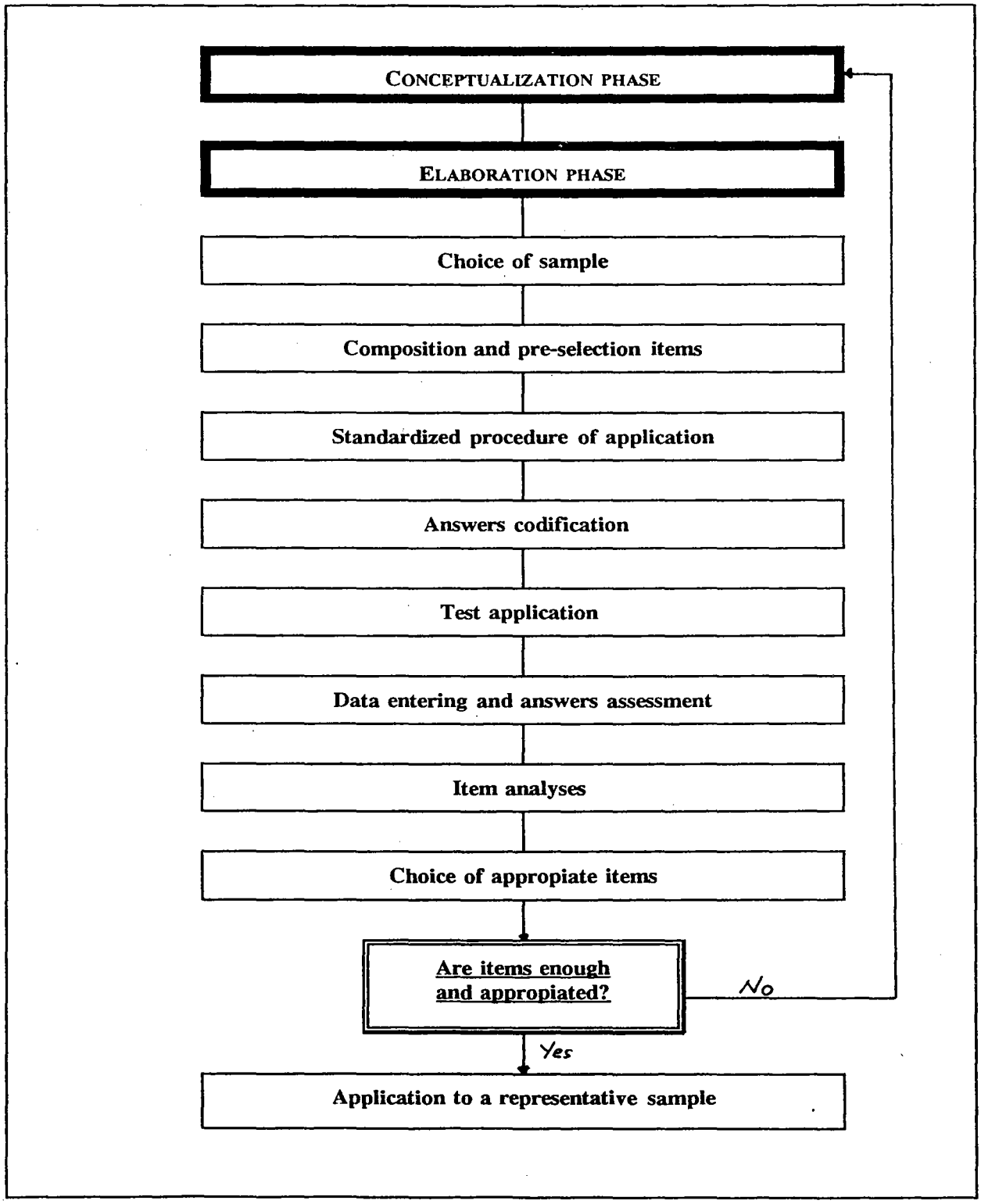

Fig. 1. Phases in the Construction of Attitude Scale (Based on Renom, 1992)

It is important to point out that because of the characteristics of the study only the first eight stages of the elaboration phase were developed.

Conceptualization phase

The aim of this phase is to select the optimal categories that explain the fairplay construct.

Following the definition of fairplay (Table 1) as well as the results obtained by Cruz et al. (1991) and Heinila (1974), the categories of values such as *Showing skills*, *Rough playing*, *Equity and Justice*, *Winning and Game enjoyment* were considered as good predictors of fairplay construct (Table 2).

TABLE 1: Definition of Fairplay

The fairplay concept **implies:**
✓ recognition and respect toward the rules of the game
✓ correct relationships with the opponent
✓ maintenance of the same opportunities and conditions for everybody
✓ avoid the victory at all cost
✓ honourable attitude in the victory and in the defeat
✓ real commitment about that each one has to contribute as much as possible

TABLE 2.: Categories of values considered as good predictors of fairplay

Showing skills
To be able to use correctly the skills or abilities required in game situations, both technically and tactically.
Rough playing
Acting agressive or violently with risk of injury.
Equity-Justice
Playing following the rules, spirit of the game and referee decisions (judge) seeking the equity.
Winning/Priority of team interest
Gaining advantages or superiority on the game result, using any legitimate or illegitimate means.
Enjoyment
Enjoying the game irrespectively of the result, experiencing feelings of satisfaction.

The values of *Showing skills*, *Equity and Justice*, and *Game enjoyment* would be in the positive side of fairplay and *Rough playing*, and *Winning* would be in the negative side.

Once stated the concept we wanted to measure, the purpose was to obtain an instrument to set each player in a "*continuum*", from the negative to the positive side of fairplay.

Elaboration phase

The aim of this phase was to choose the sample, select the items, and standardize the application procedure.

A sample of 330 soccer players, ranging in age from 13 to 19 years old, from 5 Clubs of the Catalan Soccer Federation were chosen for the study (Fig. 2.). The fairplay attitude scale contained 35 items. They were defined in terms of actual events in the soccer game with the intention to follow the categories of values proposed in Table 2. Subjects answered to the items using a 5 point scale, ranging from 1 (completely disagree) to 5 (completely agree).

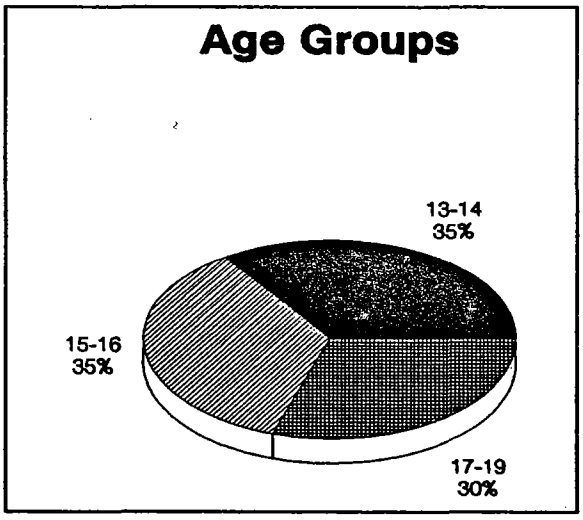

Fig. 2.: Age Distribution of the sample

The test was applied following a standardized procedure . Then, an item analyses was developed.

RESULTS

The Software used in the factor analysis was SPSS/PC+ (Stadistical Package for the Social Sciencies, v. 4.0) and the ITEMAN Program (Item Analysis v. 3.0 MicroCAT Testing System) was used for the item analysis.

Factorization was done using principal-axis method and the rotation was carried out by the varimax method. Following different criteria three factors were extracted as an appropiated solution. In the corrected item-total correlation, the eight items with the lowest correlation were removed. Table 3 shows the definitive grouping of the 27 items according to their factorial weight.

The three factors explained 31% of the total variance. Factor 1 explained 11.6% of the variance, and was labelled ROUGH PLAY. Factor 2 explained 10.7% of the variance, and was labelled SPIRIT OF THE GAME AND ENJOYMENT. Factor 3 explained 8.5% and was labelled WINNING. Finally, Internal Consistency Coefficient (α) was calculated for the 27 items of the final scale (α=0.78). From the 9 items of the first Subscale (*Rough play*) we obtained α=0.71. The second Subscale (*Spirit of the game and Enjoyment*) with 11 items had α=0.64. And the third Subscale (*Winning*) with 7 items had α=0.63. (See Table 4).

Three variables *rough play* (ROU), *enjoyment* (ENJ) and *winning* (WIN) from the sum of the items included in each one of these subescales were generated. Table 4 shows the intercorrelations of these variables. It can be observed that there is a positive correlation between *rough play* and *winnning*, as well as negative correlations of these two variables with *enjoyment*. As expected, *rough play* and *winning* are in the same side (negative side of fairplay) whereas *enjoyment* is in the opposite side (positive side of fairplay).

TABLE 4.:Intercorrelations of the variables generated

Correlations:	WIN	ROU	ENJ
WIN	1.0000	.3771**	-.2217**
ROU	.3771**	1.0000	-.3349**
ENJ	-.2217**	-.3349**	1.0000

N of cases: 330 1-tailed Signif: * - .01 ** - .001

TABLE 3.: Definitive grouping of the items of the attitude scale

(English translation)

27 ITEMS---N=330----- 30.8% TOTAL VARIANCE---ALPHA=0.78

Rough play

FACTOR 1 n=9---11.6%---α=0.71

20.- A player of the opposite team with a clear chance of scoring a goal needs to be stopped by any means
12.- On the important matches all is allowed to win the match
29.- Good players of the other team must be always stopped in a legal or illegal way
08.- It's acceptable that a team loses time to win
15.- It's acceptable that one team plays hard if the other team does the same
10.- It's acceptable that a player let himself falling in the penalty area to achieve a foul
02.- In a soccer match, a player tries to provoke a temperamental player of the opposite team to break his concentration
27.- Hard playing is justified if the spectators are waiting for that
34.-(-)* An skillful player has to be always stopped in a fair way

Spirit of the game and enjoyment

FACTOR 2 n=11---10.7%---α=0.64

25.- In soccer, enjoying the game is the most important thing
30.-(-) It's acceptable that one team use the bribe to be sure that they will win a decisive match in the championship
14.- A player must always accept referee's decisions, without protest
33.- In any category, enjoy the sport should be the main goal to achieve
23.-(-) It's acceptable that one player has a violent reaction if someone has commited a foul on him
17.- An injured player should always be substituted even if substitutions have already been made
03.- The coach must forbid rough playing during the matches
16.-(-) It's acceptable that a player handle the ball if he won't be able to reach it with the foot or the head
31.-(-) It's acceptable that a coach urge someone on his team to hurt a player of the other team
19.-(-) It's acceptable that a player protest against referee's decisions
32.- Teams must play to achieve the spectators' applause, showing, at the sametime, their skills

FACTOR 3 n=7---8.5%---α=0.63

Winning

04.- In soccer, the final result is the most important thing
07.- In soccer, winning is more important than enjoying the game
13.- Playing soccer should be considered a serious work, not a diversion
24.- The most important aspect in a championship is to be the first
35.- The most important thing in soccer is to score goals, no matter how they have been scored
28.-(-) In soccer, enjoying the game is more important than the outcome of the game
05.- A player who realize that he has comitted a foul must continue the game if the referee hasn't whisled for the foul

*(-) That means negative wheight in the rotated matrix.

DISCUSSION

It is difficult to assess fairplay attitudes in young soccer players, since: 1) Statements used to develop the fairplay attitude scale perhaps could not cover all the aspects included in the fairplay construct, and, 2) Simple statements must be elaborated in order to achieve a clear comprehension from the youngest soccer players (13 years). Because of the aforementioned reasons, some complex items, which belonged mainly to *Showing Skills* and *Equity and Justice* categories, were excluded on the final analysis of data. In spite of these limitations, our results suggest that the variability explained by our scale (31%) could be increased if some other categories belonging to the fairplay concept could be included. On the other hand, it is important to point out that the *rough playing*, *enjoyment* and *winning* categories show some important aspects of the player's attitudes. Furthermore, these categories have yet been considered as the main factors in the understanding of fairplay attitudes in sport settings in the previous studies of Heinila (1974) and Goodner and Jackson (1985).

In order to understand fairplay, it is important to develop scales like ours following studies about values (Cruz et al. 1991, Lee, 1993). It is also important to examine how conflict between specific values in the social context of sport in determines attitudes and behaviors. As Lee (1994, p.5) has pointed out, "the study of values can contribute not only to an understanding of fairplay and sportmanhip in the athletic area but it also has merit in the exploration of wider issues which arise in sport". We agree with Lee's conclusion that the relationships between coaches' and athlete's value system and motivational constructs -as institutional climate or personal goal orientation (Duda, Olson and Templin, 1991)- and their consequences in young athlete's commitment, participation patterns, attribution or self-esteem deserve further research.

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SENSATION SEEKING AMONG ADOLESCENTS: A FACTOR ANALYSIS OF ZUCKERMAN'S QUESTIONNAIRE.

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Key-Words: Sensation seeking, risk-taking, adolescence, alcohol and drug use, sex.

INTRODUCTION

Sensation seeking is conceptualized as the need for individuals to reach and maintain an optimal level of arousal. Sensations seekers seem characterized by a chronical under-activation, and sight stimulations to increase their level of arousal to a point that is hedonically positive for them (Eysenck & Zuckerman, 1978).

It has been shown that sensation seeking was a pertinent predictor of a large range of behaviors, such as drug and tobacco use (Carton, 1994; Zuckerman, 1978; Zuckerman, Ball & Black, 1990), sexual behaviors (Zuckerman, 1978), unusual experiences seeking (Zuckerman, Bone, Neary, Mangelsdorff & Brustman, 1972). Zuckerman (1983) outlined the interest of sensation seeking in the domain of sport and leisure activities: particularly, some studies have shown that sensation seeking was a significant determinant of the choice of risky activities (Zaleski, 1984; Zuckerman, 1983) and of the adoption of dangerous behaviors in these activities (Connolly, 1981; Rossi & Cereatti, 1992).

At our knowledge, sensation seeking has never been studied from a developmental point of view. The only available result in this area is the observation of a gradual decrease in sensation seeking with age, among adults. This trend provides an interesting hypothesis to analyze the evolution of leisure involvement over the life-span (Iso-Ahola, Jackson & Dunn, 1994). But sensation seeking has been mainly studied among adults and few is known about this trait among children and adolescents.

On the basis of physiological and biochemical findings, Zuckerman has proposed a biological model of sensation seeking (Zuckerman, 1984, 1990). This hypothesis allows to predict a relative intra-individual stability of sensation seeking, from childhood to adulthood. Nevertheless no research at this time could confirm this hypothesis.

From a more qualitative point of view, Zuckerman has shown that sensation seeking was a pluri-dimensional concept. Four dimensions have been identified: Thrill and Adventure Seeking, Experience Seeking, Boredom Susceptibility, and Disinhibition. The specificity of the

different subscales of sensation seeking emerges in their differential relationships with some external criteria: for example Disinhibition seems more relevant to psychopathic behaviors, and Adventure Seeking seems highly related to a lack of fear of physical danger (Zuckerman, 1978).

This factorial structure has been confirmed for the French version of the scale (Carton, Lacour, Jouvent & Widlöcher, 1990; Carton, Jouvent & Widlöcher, 1992). Nevertheless this structure was obtained from adult samples, and no information is available neither on the structure of sensation seeking among children and adolescents, nor on the evolution of this structure during the development.

This question raises evident methodological problems, as the current version of the Sensation Seeking Scale is hardly usable with children (a lot of items are directely related to sex, alcohol, and drug). The construction of a child version of the questionnaire seems absolutely necessary. The present experiment constitutes a first step, and its goal was to analyze the factorial structure of the Sensation Seeking Scale in an intermediate sample, composed of adolescents.

METHOD

115 subjects (61 males and 54 females) aged from 16 to 18 have completed a French version of the Sensation Seeking Scale (Carton, Jouvent & Widlöcher, 1992). The intercorrelations matrix was then submitted to a principal component factor analysis, with varimax orthogonal rotation.

RESULTS

A four-factor solution was firstly required, with the aim to confirm the nature of the factors identified by previous studies. This solution explained 31.33% of the total variance. The first factor was constitued by 9 items with loadings highest than 0.4. These items were in most cases related to risk and adventure seeking, and this factor could be considered as equivalent to the Thrill and Adventure Seeking factor of Zuckerman. The item 35 ("I like to have new and exciting experiences and sensations even if they are a little frightened, unconventionnal and illegal") was originally located in the disinhibition factor, but could maybe give a more accurate representation of the nature of this Adventure factor among adolescents. Some items of the original Aventure Seeking factor did not appear in this model, such as "I would like to take up the sport of water skiing " (item 27) or "I enjoy many of the rides in amusement parks" (item 34), which clearly proves that this factor was related with adolescents

to real danger and a relative illegality. More surprisingly, the item 4 ("I like to try new foods that I have never tasted before"), from the original Experience Seeking scale, presented a significant loading (0.519) on this first factor.

The second factor was composed of 5 items with loadings highest than 0.4, which all appeared in the original Disinhibition factor. These items were all related to the use of alcohol and drug. The other items of the original factor, related to sexual experiences were clearly excluded of this factor, which appeared specifically centered on the need to "get high", by the use of more or less illegal ways. It could be noted that the item 18 ("Almost everything enjoyable is illegal or immoral") had also an interesting loading on this factor.

The third factor presented a new combination of items, two from the Boredom Susceptibility factor (item 2: "I find people who disagree with my beliefs more stimulating than people who agre with me", item 28 "I prefer friends who are excitingly unpredictable"), three from the Experience Seeking factor (item 11: "I would like to meet some persons who are homosexuals", item 14: " People should dress in individual ways even if the effects are sometime strange", item 32: " I would like to take off a trip with no pre-planned or definite routes, or timetable"), and one from the Disinhibition factor (item 26: "I prefer people who are emotionally expressive even if they are a bit unstable"). This third factor seemed clearly related to the seeking of originality and nonconformity. It focussed on the adoption of behaviors in opposition with "adult models", and seemed specific to our adolescent population.

The fourth factor involved four items of the original Disinhibition factor, related to sexual experiences, but also the item 34 ("I enjoy many of the rides in amusement parks", Thrill and Adventure Seeking) and the item 23 ("I prefer popular or light classical music to modern jazz or classical music", Experience Seeking). This factor focused more particularly on social and/or sexual enjoyable experiences. Three others items had loadings higher than 0.3, and allowed a more accurate representation of this factor: "I like to explore a strange city by myself, even if it means getting lost" (item 19), "I would like to take up the sport of water skiing" (item 27) and "Looking at someone's home movies or travel slides bores me tremendously" (item 38).

Six items did not obtain significant loadings on these factors. This could be attributed to some cultural problems of translation to French, and of disadaptation to our adolescent subjects.

TABLE 1: Four-Factor Solution, for the 40 Items of the Sensation Seeking Scale.

No	Description	Factor I	Factor II	Factor III	Factor IV
15	Danger	**0.657**			
16	Parachute	**-0.632**			
39	Scuba diving	**-0.612**			
1	Mountain climber	**-0.594**			
35	Experiences	**0.588**			
4	New foods	**0.519**			
30	Airplane	**0.518**			
29	High board	**-0.511**			
21	Skiing	**0.415**			
10	Surf-board	-0.358	0.312		-0.341
17	Artists	0.321			
22	Stimulants		**-0.807**		
6	Marijuana		**0.680**		
36	Couple of drinks		**0.617**		
13	Drugs		**-0.617**		
9	Drinking		**-0.580**		
5	Movie seen before		0.319		
18	Illegal		0.323		
26	Unstable people			**-0.692**	
14	Unusual dress			**-0.576**	
28	Unpredictable friends			**0.552**	
32	Pre-planning			**0.502**	0.377
11	Homosexuals			**0.457**	
2	Divergent beliefs			**0.448**	
31	Same old faces			0.370	
33	Sex in movies				**0.499**
12	Physically exciting				**-0.489**
20	Sexual experiences				**0.465**
34	Amusement parks				**0.434**
40	Uninhibited parties				**-0.417**
23	Popular music				**0.416**
19	Strange city				0.363
27	Water skiing				-0.358
38	Slides				0.318
3	Good night of rest				
7	Stay home				
8	Modern painting				
24	Discussions				
25	Crazy things				
37	Boring people				
Eigenvalue		3.836	3.241	3.061	2.393

Note: Loading higher than 0.4 are in bold and loading smaller than .3 have been ommitted.

A three-factor and a five-factor solutions were also requested, but did not give satisfying models. In the three-factor solution the first factor appeared to be a combination of the Risk and Adventure Seeking and the Sexual and Social Experiences Seeking factors, and in the five-factor solution the Originality factor seemed dissociated into two factors: Non-conformity and Improvisation.

DISCUSSION.

The study of sensation seeking, from a developmental point of view, seems particularly interesting with the aim of understanding the antecedents of risk-taking, in the sports domain as well as in the domain of deviant social behaviours.

These results showed that the factorial structure of sensation seeking is slightly different between adolescents and adults. The first factor, related to the seeking of adventure, particularly in risky sports, seems identical among adults and adolescents. The Disinhibition, Experience Seeking and Boredom Susceptibility factors of Zuckerman's model appear to be reorganized into three new factors: Alcohol and Drug Use, Sexual and Social Experiences, and Originality and Non-conformity. This factorial model denotes a specific involvement of sensation seeking in adolescents.

This suggests that sensation seeking among adults could be conceived as the final step of a developmental process, and also that our model for adolescent constitute a median step of this process. More research is needed to analyse the structure of sensation seeking in children, and to understand the 'filiations' between these successive structures.

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MODELS PERFORMANCE OUTCOMES AND SIMILARITY BETWEEN MODELS AND OBSERVERS: IMPACT ON SELF-EFFICACY.

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KEY WORDS

Self-efficacy, Vicarious Experience, Modelling, Performance Results, Similarity.

INTRODUCTION

Self-Efficacy theory (Bandura, 1977) defines self-efficacy as people's belief in their capacity to obtain a specific level of performance in a determined environment. This cognitive construct is considered one of the most important self-evaluating factors that affects self regulation of the behaviour and that determines tasks election and effort exerted doing a task.

Studies that want to influence behaviour through manipulation of efficacy expectancies are based on the manipulation of one or more self-efficacy information sources. Following Bandura (1977, 1982, 1986) these sources are four: performance achievements, vicarious experience, verbal persuasion and physiological states.

Vicarious experience is an important source of information when observers have never done the task or have had little contact with it (Feltz, Landers & Raeder, 1979; Gould & Weiss, 1981; McAuley, 1985). Modelling in vivo and filmed has been employed to increase self-efficacy in motor tasks (Feltz, Landers & Raeder, 1979; Gould & Weiss, 1981; McAuley, 1985).

When researchers have considered modelling effects on self-efficacy they have analized some characteristics of the models. Similarity between model and observer in terms of performance has showed to be effective when we tried to influence subjects performance and self-efficacy perception (Brown & Inouye, 1978; Goulg & Weiss, 1981; McCullagh, 1987). The influence of sex and ability on the perception of similarity was studied by George, Feltz & Chase (1992). Their results showed sex of the model was a signal of similarity less prominent thnt ability of the model.

Model performance results also seems to influence observers self-efficacy. Lirgg & Feltz (1991) proved subjects that watched an expert or a peer with high ability had efficacy expectancies higher than subjects who watched an expert or a peer with low ability.

Escartí, Guzmán, Cervelló, & Campos (1993) designed a study which analized influence both similarity between model and observer (level of hability) and model performance results on subjects efficacy expectancies in respect to a motor task that needed high ability (run with hurdles). Results showed efficacy expectancies were higher when similarity between model and observer was higher. Nevertheless this study could not prove the influence of model performance results (good or bad) on efficacy expectancies.

The aim of this research has been to analize the influence of vicarious experience on self-efficacy. We considered two modelling variables: similarity between model and observer and model performance results. In this way we wanted to replicate results obtained by Escartí & at. (1993) with a bigger sample.

II. METHOD

Sample and procedure

Sample was formed by 61 males students in the Physical Education Institute of Valencia, of ages between 18 and 28. The sample was divided randomly in two groups. Group 1 was composed by 32 subjects and group was composed by 29 subjects. All subjects were put into two modelling sessions where they observed different models doing a task that consisted in passing hurdles. All subjects (Group 1 and 2) observed first a video where they watched 3 expert models (athletes in active) doing the task and secondly another video where they watched 3 peer models (students of Physical Education) doing the task. While subjects watched models they had a table where they could see the performance results of the models (time and movement evaluation). Group 1 was modelling with experts and peers that performed the task with high ability and had high performance results. Group 2 was modelling with the same video as group 1 and

with a video of peer models with lower ability than observed by group 1. The models results (experts and peers) provided to this group were lower that results administered to group 1. After each modelling session all subjects were administered a questionaire to measure their efficacy expectancies with respect to the modelling task. At the end all subjects of the sample did the task..(See Fig. 1).

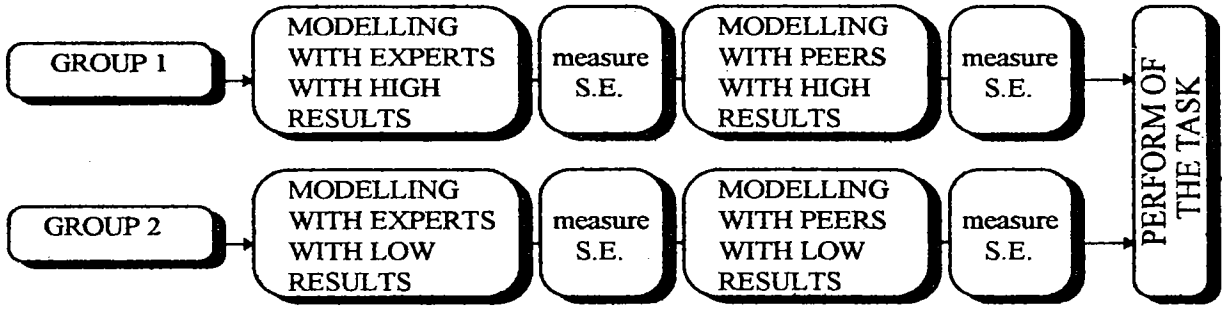

Fig. N° 1. Scheme of the modelling process and different self-efficacy measures

The proceeding we follow permited us to obtain two measures of self-efficacy by each group. In group 1: a measure of self-efficacy after watching expert models with high performance results and another measure after watching peer models with high performance results. In group 2: a measure of self-efficacy after watching expert models with low performance results and another measure after watching peer models with low performance results.

Instruments

We evaluated self-efficacy of subjects by three measures:

1. Measure of Time Expectancy (TE): It consisted in a graduated scale from "9" to "18" seconds, on wich they had to indicate the time they thought they could do.

2. Measure of Time Expectancy Strength (TES): It consisted in a series of time intervals, progressively more wide, around the time selected. For each one of these intervals they had to indicate, by a number between 0 and 100, their confidence respect his time of performance would be within that interval of time. Final punctuation was the sum of the valoration of each interval.

3. Measure of Specific Capacity of Motor Performance Expectancy (SCE): It consisted in a scale between 0 and 100 on wich they had to indicate the punctuation best representing their capacity to perform the task properly in function of their motor performance.

RESULTS

In group 1 (modelling with high results) the mean of subjects time expectancy (TE) showed a drop when it was measured after watching peer models. The mean of specific capacity of motor performance (SCE) arose when self-efficacy was measured after watching peers, and the mean of time expectancy strength (TES) also arose when self-efficacy was measured after watching peers (See Table 1.)

TABLE 1. Descriptives Efficacy Expectancies of Group 1(Modelling with high Performance Results)

Variable	Mean	Std Dev	Minimum	Maximum	Valid N
TE2	12,19	,96	10,00	14,70	32
TE1	13,22	1,32	10,90	16,00	32
SCE1	61,66	14,31	30,00	80,00	32
SCE2	67,56	12,35	35,00	95,00	32
FET1	283,78	77,77	160,00	470,00	32
FET2	313,44	80,79	150,00	450,00	32

TE:** Time Expectancy./ ***SCE**: Specific Capacity of Motor Performance Expectancy (SMPCE) /TES**: Time Expectancy Strenght / ***1**: Measure After Watch Expert Models/***2**: Measure after Watch Peers Models.

In group 2 (modelling with low results) the means of efficacy expectancy evolved in the same direction as in group 1. The mean of time expectancy (TE) went down after watching peers, the mean of specific capacity of motor performance (SCE) arose and the mean of time expectancy strength (TES) also arose after watching peers. The mean of TE was higher and the mean of SCE was lower than group 1 (See Table 2).

TABLE 2. Descriptives Efficacy Expectancies of Group 2 (Modelate with Low Performance Results)

Variable	Mean	Std Dev	Minimum	Maximum	Valid N
TE2	13,08	,59	11,50	14,50	29
TE1	13,32	,99	11,50	16,00	29
SCE1	58,21	12,85	30,00	80,00	29
SCE2	58,76	14,19	40,00	90,00	29
TES1	259,66	72,08	100,00	400,00	29
TES2	328,90	68,31	205,00	500,00	29

Results were analized with ANOVAs 2x2, taking self-efficacy (TE, SCE, TES) as a dependent variable and as independent variables similarity between model and observer (expert/peer models), and model performance results (high/low performance results).

Analysis of Variance of the specific capacity of motor performance expectancies (SCE) showed that these expectancies varied significantly in function of model performance results.. Subjects of group 1, who watched models with high performance results) showed higher expectancies that subjects of group 2, who watched models with low performance results). These expectancies did not vary significatively when subjects watched peers (See Table 3)

TABLE 3. ANOVA 2x2 of SCE in function of similarity model-observer and model performance results

Source of Variation	SS	DF	MS	F	Sig of F
Error	21343,16	118	180,87		
Similarity Model-Observer	317,23	1	317,23	1,75	,188
Models Performance Results	142,06	1	1142,06	6,31	**,013***
Simililarity by Results	218,09	1	218,09	1,21	,274
(Model)	1704,62	3	568,21	3,14	,028
(Total)	23047,78	121	190,48		

Level of Signification: p<= ,05

Time expectancies (TE) analysis of Variance showed that they were significantly altered in function both of similarity between model and observer and model performance results. TE rose (times went down) when subjects watched peer models, both group 1

and 2. Also we found that subjects of group 1 (modelling with high results) showed better TE that subjects of group 2 (modelling with low results). Interaction between two factors also afected significantly TE (See Table 4).

TABLE 4. ANOVA 2x2 of TE in function of similairty between model and observer and model performance results

Source of Variation	SS	DF	MS	F	Sig of F
Error	119,38	118	1,01		
Similarity Model-Observer	12,39	1	12,39	12,24	**,001***
Models Performance Results	7,56	1	7,56	7,48	**,007***
Similarity by Results	4,70	1	4,70	4,65	**,033***
(Model)	25,45	3	8,48	8,38	,000
(Total)	144,83	121	1,20		

Level of Signification: p<= ,05

Time expectancies strength (TES) analysis of variance showed that they were significatively altered in function of similarity between model and observer. TES rose when subjects watched peer models (See Table 5).

TABLE 5. ANOVA 2x2 of TES in function of similarity between model and observer and model performance results

Source of Variation	SS	DF	MS	F	Sig of F
Error	665918,59	118	5643,38		
Similarity Model-Observer	74397,77	1	74397,77	13,18	**,000***
Models Performance Results	571,38	1	571,38	,10	,751
Similarity by Results	1919,34	1	11919,34	2,11	,149
(Model)	84161,62	3	28053,87	4,97	,003
(Total)	750080,20	121	6199,01		

Level of Signification: p<= ,05

DISCUSSION AND CONCLUSSIONS

Self-efficacy measure was made in a mycroanalytic form, following Bandura's indications (1987, 1986). This autor says self-efficacy can be measured by three dimensions: level, strength, and generality. In our study we measured self-efficacy level and strength. Level was determined by time expectancies (TE) and specific capacity of motor performance expectancies (SCE). Studies where task is effort dependent-endurance tasks- (Feltz & Riessinger,1990; Gould & Weiss, 1981; McCullagh, 1987;

Weinberg, Gould & Jackson, 1979; Weinberg, Gould, Yukelson & Jackson, 1981), TE are enough to determine self-efficacy, nevertheless in ability dependent tasks we think this measure is not enough and it is necessary to introduce some expectancies that refer to the capacity of subjects to do the movements of the task properly.

Level of similarity between model and observer was manipulated varying the models level of ability (experts or peers). Studies of George, Feltz & Chase (1992) had indicated model level of ability was a determinant of similarity more important than other aspects like sex. In our study this manipulation affected significatively TE and TES, nevertheless did not affect significantly SCE. The significant influence over TE provide support for the results obtained by Brown & Inouye (1978), Gould & Weiss (1981) and George & at. (1992). Nevertheless we can say the influence of this factor on self-efficacy is limited because SCE is not altered significantly by it. In another way results showed similarity between model and observer was the only factor that affected TES, although we should analize if SCE strength is altered or not by this factor.

In our study model performance results affected significantly TE and SCE. These results provided support results of Lirgg & Feltz (1991). They found subjects that observed both experts and peers doing a task with high ability had higher efficacy expectancies than subjects that observed experts and peers with low ability. Nevertheless TES was not significantly different between groups modelling with high and low performance results. In this way models performance results affect level of expectancies (TE and SCE) but do not affect strength of expectancies (TES), although we should analize if SCE strength is altered or not by this factor.

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THE RECOVERY-STRESS-QUESTIONNAIRE FOR COACHES

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Key words: stress; recovery; questionnaire; coaches

INTRODUCTION

The Recovery-Stress-Questionnaire

The Recovery-Stress-Questionnaire (RESTQ) was developed to assess qualitatively a person's temporary state of strain (Kallus, 1990, 1995). The temporary state of strain is a result of the person's preceding stress levels and at the same time the preceding recovery activities. Recovery is a global term which includes goal directed behavior as well as habits and biological determined processes to reestablish a state of homoeostasis. Basic features of recovery are: (1) recovery is a time consuming process; (2) recovery is a function of the kind and the intensity/duration of stress; (3) recovery can only take place if stress is reduced, interrupted by breaks, or at least changed in quality; (4) recovery is individually specific and dependent on individual appraisals; (5) recovery processes terminate after the reestablishment of full psycho-physical efficiency and full homoeostatic equilibrium; (6) recovery takes place at different levels of organismic functioning (physical level, psychic level, social level, socio-cultural level, environmental level); (7) the different processes of recovery at different levels can be dissociated; and finally (8) recovery processes are closely bound to the actual circumstances (such as sleep, social partners, etc.). Empirical evidence suggests that recovery is a sensitive process which can easily be disturbed or prevented (e.g., Kellmann & Kallus, this volume).

The RESTQ in its basic form takes into account that recovery is a complex multi-level process. The RESTQ allows the subjects's actual stress-recovery-balance to be assessed on a universal level. To address more specific details of stress and recovery processes of coaches in high performance sports, coach-specific subtests had to be added.

The Recovery-Stress-Questionnaire for Coaches

The Recovery-Stress-Questionnaire for Coaches (RESTQ-CO; Kallus & Kellmann, 1993) expands the original 48-item RESTQ (12 subtests; e.g., Kellmann & Kallus, 1993) by adding 42 additional items related to seven coach-specific subtests ('success as a coach', 'fitness', 'motivation', 'self-efficacy', 'conveyance of self-regulation techniques', 'emotional exhaustion', and 'personal accomplishment'). The last two of the coach-specific subtests were constructed with close resemblance to the burnout construct (e.g., Maslach & Jackson, 1986). Table 1 lists the subtests of the RESTQ-CO together with the most representative items and the coefficient of internal consistency (Cronbach's α) of the German version.

TABLE 1. Subtests of RESTQ-CO as well as a Representative Item and Cronbach α

Nr.	Subtest	Example	α
1	General Stress	... I felt down	.84
2	Emotional Stress	... I was in a bad mood	.74
3	Social Stress	... I was angry with someone	.86
4	Conflicts/Pressure	... I felt under pressure	.54
5	Fatigue	... I was overtired	.77
6	Lack of Energy	... I was unable to concentrate well	.74
7	Somatic Complaints	... I felt uncomfortable	.70
8	Success	... I finished important tasks	.67
9	Social Relaxation	... I had a good time with my friends	.84
10	Somatic Relaxation	... I felt at ease	.82
11	General Well-being	... I was in a good mood	.87
12	Sleep	... I had a satisfying sleep	.85
13	Success as a coach	... I made the right decisions during competition	.79
14	Motivation as a coach	... I motivated my athletes well	.47
15	Fitness	... I was physically relaxed	.81
16	Emotional Exhaustion	... I felt burned out	.76
17	Personal Accomplishment	... I dealt with emotional problems of my athletes very calmly	.74
18	Self-efficacy of coaches	... I was convinced that I prepared my athletes as well as possible	.81
19	Self-regulation	... I spoke with my athletes about the advantages of mental training	.86

The RESTQ-CO assesses possible stressful events and their consequences and recovery activities of coaches in the "past 2 - 3 weeks". The questionnaire includes instructions and can, thus, be worked on independently without any help from others. The RESTQ-CO is an instrument for the self-description of a coach who should rate retrospectively how often these events occurred during the preceding 2 - 3 weeks. The verbal statements of the RESTQ-CO are based on 'uncompleted' sentences, i.e., the heading "During the past 2 - 3

weeks" and the item together yield a complete statement. For each of these items, the subject has to rate the frequency of the listed reactions in the preceding 2 - 3 weeks on a seven-point scale which is verbally and numerically labelled. The scale ranges from 'never' (0) to 'always' (6).

The statistical analyses, with respect to reliability and validity of the RESTQ-CO, revealed good results with few exceptions (cf. table 1). In the meantime the weak subtests have been improved, and a subtest assessing 'stress during rest periods' was added. The subtests 'conflicts', 'success', and 'motivation as a coach' cannot be interpreted with full confidence in the version on hand.

Table 2 shows that the intercorrelation of subtests supports the idea that stress and recovery have to be seen as two partly independent factors (e.g., Kallus, 1995) and that the coach-specific subtests cluster together in a third factor. This pattern could be supported by a factor analysis which revealed three independent factors in accordance with the correlation pattern of table 2.

TABLE 2. Subtest-intercorrelations of RESTQ-CO

Subtest	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 General Stress																			
2 Emotional Stress	++++																		
3 Social Stress	++	+++																	
4 Conflicts	++	++	++																
5 Fatigue	+	+	+	+															
6 Lack of energy	++	+		+															
7 Somatic Complaints	++	+			++	+													
8 Success																			
9 Social Relaxation																			
10 Somatic Relaxation	--	--			-	-	--		++										
11 General Well-being	---	--				-	-	+	+++	++++									
12 Sleep	--	-			-	-	--			+++	++								
13 Success-coach								+											
14 Motivation													++						
15 Fitness	-	-			-	-	-		+	++++	+++	+++		+					
16 Emot. Exhaustion	+++	+		+	+								++++	++	+				
17 Per. Accomplishment								++					++++	+++			+++		
18 Self-efficacy								++					++	+++	+		+++	++	
19 Self-regulation								+											

+	r ≥ .40 and r < .50	-	r ≤ -.40 and r > -.50
++	r ≥ .50 and r < .60	--	r ≤ -.50 and r > -.60
+++	r ≥ .60 and r < .70	---	r ≤ -.60 and r > -.70
++++	r ≥ .70		

One interesting detail is that the subtest 'success' of the basic RESTQ is closely related to most coach-specific subtests. On the other hand, the subtest 'success' finds no good match

in the factorial pattern of the basic version. These results can be interpreted as cross-validation of the occupation-specific subtest and the basic subtest 'success'. On the other hand, the subtest 'fitness' links the coach-specific subtests to the recovery factor of the RESTQ.

Basic question of the present study

The Landessportverband Baden-Württemberg offers two different positions for coaches. The professional coach (Landestrainer; PC) is a full-time coaching position while the semi-professional coach (Honorartrainer; SPC) coaches on a part-time basis. It is assumed that job stress of professional coaches is higher than that of semi-professional coaches because job security is dependent on the outcome of the competition.

Reffering to the differences of the two positions as coaches, the basic question of the present study was posed: How do coaches with professional full-time contracts differ from their colleagues who do their job on a semi-professional level?

METHODS AND PROCEDURE

Subjects

360 coaches of the Federal Sports Association of Baden-Württemberg (Landessportverband Baden-Württemberg) received the German version of the RESTQ-CO together with one biographic questionnaire and two additional ones which had to be completed voluntarily.

TABLE 3. Description of the Sample and Proportions of Professional Coaches (PC) and Semi-professional Coaches (SPC)

	Total sample				PC	SPC	?
	n	Age range	M	SD	n	n	n
Females	20	27-65	40.95	11.75	5	14	1
Males	175	26-64	41.94	8.72	59	113	3

? = missing responses

Of 360 subjects, 197 responded to this survey (a 55 % response rate out of 45 different sports). Table 3 gives the basic data of the sample. The gender proportion in the present study represents the quota of this institution.

RESULTS

Recovery-Stress-Profiles

The differences between professional coaches and those on a semi-professional basis were tested via MANOVA and subsequent F-tests df: (2, 147), which of course are equivalent to Student's t-tests. The results are given in figure 1.

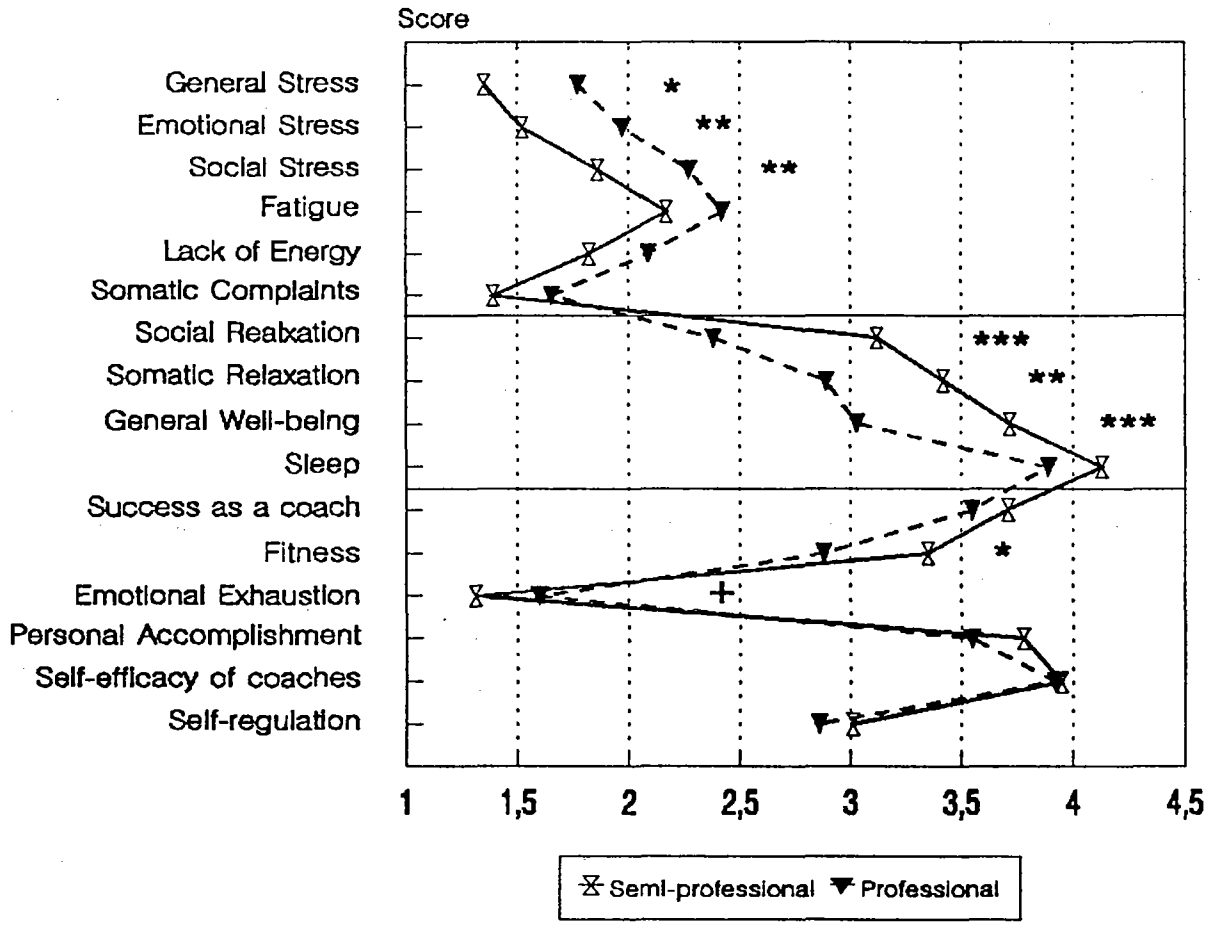

Fig. 1. RESTQ-CO Profiles of Professional and Semi-professional Coaches

p-values: +: $0.1 \geq p > 0.05$ *: $0.05 \geq p > 0.01$
**: $0.01 \geq p > 0.001$ ***: $p < 0.001$

The professional coaches described themselves as significantly under strain and less recovered than their counterparts who coach in addition to their normal occupation. These results primarily appear in the general basic part of the RESTQ-CO. For the coach-specific subtests, only 'fitness' ($p < 0.05$) and 'emotional exhaustion' ($p < 0.1$) differentiated between the two groups.

An analysis including age as an additional factor shows that for coach-specific subtests, elements such as experience as a coach are more relevant than the professional status. Figure 2 shows that the 'conveyance of self-regulation techniques' increases significantly ($p < 0.001$) with age, while no effect of occupational status and no age x occupational status emerged from MANOVA.

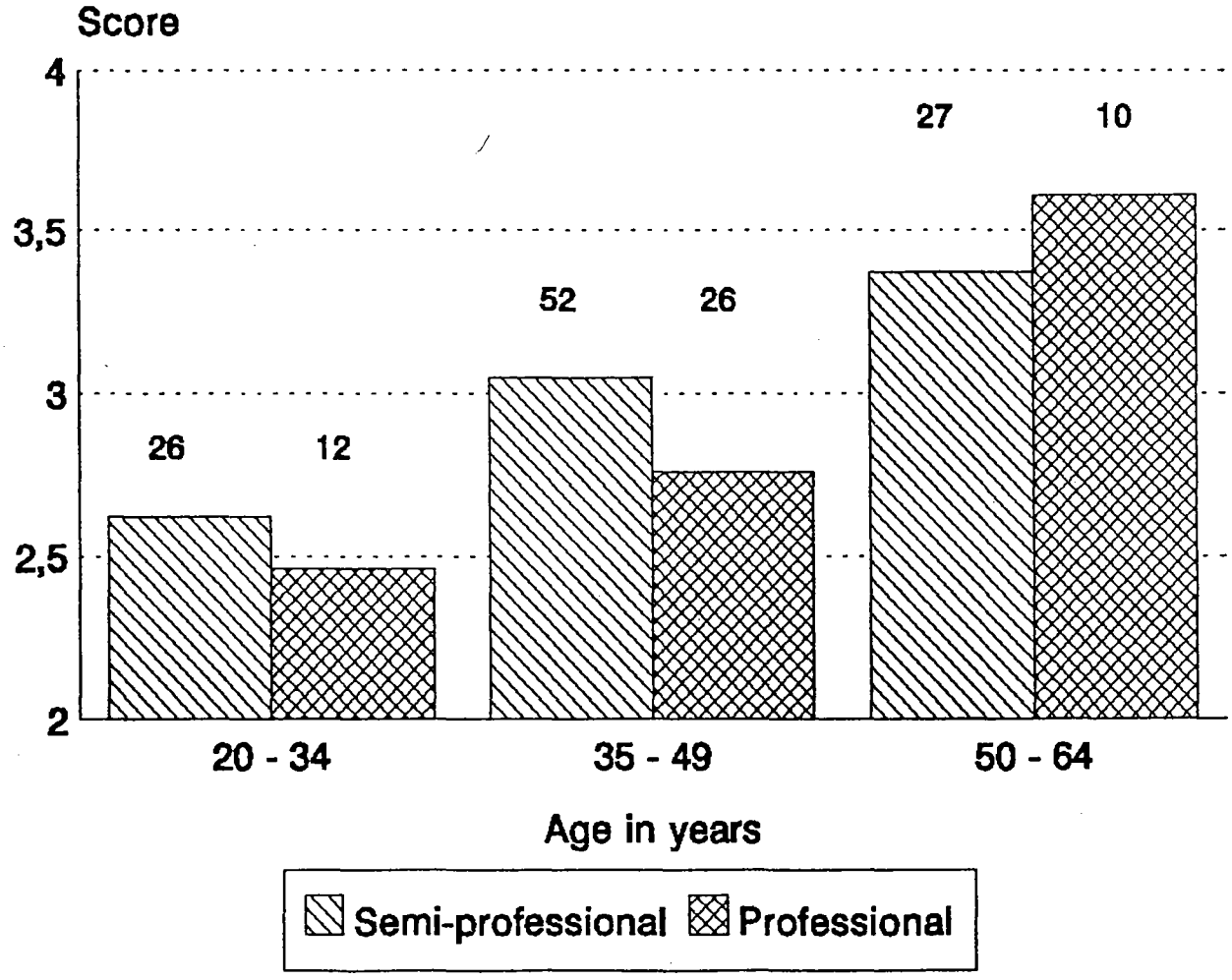

Fig. 2. Subtest 'Conveyance of Self-regulation Techniques' for Professional and Semi-professional Coaches dependent on Age and Group Size

DISCUSSION AND CONCLUSIONS

Completing the RESTQ-CO, professional coaches describe themselves as more stressed, experience less recovery, and see themselves as less fit in comparison to their counterparts who do their job as coach in addition to their normal occupation. Feedback workshops with the coaches supported the view that this has to do with the existential change. Professional coaches seem to lose their hobby by coaching as a career. At the same time they often lose the continuous contact to their athletes and spend much time driving from training camp to training camp. Thus the compensation of occupational stress by being a coach in one's free time seems to be lost by the main occupation coaches. This interpretation is supported by an analysis of time budgets. While overall time (a main occupation and second job) shows no difference between groups, main occupation hours are far more for the professional coaches ($p(t) < 0.01$).

Group differences are unaffected by variables like age as far as the general stress-recovery-balance is concerned. The stability of these results enhances the idea of optimizing the situation of the professional coaches in a large sports organization.

The coach-specific part of the RESTQ-CO drew attention to aspects of coaching behavior which seem to be related to the age/experience dimension. The low scores for self-regulation of younger coaches could be due to less experience or to selection effects in the career as a coach in high performance sports. Both causal possibilities have a common consequence for the preparation and further education of coaches. The results of this study suggest that attention should be given to redefining job-related responsibility and the opportunity for physical activities of professional coaches.

The present study demonstrated that the RESTQ-CO is able to detect possible weak and strong aspects of coaches' recovery and stress behavior. The division into a basic part and population-specific subtests allow coach-specific, as well as general problems in the population at hand, to be detected. This kind of module-built questionnaire system was also successful for the athlete-specific versions of the RESTQ. By this questionnaire, performance prognosis was possible in repeated studies (e.g., Kellmann & Kallus, 1993).

The Rest-Period-Questionnaire for Coaches is available in English as well as in German and the authors would make it available to anyone who is interested in using it for research.

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THE FACTORIAL VALIDITY OF THE PHYSICAL SELF-PERCEPTION PROFILE

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Running head: The Factorial Validity of PSPP

Key words: factorial validity, confirmatory factor analysis, physical self-perceptions

INTRODUCTION

The Physical Self-Perception Profile (PSPP; Fox, 1990; Fox & Corbin, 1989) is a self-report instrument designed to measure multiple dimensions of physical self-esteem. The PSPP is comprised of 30 items and assesses five subdomains of physical self-perceptions: sport competence, attractive body, physical condition, physical strength, and physical self-worth. Fox and Corbin's research with PSPP is in accordance with Harter's (1982), Shavelson, Hubner, and Stanton's (1976), and Marsh and Shavelson's (1985) multidimensional and hierarchical structure of self-esteem. Specifically, they have presented a psychological model in which global self-esteem is at the apex of a hierarchy, followed by the physical self-worth at domain, and sport competence, attractive body, physical condition, and physical strength at the subdomain levels.

Fox and Corbin (1989) have provided adequate support for the psychometric properties of the PSPP in college students. The internal consistency reliability coefficients of the five subscales ranged from 0,81 to 0,92 and the test-retest reliability coefficients ranged from 0,74 to 0,92 for a 16-day period of time and from 0,81 to 0,88 over a 23-day period of time. Exploratory factor analyses resulted in a four-factor structure model (the physical self-worth scale was not included in the analysis) for both males and females. In addition, confirmatory factor analyses supported the hypothesized four-factor structure of the PSPP for both sexes; however, two of the most frequently reported fit indices of the observed data, the Bentler and Bonett´s Index (BBI; 1980) and the Tucker and Lewis' Index (TLI; 1973), were not discussed. Finally, evidence for the construct validity of the PSPP was obtained by successfully predicting the physically active and inactive students, as well as the low and high active students, with 70 to 75% accuracy (Fox & Corbin, 1989).

Although the development of the PSPP has opened the way for more accurate conceptualization and measurement of physical self-perceptions, surprisingly little construct validity research with the PSPP has been published. Fox (1990) has emphasized the need for testing the psychometric properties of the instrument in various other populations as well as testing the gender differences in the PSPP scores.

Gender differences is one of the most extensively examined topic among sport/exercise psychologists and physical educators. The majority of studies, however, have relied on t-tests and multivariate analysis of variance (MANOVA) to compare the

means between gender groups and the interaction effects due to gender. However, as Drasgow and Kanfer (1985) indicated, group means are not comparable if the properties of the measured variables are not equivalent in all groups . A few researchers have employed separate exploratory factor analyses and compared the psychometric properties of the measured constructs across groups, but Alwin and Jackson (1981) argue that "the issues of factorial invariance are not adequately addressed using exploratory factor analysis" p. 250). Recently, confirmatory factor analytic computer programs (e.g. Joreskog & Sorbom, 1989) are methodologically more efficient for testing the factorial invariance across groups (Byrne, Shavelson, & Muthen, 1989).

The purpose of this research is to examine the proposed four-factor structure of the PSPP and to assess any potential differences in the factorial structure of the PSPP across sex. The factorial invariance of the PSPP was analyzed with confirmatory factor analysis by testing a series of hypotheses involving the equivalence constraints of one or all parameters in the male and female groups.

METHOD

The sample consisted of 315 undergraduate students (131 males, 184 females) enrolled in a similar 15-week fitness and wellness course at The University of Iowa and Northern Illinois University, respectively. The data were collected as part of a project designed to examine the longitudinal relationship between physical self-perceptions and fitness achievement.

Instrumentation

The PSPP contains 30 items which are written using Harter's (1982) structured alternative format designed to minimize the tendency towards socially desirable responses. This instrument is comprised of four aspects of physical self: sport competence, attractive body, physical condition, and physical strength (The fifth dimension of the scale measuring the physical self worth was not included in this study).

Analysis

First, an exploratory factor analysis was applied in order to identify the common factors of variation among the variables of the PSPP. A principal components analysis was performed using oblique rotation. In the second phase of the analysis, a

confirmatory factor analysis of LISREL VII (Joreskog & Sorbom, 1989) was conducted to test the hypothesized four-factor structure of the PSPP separately for both males and females. Finally, the factorial invariance of the PSPP was tested with the multiple group option of the LISREL program. The procedures for testing the factorial invariance across groups were identical to those applied in single model fitting. Specifically, a restricted model which has some of its parameter matrices constrained to be equal across groups was compared with a model in which the values of the same parameters are free or needed to be estimated (Byrne, Shavelson & Muthen, 1989). The following matrices were of primary interest in testing the factorial invariance across the two groups: the factor loadings matrix Lambda (Λ), the latent factor variance-covariance matrix Phi (Φ), and the measurement errors matrix Theta (Θ).

RESULTS

Principal components analyses with oblique rotation extracted four interpretable factors, accounting for 67.9% and 70% of the variance in the male and female items, respectively. A minimum loading of 0,30 was used for inclusion of an item in a particular factor. No complex factors were found in the male sample. In the female sample, however, the items 19 and 20 loaded on more than one factor. Specifically, the item 19 loaded more highly on Factor 4 and the item 20 on Factor 2. Finally, the item 24 did not load on any of the four factors on the basis of the minimum specified criterion (0,30).

Based on the principal components analyses results, separate confirmatory factor analyses were conducted to confirm the four-factor structure in the male and female samples. Since the correlations among the four-factors were relatively high (0,26 to 0,78, median = 0,65), the Phi (Φ) matrix was set as symmetric, whereas its diagonal values were fixed at 1.0 to set the scale of the latent variables (these are hypothetical constructs with no specific measurement scale).

The summary statistics for the confirmatory factor analyses are presented in Table 1. As can be seen, all the items of the PSPP have statistical factor loadings (t-values greater than 2, $p < 0,05$). However, some estimated factor loadings, mainly in the male sample, did not load very well on the hypothesized latent factors (less than 0,50). In addition, the estimated factor loading of the item 20 in the female sample was only 0,293 (t-value = 9.03).

As can been seen in Table1, the majority of the goodness-of-fit indices in this analysis did not support the proposed four-factor structure for both males and females. The chi-

Table 1. Confirmatory Factor Analyses Results for Males and Females

		MALES		FEMALES	
	Items	Factor Loadings	T-values	Factor Loadings	T-values
SPORT					
	1	0,508	9.29	0,685	12.47
	5	0,516	8.80	0,629	13.36
	9	0,683	12.32	0,832	15.15
	13	0,642	12.11	0,669	14.76
	17	0,484	8.75	0,622	12.30
	21	0,487	8.74	0,774	14.43
CONDITION					
	2	0,573	9.61	0,565	12.06
	6	0,565	8.56	0,579	11.96
	10	0,433	7.54	0,556	12 21
	14	0,519	9.13	0,593	12.82
	18	0,501	9.58	0,462	14.49
	22	0,625	12.03	0,583	14.52
BODY					
	3	0,494	10.03	0,587	11.81
	7	0,536	8.77	0,710	11.05
	11	0,628	10.60	0,597	11.94
	15	0,558	9.99	0,638	10.94
	19	0,520	10.30	0,670	5.93
	23	0,655	12.12	0,639	13.80
STRENGTH					
	4	0,569	11.48	0,596	12.17
	8	0,627	11.85	0,571	11.10
	12	0,498	9.06	0,694	10.61
	16	0,508	10.08	0,532	13.01
	20	0,652	12.96	0,293	9.03
	24	0,480	9.03	0,634	10.99

Sample size	131	184
Chi-Square (df =276)	447.73	583.58
Ratio, Chi-Square / df	1.82	2.37
Goodness-of-Fit-Index (GFI)	0,784	0,781
Root Mean Square Residulas (RMSR)	0,037	0,055
Bentler-Bonett's Index (BBI)	0,810	0,752
Tucker-Lewis' Index (TLI)	0,891	0,882

square goodness-of-fit test was statistical significant in both groups indicating that there were some discrepancies between the obtained data and Fox's model. However, since the chi-square statistic is sensitive to sample size, the relative likelihood ratio between the chi-square and its degrees of freedom was considered as a more appropriate index for evaluating the fit of a model. The χ^2/df ratio tests in this study were 1.82 for the males and 2.37 for the females, indicating acceptable fit of the proposed model. On the other hand, the Goodness-of-fit Index (GFI) and the Root Mean Square Residual (RMSR) of the LISREL program, as well as the BBI and the TLI goodness-of-fit indices, indicated possible misspecifications in this model. Values for the GFI, BBI, and TLI of 0.90 or greater are indicative of a relatively well-fitting model. Values close to 0 for the RMSR are considered as being good fit to the data. As shown in Table 1, the goodness-of-fit measures did not provide support for the hypothesized four-factor structure of the PSPP in either the males or the females.

In order to examine the factorial invariance of the PSPP across both samples several formulations of the model were examined for purposes of comparison and assessment. More specifically, six different formulations were compared in this analysis. Results of these comparisons in goodness-of-fit information for models M_0 through M_5 are presented in Table 2. The initial baseline model (M_0) represents a no-factor or null model. According to Bentler and Bonett (1980), a null model is the most restricted model in which the measured variables are assumed to be uncorrelated. As shown in Table 2, this model produces a χ^2 (552) = 5708.82, $p < 0{,}001$, which fits the data very poorly. Tests of invariance followed, with the examination of the model M_1 which is the most meaningful and best fitting model to the data. Specifically, this model examines whether the number of factors of the PSPP are invariant across sex. This model yielded a χ^2 (492) = 1031.30, $p < .001$ that equals the sum of the separate analyses for males (χ^2 (246) = 447.73) and females (χ^2 (246) = 583.58). Although M_1 does a better job of fitting the model to the data, the fit of this model can be further improved. This improvement can be seen in all of goodness-of-fit indices presented in Table 2 (GFI = 0,781, RMSR = 0,055, BBI = 0,819, and TLI = 0,882).

The third model (M_2) examines whether the factor loadings are the same across the two samples. In order to examine this hypothesis, the factor loadings for every factor were constrained invariant across groups. The fit of the constrained model yielded a χ^2 (516) = 1095.69, $p < 0{,}001$ and there were no significant changes in all of the goodness-of-fit indices of this model to the data compared to the model M_1 (See Table 2). Therefore, the fit of this model demonstrated that the factor loadings were not constant in the two groups. Inspection of the fit indices for models M_3 through M_5 indicate that the

Table 2. Goodness-of-Fit Indicators for Confirmatory Factor Analysis[a]

Model	χ^2	df	χ^2/df	GFI[b]	RMSR[c]	BBI[d]	TLI[e]
Null model (M_0)	5708	552	10.34	0,190	0,262	------	-------
No Invariance (M_1)	1031.30	492	2.10	0,781	0,055	0,819	0,882
Fac Loadings (FL) Invariance (M_2)	1095.69	516	2.12	0,766	0,063	0,809	0,880
FL, Factor Varian. (FV) Invariance (M_3)	1129.89	522	2.16	0,757	0,067	0,802	0,875
FL, Measurement Errors (ME) Invar. (M_4)	1180.22	540	2.19	0,747	0,064	0,793	0,873
Total Invariance (M_5)	1212.89	546	2.22	0,740	0,066	0,788	0,869

[a]Sample size = 315

[b]Goodness-of-Fit-Index (GFI)	0,784	0,781
[c]Root Mean Square Residulas (RMSR)	0,037	0,055
[d]Bentler-Bonett's Index (BBI)	0,810	0,752
[e]Tucker-Lewis' Index (TLI)	0,891	0,882

variances/covariances as well as the measurement errors of the hypothesized structure were not the same for males and females. Specifically, none of the goodness-of-fit indices significantly improved with the inclusion of invariant factor variances/covariances and invariant measurement errors in the model.

DISCUSSION

The purpose of this study was to examine the factorial structure of the PSPP as a multidimensional measure of physical self-esteem. The results from exploratory factor analysis revealed an acceptable and logical four-factor structure for male and female college students. However, results from confirmatory factor analyses provided only partial support for the hypothesized four-factor structure for the male sample.

One possible explanation for the inconsistent results regarding the hypothesized four-factor structure of the PSPP in males and females is that students from two different universities participated in this study. More specifically, since a number of different fitness instructors administered the instrument, this may have influenced the standardization of the administration procedures. As a result, some of the students may have misinterpreted the items of the PSPP (some students thought that the format of the scale was complicated). It would be worthwhile for other researchers to try to replicate this study with a larger sample taken from a more homogeneous population. Further, due to the complicated format of this scale, clear instructions from trained staff should be given to the subjects during the administration process.

The results of this investigation, based on a confirmatory factor analysis, indicated that the factor structure of the PSPP is gender sensitive. Fox and Corbin (1989) have found evidence for the proposed four-factor structure of the PSPP across men and women, but their findings were primarily based on traditional exploratory factor analytic techniques. However, such analyses are not entirely appropriate for the comparison of the factor structures across different groups. Although the results of this study do not confirm the proposed four-factor structure, they do not disprove Fox's previous work with the PSPP. Given these results, researchers need to pay more attention to the PSPP factorial structure and need to determine if these differences can be replicated in male and female samples as well as in other population groups (e.g. athletes-nonathletes, children-adults, etc.).

In conclusion, the results from this investigation indicate the need for additional research in order to establish reliable and valid instruments for assessing the physical self-perceptions more accurately. Continued research is needed with this instrument in order to determine the factorial as well as the convergent and divergent validity of the proposed four-factor structure and to examine its factorial invariance across different groups. If further studies replicate these results, then the items of the instrument may need to be revised in order to hold the same meaning for males and females.

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THE REST-PERIOD-QUESTIONNAIRE FOR COACHES: ASSESSING THE BEHAVIOR OF COACHES DURING REST PERIODS

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Key words: rest periods; coaches' behavior; recovery

INTRODUCTION

In elite sports, most recovery and recovery processes necessary for optimal performance of athletes take place during rest periods, e.g., intermissions, half-times, time outs. Activities during these intervals of rest may be influenced by coaches who have direct contact with the athletes (e.g., giving them information and instructions for the next phase of competition). These considerations are well supported by the results of the research on warm-up decrement (temporary decrement in performance that occurs following an interval of rest; Anshel & Wrisberg, 1993).

Rest periods are influenced by coaches who have direct contact to the athletes by giving them information and instructions for the next phase of competition. Mostly, coaches who are giving advice may not be aware of the importance of rest periods and the recovery processes that take place during these intervals of rest. As a result, rest periods can lead to a 'deficit of recovery' or even 'disturbed recovery processes' which impair subsequent performance (Kallus, Eberspächer, & Hermann, 1992). A deficit of recovery occurs if the prerequisites for an optimal recovery are not provided, e.g., too short a rest period, no facilities to rest, etc. Disturbed recovery processes even can take place when optimal prerequisites for recovery are provided but disturbances occur during these periods of rest (e.g., emotional discussion between coach and athlete about the first part of competition). Taking these facts into consideration, coaches are an influential factor and may affect the performance of athletes after rests directly and indirectly.

The goal of our studies was to develop an instrument which allows an assessment of coaches' behavior during rest periods. For this purpose, two studies were conducted to develop the Rest-Period-Questionnaire for Coaches.

METHODS AND PROCEDURE

Summary of Study I

The purpose of study I was to examine the interrelation between stress and coaches' behavior during rest periods. Subjects were 154 German coaches who completed the prior version of the Rest-Period-Questionnaire for Coaches and a Bibliographic Questionnaire designed to attribute stress to coaches' behavior during rest periods.

Analysis indicated that coaches who are highly stressed by the practice rate themselves significantly less active and less authoritarian during rest periods than do their low stressed colleagues. In addition, coaches who are highly stressed by the competition rate themselves significantly less warm-hearted than the low stressed group (Kellmann & Kallus, 1994).

Study II. The Rest-Period-Questionnaire for Coaches

The Rest-Period-Questionnaire for Coaches (RPQ-CO) was developed to assess coaches' behavior during rest periods. The questionnaire includes subtests corresponding to the extracted factors of study I e.g., 'warm-heartedness' (RPQ-CO: positive coach-athlete-relationship), 'activity' (RPQ-CO: decision behavior), 'authority' (RPQ-CO: directive coaching-behavior), 'self-criticism' (RPQ-CO: team-atmosphere), and 'calmness' (RPQ-CO: anger reaction). The subtests of the RPQ-CO (table 1) are based on the results of coaches' self-assessment of their behavior during rest periods (Kellmann & Kallus, 1994) and on mechanisms that presumed to contribute to post-rest warm-up decrement (Anshel & Wrisberg, 1993). In addition, the RPQ-CO integrates theoretical models such as Eberspächers' deactivation-regeneration-reactivation-model (Schleusenmodell; Eberspächer, 1990), as well as aspects of disturbed recovery (Kallus, Eberspächer, & Hermann, 1992).

The questionnaire includes instructions and can, thus, be worked on independently without any help from others. The RPQ-CO is an instrument for the self-description of coaches who should rate retrospectively how often these events occurred during rest periods in the past 3 competitions. The heading includes no definite time span but refers to the past 3 competitions

in which the coach participated. The verbal statements of the RPQ-CO are based on 'uncompleted' sentences, i.e., the heading "During rest periods in the past 3 competitions" and the item together yield a complete statement. For each of these items, the subject has to rate the frequency of the listed reactions "during rest periods in the past 3 competitions" on a seven-point Likert scale which is verbally and numerically labelled (table 2).

TABLE 1. Subtests of RPQ-CO as well as a Typical Item and Cronbach Alpha

Nr	Subtest	Example	Alpha
1	Positive coach-athlete-relationship	... I had a good rapport with my athletes	.78
2	Decision behavior	... I was decisive	.73
3	Directive coaching-behavior	... I told my athletes to pull themselves together	.75
4	Team-atmosphere	... my athletes and I were united	.74
5	Anger reaction	... I flared up	.85
6	Deactivation-regeneration	... I gave my athletes enough time to reflect on our current situation in the competition	.74
7	Regeneration-reactivation	... my athletes concentrated fully on the next phase of the competition	.83
8	Performance feedback	... I spoke with my athletes about their individual performance	.79
9	Disturbed recovery	... I spoke most of the time	.87
10	Goal-orientation	... clear goals were set for the next phase of the competition	.72
11	Situationoriented power to assert oneself	... I analyzed the situation adequately	.77

TABLE 2. The Warm-up Item of the RPQ-CO with the Scale

During rest periods in the past 3 competitions

... I did loosening-up exercises

0	1	2	3	4	5	6
never	seldom	sometimes	often	quite often	very often	always

The function/meaning of a 'rest period during competition' depends on the specific sports as well as on the current situational conditions. The coaches were provided with a definition of rest periods: "Rest periods during competition can be defined as regular parts of your sport/discipline, as well as a typical part of the competition, e.g., half-times, time-outs, or rest between heats. In disciplines that cannot be divided into different phases of competition, please consider the time between warm-up and the beginning of competition, or the last 15 minutes before start, respectively."

At the end of the questionnaire the coaches were asked to mark which part of competition, as described above, they considered as 'rest period' when completing the RPQ-CO.

Subjects

In the present investigation, subjects were 70 male (age M = 41.21 yr.; SD = 9.34 yr.) and 6 female (age M = 41.83 yr.; SD = 12.84 yr.) professional German coaches of the Landessportverband Baden-Württemberg (Kallus, Kellmann, Eberspächer, & Hermann, 1994). The gender proportion in the present study represents the quota of this institution. Of 115 subjects, 76 responded to this survey (a 66% response rate; out of 26 different sports). Coaches were asked to complete the German version of the Rest-Period-Questionnaire for Coaches (Kellmann, 1994), a Bibliographic Questionnaire, and one additional questionnaire once voluntarily.

RESULTS

Reliabilities of the RPQ-CO

The internal consistencies as an indicator for the homogeneity of the subtests show satisfying results (table 1; Cronbach Alpha between .72 and .87). Up to now only the subtests were included in the RPQ-CO which values of internal consistency are above .70. This criteria could not be reached for five out of 16 constructed subtests. Therefore, the following results are based on the eleven subtests listed in table 1. The subtests which failed the criteria will be modified for upcoming studies.

Subtest Intercorrelation Pattern of the RPQ-CO

The subtest intercorrelation pattern of the RPQ-CO is determined by the subtests 'positive coach-athlete-relationship', 'team-atmosphere', 'deactivation-regeneration', 'regeneration-reactivation', and 'performance feedback'. For each of these subtests, 5 to 7 correlations (out of 10) are above r = .40 (table 3). Based on this internal subtest correlation pattern, as well as on the general 'positive' meaning, these subtests are labeled as 'basic variables of coaching behavior' during rest periods.

TABLE 3. Subtest Intercorrelations of the RPQ-CO

Subtest	RPQ 1	RPQ 2	RPQ 3	RPQ 4	RPQ 5	RPQ 6	RPQ 7	RPQ 8	RPQ 9	RPQ 10	RPQ 11
RPQ 1											
RPQ 2	+										
RPQ 3											
RPQ 4	+++	+									
RPQ 5			++								
RPQ 6	+++	+		+++							
RPQ 7	++++	+		++		++++					
RPQ 8	++++			++		++++	+++				
RPQ 9											
RPQ 10	+					+	+	++			
RPQ 11	++	+++				+		+			

\+ r ≥ .40 and r < .50 +++ r ≥ .60 and r < .70
++ r ≥ .50 and r < .60 ++++ r ≥ .70

Correlations of the RPQ-CO with the Recovery-Stress-Questionnaire for Coaches

The Recovery-Stress-Questionnaire for Coaches (RESTQ-CO; e.g., Kallus & Kellmann, 1993, this volume) as an instrument to assess stress and recovery of coaches, was used to evaluate the external validity of the RPQ-CO. For the general stress and recovery subtests of the RESTQ-CO, no correlations occurred above r = .40 (table 4). However, for the coach specific part of the RESTQ-CO, a particular correlation pattern occurred with the RPQ-CO. This pattern refers to the subtests 'positive coach-athlete-relationship', 'team-atmosphere', 'deactivation-regeneration', 'regeneration-reactivation', and 'performance feedback'.

TABLE 4. Correlations of the RPQ-CO with RESTQ-CO

Subtest	RPQ 1	RPQ 2	RPQ 3	RPQ 4	RPQ 5	RPQ 6	RPQ 7	RPQ 8	RPQ 9	RPQ 10	RPQ 11
1 - 7	Stress subtests no correlation r ≥ .4										
8 - 12	Recovery subtests no correlation r ≥ .4										
13 Success as a coach	++			+++		+++	+++	+			
14 Motivation as a coach	++			+		++	++	++		++	
15 Fitness											
16 Emotional exhaustion											
17 Personal accomplishment	++			+		++	++				
18 Self-efficacy of coaches	++	+		+		++	+	+			
19 Self-regulation	+					+	++	+			
20 Stress during rest period	--	-		--		---	----	--			

\+ r ≥ .40 and r < .50 - r ≤ -.40 and r > -.50
++ r ≥ .50 and r < .60 -- r ≤ -.50 and r > -.60
+++ r ≥ .60 and r < .70 --- r ≤ -.60 and r > -.70
---- r ≤ -.70

These subtests positively correlate with the coach specific recovery subtests of the RESTQ-CO and negatively with the stress subtest 'stress during rest period' and, therefore, can be considered as support of the validity of the RPQ-CO. This correlation pattern elucidates that the RPQ-CO assesses coach specific behavior in rest periods, which cannot be measured by the general stress and recovery subtests of the RESTQ-CO.

The Definition of 'Rest Period'

Based on the last question the coaches had to indicate which part of competition they considered as rest period when completing the RPQ-CO. The profiles of the different phases are drawn in figure 1 (e.g., half-time, time out, time between heats, time between warm-up and the beginning of competition, 15 minutes before start). Some coaches considered more than one of the phases as rest period. This fact might be an explanation of the similarity of the profiles. However, if these coaches were eliminated from the data in figure 1, a similar pattern of the profiles occurred.

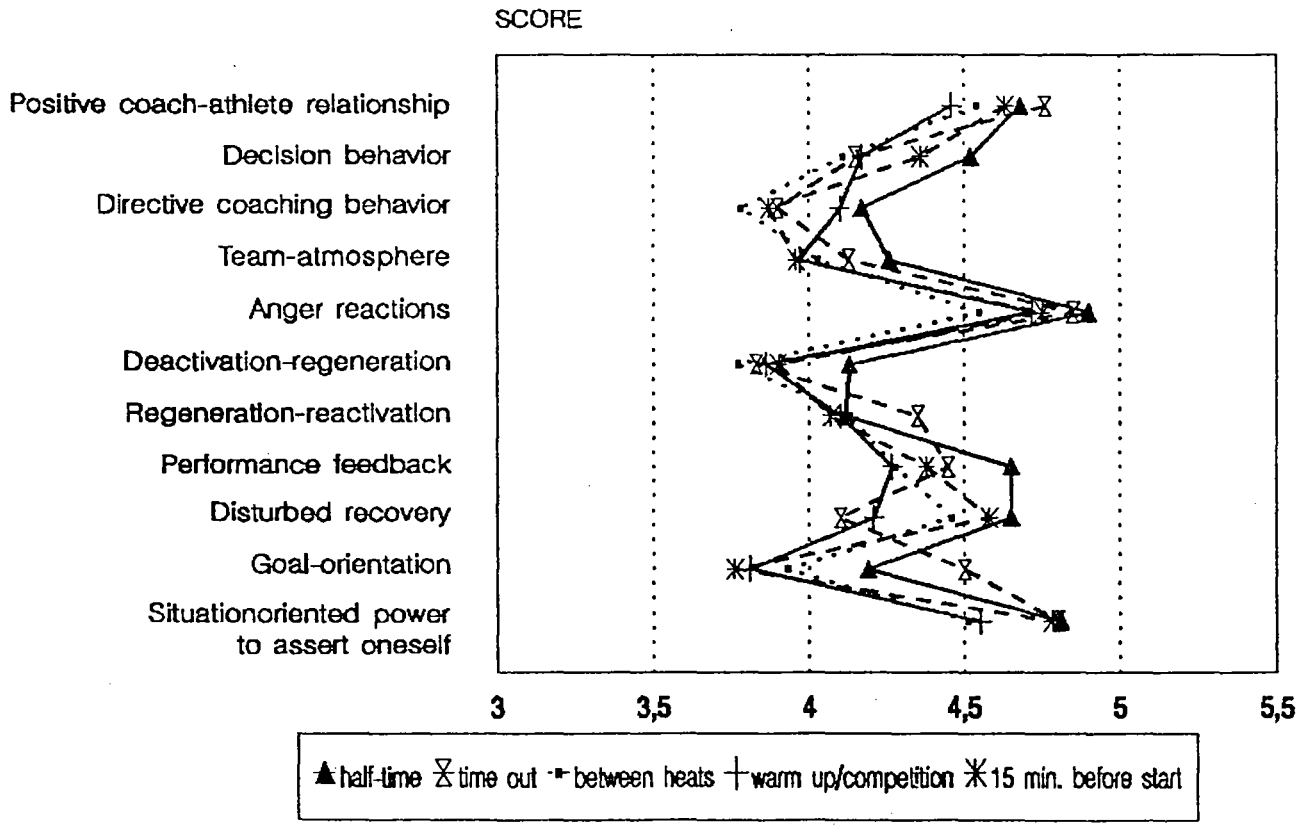

Fig 1. Profiles of different Rest Periods when the RPQ-CO was completed by the Coaches

Considering figure 1 it becomes obvious that coaches' assessment of their behavior during rest periods does not differ depending on the phases which they considered as 'rest period'. This result confirms that the given definition was similarly understood by all coaches. These results also strengthen the assumption that the RPQ-CO is a general tool to assess coaches' behavior during different rest periods, as well as in different sports. On the other hand, this instrument is sensitive to assess sport specific conditions in rest periods.

DISCUSSION AND CONCLUSIONS

In this paper, the construction phases of the Rest-Period-Questionnaire for Coaches are presented, along with results that validate the use of the RPQ-CO as a tool to assess coaches' behavior during rest periods. The RPQ-CO satisfies test-theoretical presumptions, e.g., homogeneity of subtests, external validity (correlation with RESTQ-CO). In particular, the positive meaning of the subtests 'positive coach-athlete-relationship', 'team-atmosphere', 'deactivation-regeneration', 'regeneration-reactivation', and 'performance feedback', which are labeled as 'basic variables of coaching behavior', provide information to optimize the processes that take place during rest periods. From the theoretical point of view, the positive meaning of these subtests imply that rest periods will be positively enhanced if coaches are adequately able to apply performance feedback and provide athletes with the chance to 'go through' the phases of 'deactivation-regeneration' and 'regeneration-reactivation' (Ebers-pächer, 1990). In addition, a 'positive coach-athlete-relationship' and high values in 'team-atmosphere' also may relate to the fact of enhancing cohesion and is, therefore, positively labeled.

Research on warm-up decrement has shown that the activities during rest periods influence performance that occurs following an interval of rest. Therefore, coaches should be aware of the importance of rest periods and the interaction which takes place between them and their athletes. Further analysis revealed no differences in coaches' behavior dependent on the kind of rest period (e.g., intermissions, half-times, time outs). Consequently, this result suggests that it is possible to compare coaches' behavior over different sports and different rest periods respectively. This assumption can be supported by data of coaches' behavior in different sports. For analysis we classified coaches in categories for two reasons: Firstly, the coaches came from 26 different sports and, therefore, we had to devise categories to raise

the number for statistical analysis. Secondly, the structure of rests differ depending on the sport. In team sports an almost clear description of the time frame is given when rests occur (e.g., half-time). However, in individual sports the time of rests depends on the completion of performance which makes the time span more variable compared to team sports. This leads to the assumption that coaches' behavior may differ depending on their own possibilities of preparation to instruct athletes. For these reasons we categorized the different sports into, for example, individual vs. team sports. Results of a MANOVA ($p > 0.1$) with subsequent univariate *t* tests revealed that no significant differences occurred for the coaches of individual and team sports. These results are in line with the suggestion to analyze coaches' behavior during rest periods with the RPQ-CO. In addition, useful data of the processes that take place within these intervals of rest can be gathered to detect factors which might impair performance of athletes after rest. Therefore, an emphasis of further research should be on the development of programs to support coaches to improve their behavior during rest periods.

The Rest-Period-Questionnaire for Coaches is available in English as well as in German and the authors would make it available to anyone who is interested in using it for research.

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ANALYSING SHOOTING RESULTS AND MICROMOVEMENTS OF ADOLESCENT GROUPS LEARNING WITH LASER-, MIXED- AND TRADITIONAL METHODS

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Key Words: laser shooting; optical training and analysis system; ST-1000 PC; NOPTEL OY; analysis of micromovement in shooting; learning process of shooting techniques for beginners; motor learning

INTRODUCTION

During motor learning performance manifests itself directly in activity. Feedback is immediate and direct and it is true especially for the final result. In most cases the feedback of motion-process can be observed only indirectly by the sportsmen. It is very important for the sportsman to get more feedback about the process of his motion, because it can help the learning and polishing of his sport-technique. (Daniels F.S., Landers D.M., 1985; Boyce B.A., 1987; etc...)

The various simulator-systems can give great help in this respect. The more similar or rather more unchanged these simulator- and criteria-tasks are, the higher increase can be observed in transfer-effect, because the same/identical motor control-mechanism has to be used in both series of tasks. (Schmidt R.A., 1988)

In sport-shooting they are aiming to build and use such simulator systems, with what the sportsmen can accomplish their duties similarly to reality. After shooting the aiming motion can be replayed and analysed on the monitor of the computer. Analysis of motion is connected to other, psycho-physiological measuring systems, too. (Myllylä, 1986; Heinula J., 1989; Mason B.R. et al., 1989; Zatsiorsky et al., 1990; Ackakanov et al., 1991; Haber Z., 1993; Förster W.,

1993; Helin P. et al., 1987; Nguen Z.F. et al., 1975; Rudina et al., 1979; Subbotin et al., 1983; Lesoto N.A. et al., 1985; Lénárt Á., 1991, 1992, 1993, 1994 etc.)

The acquisition and specifying of shooting technique are helped by the ST-11, ST-1000 PC and ST-2000 basic- and specified equipments of the Finnish NOPTEL OY firm. The system can be used with all different types of guns. The aiming process and the shots can be saved, replayed and statistically analysed by the computer.

METHOD AND PROCEDURE

Tested persons: Three groups of 12-13-year-old primary school pupils with 10 boys in each. They were volunteers without having previous experience in shooting. They had homogeneous motor abilities at the beginning.

Equipment: 1.52 version of ST-1000 PC training analysis system of NOPTEL OY.

Procedure: The tested persons had 20 shots 20 times, with as many trial shots as they wanted before the experiment. The average time of experience was from 3 to 4 months. They had 8 occasions while sitting 5 m, 4 occasions while standing 5 m (as a transition-period), and 8 occasions while standing 10 m from the target. They used the Hungarian MAFÉG CLG 62-type (with CO_2) air rifle for laser-, and the Czech SLAVIA 631 for life fire shooting and the official target of the UIT. Before beginning the experiment we had an accustoming period of 10 shots. The first group used only the laser system, the third (control-group) did only life fire shooting, while the second group did its first 10 training with laser, the other 10 with life fire-shooting. A mathematical-statistical analysis of multivariational analysis (BMDP statistical programme) have been accomplished from 10 shots of the 1st, 5th and 8th training, both in sitting and standing position. Data recording was from 5 m in sitting position, but the equipment was operating only with setting for 10 meter both for obtaining valuable data and keeping the motivation level of the children. So the data of sitting- and standing poisition are in different measuring system, their direct comparison is impossible.

Our aim was to trace the technical developing, to analyse the micro-motions with the help of laser equipment, and to evaluate the learning effects of novice shooters. The obtained data give

help to select the talented children and to draw up optimal developing programmes. They clarify the inner structure of the development of motion-scheme.

RESULTS

Comparing the groups: On the basis of sample taken from the middle (5th training) of sitting position, it can be seen that the laser- and the mixed group showed more than 1 point average increase (at this time both the laser- and the mixed group had the same training, until the middle (10th training) of the transition period.) The life fire shooting group had a 0.29 point lagging behind, but it is insignificant. By the end of the sitting period the mixed group had the best result, they crossed circle 8, and their divergence on $p<0,01$ and $p<0,05$ level was significant compared to the laser- and control-group. After 8 occasions (160 shots and the trial shots) development was minimal: 1,49 and 1,51 points. At this point it seemed that there was not an outstanding deviation between the results. It was the result of the small distance (5 m), the relatively stabil aiming (both elbows were leaning on the table). While aiming, the motion can be well observed with the naked eye, too. But if we examine the parametres of holding, analysed by the laser-system, we can get other interesting phenomenon, too. Although there are no great differences in the results, the process of aiming is different from those of the other two groups. The time spent on the laser register and on the target in all three of the examined position was always higher for the laser group. As a result of the continuous feedback it is worth for the children to work out the shot better.

The rough hit-probability within circle 8 had been equalized by the end of the period. Its value exceeded 43 % in all three groups, their difference was not significant. In the middle of the phase the divergence of both laser groups was more than 10 % ($p<0,01$). The 43 % means that in the final 4 seconds of the complete aiming process they have the same number of chance of hitting circle 8. Applying the same to Circle 10, it roughly increases from 2-3 % to 6-7 %. There are no significant differences among the groups. The centre of motion within Circle 10 naturally gives much lower values. The area of Circle 10 is 0,5 mm on the target.

The starting value is between 6-10 %, and reaches 10-15 % by the end. Group 2 was continuously developing, Group 1. was more intensive at the beginning of the phase. The

divergence was significant on $p<0,05$ between the mixed and control group, and on $p<0,01$ between the laser and control group. The vector of the centre of motion was all the time in the low regions, mostly directing to number 6 on the clock.

The x-deviation shows the horizontal extension of aiming motion in circle-values. Both of the laser groups reached their best results by the middle of the period, they became worse by the end. Comparing the deviation value of the control group to the first laser group, we can state that it moves to the higher values on $p<0,01$ level. In practice the 0,5 circle-value means 0,1 mm.

The y (vertical)-deviation shows a significant difference in all cases, except the 8th occasion of the mixed- and control-groups. The greatest (highest) deviation ($p<0,001$) can be seen between the laser- and control group with 0,648 circles to/for the laser group.

Comparing the different groups: In standing position both the laser- and the control group started from the same value (3,22 point). The mixed group had 4,48 points.

There was a significant difference between the laser- and the mixed group, among the children, the shots, and the children and the shots ($p<0,001$; $p<0,001$ and $p<0,01$).

There were the same differences between the mixed and the standing group (on level $p<0,01$; $p<0,001$; $p<0,001$). In the middle of the phasis the mixed group had its advantage against the laser group (4,61 points, $p<0,001$), while the control group was lagging behind the laser one (3,69 points against 4,06 points) /$p<0,001$/.

At the end of the 20 shot learning process, the laser group had the best result (5,24 points), the 50 point limit was exceeded by the mixed group, too (50,1 points), while control group had 10 point less (40,2 points). The difference was significant between the mixed and crontol group on level $p<0,05$; and on level $p<0,001$ between the laser- and control group. In the next stage we can compare the 1st training of the standing position between the laser- and the control group, and at the end of the process all three groups. In relation to the decimal evaluation hits there is no estimateable difference between the laser- and the control group, both of them

started from 3,5 points (3,501 and 3,557), there were differences only in the shots ($p<0,05$). The sector number and the direction showed 5,95 and 6,53 values. In the time spending on the target they have already differences: 2,359 and 1,77 ($p<0,01$), and the same can be said about the time spent on the register of the laser, which is less than that of the control group: 7,061 and 4,705 ($p<0,001$). From among the other parametres only the hit-probability of 10 differs significantly ($p<0,05$, 0,4 and 0,35 %). There is an advantage for the laser group in the hit-probability within circle 8 (3,80 and 3,04%), in the centre of motion within circle 8 (6,60 and 5,33 %), and in the centre of motion within cirle 10 (0,81 and 0,69 %). The given holding time within circle 7 is better at the control group (with 0,013 seconds). The centre of motion exceeds the centre of the target (5,288 circle), there is a lower value at the group of life fire (4,931). The sector of the center of motion is constant (6,41 and 6,40). It is interesting that the x and y deviants do not differ much from each other to a great extent, although it would be logical for the first, that more economic motion and better hits would go together with less extent motion, the same as we can experience with top level athletes.

The fine differences related to hit-probability and centre of motion can have a warning value if we take that the inner structure of motion with similar deviant, could differ from each other to a great extent. This "molecular motion" is organized differently according to training methods. They are the time differences that make this process more probable. This process becomes conscious in case of visual feedback training, the awareness of time and spatial extension of motion scheme is more accurate and the expecting of hitting rate is more differenciated.

The lagging behind of control group is outstanding (40,2 points and 43,59 points). It is significant on level $p<0,05$ between the mixed- and the control groups, and $p<0,01$ between the laser- and the control groups. The direction of the hits is constantly between 6 and 6,5 on the clock. The time differences in aiming time remained until the end of the experience. The members of the laser group spent the most time with aiming (3,211 seconds on target, and 6,646 seconds on laser-receiver on average). About 6-8 or maximum 10 seconds are said to be the optimal time. The shorter time of the children can be explained by their weak holding ability. The motion of higher amplitude makes uncertain the handling of the trigger, so they try to shoot within a relatively short time.

In case of the mixed and control groups time was even shorter. We can suppose that less information on motion has an effect on quicker time, but we have to mention that there were differences in it even at the beginning. The time of the mixed group (2,53; 5,48) and those of the control group (1,63/!/ and 4,32) are lagging behind the optimal.
The hit-probability within circle 8 is higher than 7 % with the laser group, while it is above 6 % at the mixed and does not reach 3 % at the control group. (7,25; 6,06; 2,93)

The program could hardly measure the hit-probability within 10, as we got very low results (laser group 1,02 %; mixed 0,81 %; control 0,40 %), with $p<0,05$ between mixed and control, $p<0,001$ between laser and control groups. This means that the children had 1 % probability to shoot 10 in the last 4 seconds of aiming. The centre of motion within 8 showed values around 10, 9 and 5 % (10,26; 9,10; and 5,41 %). The mixed and laser groups differed similarly from the control one ($p<0,001$). Most probably the center of motion within 10 must be better than the hit-probability shows (1,35; 1,21 and 0,61 % in case of the three groups). Their deviation was significant between the mixed and control group on $p<0,01$; and between the laser and control groups on $p<0,001$ level. It was the same situation with the actual holding time within Circle 7 (0,07; 0,063 and 0,040 seconds). Their deviation is not significant. The centre of aiming exceeded the area of circle 6 at the laser group; that of circle 5 at the mixed group, and 4 at the control group.

Both the laser and the mixed group similarly differ from that of the control one ($p<0,001$). It is strange that the x and y deviants - similar to the first standing training - does not differ from each other in the three groups. Y deviant is the smallest at the control group.

Having analysed the parametres the question rises: what is the real difference in the motion arrangement of the three groups?
Hit, aiming time, hit-probabilities and centre of motion could be taken as determinative factors. The higher values of laser group were observable: their inner motion-structure were all the time lower related to the other two groups.

DISCUSSION AND CONCLUSIONS

ST-1000 PC laser training and analysis system proved to be suitable for acquiring shooting technique and analysing motion. We could prove that motion schemes of children learning with different methods changed/developed in different ways. The ones training with laser could acquire shooting technique more accurately, their holding parametres are much better. The ones training with mixed technique had better hit-rates during the second phasis of the learning process. The early feedback had a long lasting effect in case of the laser and mixed groups. The fluctuating performance and lagging behind of the control group was outstanding. The aiming time, the rough and fine hit-probability, the centres and the x and y deviants can give good basis for judging the quality of aiming motion. We could state the differences between the motion schemes of the three groups in the fine motions. It is worth beginning with laser shooting-simulator in the developing programmes and continuously use it in improving the techniques, and later use it paralel to life fire.

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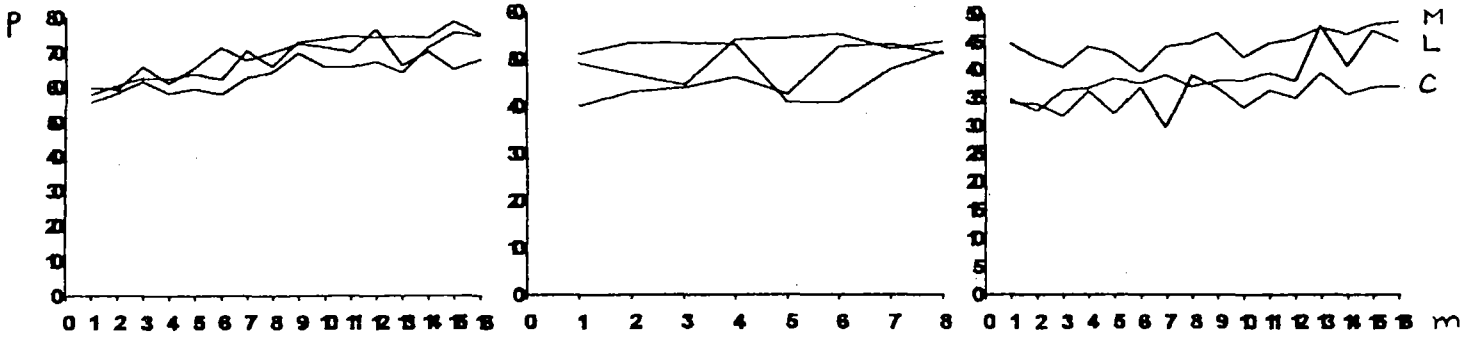

Development of the shooting results in the whole period

Comparison of the differences between the groups

Sitting position - upper line Standing position - lower line

	L_1M_1	M_1C_1	L_1C_1	L_5M_5	M_5C_5	L_5C_5	L_8M_8	M_8C_8	L_8C_8
Hit	- * * *	- * * * * * * *	- *	- * * * *	- * * * *	- * * * *	* *	* *	- * *
Hit (dec)			*				* *	* * *	- * *
Sector				* *					
Time 1	* * *		* * * * *	* * *			* * *	* *	* * * * * *
Total time	* * *		* * * * * *	* * *			* * * * *	* *	* * * * * *
Rough hit prob.		* * *	* *	* *				* * *	* * *
Fine hit prob.		*	*					*	* * *
Ruogh centre of mot.	* *	* *	* * *	* * *			*	* * *	* * * * * *
Fine cent. of motion			* * *	* *				* *	* * *
Holding time		*	*					* *	* *
Cent.of motion grav.			*				*	* * *	* * *
Sect. of cent. of grav	*	*							
x dev		* * *	* * *	* * *					* *
y dev	* *	* *	* * *	* * *			* *		* * *

MOOD PROFILE IN TOP ITALIAN ATHLETES

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KEY WORDS: Profile of Mood States (POMS), elite athletes, performance.

INTRODUCTION

The first studies on the relation between psychological states and sporting performance, date back to the 1930's. It was observed that when an athlete is depressed and fatigued, he is unlikely to perform as well as when he is feeling in top form (Jackson, 1933). There has been a long-standing debate concerning the psychological evaluation of an athlete and its importance in his training and the best suited psychological programme. Some psychologists have used psychological measures which evaluated the characteristics of relatively stable personalities while others have attempted to integrate the two aspects of state and trait. On the basis of these experiments and the reactions of the sporting world, it has been concluded that there is not one ideal test type, but rather the choice of psychological programme depends on the reason for the evaluation and the characteristics of the athletes in question.

This paper , therefore, discusses the profile of mood from a specific psychological perspective. It investigates the psychological state of a group of elite athletes in Italian national teams. In particular, this research aims to verify whether the model of mental health in sport proposed by Morgan (1985) can be applied in Italy. Such a model suggests that positive mood states are associated with top level performance and that, the condition of a positive mental state is directly correlated to sporting performance and success.

Morgan carried out research (Morgan & Johnson, 1977; Morgan & Pollock, 1977; Morgan & Johnson, 1978; Morgan, Brown, Raglin, O'Connor & Ellickson, 1987; Morgan, O'Connor, Elickson & Bradley, 1988) in which he shows that top athletes manifest more positive mood states than less successful ones. Based on the athlete's answers, he defines the model of mental health as the "iceberg profile" characterised by scores above the non-sporting norm for Vigour and significantly lower for the norm in relation to the other five variables. He has identified these profiles in long distance runners, wrestlers and American oarsmen (Fig.1). Further studies, which followed on from Morgan's research, have been conducted in other sports in order to show particular psychological characteristics in elite athletes. A review of these studies up to 1988 was published by LeUnes and Hayward (1988).

The mood states which are examinated here, are those listed in the questionnaire in Profile of Mood States (POMS) (McNair, Lorr & Droppleman, 1971) - Tension, Depression, Anger, Vigour, Fatigue and Confusion.

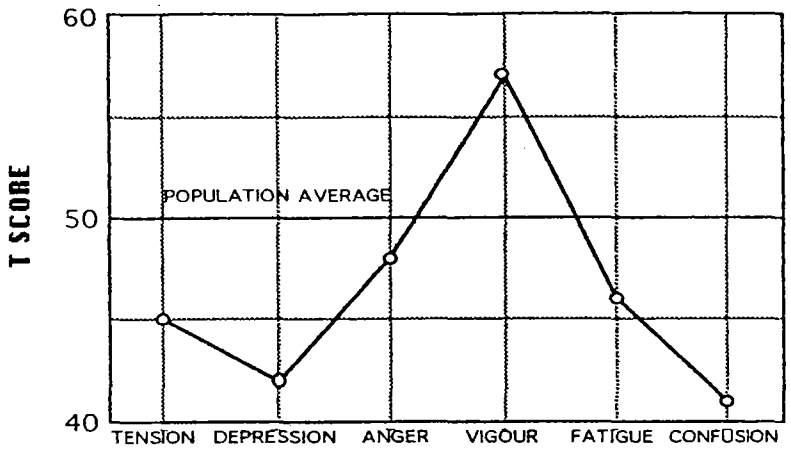

Fig. 1."Iceberg" Profile in Different Sports (adapted from Morgan et al., 1988).

Not all the studies carried out have demonstrated the same results described by Morgan. Although the model of mental health is on the whole confirmed, several studies have not confirmed the "iceberg profile" (Miller & Miller, 1985; Daiss, LeUnes & Nation, 1986; Craighead, Privette, Vallianos & Byrkit, 1986; Frazier, 1988; Mahoney, 1989); neither have they found any difference in the athlete's mood profile for athletes of different levels of ability. On the basis of this data, Renger (1933) has suggested recently that the POMS scores for athletes differ in a positively significant way with respect to the norms used for his evaluation of students. However, this data does not allow for different levels of ability among athletes to be distinguished.

With regard to research conducted so far, the variable, "success in sport", is ambiguous. Very often, the comparisons are not homogeneous: e.g. the type of population participating in the survey, the distinction between reserves and regular members of a team (Craighead et al., 1986), or between athletes to be selected for training for the United States Olympic team from the national level of athletes (Morgan, Johnson, 1978); or the definition of the psychological profile of American college football players (LeUnes & Nation, 1982). It is evident, therefore, to what extent the concept of success can vary according to the characteristics of the subjects studied and the hypothesis of the research. Even though they may be completely positive, different mood profiles can emerge.

For the purposes of this research, the definition of success takes into consideration the results obtained at the Olympic Games and World Championships for each individual sport. It is our hypothesis that athletes who are at the top internationally, reveal "iceberg profile" characteristics compared with athletes at a national level. Their level of Vigour is significantly superior while the levels of Tension, Anger, Depression, Fatigue and Confusion are inferior.

Furthermore, it is our hypothesis that athletes, on the whole, show a greater positive profile compared with the non-sporting norm, demonstrated in a test on students. In other words, in keeping with the mental health model (Morgan, 1985), top level performance is related to a more positive psychological condition compared with the population norm.

METHOD

Subjects

The pattern was composed of 411 athletes (Table 1), 306 male and 105 female, all of national and international standing. We administered a series of psychological tests including the Profile of Mood States (POMS). These evaluations were made throughout 1993 at the Sport Psychology Department of the Science Sport Institute of C.O.N.I. All participants in the project were divided into two groups according to their previous sporting successes. The first group was composed of athletes who had reached the first top ten in rank for the Olympic Games or World Championships in a single sport over the previous four years. The second group was made up of national and international athletes who had not reached the top ten in their sport. The same procedure was followed for the group of female athletes, identified as a sub-group of 21 top athletes.

TABLE 1.

ATHLETES		ELITE	NATIONAL	TOTAL
MALE	N	110	196	306
	A	26,1	24,5	25,1
	SD	4,1	4,6	4,5
FEMALE	N	21	84	105
	A	22,7	21	21,3
	SD	3,9	5,4	5,2
TOTAL	N	131	280	411
	A	25,6	23,4	24,1
	SD	4,2	5,1	5

Number (N), Average Age (A) and Standard Deviation (SD) of Sample Athletes.

Questionnaire

The questionnaire administered was an Italian translation (Farnè, Sebellico, Grugnoli & Corallo, 1991) of the Profile of Mood States (McNair, Lerr & Droppleman, 1971), used in over 60 studies concerning theoretical or practical problems such as, forecasting success (LeUnes & Hayward, 1988; Vanden Auweele et al., 1993). The questionnaire is composed of 58 adjectives describing different sensations to which the participant answers according to the Likert five point scale from "nothing to very much". The score the participant gives for every adjective is determined by the intensity of the sensation felt during the previous week. From the sum of scores given, six scales can be distinguished - Tension, Depression, Anger, Vigour, Fatigue and Confusion. The score of Total Mood Disturbance (TMD) was calculated by adding

the scores of the five scales (Tension, Depression, Anger, Fatigue and Confusion), subtracting the Vigour score and adding 100 to obtain a positive value; in fact, the lower the score, the better the total mood state.

RESULTS

A Comparison between the Italian Norm and Italian Athletes

The correlation between the scores of POMS showing that these scores are totally analogous, has been evaluated, even though some correlations are higher than those surveyed in the Italian translation of the questionnaire (Farnè et al., 1991). These data confirm, in accordance with Farnè and colleagues, that these positive and particularly significant correlations between the five factors and the single negative correlation with one factor namely Vigour, could indicate the presence of a lower number of dimensions with regard to the six American affirmations (McNair et al., 1971). The Total Mood Disturbance (TMD) correlates negatively with the Vigour scale and positively with all the other scales of POMS.

A comparison between the averages of male norms (157 students) with those of the group of athletes represented by t Student reveals significant differences in favour of the sportsmen who show a better score average - lower in Tension, Depression, Anger, Fatigue and Confusion and higher in Vigour. Similarly, a comparison between the average of the Italian female norms represented by 263 female students, with those of the relative group of female athletes, shows the same tendency noted in both the male athletes' scores, although not for all the scales. Indeed, the female athletes show significatively better scores - lower in both Depression and Confusion and higher in Vigour.

Comparison between Male and Female World Class Athletes and National Male and Female Athletes

The scores obtained by athletes in each scale of POMS and TMD were subjected to an analysis of the two factor variance - Sex (male and female) and Level (elite and national athletes). The Level factor gave a significative result in all POMS and TMD scales (Table 2), showing a lower degree of Tension, Depression, Anger, Fatigue and Confusion among elite athletes compared with national athletes. In the Vigour scale in which elite athletes obtained higher significant scores than national athletes, differences also appeared in the Sex factor [$F(1,407)=8,45$; $p<0,005$]: male athletes obtained a higher score compared with female athletes (Fig.2). The interaction between Sex and Level gave a significant result on the Tension scale [$F(1,407)=4,96$; $p<0,03$], on the Depression scale [$F(1,407)=4,06$; $p<0,05$] and on the Fatigue scale [$F(1,407)=4,16$; $p<0,05$] (Fig.3). The Duncan test has shown that the averages obtained by the national female athletes are significantly higher than those obtained by the other groups.

TABLE 2.

	DF	F	SIGN.	ELITE	NATIONAL
TENSION	1,407	20,46	p<.0001	5,41	7,76
DEPRESSION	1,407	11,48	p<.001	2,81	4,67
ANGER	1,407	9,01	p<.005	4,61	6,87
VIGOUR	1,407	27,3	p<.0001	22,76	19,1
FATIGUE	1,407	25,3	p<.0001	3,18	5,28
CONFUSION	1,407	21,58	p<.0001	3,89	6,03
TMD	1,407	27,68	p<.0001	97,38	111,78

The Significance Level was Positive in all POMS Scales and in TMD. The Degrees of Freedom (DF), the F Values, the Significance Level and the Averages of the Group of the Athletes (Elite and National) are Given.

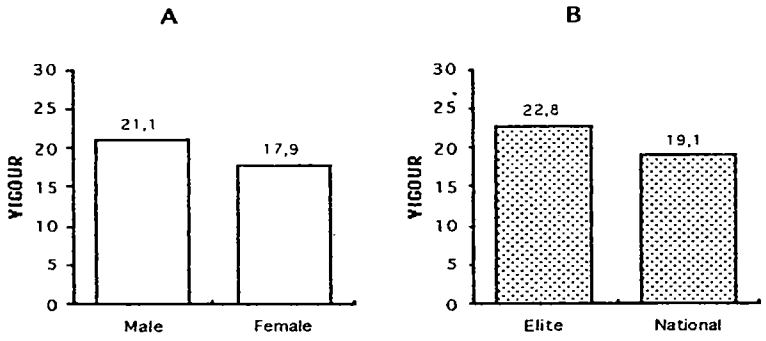

Fig. 2. Differences between the Sexes (A) and Level (B) in the Vigour Scale.

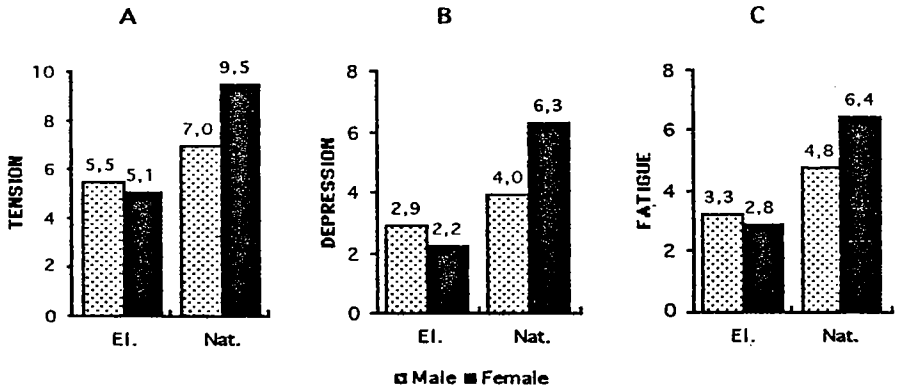

Fig. 3. Interaction between Sex and Level in Tension Scale (A), Depression Scale (B) and Fatigue Scale (C).

The analysis carried out on TMD shows the significance of the Sex factor [F(1,407)=4,15; p<0,05], of the Level factor [F(1,407)=27,68; p<0,0001] and of the interaction of Sex and Level [F(1,407)=4,95; p<0,05]. This shows the same trend seen in the Tension, Depression and Fatigue scales evident in national female athletes.

DISCUSSION AND CONCLUSIONS

From the results of this research on Italian male and female athletes, Morgan's mental health profile (1985) may be confirmed. This profile is characterised by Tension, Depression, Anger, Fatigue and Confusion scores which are lower than the average scores obtained by the non-sporting population and by a higher Vigour score than the norm for the average population (Fig. 4).

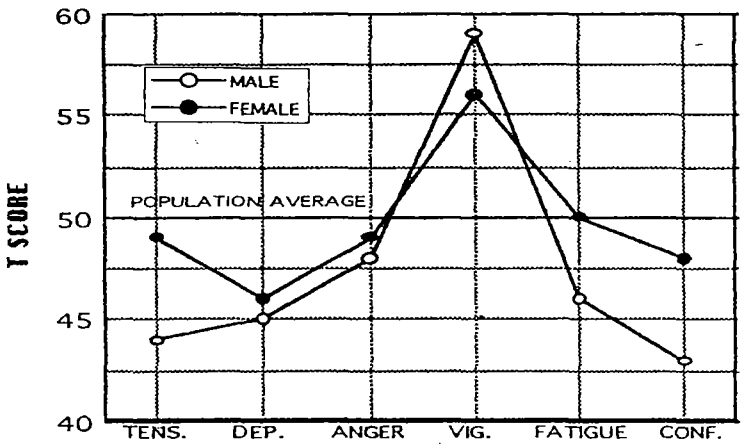

Fig. 4. Profile Obtained from Average Male and Female Athletes' Results Given on the POMS Scale.

In particular, the male athlete group shows significantly higher scores than those for the Italian male norm; the female athlete group's scores are lower on the Depression and Confusion scales than the female norm and significantly higher on the Vigour scale. It is interesting to note that female athletes show a higher score on the Vigour scale than male non-athletes. We believe there is a positive relationship between top rate sporting performance at a national or international level and the athlete's self perception, i.e. whether he considers himself active, full of energy and ready to go or not. A numeric global index (TMD) was set up so that the athlete's mood and its proximity to the "iceberg profile" could be identified immediately thus facilitating a quick understanding of the athlete's characteristics by the coach and psychologist. Furthermore, the "iceberg profile" of top world class athletes compared with those at a national level, shows significantly higher scores on the mood scale (Fig. 5).

This result is particularly important for two main reasons: 1) contrary to research conducted in North America on a limited sample of athletes, our study involves a much greater number of participants and is more representative (it includes almost all Italian male and female athletes);

2) sporting success has been more clearly defined, based on results obtained at the two most prestigious meetings an athlete can participate in - the Olympic Games and the World Championships.

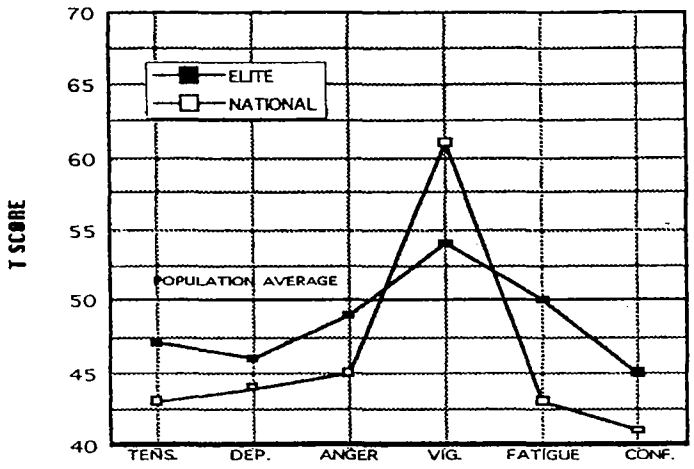

Fig. 5. Profile Obtained from Average National and Elite Athletes' Results Given on the POMS Scale.

With regard to Vigour on the POMS scale, in which elite athletes show a significantly higher score than the national athletes differences correlated to sex emerged, male athletes show a better profile than female athletes. Through the interaction between sex and level (national or elite), it became evident that female athletes at a national level show Tension, Depression, Fatigue and TMD average scores which are significantly higher than the other three groups examined.

In summary, it is evident that: a) there is no difference between elite female and male athletes with regard to mood profiles; b) with regard to Vigour, national athletes are dissimilar to elite athletes; c) elite male and female athletes show a lower degree of Anger and Confusion than national athletes; d) national female athletes show more negative mood states with regard to Tension, Depression, Fatigue and TMD compared with the other groups; e) TMD for national male athletes is higher than it is for national female athletes. Not only this research but also North American research has confirmed that success in sport is mainly associated with a positive mental state and that POMS represents a sufficiently sensitive method of measuring an individual's psychological state (see Vanden Auweele et al., 1993 for a review).

In conclusion, on the basis of these results and other relevant data regarding levels of optimum arousal before performance, it is possible to start a specific programme of psychological preparation for athletes who have identified their objectives and wish to learn to reproduce the moods and the global psychophysical arousal state which make it possible for them to achieve a top level performance whenever necessary.

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STRUCTURAL AND ENERGETICAL MECHANISMS OF INFORMATION PROCESSING: AN EXTENSION OF SANDERS' (1983) MODEL TO THE MOTOR PROGRAMMING STAGE

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INTRODUCTION

In the information processing approach to the study of motor skills, the onset of the movement is considered to be the result of a set of cognitive processes existing between sensory inputs and motor output (Theios, 1975).

Based on the additive factor method (AFM, Sternberg, 1969), Sanders (1990) has proposed a serial information processing model which includes seven stages distributed over perceptive, decisional and motor aspects domains. This model emphasizes the structural mechanisms involved and allows one to provide an architecture for the information processing system.

Structural mechanisms can be affected by the modification of the subject's state during task execution (Sanders, 1983). Sanders (1983) proposed a cognitive-energetic model formalizing the relations between the structural mechanisms and three energetical mechanisms - arousal, activation and effort - permitting the modulation of information processing time.

The aim of the following experiments was to determine whether it exists an energetical mechanism linked to the motor programming stage, which was not included in Sanders' model (1983).

EXPERIMENT 1

Method

Subjects

10 subjects (5 males, 5 females; M = 21, SD = 1.3) participated in the experiment.

Task and apparatus

The subjects carried out a simple RT task with a Go/No-Go procedure. The subjects had to move a pen from a point in the centre of a plexiglass plane and pass through a target which was situated to the right or left of the starting position. The movement time was imposed by the experimenter (200 ms +/- 15% = 170-230 ms). No spatial accuracy was required.

Procedure

A trial began with a preparatory signal (PS) of 2 seconds duration, which preceded a signal to either the left or the right of the preparatory signal. The subjects knew in advance

before each trial the direction (left or right) of the signal for which they had to trigger the response (Go signal) and that for which no response had to be produced (No Go signal).

Two movement velocities - 30 and 225 cm/s - were used. The subjects carried out two experimental sessions with 240 trials, i.e. 120 trials for each movement velocity.

The temporal constraints were manipulated between each experimental session. During the first session, the instruction given to the subjects was to respond "fast and accurately". The time value that the subjects had to try to better in the second experimental session was equal to the mean RT of the first session less 20%.

Variables

The dependent variables were 1) the RT, 2) the effective movement velocity, 3) the variability of movement time (MT), and 4) the number of response selection errors.

Results

Reaction time

The results were analysed by using a 2 (velocity) x 2 (session) ANOVA performed upon the mean RTs of all non-error trials. We observed main effects of movement velocity ($F_{(1,9)} = 18.88$, $p < .01$), and session ($F_{(1,9)} = 24.23$, $p < .01$), and an interaction between movement velocity and session ($F_{(1,9)} = 5.38$, $p < .05$). Post-hoc analysis (Newman-Keuls test) showed that the decrease in RT in the second session relative to the first was smaller for fast movements than for slow movements, resulting in a disappearance of the difference between the RTs of these two classes of movement during the second session ($p > .05$).

The analysis of coefficient of variation of RT showed that, relative to the first session, the second session RTs of fast movements decreased by 23.4 % whereas those of slow movements ones decreased by 31.9 % ($F_{(1,9)} = 8.21$, $p < .01$).

Errors of response selection

The rate of response errors was inferior to 3% in each experimental condition. The percentage of response errors were analyzed after an arcsine transformation. The analysis revealed a main effect of velocity ($F_{(1,9)} = 9.05$, $p < .01$). The rate of response errors was greater for fast movements.

Movement velocity

The analysis revealed main effects of movement velocity instructions ($F_{(1,9)} = 3382$, $p < .01$), of session ($F_{(1,9)} = 17.31$, $p < .01$), and an interaction between velocity and session ($F_{(1,9)} = 5.59$, $p < .05$). The post-hoc analysis carried out with the Newman-Keuls' test showed that, during the second session, the movement velocity increased for the fast movements but not for the slow ones.

Variable error of movement time

The statistical analysis revealed a significant effect of movement velocity ($F_{(1,9)} = 19.61$, $p < .01$). The variable error of MT was higher for slow movements that for fast ones.

Discussion

The results of this experiment show that the subjects decreased the RT of slow movements to a greater extent than that of fast movements. Furthermore, the RT decrease was not caused by an increase in the rate of response errors nor by an increase in temporal movement variability, suggesting that AFM validity was not violated. According to the AFM logic, these results show that movement velocity and temporal constraint affect the same stage of information processing, that is the motor programming stage (Spijkers & Sanders, 1984). However, it could be suggested that temporal constraint affects an intermediate energetical mechanism rather than the motor programming stage directly. This energetical mechanism has not yet been identified. If it is the effort mechanism, subjects might be able to increase energetical supplies intentionally and progressively. The aim of the second experiment was to verify this prediction.

EXPERIMENT 2

Method

Subjects

25 subjects (12 males, 13 females, M = 20.8, SD = 2.0) took part in the experiment. All were right-handed.

Task and apparatus

The task and the apparatus were the same as those in experiment 1. The value of the rapid velocity was decreased to 120 cm/s.

Procedure

The subjects performed in two experimental sessions. During the first session there was one block of trials and the subjects were instructed to react rapidly without committing response errors and respecting the movement time set by the experimenter (170-230 ms). The subjects executed 240 trials, i.e. 120 for each velocity condition.

After the first session, the subjects were then allocated to one of two groups for the second session. A preliminary analysis of the mean RTs allowed us to verify that there was not a significant difference between the RTs of the two groups.

During the second session, the subjects carried out 320 trials spread over two series. Within each series, there were two blocks of the same movement velocity but which differed in terms of reaction time required for the experimental group. The two series differed in terms of movement velocity (rapid vs. slow). For the control group, the instructions were the same in both blocks as those given during the first session (i.e. first block). The subjects in the experimental group carried out the a first block of trials with the instruction to try to decrease their RTs to between 80% and 90% of the mean RT of the first session. During a second block of 40 trials, the instruction was to try to decrease RT to less than 80% of the mean RT of the first session. Throughout, the subjects had to respect the movement time set by the experimenter (170-230 ms). The dependent variables of interest were the same as those in the first experiment.

Results

Reaction time

The means of the RTs obtained for all trials were analysed by a 2 (group) x 3 (block) x 2 (velocity) ANOVA with repeated measures on the velocity and block factors. The analysis revealed main effects of movement velocity ($F_{(1,46)} = 85.48$, $p < .01$), and block ($F_{(2,46)} = 12.04$, $p < .01$), an interaction between block and group ($F_{(2,46)} = 24.24$, $p < .01$), and an

interaction between block and velocity ($F_{(2,46)} = 5.01$, $p<.01$). The analysis of simple effects of the block x group interaction showed that only the subjects of the experimental group decreased their RTs during the second and third blocks. It is therefore surprising that no interaction between group, block and velocity ($F_{(2,46)} = 1.07$, $p >.05$) was observed. To explain this finding the results of the control and experimental groups were analysed separately.

The analysis of control group results revealed a velocity effect ($F_{(1,11)} = 44.26$, $p <.01$). The interaction between velocity and block failed to reach the conventional significance threshold ($F_{(2,22)} = 1.04$, $p = .36$).

The results of the experimental group were analysed using a 3 (block) x 2 (velocity) ANOVA. The analysis revealed a velocity effect ($F_{(1,24)} = 42.00$, $p < .01$), a block effect ($F_{(2,24)} = 37.8$, $p <.01$), and a velocity x block interaction ($F_{(2,24)} = 7.42$, $p <.01$). A comparison of means carried out with the Newman-Keuls' test showed that, for slow movements, there was a significant decrease in RT ($p < .01$) in blocks 2 and 3 relative to block 1 (respectively 16% and 24% of mean RT). This contrasts with the fast movements, for which we observed a significant decrease only in block 3 relative to block 1 (17%).

Errors of response selection

The response error rate was lower than 3% within all experimental sessions. A 3 (block) x 2 (velocity) ANOVA was carried out upon the experimental group's rate of response error after an arcsine transformation. We observed a block effect ($F_{(2,24)} = 8.96$, $p < .01$) and a movement velocity effect ($F_{(1,12)} = 19.67$, $p < .01$). A comparison of means carried out using the Newman-Keuls' test showed that the error rate was higher within the third block than in the two other blocks, which did not differ. A further analysis showed that this increase was due to the performances of three of the ten subjects, for whom the error rate was between 5% and 7%. The number of response determination errors was greater for fast movement that for slow movements.

Movement velocity

A 3 (block) x 2 (velocity) ANOVA was performed on the mean velocities obtained for all trials of the experimental group. The analysis revealed an effect of block ($F_{(2,24)} = 18.02$, $p <$

.01), of movement velocity ($F_{(1,12)} = 2900.44$, $p < .01$), and an interaction between block and velocity ($F_{(2,24)} = 13.99$, $p < .01$). The post-hoc analysis using the Newman-Keuls' test showed that, for rapid movements, the subjects decreased the velocity of their movements in the second block and increased it in the third block. For the slow movements, movement velocity was the same in all three blocks.

Variable error of movement time

A 3 (block) x 2 (velocity) ANOVA was carried out on the variable error obtained for all trials of experimental group. We observed an effect of block ($F_{(2,24)} = 9.28$, $p < .01$), and of movement velocity ($F_{(1,12)} = 15.95$, $p < .01$). The variable error decreased for high velocity movements. The comparison of the means made using the Newman-Keuls' test showed an increase in the movement time variable error in the second block, in contrast with the two other blocks, which did not differ significantly.

Discussion

For the experimental group, the present results are in accordance with those obtained in the previous experiment. Moreover, these results show that the subject can intentionally and progressively modify the processing duration of the motor programming stage. This suggests that the effort mechanism is responsible for energetical supply to the motor programming stage (Sanders, 1983; Van der Molen, Somsen, Jennings, Nieuwboer, & Orlebek, 1987). Nevertheless, it is not possible to determine whether or not effort acts directly on the motor programming stage or through a specific energetical mechanism. It should be done in further experiments.

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THE DEVELOPMENT AND VALIDATION OF THE PERCEPTION OF SUCCESS QUESTIONNAIRE

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Recent research into motivation and achievement behavior has focused on a social-cognitive perspective. One important social-cognitive perspective is the achievement goal analysis derived from the independent and collaborative classroom based research of Nicholls (1989), Ames (1992), and Maehr (Maehr & Braskamp, 1986). This framework assumes that the individual is an intentional, goal directed organism who operates in a rational manner, and that achievement goals govern achievement beliefs and guide subsequent decision making and behavior in achievement contexts. This line of research has been primarily concerned with the behavioral antecedents and consequences of two different conceptions of the meaning of ability, namely an undifferentiated conception and a differentiated conception of ability (Nicholls, 1989). These two conceptions of ability are assumed to manifest themselves through the adoption of an achievement goal orientation consistent with one of the conceptions of ability. Achievement goals are thereby perceived as personal theories of achievement (Nicholls, 1989) that govern how individuals construe achievement contexts as well as how they interpret, assess, and react to achievement feedback (e.g., Ames & Archer, 1987; Duda, 1992;; Nicholls, 1989; Roberts, 1984, 1992).

The achievement goal approach assumes that two goals function in achievement contexts. These goals are termed task and ego goal orientations in our research. When a person has a task goal orientation, that person is concerned with demonstrating mastery at the task. The individual employs an undifferentiated conception of ability (Nicholls, 1989) where perceptions of ability are self referenced and dependent upon learning or improvement at the task. This goal drives achievement behavior when mastery is determined to be important.

When a person has an ego goal orientation, that person is concerned with demonstrating ability compared to others. The individual employs a differentiated conception of ability (Nicholls, 1984, 1989) where perceptions of ability are other referenced and dependent upon subjective assessment of one's ability with that of others. This goal drives achievement behavior in circumstances where social comparison is extant.

There are considerable data to show that the two achievement goals exist and are relevant to the ongoing stream of behavior of individuals. If one has a task goal, then the individual is likely to engage in adaptive patterns of behavior such as choosing moderately challenging tasks, focusing on effort, trying hasr in the face of difficulty, being interested in the task, and persisting over time. The same pattern of adaptive behaviors is assumed to hold for ego oriented individuals when their perception of ability is high (Duda, 1989). It has been argued, however that perceptions of ability are very fragile in the face of failure or difficulty. The perception of ability may weaken, and in those instances maladaptive behaviors soon manifest themselves. Therefore, individuals who are ego involved and have concerns over the demonstration of ability begin to exhibit maladaptive achievement behaviors. Maladaptive behaviors are choosing easy or hard tasks in order to avoid challenge, not exerting effort, having deteriorating performance over time, and lacking persistence (Ames, 1992; Duda, 1989; Nicholls, 1989; Roberts, 1992).

Measures of Goal Orientations in Sport

In order to measure the goal orientations, researchers typically create questionnaires that are assumed to assess ego and task goal orientations(eg. Nicholls, Patashnik & Nolen, 1985). Several attempts to create scales to assess the concepts in sport have occurred. For example, Vealey (1986) used a scale to assess the relative use of outcome versus performance strategies, but the scale is cumbersome to use. Gill and Deeter (1988) also developed a scale to measure similar constructs, but it was not designed with achievement goal theory in mind, and the constructs do not conform to achievement goal constructs. In addition, Nicholls (1989) has argued that in order to assess achievement goals of individuals, they should be asked about the criteria that makes them feel successful in a given situation. In line with this suggestion, Duda and colleagues (1989; Duda & Nicholls, 1989) used the questionnaire developed by Nicholls and his colleagues for the academic context by changing the words to be sport specific. The questionnaire is called the Task and Ego Orientation in Sport Questionnaire, or TEOSQ (Duda, 1989). This questionnaire has demonstrated acceptable validity and reliability and has been used successfully in the sport context (e.g.: Duda, 1989). Roberts and Balague (1989, 1991) have also developed a questionnaire to measure the goal orientations. However, Roberts and Balague used extensive scale development procedures to develop the Perception of Success Questionnaire, or POSQ.

The Development of POSQ.

Recognizing that the context of sport was very different from the academic, Roberts and Balague argued that a questionnaire specifically designed for the sport context needed to be developed. Therefore, they used basic scale development procedures to construct a scale sensitive to the sport context. Following the suggestion of Nicholls(1989) that individuals need to be asked their perceptions of success in order to measure task and ego goal orientations, Roberts and Balague initially created a large pool of questions (48) drawn from the extant literature that addressed perceptions of success in sport. Then they used a panel of experts to narrow down the list to questions that best met the specified task and ego goal orientation in sport criteria. This produced a pool of questions (29) that were used to determine their efficacy in assessing goal orientations.

The next step involved administering the scale to a large sample of athletes and, following factor analysis procedures, a two factor solution emerged with 26% and 22% of the variance explained by the ego and task orientation factors respectively (Roberts & Balague, 1989). The alpha coefficients were strong with .92 for task and .90 for ego. To measure concurrent validity, the POSQ was correlated with the Vealey (1986) scale, but the correlations were insignificant and reflected the fact that the scales are measuring different constructs. Further, Vealey asked whether subjects felt satisfied rather than assessing the criteria of success. We also used Duda's TEOSQ scale. The correlatios with TEOSQ were .69 for task orientation and .80 for ego orientation, confirming the concurrent validity of POSQ. Following elimination of items that loaded on both factors, or which decreased alpha coefficients, a 26 item questionnaire was derived that formed the initial scale of POSQ.

Subsequent administrations of the scale to several populations have shortened the scale to those items that consistently loaded on one factor or the other. In a recent administration of the

scale (Roberts & Balague, 1991), the correlation of the current 12 item POSQ to the long form was .98 for task and .97 for ego orientation. The intercorrelation was .08. The coefficient alpha for task was .92 and for ego was .90. Thus, the goal orienations of ego and task have been orthogonally isolated and and the psychometric properties of the POSQ are strong. The robustness of POSQ was confirmed in a recent study with parents whose children were involved in the competitive sport experience (Roberts, Treasure, and Hall, 1994). The POSQ was administered to the parents and following an orthogonal rotation, two factors were extracted reflecting a task and an ego orientation identical to other populations. Cronbach alpha coefficients were .84 for task and .90 for ego. The item loadings for the parents was identical to other populations and the intercorrelation was .14.

The primary purpose of the present study was to demonstrate the construct (factorial) validity of the POSQ by confirmation of the two factor structure representing task and ego goal orientations. Secondly, to further determine the construct validity, we examined the degree to which task and ego achievement goals were related to beliefs about the causes of success in sport and preference for challenging tasks. We expected to find that task and ego oriented individuals would differ in their beliefs and expectations.

Method

Subjects were 274 adolescent female basketball players (M=14.01 years) attending a week long resedential summer camp at a large Mid Western university in the United States. After obtaining normal informed consent, the subjects completed the POSQ and a questionnaire asking them about their beliefs about the causes of success on the Causes of Success Scale (Duda & Nicholls, 1992), and their preference for challenging tasks.

Results and Discussion

Confirmatory Factor Analysis. In order to examine the stability of the hypothesized factor structure of POSQ, a confirmatory factor analysis was conducted employing the the Romana Version 3.8 computer program (Browne & Mels, 1993). This method was utilized to verify a hypothesized factor structure of 12 observed variables (items) loading on two latent constructs (dimensions). The standardized maximum likelihood factor loadings for the observed variables on their proposed dimensions are depicted in Table 1.

As can be seen, all of the items have statistically significant factor loadings, as indicated by the t-values greater than 1.96 suggesting a meaningful association between the items and their proposed dimensions. Although a number of different assessments of fit of the observed data to the specified model are available, to date, no universally accepted guidelines exist. To assess the fit of the data to the proposed factor structure, the chi-square goodness-of-fit test and the root mean square residual (RMSR) statistics were generated.

The chi-square is a function of the difference between the observed covariance matrix and predicted matrix bases of the respective model. A non-significant chi-square indicates the model fits the data. The chi-square was significant in this case ($X(54)=138$, $p<.005$) suggesting that the data was an inadequate fit of the model. The RMSR is a measure of comparison between the observed and the reproduced correlational matrices. The closer the RMSR is to zero, the better

Table 1. Standardized maximum likelihood loadings and t -values of items comprising the POSQ (Ego items 1-6; Task items 7-12).

Item	Loading	t-Value
1. I beat other people	0.593	12.82
2. I am best	0.721	19.62
3. I do better than others	0.752	21.90
4. I show other people I am the best	0.775	23.76
5. I accomplish something others cannot do	0.653	15.57
6. I am clearly better	0.617	13.86
7. I try hard	0.612	14.10
8. I really improve	0.748	22.98
9. I overcome difficulties	0.690	18.45
10. I succeed at something I couldn't do before	0.731	21.51
11. I perform to the best of my ability	0.737	33.14
12. I reach a target I set for myself	0.837	33.14

All t-values >1.96 are significant

the fit of the model. Values below .05 indicate a good fit, values between .05-.10 is considered acceptable (Rupp & Segal, 1989). The RMSR in the present data is .07 demonstrating an adequate fit.

The two indices above are subject to inflation due to sample size, therefore we employed the X/df ratio test which is suggested as the best assessment of overall goodness of fit. Ratios less than 2 are considered good while ratios between 2 and 3 are considered acceptable (Bryne, 1984). A ratio of 2.5 emerged in the present data suggesting an acceptable fit. Further, the internal consistency of the subscales was determined by Cronbach alpha and these were .84 for ego and .87 for task. These indicate high reliability.

Achievement Goals and Cognitive and Affective Responses. Using the scale developed by Duda and Nicholls (1992), subjects were also asked what they thought caused success. The scale is made up of 17 items that incorporate 3 subscales assessing beliefs that sport success comes from: (a) ability, (b) effort, and (c) deceptive tactics. The stem was: "Kids succeed if...". Internal consistency was determined by Cronbach alpha and these were .66, .83, and.71 for the ability, effort, and deceptive tactics respectively. Two questions were used to assess the preference for challenging tasks. These questions were drawn from the work of Ames (1992). The subjects were asked to indicate the likelihood of their choosing two types of tasks: "A task in which you can learn a lot of new things but will also have some difficulty and you will make a lot of mistakes", and "A task that will involve a minimum of struggle or confusion and on which you would do very well". These items were conceptually similar, and the responses of subjects were inversely related (R -.37). The item scores were combined so that a high score indicated a preference for challenging tasks.

To further determine the construct validity of POSQ, correlational analysis was used to examine the the relationship between task and ego achievement goals and the subjects' beliefs about success and preference for challenging tasks. The results of the zero order correlations revealed that a task orientation was positively related to the belief that effort (R .34, $p<.001$), and negatively related to using deceptive tactics (R -.27,$p<.001$) cause success in sport. A task

orientation was also positively related to to choosing challenging tasks. These were as expected if task oriented individuals do focus on self referenced achievement criteria. In contrast, an ego orientation was positively related to to the belief that ability (R.34, p<.001) and deception (R.20, p<01) cause success in sport, and negatively related to preference for challenging tasks (R-.62, P<.05). Once again, these data suggest that a conceptually coherent relationship exists between an individuals achievement goal orientation and their beliefs about the sport experience.

General Discussion

The use of linear structure relationships to investigate the efficacy of factor structures in sport psychology is not common. The procedure derives indices of fit that confirm the adequacy of a proposed factor structure underlying a construct. The present study confirmed the existence of a stable two factor structure and the indices of fit for POSQ were acceptable. Clearly, the two dimensional achievement goal structure does exist for the sample used. The correlation between the factors confirms the orthogonality of the two goal orientations. It may be concluded, therefore, that the POSQ is a reliable measure of task and ego goal orientations in sport.

Further support is given in the confirmation of the hypothesized relationships between perceptions of the causes of success and the preference for challenging tasks. Being task or ego oriented is conceptually meaningful in that task oriented subjects prefer challenging tasks and believe effort is the cause of success, while ego oriented subjects avoid challenging tasks (prefering tasks they know they can do) and believe ability and deception cause success. This conforms to the findings of other research with POSQ which has consistently shown that ego and task orientations are useful when one investigates the determinants and consequences of achievement behavior in sport contexts (e.g.: Roberts & Treasure, in press; Roberts, 1992: Roberts & Balague, 1991; Roberts, Treasure & Hall, 1994)

Current and future research is directed toward determining the cross cultural validity of achievement goals (POSQ has been successfully translated into French, Finnish, Korean, Spanish, and Norwegian) as several papers at this conference attest. Thus, an exciting era in motivation research stretches before us. The robustness of the achievement goal approach is now well docuemented, and the evidence to support the robustness, reliability, and validity of POSQ to measure achievement goal orientations in French, English, Korean, Spanish, and Norwegian is now considerable.

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THE OTTAWA MENTAL SKILLS ASSESSMENT TOOL: A CONFIRMATORY FACTOR ANALYSIS

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KEY WORDS

Confirmatory Factor Analysis, Ottawa Mental Skills Assessment Tool (OMSAT)

INTRODUCTION

The Ottawa Mental Skills Assessment Tool (OMSAT), originally developed by Salmela, Barbour, Cox, Howlett, Iami, and Ping (1992), later revised by Bota (1993) and Durand-Bush & Salmela (1995), was designed to provide sport psychology practitioners with feedback on "the relative importance of mental skills required to achieve levels of excellence in sport performance." (Bota, 1993, p. IV.) The OMSAT was constructed based on both a review of literature relevant to sport performance and an examination of existing sport-specific psychological inventories. The first version of the OMSAT contained 14 scales that were designed to measure five different mental skills components: foundation skills (commitment, belief); affective skills (stress reactions, fear, relaxing, energizing); cognitive skills (goal-setting, imagery, mental practice, focus, re-focus); competition planning skills (simulation, competition planing); and team dynamics skills (team dynamics and cohesion). Intended as a diagnostic aid to mental training practitioners, the OMSAT was also designed to provide feedback on problem areas, and direct intervention strategies. Since it's conception in 1992, the OMSAT has undergone revision, and is currently in the process of another. (Durand-Bush & Salmela, 1995)

Bota's (1993) attempt to validate the first version of the OMSAT resulted in the creation of a somewhat shorter second version of the questionnaire. The second version of the OMSAT was reduced to 71 items, 12 scales, and four major concept areas. Foundation skills were expanded to include goal-setting along with belief and commitment. Affective skills remained unchanged while cognitive skills were revised to include mental training — a composite of simulation and mental practice, as well as imagery, focusing, and re-focusing. Simulation was removed from the competition planing skills component, and the team

dynamics skills component was removed entirely. In summarizing the empirical properties of the revised version of the OMSAT, Bota (1993) indicated that the scales of the questionnaire

> Demonstrate high levels of internal consistency (alpha levels above .78), and high levels of test-re-test reliability (r levels above .63). Mean score differences indicated that elite level athletes scored higher than competitive athletes, who in turn, scored higher than recreational athletes in nearly all of the OMSAT scales. (p. VII)

Results of Bota's (1993) empirical investigation of the second version of the OMSAT led to the conclusion that this version was able to provide a "potentially useful assessment and diagnostic tool for both understanding, and potentially, counseling athletes of different ability levels." (p. VII). However "potentially useful" the second version of the OMSAT might prove to be, only the preliminary steps in test construction have been taken thus far. Regardless of the levels of reliability and validity established by Bota (1993), further work is needed before the instrument can be considered useful.

Schutz (1993), in his keynote address to the 8th World Congress on Sport Psychology, made the proposition that no new inventories be developed, unless it could first be demonstrated that firstly, there was a need for the test, secondly, the conceptual definition of the construct was well developed and theoretically sound, and finally, the developer of the questionnaire/test/inventory had followed careful procedures and adhered to rigorous standards in constructing the items and in establishing the reliability and validity of the test. (p. 128) With regards to the first question, Bota (1993) cited a lack of empirically validated inventories that measured a composite of mental skills for diagnostic and counseling purposes, as justification for the continued work on the development of the OMSAT.

The process of test development and construction for the initial version of the OMSAT combined a review of theoretical literature, with regards to elite athletic performance, with a review of eight existing inventories designed to measure mental aspects of athletic performance. The theoretical framework from which the first version of the OMSAT was to evolve was a combination of Orlick and Partington's (1988) "mental links to excellence", Orlick's (1992) "psychology of personal excellence", and the "wheel of human excellence", and Seiler's (1992) "psychological approach to performance enhancement." This framework was further enhanced through examination and incorporation of aspects of existing mental

skills inventories. It is from this theoretical perspective that the most recent version of the OMSAT has also evolved.

Schutz's third question, regarding test construction and validation, is hopefully presently being addressed. Durand-Bush and Salmela (1995) are currently working on revising the second version of the OMSAT, and creating and validating a third version. The focus of the present research was to test the fit between the theoretical structure or framework, that the second version of the OMSAT was developed to reflect, and the structure that the instrument itself was actually measuring. In order to test this fit, Linear Structural Relations model (LISREL, Jöreskog and Sörbom, 1989) was used to conduct a confirmatory factor analysis (CFA) on the OMSAT.

Confirmatory Factor Analysis and Test Development

Schutz (1993) was rewarded to see an increasing number of sport psychologists using confirmatory factor analysis (CFA) in the development and revision of their assessment instruments. Citing Ford and Summers' (1992) CFA of the Test of Attentional and Interpersonal Style, as well as Chartrand, Jowdy, and Dainish's (1992) CFA of the Psychological Skills Inventory for Sports (PSIS R-5), both of which failed to confirm the hypothesized factor structure, Schutz (1993) cautioned that "even the most venerable of tests are constantly being re-evaluated and questioned." (p. 128) The confirmatory factor model, as developed by Jöreskog (1967, 1969) and Jöreskog & Lawley (1968) is one such method used in the re-evaluation of psychological inventories and tests.

Assuming that the 12 individual scales are both a reliable and valid measure of the constructs they are intended to measure, (a premise which is currently being investigated by Durand-Bush & Salmela, 1995) the present research project attempted to test the model outlined by Bota (1993) for the theoretical structure of the OMSAT. Figure 1 presents the path diagram of the proposed theoretical structure of the OMSAT. The first three comprised the "foundation skills" factor, the next four comprised the "Affective Skills" factor, and the final four comprised the "Cognitive Skills" factor. The fourth factor "Competition Planing" was not related to *mental* preparation, and was dropped from the present analysis.

METHOD AND PROCEDURE

Participants

Questionnaires from 577 athletes were used as the sample for the CFA process. Of the 577 questionnaires analyzed, 63.8 % were from male, and 36.2 % were from female athletes. Level of athlete participation ranged from elite-level athletes (international/national), making up 23.1 % of the sample, to intermediate-level athletes, making up 54.6 % of the sample, to recreational / beginner-level athletes, making up the remaining 22.4 % of the sample. The questionnaires were administered over a one-year period, and the data entered into Microsoft Access for Windows.

Instrument

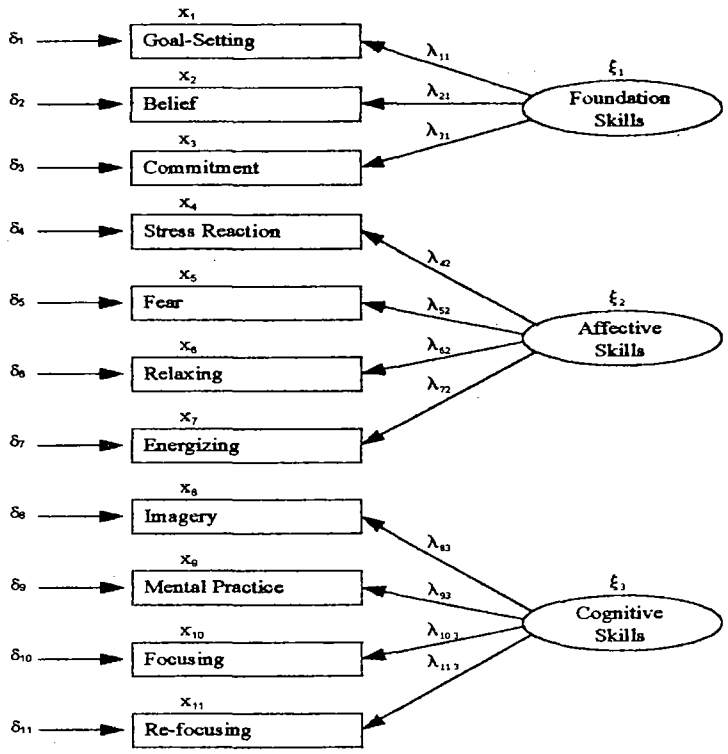
The second version of the OMSAT was used as the instrument for this project. Consisting of 77 likert-scale questions (strongly agree to strongly disagree) and 12 scales, the OMSAT version two was still in its developmental stages when administered to the athletes.

Data Analysis

Descriptive statistics were calculated using SPSS for Windows (version 6.1), while reliability statistics were calculated using SPSS PC. For the LISREL analysis, a covariance matrix produced by Quattro Pro (6.0) was used. Following the path diagram (Figure 1) the model was identified and tested using LISREL 7.16. Maximum Likelihood estimation (the LISREL default) was the method selected for the CFA. Output requested included standard errors (SE), t-values (TV), modification indices (MI), estimated covariance matrix, residuals, standardized residuals and Q-plot (RS). as only x and ξ variables were specified, submodel 1 of the LISREL model (confirmatory factor analysis, cogeneric measurement models) was assumed.

Figure 1

Path Diagram of the Proposed Structure of the OMSAT



RESULTS

Descriptive and Reliability Statistics for the OMSAT, Version Two

Average inter-item correlations ranged from 0.3253 for the commitment scale, to 0.5774 for the relaxation scale, with an overall average inter-item correlation for the eleven scales of the OMSAT of 0.4108. Chronbach's alpha scores ranged from 0.7394 for the focus scale to 0.8321 for the commitment scale with an average of 0.7961 for the eleven scales of the OMSAT. Output from SPSS for Windows EXAMINE procedure, as well as the histograms for the eleven scales indicated that with the exception of the fear scale which was notably negatively skewed, the scales approached normality.

Examination of the Solution

Parameter estimates produced by LISREL's maximum likelihood (ML) estimation did not appear to be "unreasonable." Jöreskog and Sörbom (1989) point to "negative variances, correlations which are larger than one in magnitude, covariance or correlation matrices which

are not positive definite" (p. 41) as indicators of an unreasonable solution. Although the initial covariance matrix was not positive definite (the ridge option with constant = 10.0 was initiated), no indication was given that the fitted covariance matrix was not positive definite.

Standard errors and t-values for the solution were difficult to interpret, as Jöreskog and Sörbom (1989) did not indicate a range of what would constitute "large" values. Squared multiple correlations were low to moderate, ranging from , 0.003 for mental, 0.004 for imagery training, and 0.008 for energize, to 0.672 for stress reaction. The coefficient of determination for the model was 0.737.

Measures of Overall Fit

Measures of overall fit for the model were good. LISREL reported a Chi-square with 41 degrees of freedom = 11.54 (p = 1.00). Goodness-of-fit index and adjusted goodness-of-fit indices were 0.996 and 0.994 respectively. The root mean square residual reported by LISREL was 5.311.

Detailed Assessment of Fit

The modification indices and estimated change for lambda X produced by the LISREL analysis indicated that the maximum modification index was 2.28 for element (7, 3) of lambda X. This indicated that, should energizing (as a cognitive skill) be set free, the chi-squared for the model would decrease by 2.28. Although there might be some theoretical justification for associating energizing with the cognitive skills of mental training, imagery, focusing and refocusing, the magnitude of the predicted improvement in the χ^2 is not sufficient to warrant such a change.

DISCUSSION AND CONCLUSIONS

From an examination of the solution, the measures of overall fit, and the detailed assessment of fit, it could be concluded that the factor structure of version two of the OMSAT, fit reasonably well the proposed theoretical factor structure. From the examination of the solution, no "unreasonable" covariance or correlation matrices were found. Standard errors appeared reasonable, given the scale of the original scales of the OMSAT.

The small squared multiple correlations for the x-variables, and the relatively large coefficient of determination for the model (.737) seem to indicate that jointly, the x-variables serve as much better measurement instruments for the latent variables (foundation skills, affective skills, and cognitive skills) than they did separately, with the exception of the stress reaction scale. Attention should be given to the relatively large squared multiple correlation for the stress reaction scale, $r^2 = 0.672$. If this value indicated "how well the observed variable[s] served... as measurement instruments for the latent variables" (Jöreskog & Sörbom, 1989, p. 42) the stress reaction scale certainly deserves another look.

The measures of overall fit for the model were good. The chi-squared, with 41 degrees of freedom = 11.54 (p. = 1.00) according to Jöreskog and Sörbom (1989) should be interpreted as indicating that the fit is adequate as "large χ^2-values correspond to bad fit and small χ^2-values correspond to good fit." (p. 43.) The goodness of fit, and the adjusted goodness of fit indices provide the most compelling argument for the conclusion that the model fit is adequate. Both values were greater than 0.994 indicating that the overall fit of the model was quite good.

The maximum modification index produced in the detailed assessment of fit was 2.28, for element (7,3) of lambda x. This relatively small modification indices indicated that, should the constraint on the energizing scale be set free, the chi-squared would decrease by 2.28. Given the already small chi-squared, a further reduction of almost 20 % might appear desirable. Theoretically, this would indicate that energizing loads both on the affective skills component, and on the cognitive skills component. From a conceptual point of view, it's inverse relationship with the relaxation scale of the affective component, and its function in "psyching-up" — a concept closely related to mental training and imagery of the cognitive component, suggest that at least from a theoretical perspective, some justification exists for freeing the element. However, given that the existing model already fits adequately, modification of the theoretical structure will be left until Salmela and Durand-Bush (in progress) complete their CFA of the structure of the *scales* of the third version of the OMSAT.

Conclusions

Although most of the indicators point to a relatively well-fitting solution, these results should be interpreted in context. The present research did indicate that the proposed theoretical framework was reflected in the data gathered with the second version of the OMSAT. However, the scales themselves must first be analyzed to determine if the 11-factor model does, in fact, fit the data before the overall structure can be interpreted.

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A MODEL AND ANALYSIS OF PSYCHOLOGICAL MOMENTUM

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Key words: outcome, positive and negative psychological momentum, micro and macro effects, cycling.

INTRODUCTION

Psychological momentum is a phenomenon which is common in everyday sports language, but still struggles to receive extensive empirical research. As a result psychological momentum remains one of the least understood aspects within sport. It is typically viewed in an almost mystical manner; as a phenomenon over which we as participants, coaches, or spectators have little or no control. However, in sporting contests, particularly close contests, terms such as "on a roll" and "changes in momentum" are common place. A positive change in momentum is often associated with enhanced performance and ultimately a positive result. At the same time, negative momentum is thought to have an adverse effect ultimately leading to failure.

Early studies have tended to plot the course of psychological momentum by examining archival data. For example, Weinberg, Richardson, and Jackson, (1981) reported that the winning of the first set in a tennis match is a strong predictor of a three-set match. Silva, Hardy, and Crace (1988) reported that in a five set game the outcome in set 1 predicts the outcome in set 2 and that the outcome of 1 and 2 combined predicts the match result. Both these studies support the hypothesis put forward by Iso-Ahola and Mobily (1980) that one successful performance should increase the probability of a subsequent successful performance. Adler (1981) pursued this notion suggesting that in addition to predicting that success follows success, failure follows failure.

Taylor and Demick (1994) suggested however that much of this research may be misleading and may have led to erroneous conclusions. They view the inference that psychological momentum was responsible for results as being problematic. In support of this contention Silva, Hardy, and Crace (1988) suggested that the results may be ability based, that is, more talented competitors won the first game and consequently the match. Further evidence for this position comes from a study by Richardson, Adler and Hankes (1988) in which skill was controlled and the effects of momentum were not realized. Ransom and Weinberg (1985) reported that amongst equally skilled tennis players only 61% and 63% of males and females who won the first set actually won the match. Miller and Weinberg (1991) further reported that volleyball

teams who came back from a three-point deficit to tie late in a match (between 10 and 14 points) were not more likely to win the match. Gilovich, Vallone, and Tversky (1985) went further and called psychological momentum a "powerful and widely shared cognitive illusion" (p. 313).

To date most research in the area has been content to describe the phenomenon with little research having a theoretical basis or operationalized constructs. However, there have been exceptions. Vallerand, Colavecchio, and Pelletier (1988) developed an antecedent-consequence psychological momentum model which viewed psychological momentum in terms of participants' perceptions of progress toward their goals. They reported that the presence of a psychological momentum pattern led to enhanced psychological momentum perceptions on the part of the athlete. Another exception was a study reported by Taylor and Demick (1994) in which a multidimensional model of psychological momentum was tested. The model was based on a momentum chain which comprised of precipitating events; changes in cognition, affect, and physiology; behavior changes; an opposing change on the part of the opponent and; an immediate change in the immediate outcome. Two studies involving tennis and basketball players provided partial evidence in support of the model. However, although the model clearly articulates a sequence of precipitating events it fails to account for the magnitude of these events. Furthermore, the Taylor and Demick model does not permit or allow for changes or fluctuations during the course of an event The purpose of this present study is to test a model of psychological momentum which is feedback or loop driven and which also takes into account the magnitude of specific outcomes during the course of an event.

Present Study: An Outcome Model of Psychological Momentum

This model operationalizes the definition and develops and expands the model of psychological momentum developed by Taylor and Demick (1994). This present model is composed of a number of specific elements which are arranged in a chain like fashion within a feedback loop. These specific elements are (a) influential prior event(s), (b) state of psychology readiness, (c) resulting physiological effect, (d) performance, (e) outcome, (f) positive or negative, micro-macro effect (g) feedback loop to psychological readiness, and (h) resulting change on the part of the opponent.

The influence of prior events relates to variables such as past results, preparedness, and environmental factors (home field, weather conditions, time of day, etc.). The influence that each one of these factors has on any one team or on any one individual will vary greatly. In other

words, what might trigger positive momentum in one individual may have the opposite effect for another individual.

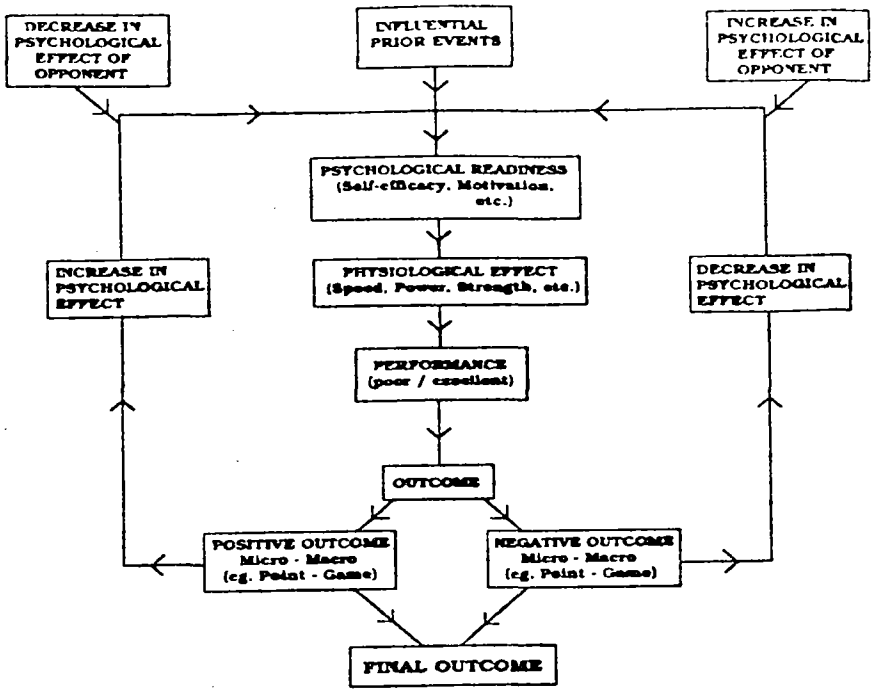

Fig. 1. Outcome Model of Psychological Momentum

The influence of prior events and the state of any event in progress will have an effect on the psychological readiness of the individual or team. This influence effects perceptions of control over the competitive situation which in turn manifests itself primarily in the form of self-efficacy. It has been reported that sport success is often significantly related to self efficacy (Bandura, 1977; Gould, Weiss, & Weinberg, 1981) and is also associated with motivation and persistence (Bandura & Schunk, 1981).

Taylor and Demick (1994) have pointed out that physiological arousal is often a result of changes in psychological state. This concept which is supported by Sarason (1978) and Scott (1988) is also the basis on which the inverted U hypothesis is based. Changes in psychological state produces changes in physiological state which in turn produces a shift or movement in performance. Positive momentum occurs when these changes move toward the optimal performance state producing a more satisfactory event performance and negative momentum when they move away from the optimal state which in turn produces a less than satisfactory performance.

Performance has a clear and direct influence on outcome, that is, outcome of a point, a game, and/or a match. Should that performance be less than optimal or satisfactory then there is a greater likelihood that the outcome will be negative, that is, failure to win the point, game, and or match.

The outcome (positive or negative) which can be thought of on a micro to macro level (point to match) will have a direct influence on the ever changing psychological readiness of the competitor. However, the magnitude of the psychological effect does not necessarily have to equate with the magnitude of the outcome. In other words the losing of one point could have a devastating effect on an individual with regard to future performance. The magnitude of the actual effect will be somewhat dependent on the individual and the circumstances. This new level of psychological readiness will in turn influence physiological state, performance, outcome, psychological readiness, and so on. In other words a momentum loop has been created which will only end with the ending of the contest.

A final intervening variable relates to momentum and the opponent. It has been suggested by Taylor and Demick (1994) that there will be an opposite reaction to positive or negative momentum on the part of the opponent. In other words if one player or team relates to an outcome with positive momentum, the opponent will react to that outcome with negative momentum.

METHOD AND PROCEDURE

The purpose of this exploratory study was to test the Outcome Model of Momentum by means of a cycling competition. More specifically, the objective was to assess whether psychological momentum could be created and whether the creation of psychological momentum would produce performance and outcome changes in the predicted manner. To fulfill the purposes of this study the following hypotheses were tested: (a) Cyclists who experience positive psychological moment will cover the final five kilometers of the race quicker than the cyclists experiencing negative psychological momentum; and (b) Winning cyclists will experience more positive influential prior events.

Following a 15 minute warm up period, forty physical education students, of varying cycling ability, were asked to cycle, as quickly as possible a distance of 15 kilometers, with 7 kp resistance, on a Monarch stationary bicycle. Each cyclist completed this task on their own with only the researchers being present.

One week later matched pairs, based on the previously recorded times, were formed and asked to race against each other over a distance of 15 kilometers, with 7 kp resistance, again on stationary bicycles. Unlike the previous time trial, subjects were told that the objective was now not time but rather to simply finish in front of their opponent. Prior to the start of the race each subject was reminded of both their own and their opponents time taken to over the distance one week previously.

The bicycles were set at a distance of 3 meters apart with a wooden screen 3 meters in length and 2.5 meters in height placed between them. At a distance of 5 meters from the bicycles and within in sight of both subjects a distance board was placed on which the total distance covered by each subject was plotted every 30 seconds. This was the only feedback that each subject received as only the researchers had access to the bicycle distance monitors.

After a warm up period of 15 minutes the race began and distances covered were plotted every 30 seconds. However, when the first subject of the pair reached 10 kilometers the study took a different tact. This subject continued on as before until they had completed 15 kilometers The time taken to complete their final five kilometers was recorded. On the first subject reaching the 10 kilometer mark the trailing subject began to be shown erroneous feedback which on the distance board gradually showed them to be closing on the leader and catching them at the 14 kilometer mark. The time taken for this subject to cycle their final five kilometers, that is, five kilometers from when they first received erroneous feedback was recorded. (An example would be from 9.900 kilometers to 14.900 kilometers and on reaching 14.900 the distance board would display 15 kilometers cycled).

RESULTS

The results if the study are presented in Table 1. Although there was no significant difference between the mean time for the group which experienced positive psychological momentum and the group which did not $F(1, 38) = 1.67$, $p > .05$; it should be noted that in 16 of the 20 "races" the subject who trailed at 10 kilometers and then experienced psychological momentum was quicker over the last five kilometers than their opponent. In other words, of the 20 subjects who led after 10 kilometers only four were quicker than there opponents over the final five kilometers. Thus, 80% of subjects experiencing positive psychological momentum were faster over their final five kilometers than their opponents.

It should also be noted that in the 20 races, 10 were won by riders who had a pre race better time that their opponent and 10 by subjects who had a slower pre race time.

TABLE 1. Means, Standard Deviations, and F Scores for Subject Exposed to Positive and Negative Psychological Momentum

	M	SD	F
Time (secs) for trailing subjects over the final five kilometers.	433.30	33.69	1.67
Time (secs) for leading subjects over the final five kilometers	447.35	34.65	
Trailing distance (ms) prior to onset of psych. momentum	95.65	48.36	

Note: N = 40

DISCUSSION AND CONCLUSIONS

The purpose of this exploratory study was to assess the outcome model of psychological momentum in sport. The specific objective was to assess the effect that changing levels of psychological readiness, physiological readiness, performance, and positive and negative micro and macro outcomes had on each other and on the ultimate or final outcome.

The results of the study lend support to the model. The majority of subjects who experienced positive psychological momentum responded with an increase in performance and positive outcome. This positive outcome in turn served to enhance psychological readiness, physiological readiness, and performance. In contrast, those subjects who experienced negative psychological momentum responded in a fashion which mirrored those subjects who experienced positive psychological momentum, except that outcome were negative leading to decreases in the other related areas.

The second hypothesis suggested that winning subjects would have more positive influencing prior events than non winners. This hypothesis was not supported in this study. Results suggest that outcomes within the contest can negate the influence of prior events. In this study there was no positive psychological momentum effect to be gained from the pre race performance times. This is not to suggest that prior events are never influential. Rather it suggests that when skill or ability levels are held relatively constant, outcomes within the contest can be a stronger and more important predictor as to outcome than influential prior events.

This study also served to show the importance of outcomes as a means of creating positive and negative psychological momentum. As the trailing subject began to see themselves close on their opponent they gradually asserted more and more of a psychological and physiological effort. In other words they "got on a roll." As a result of a number of positive outcomes they were able, by means of creating positive psychological momentum, to turn a losing situation around and "win" over the last five kilometers. It may be argued that the trailing subject had covered less distance than their opponent and therefore should have been quicker over the final five kilometers. While this is an important point it should be noted that the mean training distance was not substantial and that in many cases the trailing subjects, given the time margin of their victory, would have completed the 15 kilometers ahead of their opponents.

Though this study lends support to the proposed model further study is required so as to confirm these exploratory findings. Furthermore, the precise effect, in terms of magnitude, that each outcome has needs to be examined in more detail. There is also a need to assess this model in the actual competition environment as opposed to contrived testing situations.

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THE DEVELOPMENT OF THE CHAMPION GOAL-SETTING CHECKLIST FOR CROSS COUNTRY SKIERS.

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Key words: Cross country skiing, Olympic and World medalists, goal-setting, pedagogy.

INTRODUCTION

Goal-setting is broadly considered one of the most effective and consistent performance enhancement techniques available in the behavioral sciences (Locke & Latham, 1990). In Sport, however, goal-setting has not received a great deal of research attention, and when it has been investigated, the effects have not been as robust or consistent as in other areas of inquiry (Burton, 1993; Duda, 1992;Weinberg, 1992). Explanations for this have been sought in methodology as well as in the nature of sport (Burton, 1993; Locke, 1991).

The literature shows a paucity of knowledge about how in fact athletes go about their goal-setting (Burton, 1993; Weinberg, 1992). The scarcity of data about world class athletes is even more apparent, and may well be related to the lack of instruments permitting the gathering of such information in an organized manner (Vikander & Stallman, 1991).

In 1989 Rushall and Fisdel (1989) developed the Goal-Setting Inventory, employing the philosophy and structure underlying the series of environment/behavior/sport-specific inventories for athletes that Rushall and coworkers had constructed over the previous twelve years (Sport Psychology Consultation System: SPCS).

The response pattern of international class swimmers to the Goal-Setting Inventory was analyzed by Vikander and Stallman in 1991 and a thirtyone (31) item Swimming Champion Goal-Setting Checklist was developed. This instrument was modeled on the 1987 procedures of Rushall in his analysis of world class athletes' responses to similar content items in the various SPCS inventories, which resulted in the Champion Characteristics Checklist . This checklist was proposed as a tool to increase athlete interest in sport psychology, as an auto-didactic change monitoring instrument, and as a delineator of psychological-improvement goals.

The present study received its impetus and form from these earlier works, and extends the sport-specific direction into the cross country skiing arena. The aim has been to produce an easily administered instrument permitting a clear comparison of developing skiers with the goal-setting characteristics of the world's finest athletes in their sport, as well as providing recommendations for self-development based on that comparison.

METHOD AND PROCEDURE

All male and female cross country skiers who won medals (individually or relay) in Olympic Games or World Championships during the period 1987-94 were contacted through their national ski association. Twentyseven (27) athletes responded and were assessed using the Goal-Setting Inventory of Rushall and Fisdel (1989). Those who had retired were instructed to respond from their medal-winning career segment perspective. The skiers representing the following countries: Finland, Italy, Kazakhstan, Norway, Russia, Sweden, and Switzerland. Translation of the Goal-Setting Inventory were undertaken into Finnish, Norwegian, and Russian and were available to those how preferred

As in the Champion Characteristics Checklist and the Swimming Champion Goal-Setting Checklist, questions answered in a like manner by 75% or more of the subjects were reformulated in statement form and categorized into nine (9) content areas, composing the final Goal-Setting of Cross Country Ski Champions

The questions corresponding to the selected items were organized in the same manner and produced separately as a "yes/no" forced choice Champion Goal-Setting Checklist for Cross Country Skiers.

Finally, the "coaching prescriptions" of the Goal-Setting Inventory which corresponded to the selected items of the Champion Goal-Setting Checklist for Cross Country Skiers were rewritten in a more informal mode. In addition, the language was modified to reflect a philosophy of encouraging a growth in self-efficacy in the athlete. The resulting items, which represented six (6) of the nine (9) content areas, composed the Champion Goal-Setting: Recommendations for Developing Athletes.

RESULTS

Twentyfive (25) items were responded to in the same manner by 75% or more of the subjects

The Champion Goal-Setting Checklist for Cross Country Skiers and the Goal-Setting of Cross Country Ski Champions are presented below in full, and are followed by illustrative examples of the Champion Goal-Setting: Recommendations for Developing Skiers.

Champion Goal-Setting Checklist for Cross Country Skiers

This checklist contains questions that deal with goals, goal-setting, goal-evaluation, and goal-achievements. The answers that you give will enable you to compare yourself with the way Olympic and World Championship medalists in cross country skiing work in the area of goal-setting.

This evaluation is appropriate only for skiers who believe they have goals in their sport. If you believe that you have no goals then discuss with your coach the role of goals in cross country skiing.

Champion Goal-Setting Checklist for Cross Country Skiers

It is necessary that you answer each question as truthfully as possible. False or inaccurate answers will cause the results to suggest improper action. Take your time in answering each item so that you can answer what is true for you. Provide only one answer to each question. Leave blank those items which do not apply. Cross off your answers directly on the question sheets.

WHAT ARE GOALS? *Goals are what an individual or team tries to accomplish in their sport. They are the objects or aims of the activities of training and competing. Goals influence sport behaviors. They serve as standards against which performance is evaluated.*

1. GENERAL

		Yes	No
1.1	Are you ready to answer each question as truthfully as possible?	☐	☐
1.2	Do you understand how your performance is measured in cross country skiing?	☐	☐

2. GOAL-PERCEPTION

		Yes	No
2.1	Do you have specific goals to aim for in your cross country skiing?	☐	☐
2.2	Do the goals that you have in cross country skiing conflict with your personal values?	☐	☐
2.3	Are some goals that you have for your cross country skiing not specific enough for you to understand how you can achieve them?	☐	☐

3. GOAL-SETTING INTERACTIONS WITH THE COACH

		Yes	No
3.1	Does your coach encourage you to reach your goals?	☐	☐
3.2	Does your coach let you participate in the setting of your goals?	☐	☐
3.3	Does your coach let you have some say in deciding how you will go about achieving your goals?	☐	☐
3.4	Do you know that your coach will be pleased when you reach your goals?	☐	☐

4. THE EFFECTS OF GOALS ON THE ATHLETE

		Yes	No
4.1	Does having goals make cross country skiing more interesting?	☐	☐
4.2	Do you feel proud when you achieve your goals?	☐	☐

5. GOAL-SETTING ACTIONS

		Yes	No
5.1	Do you plan the way that you will go about achieving your goals?	☐	☐
5.2	When you set goals for yourself, do you make them relatively difficult to achieve?	☐	☐
5.3	Do you set your goals low so that you are guaranteed of attaining them?	☐	☐
5.4	Do you prefer to set your own goals?	☐	☐
5.5	Do you like to set the ultimate goals for your ski career yourself?	☐	☐

6. FACTORS WHICH AFFECT THE SETTING OF GOALS

		Yes	No
6.1	Do you feel that your training is good enough to allow you to reach your goals?	☐	☐
6.2	Are your abilities taken into account when your goals are established?	☐	☐

7. RELATIONSHIP OF GOALS TO PERFORMANCE

		Yes	No
7.1	Are you prepared to train for many years to achieve specific goals in cross country skiing?	☐	☐

8. OTHER FACTORS RELATED TO GOAL-SETTING

		Yes	No
8.1	Is it important for you to continually improve your performances in training?	☐	☐
8.2	Do you prefer competitions that are more difficult than easy?		
8.3	Do you like goals that, if achieved, indicate you have improved your performance standard?	☐	☐

9. TYPES OF GOALS

A. Career Goals are the ultimate things that an athlete wishes to attain through participation in the sport. They describe the final major outcomes that are sought through training and competing. Examples are: I) to participate until 2006 and make the Olympic Games team; 2) to become a well-sponsored full-time skier.

		Yes	No
9.1	*Have you established career goals?*	☐	☐

B. Relatively long-term goals are one or two major sets of goals that have been established to occur on the way to achieving career goals. Examples are: 1) participating in the senior national championships by the year 2002; and 2) to make the National Team by the year 2004.

		Yes	No
9.2	*Have you established relatively long-term goals?*	☐	☐

C. Performance goals are goals which are to be achieved at some time in the current competition year. Examples are: 1) to qualify to go to the junior national championships, and 2) to be selected for the regional team.

		Yes	No
9.3	*Have you established performance goals?*	☐	☐
9.4	*Do you believe that you can achieve your performance goals?*	☐	☐

THIS COMPLETES THE CHAMPION GOAL-SETTING CHECKLIST FOR CROSS COUNTRY SKIERS.

NOW YOU CAN COMPARE YOURSELF WITH THE CHAMPIONS!

Goal-Setting of Cross Country Ski Champions

This list of champion goal-setting characteristics is based on a study of 27 male and female medal winners in cross country skiing at Olympic Games and World Championships in the period 1987-1994. The research instrument used was the "Goal-Setting Inventory" (Rushall, B.S. & Fisdel, J.G., 1989). These athletes represent the following countries: Finland, Italy, Kazakhstan, Norway, Russia, Sweden, and Switzerland. The champion characteristics can be a point of departure in the goal-setting realm for developing cross country skiers.

1. GENERAL

1.1 Olympic and World medalists understand how performance is measured in cross country skiing.

2. GOAL-PERCEPTION

2.1 Champions have specific goals to aim for in their cross country skiing.
2.2 The goals that medalists have for their cross country skiing do not conflict with their personal values.
2.3 Cross country ski champions have goals in their sport that are specific enough so that they understand how they can achieve them.

3. GOAL-SETTING INTERACTIONS WITH THE COACH

3.1 Olympic and World medalists are encouraged by there coach to reach their goals.
3.2 The world's best skiers participate with their coach in the setting of goals.
3.3 Cross country ski medalists have some say with their coach in deciding how they will go about achieving their goals.
3.4 When skiing champions reach their goals, they know that their coach will be pleased.

4. THE EFFECTS OF GOALS ON THE ATHLETE

4.1 Having goals makes cross country skiing more interesting for Olympic and World medalists
4.2 Champion skiers feel proud when they achieve their goals.

5. GOAL-SETTING ACTIONS

5.1 *The best skiers in the world plan the way that they will go about achieving their goals.*
5.2 *When cross country ski medalists set goals for themselves, they make them relatively difficult to achieve.*
5.3 *Skiing champions do not set their goals low so that they are guaranteed of attaining them.*
5.4 *Cross country ski medalists prefer to set their own goals.*
5.5 *The world's best skiers like to set the ultimate goals for their skiing career themselves.*

6. FACTORS WHICH AFFECT THE SETTING OF GOALS

6.1 *Medalists in cross country skiing feel that their training is good enough to allow them to reach their goals.*
6.2 *When the goals of skiing champions are established, their abilities are taken into account..*

7. RELATIONSHIP OF GOALS TO PERFORMANCE

7.1 *Olympic and World medalists in skiing are prepared to train for many years to achieve specific goals in their sport.*

8. OTHER FACTORS RELATED TO GOAL-SETTING

8.1 *It is important for cross country ski champions to continually improve their performances in training.*
8.2 *Skiing medalists prefer competitions that are more difficult than easy.*
8.3 *The world's best skiers like goals that, if achieved, indicate they have improved their performance standard.*

9. TYPES OF GOALS

9.1 *Olympic and World medalists have established career goals.*
9.2 *Cross country ski champions have established relatively long-term goals.*
9.3 *Ski medalists have established performance goals.*
9.4 *The best skiers in the world believe that they can achieve their performance goals.*

Champion Goal-Setting: Recommendations for Developing Skiers.

Below follow some sample illustrations of recommendations for skiers based on checklist responses. It is important to realize that good performance in cross country skiing is dependent on thoroughness in many areas. Work with goal-setting is one such area. The goal-setting process is essential because it sets the standard for planning and for the carrying out of training and competition activities. Goal-setting is also important for the effective evaluation of your performances.

2. GOAL-PERCEPTION

1. *If you do not have specific goals to aim for in your cross country skiing, then you should learn how to aim for goals. Ask your coach for assistance.*
2. *If your goals conflict with your personal values, then procedures should be started to remove this conflict.*
3. *If your goals are not specific enough so that you understand how to achieve them, then you and your coach should begin procedures that ensure that your skiing goals are understood well enough to be translated into action.*

To become a high-level cross country skier requires long-term work. As a developing athlete it is important that you and your coach decide on priorities among the many goal-setting areas that may lead to more satisfying skiing experiences. Over time you will then be able to more comfortably and productively incorporate goal-setting in all its dimensions into your skiing career.

DISCUSSION AND CONCLUSIONS

A study of the ultimate exponents of sport provides a clear understanding of why there is a lack of reliable knowledge about psycho-social factors in international sport. Close personal contacts, consummate diplomacy at an Oslo-accord level, and the patience of Job may be sufficient to get the researcher out of the starting gate.

With so little comparative data available, it is not possible to assign meaning to the 26% of the Goal-Setting Inventories items that at least 75% of the medalists agreed on. The swimming data of Vikander and Stallman (1991), based mainly on lower elite level athletes, showed a 31 % figure.

Future expansions of the data base with new medalist skiers will provide opportunities for trend and cluster analyses, as well as studies of possible gender and national differences.

The pedagogical instruments in their present and future update forms can, in addition to their main applied function, be used for longitudinal studies of developing skiers where age and gender differences as related to performance can be investigated.

Of particular merit would be inquiries regarding the appropriateness of different goal-setting dimensions at different psychological development levels. The question whether there are desirable sequences of goal-setting items should also be posed.

Finally, it should be stated that the data of this study clearly indicates that great variability exist among world class skier in the goal-setting realm. For developing skiers ,then, emulation should be more inspiration than cloning. For the coaches variability should steer them away from the temptation of talent identification on basis of test results.

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RELIABILITY AND VALIDITY OF THE GREEK VERSION OF CSAI - 2*

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The effects of state anxiety on sport performance is an area of sport psychology that has been widely researched. One of the major problems with state anxiety research was the development of a validated method for the measurement of state anxiety. State anxiety is consisting of two dimensions, somatic anxiety and cognitive anxiety. Several authors established the theoretical basis for this distinction (Borkovec, 1976; Davidson & Schwartz, 1976; and Morris, Davis & Hutchings, 1981, cited in Martens, Vealey & Burton 1990). According to Martens et al. (1990, 6) *"somatic anxiety refers to the physiological and affective elements of the anxiety experience that develop directly from autonomic arousal"*, while *"cognitive anxiety is the mental component of anxiety caused by negative expectations about success or by negative self-evaluation"*.

Based on this distinction, a sport specific questionnaire for the measurement of competitive state anxiety, known as Competitive State Anxiety Inventory - 2 (CSAI - 2) was developed by Martens, Burton, Vealey, Bump & Smith (1983, cited in Martens et al., 1990). This questionnaire was developed in order to estimate self-confidence and two dimensions of competitive state anxiety, somatic anxiety and cognitive anxiety. It is consisted of 27 items, nine for each factor.

Martens et al. (1990) conducted four studies for the validation of CSAI - 2. The first study examined the relation between the three components of CSAI - 2 and gender, skill level, individual differences, items of competitive trait anxiety and sport type. The findings of this study supported the difference of the three subscales in the expected direction but they did not provide satisfactory evidence that somatic and cognitive anxiety are independent factors. The second study was conducted in order to investigate the existence of two different factors of competitive A-state, somatic and cognitive anxiety, and ascertain the need for the development of a multidimensional model. The results of this study supported the initial hypothesis that cognitive and somatic anxiety are independent factors and consequently supported the construct validity of CSAI - 2. The third study was conducted in order to investigate the relationship between the three components. This study did not support the construct validity of the CSAI - 2. However, according to Martens et al. (1990) this was due to methodological mistakes and not to weakness of the questionnaire. Burton

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(1988) conducted the fourth study examining the anxiety-performance hypothesis. This study offered complete support for the construct validity of CSAI - 2.

Some other studies that supported the validation of the CSAI - 2 were conducted by Gould, Petlichkoff & Weinberg (1984), Barnes, Sime, Dienstbier & Plake (1986) and Karteroliotis & Gill (1987). Gould et al. (1984) supported the construct validity of the CSAI - 2. On the other hand, Barnes et al. (1986) did not support the contention that CSAI - 2 measures the factor of self-confidence, while Karteroliotis & Gill (1987) provided partial support for the validity of CSAI - 2. Generally, CSAI - 2 is thought to be a valuable tool for the measurement of multidimensional state anxiety.

The development of CSAI - 2 gave the opportunity to sport psychologists to examine and understand better the effect of state anxiety's dimensions upon performance. Some other important areas in competitive state anxiety research are the relationships between state anxiety and trait anxiety, gender, sport type, task characteristics, experience and skill level.

Examining the relationship between state anxiety and gender Martens et al. (1990) found that females demonstrated higher cognitive and somatic anxiety but lower self-confidence than males. Krane & Williams (1994) partially supported these findings. In this study the authors found that there were no cognitive anxiety differences between the genders. Examining temporal changes' differences between the genders Jones et al. (1991) found that cognitive anxiety remained stable during the testing period for males, while it was increased on the day of the competition for females. On the other hand, both genders followed the same temporal pattern for somatic anxiety and self-confidence.

Moreover, Martens et al. (1990) examined high skilled athletes versus low skilled athletes and found out that the former demonstrated lower levels of cognitive and somatic anxiety but higher self-confidence than the latter. Furthermore, examining successful and less successful athletes Gould, Horn & Spreeman (1983) did not find differences as far as the dimensions of A-state were concerned. Additionally, Gould, Petlichkoff & Weinberg (1984) did not find differences between high and low experienced athletes. Gould et al. (1983) suggested that differences between successful and less successful and between high and low experienced athletes were found due to the unidimensional investigation of anxiety used from previous researchers.

Most of the above mentioned studies were conducted in Angloosaxon countries. Only a few studies were conducted in other countries. Especially in Greece these studies are very

rare. This is ascribed to the lack of a valuable and reliable tool in Greek language for the evaluation of state anxiety.

The overall purpose of this study was to examine the validity and reliability of the Greek version of CSAI - 2. Additionally, this study was designed to examine the relationship between performance, genders and precompetitive A-state.

Method

Sample: Seventy elite basketball players (41 males and 29 females) completed the questionnaire. The male athletes were competing in the first and second national basketball division, while females in the first national division. The mean age of the athletes was 22.4 years (S.D=3.47).

Methodology: The CSAI - 2 was used for the measurement of somatic, cognitive anxiety and self-confidence in this study. The CSAI -2 consists of 27 items, 9 for each subscale. Each item is rated in a 4-point Likert scale (the score ranges from 9 to 36 for each subscale). Moreover, the subjects gave information about their date of birth, the years of systematic involvement in basketball, their previous clubs, years of participating in each club and the division of each club. An expert evaluated the above information and classified the athletes as high or low experienced.

For the assessment of performance the researchers developed a new questionnaire consisting of five items, that was given to the coaches in order to estimate the performance of each athlete. Coaches evaluated their athletes in all five items: players' lack of concentration on the tactical systems of the team, nervousness of the players during the game, players' confidence about their movements. Finally, coaches asked to rate the players; performance at defence and players' performance at offence. Coaches described the behavior of his athletes in a 5-point Likert scale.

Procedure: The questionnaire was administered to the athletes 45 minutes to 1 hour before the competition by the assistant coach or the trainer. The questionnaires were administered to the athletes while they were preparing for the game. The competitions were chosen when the teams were guests in order to increase the difficulty of the competition. Coaches completed their questionnaire 1 hour to 1 day after the competition.

Results

The analysis of correlation between the subscales of CSAI - 2 revealed significant correlation between cognitive anxiety and somatic anxiety ($r=.42$, $p<.001$) and between cognitive anxiety and self-confidence ($r=-.49$, $p<.001$).

The t-test between the subscales of CSAI - 2 and the genders revealed significant difference between males (M=11.9, S.D=2.4) and females (M=14.1, S.D=3.9) for cognitive anxiety ($t_{(43.75)}=-2.39$, $p<.05$), but not for the somatic anxiety and the self-confidence.

The analysis of correlation between the subscales of CSAI - 2 and the performance revealed trends for correlation between cognitive anxiety and performance at defence ($r=.23$, $p<.01$) and between self-confidence and performance at offence ($r=-.27$, $p<.05$).

	Somatic anxiety	Cognitive anxiety	Self-confidence
Somatic anxiety	1.00	r=.42 p<.001	n.s.
Cognitive anxiety	n.s.	1.00	r=-.49 p<.001
Defence	n.s	r=.23 p<.01	n.s
Offence	n.s	n.s	r=-.27 p<.05

TABLE 1: Correlations between CSAI-2 subscales and performance.

The analysis of correlation between the subscales of CSAI - 2 and the evaluations of the coach did not reveal any significant correlation.

On the contrary, the analysis of correlation between the evaluations of the coach and the actual performance demonstrated significant correlations between cognitive anxiety, somatic anxiety, self-confidence and performance at defence ($r=.54$, $p<.001$, $r=-.37$, $p<.005$ and $r=.25$, $p<.01$ respectively). Moreover, significant correlations were found between cognitive anxiety, self-confidence and the offensive performance ($r=.46$, $p<.001$ and $r=-.74$, $p<.001$ respectively).

	Cognitive anxiety	Somatic anxiety	Self-confidence
Defence	r=.54 p<.001	r=-.37 p<.005	r=.25 p<.01
Offence	r=.46 p<.001	n.s	r=-.74 p<.001

TABLE 2: Correlations between the evaluations of the coach and the performance.

For the estimation of the construct validity of the Greek version of CSAI - 2 the factor analysis was used. The factor analysis demonstrated the following loadings for each item of the Greek version of CSAI - 2 (Table 3).

For the estimation of the reliability of the Greek version of CSAI - 2 we used the Cronbach's α coefficient. The Cronbach's α coefficient was high for all the subscales of the CSAI - 2. For the somatic anxiety the Cronbach α was .81, while for the cognitive anxiety was .79 and for the self-confidence was .84.

		Factors' loadings		
Factors	Communality	I	II	III
Q1	.407	.583		
Q10	.338	.508		
Q11	.568	.724		
Q17	.516	.700		
Q2	.570	.697		
Q20	.361	.532		
Q23	.261	.500		
Q26	.494	.696		
Q5	.477	.546	-.423	
Q8	.521	.721		
Q12	.494		.638	
Q15	.575		.756	
Q18	.555		.623	-.395
Q21	.416		.572	
Q24	.511		.570	-.356
Q27	.622		.628	-.464
Q3	.276		.509	
Q6	.580		.718	
Q9	.661		.763	
Q13	.326			.531
Q16	.595			.739
Q19	.563			.710
Q22	.555	.457		.576
Q25	.445			.581
Q4	.416		-.391	.487
Q7	.547	.343		.629
		26,9%	13,7%	8,1%

TABLE 3: Factor analysis with varimax rotation.

Discussion

The results of this study support the independency of CSAI-2 subscales. Moreover, this study supported the prediction of Martens et al. (1990) that cognitive anxiety would be a better predictor of performance. The positive correlation found between cognitive anxiety and defensive performance in this study is contradictory to the correlation found by Bird & Horn (1990). Bird & Horn found relationship between cognitive anxiety and mental errors. But both our study and the study made by Bird & Horn do not support the positive relation previously proposed (Burton 1988) between self-confidence and sport performance.

The lack of correlation found between CSAI-2 subscales and the estimation of the anxiety's dimensions by the coach is possibly ascribed to the fact that athletes recorded the precompetitive A-state, while the coaches described the competitive A-state. The fact that the correlations between CSAI-2 subscales and sport performance were low, while the correlations between the estimation of the coach and the sport performance were high, leads to the conclusion that in sports, such as basketball, precompetitive A-state may not be a valuable predictor of sport performance. On the contrary, competitive A-state is probably a better predictor of sport performance because of the long duration of the sport, the effect of the spectators, the progress of the game etc. Thus, a major part of future research should examine the relationship between competitive A-state and sport performance, especially in team sports.

According to the results of this study females demonstrated higher cognitive anxiety than males. These findings partially support the results of Martens et al. (1990) and Jones et al. (1990). Martens et al. (1990) reported that females demonstrate higher somatic and cognitive anxiety, but lower self-confidence than males. On the other hand, Jones et al. (1990) found out that females demonstrated higher cognitive anxiety and lower self-confidence than males.

The Cronbach's α coefficients were high and very close to those described by Martens et al. (1990) at the three studies designed for the validation of CSAI - 2. These coefficients are strong evidence for the reliability of the Greek version of CSAI-2.

The factor analysis confirmed the existence of three factors at the Greek version of CSAI-2, interpreting approximately 49% of the variance. The first factor is loaded by the items 1, 10, 11, 17, 2, 20, 23, 26, 5 and 8. This factor represents somatic anxiety. The items 12, 15, 18, 21, 24, 27, 3, 6 and 9 loaded the second factor which represents self-confidence. The third factor which represents cognitive anxiety is loaded by the items 13, 16, 19, 22, 25,

4 and 7. The item 14 which according to Martens et al. (1990) belongs to somatic anxiety showed extremely low loads and was excluded from the analysis. With the exception of items 1 and 10 which belong to cognitive anxiety according to Martens et al. (1990) but they were loaded the factor of somatic anxiety in the Greek version, the rest of the items loaded the same factors as the original version. The results of the factor analysis support the construct validity of the Greek version of CSAI-2 and independency of the three factors. Thus, the Greek version of CSAI-2 used in this study is a valuable and reliable tool for the measurement of the dimensions of state anxiety. But there are still some adjustments to be made in order to become identical to the original CSAI-2.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study support the construct validity of the Greek version of CSAI-2 and ensure that this questionnaire is a valuable and reliable method for the measurement of A-state in Greek athletes. These results also lead to the conclusion that females demonstrate higher cognitive anxiety than males, while there were no significant differences for somatic anxiety and self-confidence. Another important finding from this study is that the evaluations of competitive anxiety by the coaches is a better predictor of sport performance than the estimation of precompetitive anxiety by the athletes.

More empirical research is needed. First of all, some adjustments have to be made in this version in order to be identical to the original one. Additionally, it is very important to further examine the relationship between state anxiety and sport performance. The results from this study revealed that competitive anxiety in basketball is a better predictor of sport performance than precompetitive anxiety. The investigation of the relationship between competitive and precompetitive anxiety with sport performance will provide important information that can be used for the mental preparation of athletes. Moreover, it is essential an intraindividual examination of A-state. The first approach to this topic has been made by Hanin (1980) and the latter years many researchers (Krane 1992, Gould et al. 1994) expressed their interest for this approach. Finally, a major problem for research in the area of anxiety is the development of a reliable method for the evaluation of sport performance.

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TURNOVER AMONG VOLLEYBALL REFEREES: A TEST AND REFINEMENT OF THE SPORT COMMITMENT MODEL

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Key words: referees, turnover, commitment

INTRODUCTION

The primary purpose of the present longitudinal study was to determine the causes of the high and costly annual turnover rate (15%) among volleyball referees. The starting point was the Sport Commitment Model of Scanlan and her colleagues (Scanlan, Carpenter, Schmidt, Simons & Keeler, 1993a), which is based upon the exchange theory of Thibaut and Kelley (1959) and the investment model of Rusbult (1980). Commitment constructs have been used widely to explain personal involvement across diverse domains and endeavors, including work settings and close relationships. In the Sport Commitment Model of Scanlan et al. (1993a), commitment is defined as a psychological state representing the desire or resolve to continue participation. Actual behavior of staying or leaving is considered as a consequence of commitment. On the other hand, enjoyment, involvement alternatives, personal investments, social constraints, and involvement opportunities are viewed as the five antecedents of commitment.

Although the results of Scanlan and her colleagues (Scanlan, Simons, Carpenter, Schmidt & Keeler, 1993b) indicate reliable measures, the operationalization of commitment is not unequivocal. The items of the scale seem to reflect different concepts: the intent to quit and psychological attachment to the task (for similar ambiguous scales, see Farrell & Rusbult, 1981; Rusbult & Farrell, 1983). Furthermore, there are no studies on the sport commitment model that relate the predictor variables to actual behavior. However, the results of a longitudinal study on turnover of Rusbult and Farrell (1983) provided good support for the predictions of the investment model of Rusbult (1980) on which the sport commitment model is based. They showed that moderately professionalized technical workers who left the organization experienced greater decline in

job satisfaction and investment size, and a greater increase in alternative quality than did those who stayed.

In the present study, the sport commitment model (**Model 1**), added by actual turnover (see Figure 1), is contrasted with **Model 2**, in which the commitment variable is replaced by a variable that is unequivocally defined as the intent to quit (see Figure 2). Behavioral intention measures are generally viewed as superior to affective variables in predicting actual turnover (Steel & Ovalle, 1984; Tett & Meyer, 1993; but see Mathieu & Zajac, 1990). As argued by attitude theorists (e.g. Fishbein & Ajzen, 1980), the predictor variables must be congruent with the behavior being predicted. Thus, if we are predicting decisions by referees to quit officiating at the end of the current season, which is the case in this study, we must assess attitudes toward the act of quitting rather than attitudes toward officiating. In line with the model of Scanlan et al. (1993a), these latter variables can be seen as correlates of the behavioral intention measure.

Figure 1. The Sport Commitment Model of Scanlan and her colleagues (1993a), with actual turnover as the ultimate dependent variable (Model 1).

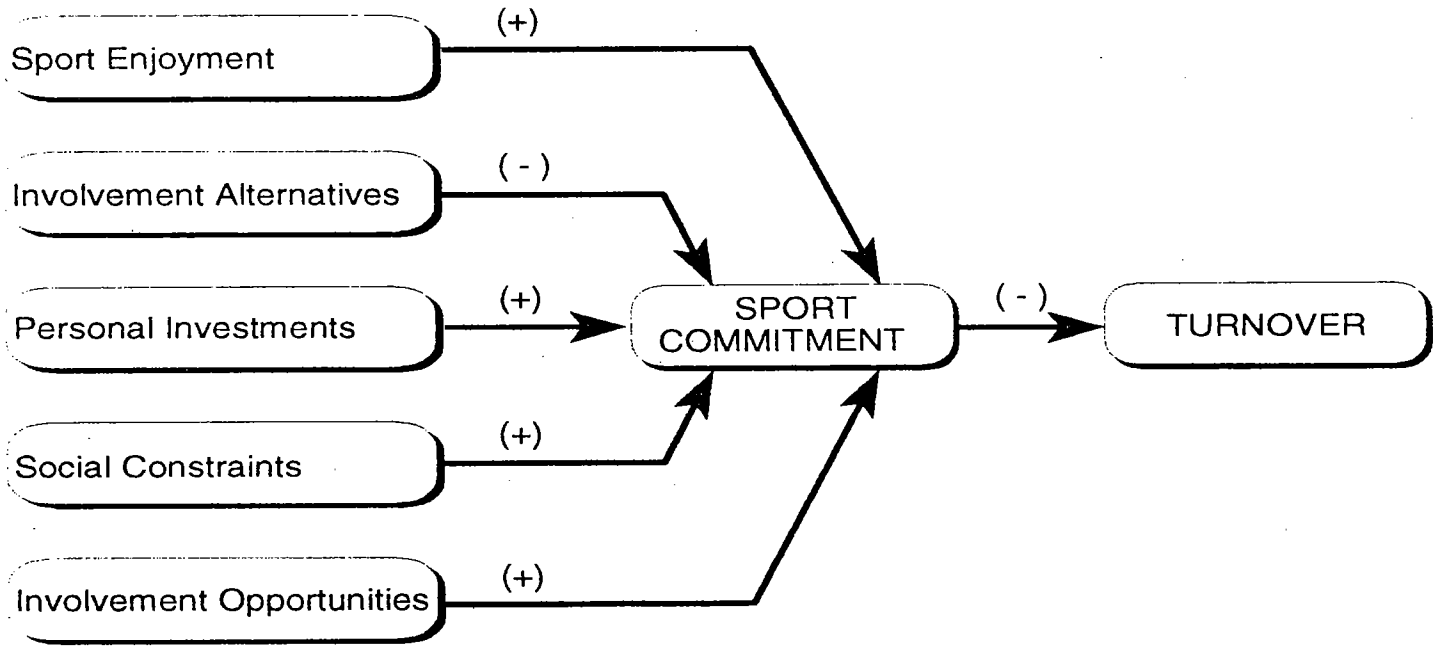
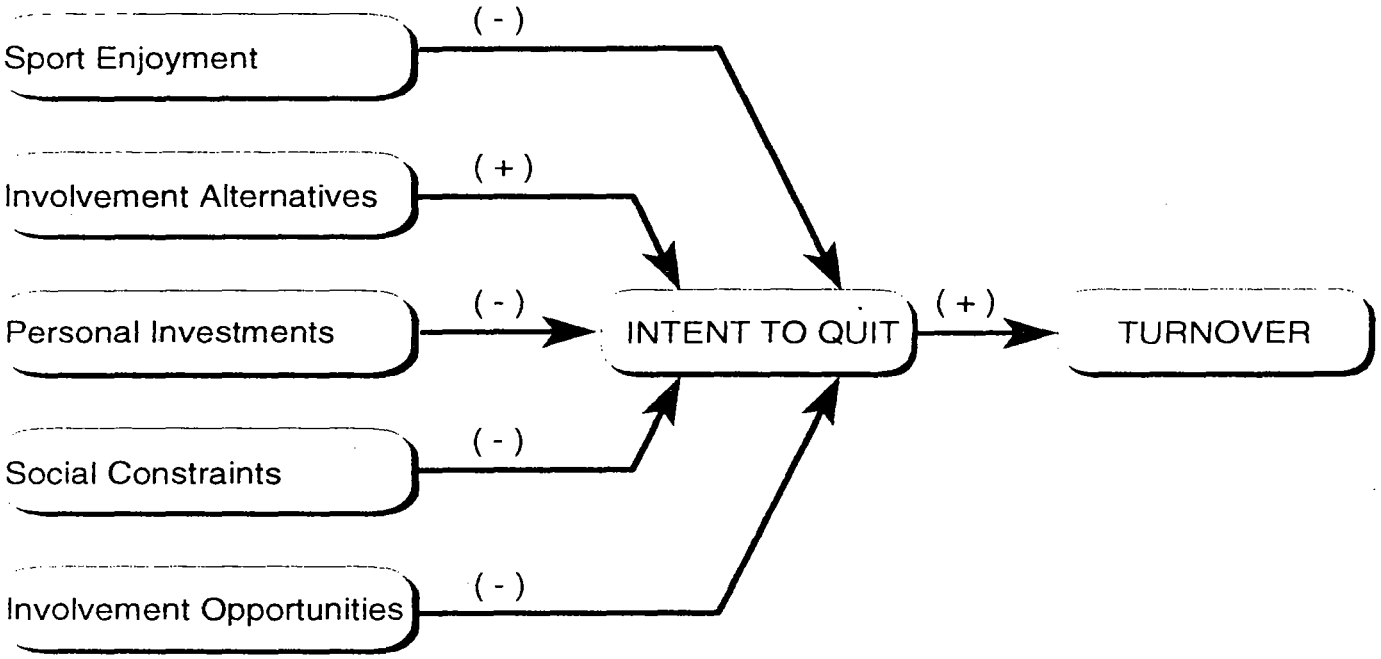


Figure 2. Slightly modified model of Scanlan and her colleagues (1993a), with commitment replaced by intent to quit, and with actual turnover as the ultimate dependent variable (Model 2).



METHOD AND PROCEDURE

About two months before the end of the season, questionnaires were mailed to all registered active, (inter)national level referees, and a representative sample of volleyball referees officiating at the local level. The response rate was 70% in both groups (n = 182 and n = 211, respectively). During the course of the next volleyball season (about six months later), actual turnover data were collected. Of 86% of the sample (n = 350), turnover data could be traced. The number of subjects in the following analyses varies due to occasional missing data.

All measures are identical to the operationalizations of Scanlan et al. (1993b). However, some items are slightly revised, i.e., applied to the present sample. Cronbach's alpha's were high: Commitment .91; Sport Enjoyment .94; Involvement alternatives .86; Personal investments .81; Social Constraints .72, and Involvement Opportunities .88. The additional measure **intent to quit officiating** was assessed by a three item seven-point scale: (1) Do you intent to quit officiating at the end of this season? (2) Are you planning

to officiate again next season? (3) If there is a possibility to quit officiating right now, would you quit? Response categories varied from (1) absolutely not to (7) 100% definite. Cronbach's alpha was .89.

RESULTS

Means, standard deviations, and intercorrelations among the variables are shown in Table 1. Several items of the commitment scale refer to the intent to quit, which explains the high correlation (r = -.74) between commitment and intent to quit. Furthermore, the links between the predictor variables enjoyment, involvement alternatives, personal investments, and involvement opportunities are rather strong (between .41 and .74).

Table 1
Means, Standard Deviations, and intercorrelations (n = 374)

Variable:	2	3	4	5	6	7	M	SD
1. Enjoyment	-.67**	.51**	-.23**	.74**	.82**	-.64**	3.66	.99
2. Involvement Alternatives	-	-.41**	.19**	-.65**	-.73**	.66**	2.70	.85
3. Personal Investments		-	-.12*	.49**	.51**	-.29**	2.90	.88
4. Social Constraints			-	-.15**	-.19**	.08	1.59	.70
5. Involvement Opportunities				-	.79**	-.55**	2.79	.97
6. Commitment					-	-.74**	3.25	.95
7. Intent to quit						-	2.35	1.58

* $p < .01$ ** $p < .001$

Table 2 and Table 3 show the results of cross-sectional stepwise regression analyses of commitment (Model 1) and the intent to quit officiating (Model 2), respectively, on enjoyment, involvement alternatives, personal investments, social constraints, and involvement opportunities. As can be seen in both tables, enjoyment and involvement alternatives are important correlates of both dependent variables. The inclusion of involvement opportunities results in a total of 77% explained variance of commitment, while the inclusion of personal investments and social constraints results in a total of 52% explained variance of the intent to quit.

Table 2
Final results of a regression (forward stepwise variable selection) of commitment on enjoyment, involvement, alternatives, personal investments, social constraints, and involvement opportunities (Model 1) (n = 374)

Predictor variable:	beta	R^2	R^2ch
1. Enjoyment	.42**	.67	.67
2. Involvement Opportunities	.32**	.74	.09
3. Involvement Alternatives	-.24**	.77	.03

** $p < .001$

Table 3
Final results of a regression (forward stepwise variable selection) of intent to leave on enjoyment, involvement alternatives, personal investments, social constraints, and involvement opportunities (Model 2) (n = 374)

Predictor variable:	beta	R^2	R^2ch
1. Involvement Alternatives	.43**	.43	.43
2. Enjoyment	-.42**	.50	.07
3. Social Constraints	-.09*	.51	.01
4. Personal Investments	-.09*	.52	.01

* $p < .05$ ** $p < .001$

Most importantly, however, is the prediction of actual turnover. Simple frequencies revealed that 15.1% local level referees and 10.4% (inter)national level referees resigned officiating. Logistic regression analysis is a multivariate statistical technique that can be used for predicting whether an event will or will not occur, as well as for identifying the variables useful in making the prediction. The results of the logistic regression analysis (forward stepwise variable selection) of actual turnover on commitment, enjoyment, involvement alternatives, personal investments, social constraints, and involvement opportunities (Model 1) are shown in Table 4. As can be expected, commitment is the most important predictor of actual turnover several months later, as indicated by the regression coefficient B (-1.73) and the partial correlation R (-.25) between turnover and commitment. In this model, however, involvement alternatives, personal investments, and involvement opportunities are three additional predictor variables of actual turnover.

Table 4
Final results of a logistic regression (forward stepwise variable selection) of actual turnover on commitment, enjoyment, involvement alternatives, personal investments, social constraints, and involvement opportunities (Model 1) (n = 318)

Predictor variable:	B	R
1. Commitment	-1.73	-.27**
2. Involvement Alternatives	.92	.15*
3. Personal Investments	.66	.15*
4. Involvement Opportunities	1.02	.16*

* $p < .01$ ** $p < .001$

Table 5
Final results of a logistic regression (forward stepwise variable selection) of actual turnover on intent to quit, enjoyment, involvement alternatives, personal investments, social constraints, and involvement opportunities (Model 2) (n = 315)

Predictor variable:	B	R
1. Intent to quit	1.11	.55**
2. Personal Investments	.69	.18*

* $p < .01$ ** $p < .001$

Model 2 appears to be a more parsimonious model (see Table 5), with the intent to quit as the most important predictor variable of turnover, and personal investments as the only additional predictor variable. Furthermore, there is a better fit between the observed outcomes and the predictions with regard to Model 2 than with regard to Model 1 (see Table 6 and Table 7). Of the referees who resigned, 27.3% are correctly classified in Model 1, while this percentage is 41.9% in Model 2. There were big differences neither with regard to the correctly classified percentages of the referees who did not resign, nor with regard to the overall percentage of correctly classified subjects.

Table 6
Classification table: comparisons of the predictions of the Sport Commitment Model of Scanlan and her colleagues (1993a) (Model 1) to the observed outcomes

		Predicted:		
		Stay	Leave	Percent correct:
Observed:	Stay	268	6	97.81%
	Leave	32	12	27.27%
				Overall: 88.05%

Table 7
Classification table: comparisons of the predictions of the slightly modified model of Scanlan and her colleagues (1993a) (Model 2) to the observed outcomes

		Predicted:		
		Stay	Leave	Percent correct:
Observed:	Stay	266	6	97.79%
	Leave	25	18	41.86%
				Overall: 90.16%

DISCUSSION

A general conclusion is that both models fit the data very well. Model 1, i.e., the model of Scanlan et al. (1993a), is strongly supported by the cross-sectional data. A total of 77% of the variance of commitment can be explained by the predictor variables. Furthermore, there is a rather good fit with actual turnover, with commitment as the most important predictor of turnover. In a similar vein, Model 2 was strongly supported by the cross-sectional data, although the percentage of explained variance of the intent to quit was lower than 76%, namely 52%. In contrast, the fit between the predictor variables of Model 2 and actual turnover was stronger, as indicated by the percentage of correctly classified subjects who resigned.

In contrast to turnover research in organizational settings, the perception of alternatives appears to be an important correlate of both commitment and intent to quit (cf. Carsten & Spector, 1987; Johns, 1991). Indeed, the volunteers of the present study are not highly constrained in terms of the economic constraints they face, resulting in

more variation in perceived alternatives, and a decline in commitment and a higher intent to quit in case of discontentment.

Despite this support for both models, it can be argued that Model 2 is a somewhat better model than Model 1. First, there is a serious concern about the construct validity of the commitment variable. The sport commitment scale comprises items that refer to the intent to quit as well as items that refer to psychological attachment to the task. From a theoretical point of view, unequivocal operationalization of concepts are preferred. Thus, "commitment" should be defined as either intent to quit (cf. Model 2) or as psychological attachment to a task. Secondly, the results suggest that more than commitment, the intent to quit mediates the impact of the predictor variables of the model of Scanlan et al. (1993a) on actual turnover. In Model 2, there is only one predictor variable (personal investments) that can explain additional variance of turnover. In contrast, in Model 1, three variables (involvement alternatives, personal investments, and involvement opportunities) can explain additional variance of turnover. Most importantly, however, these additional predictors do not lead to a better fit between observed outcomes and predictions than between observed outcomes and predictions of the more parsimonious Model 2. Thus, criteria of unequivocal conceptualization, parsimony, and predictive validity lead to a preference for Model 2, that is, the Model of Scanlan et al. (1993a), with the commitment variable replaced by intent to quit.

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THE DEVELOPMENT OF CHAMPION CHARACTERISTICS INSTRUMENTS FOR CROSS COUNTRY SKIERS

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Key words: Cross country skiing, Olympic and World medalists, champion characteristics, pedagogy.

INTRODUCTION

In 1976 Rushall, in a reaction to the deficiencies of trait-oriented personality analyses in sport, developed the Behavioral Inventories for Athletes. This stimulated the construction of a series of environment/behavior/sport-specific inventories.

The response pattern of top world class athletes to similar content items in the various inventories was analyzed by Rushall in 1987 and a 100-item Champion Characteristics Checklist was developed. It was proposed that this checklist could play a role as a tool to awaken athlete interest in sport psychology, as an auto-didactic change-monitoring instrument, and as a delineator of psychological-improvement goals.

The present study takes its rationale from the Champion Characteristics Checklist, but with a basis in the Rushall and Vikander (1987) Behavior Inventories for Cross Country Skiers, leading it into a sport-specific direction. The aim has been to produce an easily administered instrument permitting a clear comparison of developing skiers with the characteristics of the best skiers in the world, as well as providing recommendations for self-development based on that comparison.

METHOD AND PROCEDURE

All male and female cross country skiers who won medals (individually or relay) in Olympic Games or World Championships during the period 1987-94 were contacted through their national ski association. Twentyseven (27) athletes responded and were assessed using the Goal-Setting Inventory of Rushall and Fisdel (1989). Those who had retired were instructed to respond from their medal-winning career segment perspective. The skiers represented the following countries: Finland, Italy, Kazakhstan, Norway, Russia, Sweden, and Switzerland. Translations of the Goal-Setting Inventory were undertaken into Finnish, Norwegian, and Russian and were made available as preferred.

Champion Characteristics Instruments for Cross Country Skiers

As in the Champion Characteristics Checklist and the Swimming Champion Goal-Setting Checklist, questions answered in a like manner by 75% or more of the subjects were reformulated in statement form. These items represented nine (9) content areas, constituting the Goal-Setting of Cross Country Ski Champions.

The questions corresponding to the selected items were organized in the same manner and produced separately as a "yes/no" forced choice Goal-Setting Questionnaire for Cross Country Skiers.

Finally, the "coaching prescriptions" of the Goal-Setting Inventory which corresponded to the selected items of the Goal-Setting Questionnaire for Cross Country Skiers were rewritten in a more informal mode. In addition, the language was modified to reflect a philosophy of encouraging a growth in self-efficacy in the athlete. The resulting items, which represented six (6) of the nine (9) content areas, composed the Ski Champion Goal-Setting: Recommendations for Developing Athletes.

RESULTS

Twentyfive (25) items were responded to in the same manner by 75% or more of the subjects.

The Goal-Setting Questionnaire for Cross Country Skiers and the Goal-Setting of Cross Country Ski Champions are presented below in full, and are followed by illustrative examples of the Ski Champion Goal-Setting: Recommendations for Developing Athletes. Items in all three instruments were phrased in ski-specific therminology where appropriate.

A. Cross Country Skiers Characteristics Questionnaire

This instrument contains questions that deal with different important aspects of cross country skiing. It is based on the Rushall and Vikander Behavior Inventories for Cross Country Skiers (1987). The answers that you give will assist you and your coach in enhancing your experience and development in skiing.

It is necessary that you answer each question as truthfully as possible. False or inaccurate answers will cause the results to suggest improper action. Take your time in answering each item so that you can answer what is true for you. Provide only one answer to each question. Leave blank those items which do not apply. Cross off your answers directly on the question sheets.

1. Your relationship with other athletes.	***Yes***	***No***
1.1 Do you readily get together with your teammates at parties which are associated with skiing?	☐	☐
1.2 Can you accept criticism from other skiers?	☐	☐
1.3 Do you try to get to know everyone on your ski team?	☐	☐
1.4 Do you yell encouragement to your teammates along the course if you are not selected to ski in a relay?	☐	☐
1.5 When you observe your teammates skiing well, do you tell them so?	☐	☐

2. Your relationship with the coach.	***Yes***	***No***
2.1 When a coach tells you to do something, do you like to know the reason behind it?	☐	☐
2.2 Do you prefer your coach to tell you privately when you have done something wrong?	☐	☐
2.3 Do you tell the truth when your coach asks you about your training and races?	☐	☐
2.4 Do you notify your coach in plenty of time, if you not going to be able to attend a training session?	☐	☐
2.5 Does it make you perform worse, if your coach is upset or acts unusually before a race?	☐	☐

2.6	*Would you like your coach to tell you why you do a particular drill in training?*	☐ ☐
2.7	*Would you like the coach to tell you that he/she likes the way you are training or racing?*	☐ ☐

3. Your relationship to significant others.	**Yes**	**No**
3.1 *Do you feel that people close to you pressure you to justify your involvement in skiing?*	☐	☐
3.2 *Does it distract you when your parents yell at you along the race course?*	☐	☐
3.3 *Would you like your parents to be interested in your efforts in skiing?*	☐	☐

4. Training factors.	**Yes**	**No**
4.1 *Do you consider yourself to be very enthusiastic about training?*	☐	☐
4.2 *No matter how much time is required for training, are you prepared to do it?*	☐	☐
4.3 *Do you try to do everything as well as you can in training?*	☐	☐
4.4 *Do you train as well as possible during the dry-land period in preparation for the upcoming racing season?*	☐	☐
4.5 *Do you train as well as possible during the competitive season in order to improve your performances?*	☐	☐
4.6 *Do you use proper equipment and clothing when training?*	☐	☐
4.7 *Do you try to avoid making mistakes in your training?*	☐	☐
4.8 *Do you find it easy to change the training plans for the day in order to do a workout which seems to be more productive?*	☐	☐
4.9 *Do you try your best in training?*	☐	☐
4.10 *Do you want your skiing skills to continually improve as you train?*	☐	☐
4.11 *Do you like to have a goal set for most things that you do in your training?*	☐	☐

5. Pre-competition factors	**Yes**	**No**
5.1 *Would you like to be able to "psych-out" other skiers before a race?*	☐	☐
5.2 *Are you at the starting line on time for your races?*	☐	☐
5.3 *Are you at the race-site in time to do your full warm-up?*	☐	☐
5.4 *Are you distracted if the coaches or other skiers watch you during your pre-race preparations?*	☐	☐
5.5 *Do you prefer to warm-up for an important race by yourself?*	☐	☐
5.6 *Do you stay in control of your pre-race preparations?*	☐	☐
5.7 *Do you feel confident that you can select the correct skis for a race?*	☐	☐
5.8 *Do you have full confidence in your equipment and how it has been prepared when you stand at the start line?*	☐	☐

6. Competition factors.	**Yes**	**No**
6.1 *Do you like important races because they give you a chance to show what you can do?*	☐	☐
6.2 *Do you use illegal tactics to gain an advantage in mass start races?*	☐	☐
6.3 *Do you prefer to compete in the highest level races available?*	☐	☐
6.4 *Do you use the information and experience gained in a race to improve your next performance?*	☐	☐
6.5 *Does it distract you and negatively affect your skiing if the people along the course, other than coaches, shout at you?*	☐	☐
6.6 *Do you still try to finish a race that you start no matter what problems may arise or how you feel?*	☐	☐
6.7 *Do you want to be able to perform well in every race?*	☐	☐
6.8 *Would you like to be the top skier in your class of competition?*	☐	☐

7. Your reaction to things that go wrong.	**Yes**	**No**
7.1 *Do you feel guilty if your relay team loses positions as a result of something that you have done poorly?*	☐	☐
7.2 *If you ski poorly in a race, do you try your best in training to correct your mistakes?*	☐	☐
7.3 *Do you drop out of races if you are not performing well?*	☐	☐

8. Considerations about the sport.	**Yes**	**No**
8.1 *Does slow-motion video or movies give you more understanding about your skiing?*	☐	☐
8.2 *Do you try to improve your skiing?*	☐	☐

8.3	*Do you watch other skiers in races and training to see if you can learn things that would help you improve?*	☐	☐
8.4	*Do you want to be selected for the National Team?*	☐	☐
8.5	*Does skiing seem to be very worthwhile when you are selected to a representative team?*	☐	☐
8.6	*Do you like to know your progress and improvement in all features of skiing (e.g., technique, strength, mental skills, etc.)?*	☐	☐
8.7	*Do you like to set the ultimate goals for your skiing career yourself?*	☐	☐
8.8	*Do you want to be able to qualify for teams going to the major competitions?*	☐	☐
8.9	*Would you like to be considered the best skier on your team?*	☐	☐

9. Things you may like about cross country skiing.

		Yes	No
9.1	*Is one of the enjoyable things about skiing that you are able to compete and train with your friends?*	☐	☐
9.2	*Does just being able to ski make training enjoyable for you?*	☐	☐
9.3	*Do you like skiing because every race is a challenge?*	☐	☐
9.4	*Do you enjoy watching ski races?*	☐	☐

B. Characteristics of Cross Country Ski Champions

This list of champion characteristics is based on a study of 28 male and female medal winners in cross country skiing at Olympic Games and World Championships in the period 1987-1994. The research instrument used was the "Behavioral Inventories for Cross Country Skiers" (Rushall, B.S. & Vikander, N. O., 1987). These athletes represent the following countries: Finland, Italy, Kazakhstan, Norway, Russia, Sweden, and Switzerland. The champion characteristics can be a point of departure in your development as a cross country skier in the areas indicated.

1. Relationship with other athletes.

1.1 *The best skiers in the world will readily get together with teammates at social occasions related to skiing.*
1.2 *The best skiers in the world can accept criticism from other skiers.*
1.3 *Olympic and World medalists try to get to know everyone on the team.*
1.4 *Even if medalists are not selected for the relay, they yell encouragement to their teammates along the course.*
1.5 *Medalists praise teammates when they observe them skiing well.*

2. Relationship with the coach.

2.1 *The best skiers in the world prefer that the coach give reasons for all directives.*
2.2 *Medalists prefer to have the coach tell them privately when they have done something wrong.*
2.3 *Medalists tell the truth with regard to matters of training and racing.*
2.4 *If medalists cannot attend training the coach is notified beforehand.*
2.5 *The best skiers do not perform worse if the coach is upset or acts unusually before a race.*
2.6 *The best cross country skiers like the coach to tell them why particular drills are done in training.*
2.7 *The best skiers in the world like the coach telling them he/she likes the way they are training or racing.*

3. Relationship to significant others.

3.1 *The best skiers in the world do not feel that people close to them pressure them to justify their involvement in skiing.*
3.2 *Medalists do not get distracted if their parents yell at them along the race-course.*
3.3 *Medalists like their parents to be interested in their efforts in skiing.*

4. Training factors.

4.1 *Medalists consider themselves to be enthusiastic about training.*
4.2 *No matter how much time is required for training, medalists are prepared to do it.*
4.3 *The best skiers in the world try to do everything as well as possible in training.*
4.4 *Champions train as well as possible during the dry-land period in preparation for the upcoming racing season.*
4.5 *During the competitive season the best skiers in the world train as well as possible in order to improve their performance.*
4.6 *Champions use proper equipment and clothing when training.*

4.7 Medalists try to avoid making mistakes in training.
4.8 Skiing medalists find it easy to change the training plans for the day in order to do a workout which seems to be more productive.
4.9 Skiing medalists try their best in training.
4.10 Olympic and World medalists want their skiing skills to continually improve as they train.
4.11 Ski champions like to have a goal set for most things that they do in their training.

5. Pre-competition factors.

5.1 Ski champions would not like to be able to "psych-out" other skiers before a race.
5.2 Medalists are at the starting line on time for their races.
5.3 Champions are at the race-site in time to do their full warm-up.
5.4 Olympic and World medalists are not distracted if the coaches or other skiers watch them during their pre-race preparations.
5.5 Ski champions prefer to warm-up for an important race by themselves.
5.6 The champion skiers stay in control of their pre-race preparations.
5.7 Olympic and World Championship medalists feel confident that they can select the correct skis for a race.
5.8 When the world's best skiers stand at the start line. they have full confidence in their equipment and how it has been prepared.

6. Competition factors.

6.1 Olympic and World medalists like important races because they give them a chance to show what they can do.
6.2 Ski champions do not use illegal tactics to gain an advantage in mass-start races.
6.3 Medalists prefer to compete in the highest level races available.
6.4 Champions use the information and experiences gained in a race to improve their next performance.
6.5 If people, other than coaches, shout at Olympic and World medalists along the course, it does not distract them or negatively affect their skiing.
6.6 No matter what problems may arise or how they feel, Olympic and World medalist skiers still try to finish a race that they start.
6.7 Medalists want to be able to perform well in every race.
6.8 Champions would like to be the top skier in their class of competition.

7. Reaction to things that go wrong.

7.1 Olympic and World medalists feel guilty if their relay team loses positions as a result of something that they have done poorly.
7.2 If champions ski poorly in a race, they try to do their best in training to correct their mistakes.
7.3 The best skiers in the world do not drop out of races if they are not performing well.

8. Considerations about the sport.

8.1 The best skiers in the world gain greater understanding of their skiing through slow motion video or movies.
8.2 Olympic and World medalists always try to improve their skiing.
8.3 Champions watch other skiers in races and in training to see if they can learn things that would help them improve.
8.4 Ski champions want to be selected for the National Team.
8.5 When medalists are selected to a representative team, then skiing seems to be very worthwhile.
8.6 The champions like to know their progress and improvement in all features of skiing (e.g., technique, strength, mental skills, etc.).
8.7 Olympic and World medalists like to set the ultimate goals for their skiing career themselves.
8.8 Ski champions want to be able to qualify for teams going to the major competitions.
8.9 Medalists would like to be considered the best skier on their team.

9. Things champions like about cross country skiing.

9.1 One of the enjoyable things about skiing for the Olympic and World Championship medalists is that they are able to compete and train with their friends.
9.2 Just being able to ski makes training enjoyable for the world's best skiers.
9.3 Champions like skiing because every race is a challenge.
9.4 Olympic and World medalists enjoy watching ski races.

C. Ski Champion Characteristics: Recommendations for Developing Athletes

Below follows the introductory statement, some sample illustrations of recommendations for skiers based on checklist responses, and summary advice:

It is important to realize that good performance in cross country skiing is dependent on thoroughness in many areas. The emulation of champions in their attention to detail can be the basis for enhanced training and competition practices.

Your relationship with other athletes.

1. *If you do not readily get together with teammates at social occasions related to skiing, then it would be best to let your coach and fellow athletes know that you prefer to remain quietly in the background on such occasions. In this way you will not be unwillingly drawn into situations of social responsibility. It is recommended, however, that you gradually accustom yourself to participation in group activities.*

3. *If you try to get to know everyone on your team, then a good approach is to pair up with a variety of teammates in activities within and outside of skiing. Let your coach know your desires in this area.*

4. *If you do not yell encouragement to your teammates along the course when you have missed selection to the relay, then this may be an indication that you are not happy with your situation. Discuss with your coach what your should do to increase future relay selection possibilities. Reflect also on the fact that expressing support benefits everyone on a team.*

To become a high-level cross country skier requires long-term work. As a developing athlete it is important that you and your coach decide on priorities among the many areas indicated above that may lead to more satisfying skiing experiences. Over time you will then be able to more comfortably and productively incorporate these changed practices into your skiing career.

DISCUSSION AND CONCLUSIONS

The 58 items of the Behavioral Inventories for Cross Country Skiers that the medalists (using the 75% criterion) agreed on constitute 21% of the total number of items. The 100 items of the Champion Characteristics Checklist, based on 45 athletes in 13 sports, shows a much greater response homogeneity, though an exact percentage calculation is not possible because of variation in the number of items in the different instruments used as a base. Why greater homogeneity was not evidenced in a single sport, a reasonable expectation, should be a topic for future inquiry.

Future expansions of the data base with new medalist skiers will offer opportunities for cluster and trend analyses, as well as the investigation of possible national and gender patterns.

The pedagogical instruments in their present form can, in addition to their main applied function, be used for longitudinal studies of developing skiers where age and gender differences as related to performance can be investigated. Revised editions of the instruments can also be produced as the data base grows.

Of special interest would be studies concerning the appropriateness of the different attributes as described in the Characteristics of Cross Country Ski Champions at different psychological development levels.

It should be emphasized that the data of this study indicate that great variability exists among world class skiers in the realms covered by the Behavioral Inventories for Cross Country Skiers. For the developing skier, then.

emulation of the champions should be expressed more in the form of inspiration than as cloning. For the coaches, this variability among the elite should reinforce the value of individualization, and dampen the temptation to base talent identification on test results.

Finally, studying the peak performers in a sport clarifies why there is a dearth of robust data on psycho-social factors at the elite international level. Intimate personal networks, Metternichian diplomatic skills, and the strategic cunning of a Machiavelli may get the researcher to first base. From there on it will be advisable to have an interest in chaos theory (Singer, 1993).

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COMPARING CONVENTIONAL TO COMPUTER-AIDED ANALYSIS OF CONTENTS

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Keywords: Motor Learning, Movement Knowledge, Analysis of Contents

INTRODUCTION

Analysis of Contents as a Means for Knowledge Assessment

Knowledge plays an important role in solving tasks. There do exist sophisticated methods of knowledge assessment in psychology of knowledge (e.g. Mandl & Spada, 1988). Recently the concept of knowledge states has been developed in order to assess the structure of knowledge, based on the performance on questions or tasks (e.g. Albert, 1994). These methods have successfully been adapted to sports science (Narciss, 1993).

However a main disadvantage of these methods is that their highly formalistic structure may prevent research from realizing how knowledge actually develops. Especially of interest is not only the knowledge relevant to the task but also irrelevant or even false components of knowledge. For this reason it seems appropriate to communicate with the learner, record the communication and later analyze the recorded data by means of analysis of contents. Analysis of contents is a method for analyzing symbolic material according to specific rules or theories (cf. Mayring, 1993).

Analysis of Contents in Motor Learning

Knowledge plays also an important role in performing and learning movements in sports (e.g. Daugs & Blischke, 1984; Wiemeyer, 1994). Analysis of contents may be useful in analyzing the dynamics of knowledge during motor learning. Only few attempts have been made to assess verbal data in motor learning or motor control (e.g. Kuhn, 1984; Fikus, 1989). A particular shortcoming of these reports is their singularity. They are not integrated into a more general theoretic framework.

A Theoretical Framework for Analysis of Contents in Motor Learning

Recently we have developed a heuristic model which can serve as a theoretic basis of

analysis of contents in motor learning (Wiemeyer, 1994; see Fig. 1). This model assumes four representational (knowledge) structures with different functions for the learner:

- Theoretic knowledge has explanatory functions. By means of this knowledge (e.g. biomechanics) the basics of movements can be explained, e.g. the relationship between angular velocity and moment of inertia in the somersault.
- Prescriptive movement knowledge has preparatory functions. By means of this knowledge the learner intends what to do and in which way to do it, e.g. to perform a fast rotation by means of a narrower squat in somersault.
- Executive movement knowledge has control functions for the movement execution. This knowledge is procedural in nature and controls the actual movement.
- Interpretative movement knowledge has evaluative functions. By means of this knowledge the learner evaluates her performance, e.g. "My squat position was too narrow".

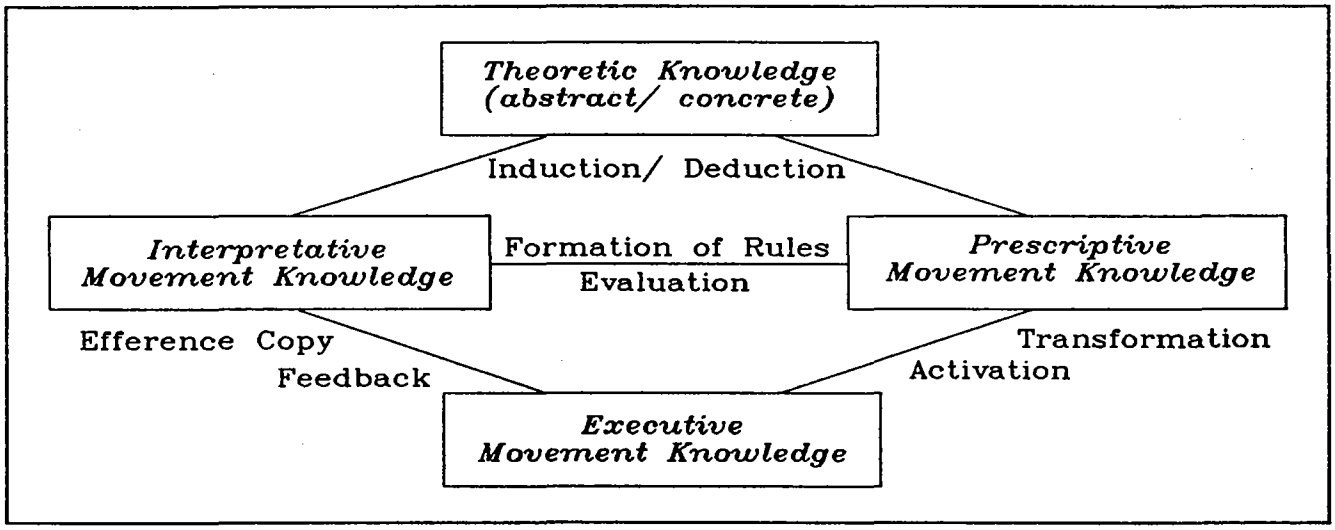

Fig.1. Heuristic Model of Movement Knowledge Structures

There are several interactions between the four knowledge structures (see Fig. 1).

The Computer as a Tool for Analysis of Contents

Computers are usual tools in many scientific areas. A new application field of computers is the analysis of textual contents (e.g. Schlattmann, 1994). This application seems particularly appropriate because conventional analysis of contents is usually very time-consuming and

inflexible. If the rules for coding are changed the whole analysis must be repeated.
The question arises, whether or to which extent computer-aided analysis of contents is superior to conventional analysis. This question will be dealt with in the following text.

METHOD AND PROCEDURE

30 subjects attended a motor learning experiment. The learning task was to perform the backward turn into the handstand. The subjects were distributed into three different experimental groups, each group consisting of ten subjects. The Instruction group received concrete information which activities to perform. The Theory group received abstract biomechanical informations relevant to the movement task. The Task group only received the request to perform the movement task. All experiments were performed in the laboratory of biomechanics in Münster.

On the first day each subject performed 20 acquisition trials and after a retention interval of 24 hours she performed three retention and transfer trials, respectively. During the acquisition phase after each trial subjects were asked to give verbal reports about their experiences and intentions. These reports were tape-recorded and were transcribed later.

The Transcript was analyzed twice. First, a conventional analysis of contents (ConAC) according to Mayring (1993) was performed using a special coding scheme. Second, a computer-aided analysis of contents (ComAC) applying the software "TEXTPACK PC" (cf. Mohler & Züll, 1990; Züll, Mohler & Geis, 1991) was performed using a slightly modified coding scheme. These methods allow completely different ways of analyzing verbal data, i.e. forming categories on the basis of semantic entities (e.g. "I stretched the hip joint too late") versus single words (e.g. verbs, nouns). Strictly speaking concerning a particular text unit the performed ConAC asked which categories are dealt with whereas ComAC asked how often special categories are dealt with. The results of these methods were compared. According to our heuristic model separate analysis was applied to prescriptive and interpretative knowledge.

RESULTS

Table 1 contains the results of ConAC and ComAC concerning interpretative knowledge.

TABLE 1. Results of Analysis of Contents concerning Interpretative Knowledge

Category	Experimental Group					
	Task		Instruction		Theory	
	ConAC	ComAC	ConAC	ComAC	ConAC	ComAC
Upper extremity	79	125	65	96	80	153
Shoulder	3	5	1	2	0	2
Lower extremity	12	25	7	33	17	45
Hip/ Body Extension	9	22	57	83	57	71
Head	6	18	2	13	4	33
Starting Position	1	5	0	1	0	3
Roll	19	26	9	14	23	54
Handstand	70	91	35	66	39	116
Performance	63	133	96	157	73	146
General Experience	101	154	69	113	58	140
Interpretation of Performance	13	41	15	38	9	42
Conditions of Exercise	31	47	51	61	33	61
Reference to instructions	0	0	9	10	17	14
Consciousness	12	22	19	29	27	54
Perception	23	65	55	79	53	88
Control	11	17	2	11	9	26
Experience of Time	4	1	8	8	8	8

The first part of Table 1 contains concrete statements of interpretative knowledge, e.g. "I could not extend my right arm" (Upper extremity). In the middle of Table 1 there are more general statements, e.g. "The movement was very fluent" (General Experience) or "The movement became better" (Performance). In the lower part of Table 1 there are "meta-

statements". i.e. cognitions about cognitions, e.g. "I have no informations from any part of the body" (Perception) or "I could not perform what I wanted to perform" (Control).
Obviously ComAC provides higher frequency values than ConAC. This difference is significant (Wilcoxon-Test: N=48; z=-5.68; 2p<.001). Despite this difference the correlations between ConAC and ComAC are highly positive (see Table 2). The overall correlation between ConAC and ComAC is .95 (N = 48; 2p<.001).

TABLE 2. Correlations between ConAC and ComAC concerning Interpretative Knowledge

Category	N	r
Concrete Interpretative Knowledge	24	.94 ***
General Interpretative Knowledge	12	.96 ***
Interpretative "Meta-Knowledge"	12	.94 ***

*** - 2p < .001

The analysis of the prescriptive data shows the same tendency (see Table 3): The frequencies of ComAC codings are significantly higher than the ConAC codings (Wilcoxon-Test: N = 48; z=-3.64; 2p<.001). The overall correlation between ConAC and ComAC is .77 (N = 48; 2p<.001). Table 4 contains the correlations in the three subcategories. Whereas the correlations between ConAC und ComAC are highly positive in the subcategory of the interpretative knowledge this is only the case with concrete prescriptive knowledge. Considerably lower correlations are found in the other two subcategories.

The TEXTPACK procedure KWIC was performed for selected categories (interpretative knowledge: performance, general experience; prescriptive knowledge: general intention, general coordination, performance) in order to examine whether the codings were correct. For this analysis the particular codings were printed within the context of the whole text unit. With very few exceptions the codings specified by a TEXTPACK dictionary were correct.

TABLE 3. Results of Analysis of Contents concerning Prescriptive Knowledge

Category	Experimental Group					
	Task		Instruction		Theory	
	ConAC	ComAc	ConAc	ComAC	ConAC	ComAC
Upper Extremity	61	70	41	46	57	78
Shoulder	2	5	0	0	0	0
Lower Extremity	11	13	5	13	16	30
Hip/ Body Extension	13	16	60	57	82	68
Head	3	7	3	5	6	3
Starting Position	2	2	1	0	1	1
Roll	29	25	10	12	15	27
Handstand	37	50	5	19	24	69
General Intention	33	60	51	80	33	38
General Coordination	12	74	7	48	18	70
Performance	5	20	25	29	9	15
Effort/ Perception	5	6	11	16	6	22
Consciousness	0	10	3	10	11	20
State of Knowledge	12	8	31	13	33	12
Control	0	1	5	2	1	12
Methods	0	0	1	0	1	3

TABLE 4. Correlations between ConAC and ComAC concerning Prescriptive Knowledge

Category	N	r
Concrete Prescriptive Knowledge	24	.90 ***
General Prescriptive Knowledge	12	.61 *
Prescriptive "Meta-Knowledge"	12	.51

* : $2p < .05$; *** : $2p < .001$

DISCUSSION

The differences found between ConAC and ComAC, i.e. significantly more codings for most of the categories in ComAC, may be explained by the different rationales of these techniques. As we already mentioned ConAC determined whether or not the particalur text unit contains propositions concerning special categories whereas ComAC counted the frequency of these categories within the text unit. Hence it is not surprising that the number of ComAC codings exceeds the number of ConAC codings because the maximum count of ConAC is only one per text unit. Especially the differences in the categories of concrete knowledge are due to this fact.

A second possible explanation of the differences is that in ConAC special categories have simply been overlooked. From our experience this seems to be a great danger when searching for semantic units. Hence ComAC seems to be much more accurate because a word for word analysis starts from a lower complexity. On the other hand ComAC does not detect meta-cognitions about the state of prescriptive knowledge as reliable as ConAC does.

Another advantage of ComAC is that one can analyze "critical" words in a blocked manner. All the units concerning a particular word can be printed (by means of the KWIC procedure) and analyzed at once. In ConAC there may be much text between the first and next occurence of a critical word.

Another advantage of ComAC is that the analysis is "blind" to the special subject. Especially in experiments or studies with different groups codings may be biased by the fact that the whole context of the verbal data from a particular subject may reveal to the analyzing person to which experimental group she belongs. On the other hand this may be considered a severe disadvantage because a particular word may only be appropriately coded if analyzed in the whole context.

Especially the TEXTPACK software allows the fast and comfort validation of coding (cf. Züll, Mohler & Geis, 1991, 54f.). Moreover it is possible to generate a file for statistic analysis (SPSS, SAS and SIR, cf. Mohler & Züll, 1990; Züll, Mohler & Geis, 1991).

As already mentioned ComAC is much more flexible and less time-consuming than ConAC. Saving of time result especially from the fact that keywords or key-expressions are delivered

by the computer. The user has to assign only the particular codes to the keywords or expressions. Saving of time may be also due to the fact that because of the above mentioned blocking difficult decisions can be made easier.

Summing up it may be said that in our special case the ComAC turned out to be a more powerful, more accurate, more flexible and more economic tool than ConAC. Hence it may be useful to apply this method in other research fields.

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P. 1.2. EMOTIONAL ASPECTS

EVOLUTION OF MOOD STATE PATTERN IN THE ITALIAN NATIONAL RUGBY TEAM DURING A TOURNÈE

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KEY WORDS: Mood, Team, Position players.

INTRODUCTION

Previous research has demonstrated the role of emotion in influencing the athletes' answers to competitive pressure (e.g., Rotella & Learner, 1993; Silva & Hardy, 1984). Different affects have been investigated and, since the first Morgan and colleagues' works (e.g., Morgan, 1985; Morgan & Johnson, 1977, Morgan & Pollock, 1978), the mood states are among the emotional conditions more studied . McNair, Lorr, and Droppelman (1971) have been the initial proponents of the study on the mood. They developed a specific measure, "The Profile of Mood States (POMS)", to detect the mood fluctuating states to evaluate changes resulting from therapeutic settings. Morgan applied this model in sport psychology research and counseling and his main contribute has been to find that positive mood states are related to higher level performances. He called *Iceberg Profile* this positive condition, characterised by scores below the 50th percentile on Tension, Depression, Anger, Fatigue and Confusion POMS subscales and above the 50th percentile on Vigor sub scale.

This Morgan's model has been verified in a large number of studies usually carried out on North-american athletes and Vanden Auweele, De Cuyper, Van Mele, and Rzewnicki (1993) argue that the review of these investigations supports, in conclusion, the hypothesis that elite athletes show the iceberg profile, normally during training periods and less frequently before competition. The same profile has been found comparing the mood states profile of Italian athletes of world level vs Italian athletes of national level, administering POMS during training period (Manili, Cei, Taddei, & Buonamano, 1995).

The mood states are dynamic, in fact they can change very readily as a function of personal and/or situational variables. For this reasons some research has been carried out to investigate the relation between personality variables and precompetitive mood states (e.g., Prapavessis & Grove, 1994). Other research has investigated situational variables as the temporal changes of the mood in different periods before the competition (e.g., Gutman, Knapp, Foster, Pollock, & Rogowski, 1984; Gutman, Pollock, Foster, & Schmidt, 1984) or has measured the mood of one specific moments (e.g., Cei, Manili, Taddei, & Buonamano, 1995; Silva, Shultz, Haslam, & Murray, 1985). No investigation has been carried out to verify, another important situational variable, that is to say the temporal evolution during a camp-period of a team. This study could be useful, from an applied perspective, for coaches and psychologists, to understand which are the fluctuations of the players' mood states in this specific period, with the aim to acquire knowledge to optimise the team energy levels. In fact it is well known that the self-regulation of the own level of arousal plays, before the sport event, a significant role to influence the performance. Moreover, in team sport not all the players will play the match: some of them are reserves. So it can been suggested that these two groups could show different profiles of mood states, derived from their different situations in front of the match: since the beginning the titular-players will act directly in the match and they need an optimal mood state, whereas reserves are not immediately involved and, usually, they do not know if or when they will play. Players could live this last condition of incertitude showing mood states more negatives than titular-players.

The goal of this research has been to study the temporal evolution of the mood states in a team sport, specifically during a summer tournée of the Italian national rugby team. It has been suggested that these changes could be influenced by the situation of the players experienced before six matches played during this tournée. Three were the specific conditions studied: titular-players, reserves and players in tribune pre - and post-match.

METHOD

Subjects. The sample was composed by all the players of Italian rugby team (N=27), participating the 1994 Australia Tournée.

Instruments. All athletes have filled the Profile of Mood States (POMS, McNair et al., 1971) measuring six specific mood: Tension, Depression, Anger, Vigor, Fatigue, and Confusion. The Italian version has been tested on a sample of university student (Farné, Sebellico, Gnugnoli, & Corallo, 1991) and the results are consistent with the original norm.

Procedure. POMS has been administered from four to eight hours before six matches played by team during the Tournée, and from fourteen to twenty hours after the matches. The sample was divided in three subgroups: titular-players, reserves, and players in tribune.

RESULTS

Data analysis made by ANOVA reveals significant differences among the groups only in the pre-match condition for the scales showing: Tension ($F(2,128)= 5{,}66$, $P<.0044$); Depression ($F(2,128)= 6{,}40$, $P<.0022$); Anger ($F(2,128)= 4{,}45$, $P<.0135$); Fatigue ($F(2,128)= 3{,}51$, $P<.0328$) and Confusion ($F(2,128)= 5{,}47$, $P<.0052$) and not for Vigor ($F(2,128)= 1{,}22$, $P<.2991$).

No significant differences has been showed among groups in the post match condition.

A post-hocs multiple comparaison test (Scheffe's test), in the pre-match condition, shows that the group of the titular-players has significant differences, in front of the reserves, on the scales of Depression ($p<.0022$), Anger ($p<.0151$), Fatigue ($p<.0328$) and Confusion ($p<.0263$).

In the same way we find significant differences between reserves and the titular-players in the scale of Tension ($p<.0046$) and between the titular-players and the players in tribune on the scale of Confusion ($p<.0382$).

Finally, we can see on the following figures, showing the scales with significant differences, the interesting position of the reserves in front of the other groups (fig.1-5).

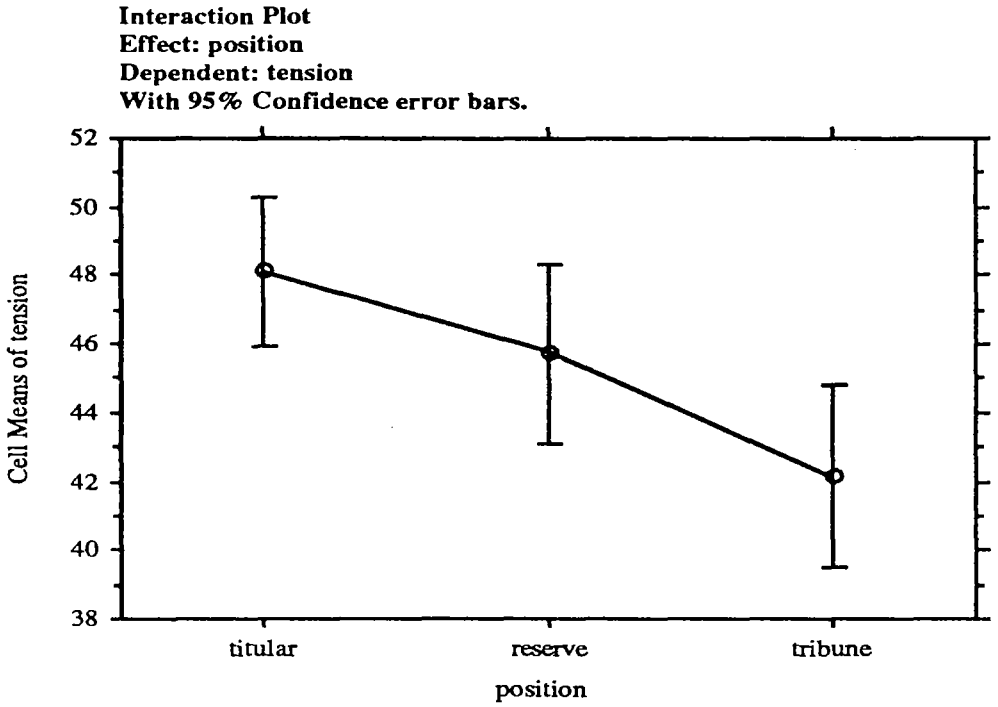

Fig.1. Interaction between player's positions and tension scale

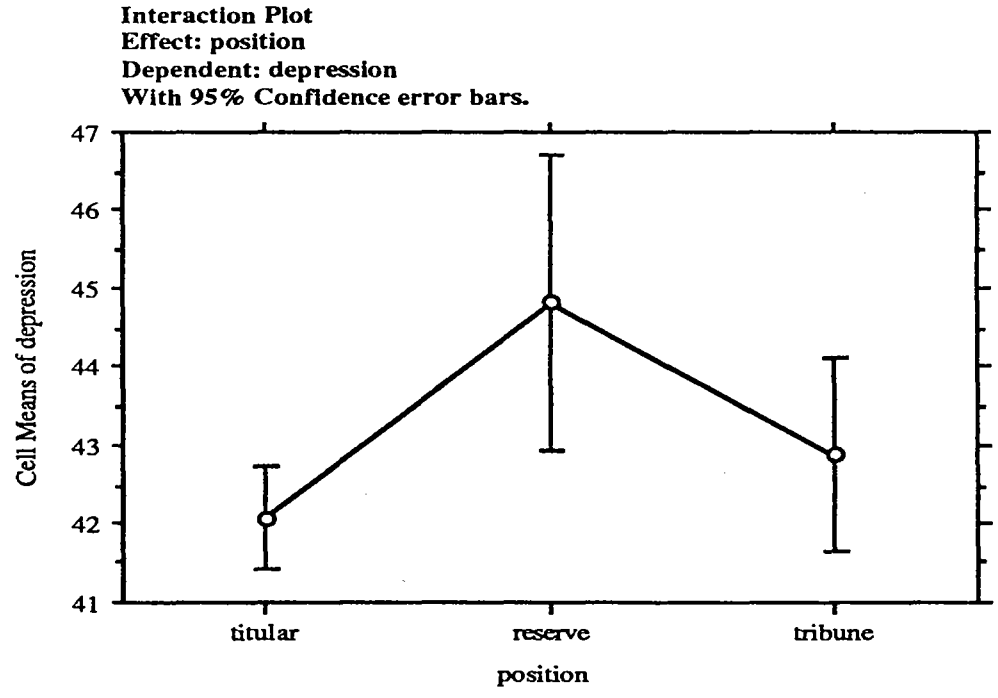

Fig.2. Interaction between player's positions and depression scale

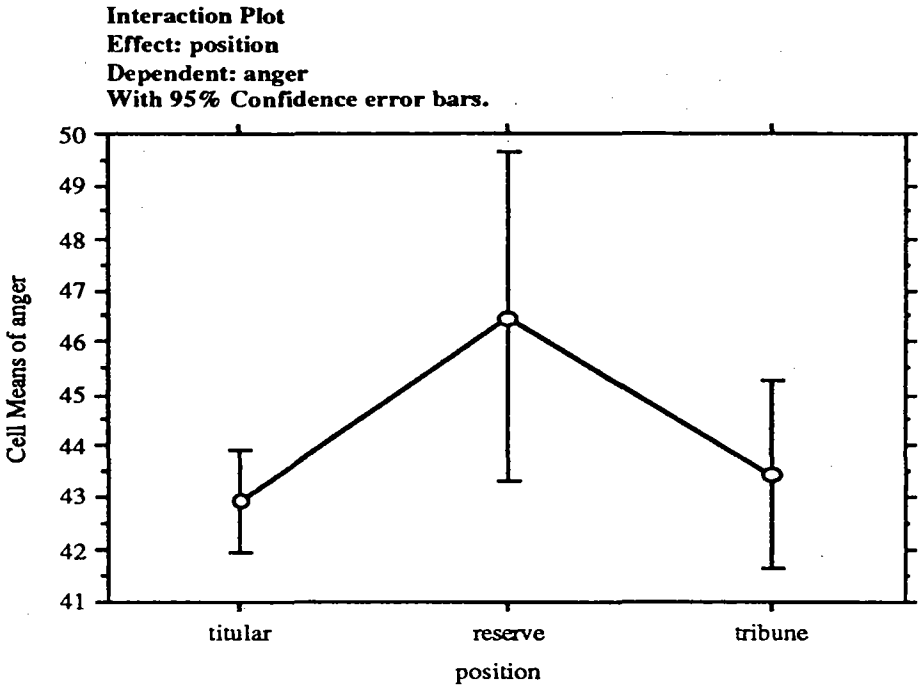

Fig.3. Interaction between player's positions and anger scale

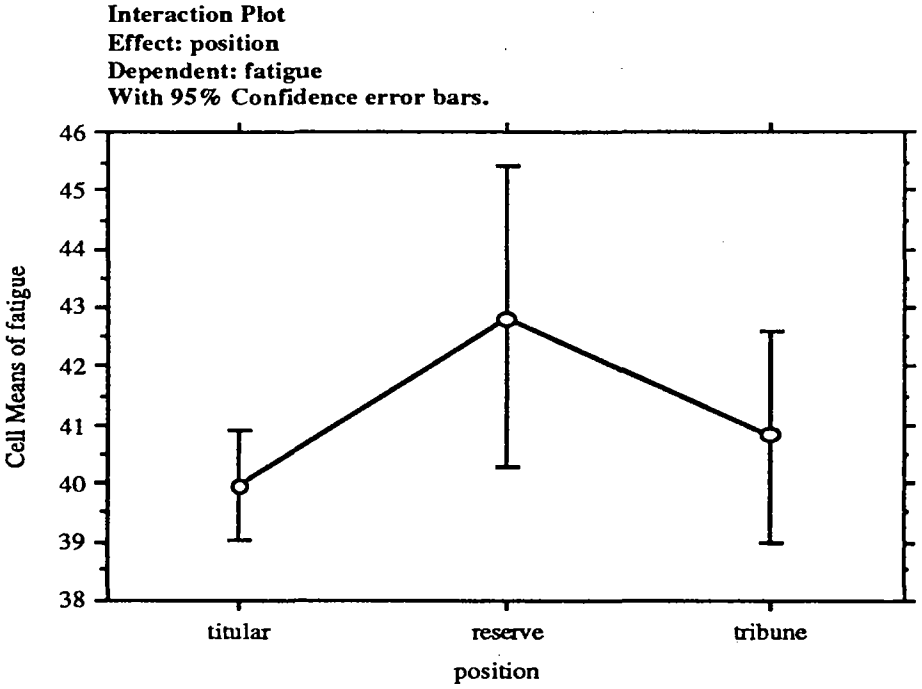

Fig.4. Interaction between player's positions and fatigue scale

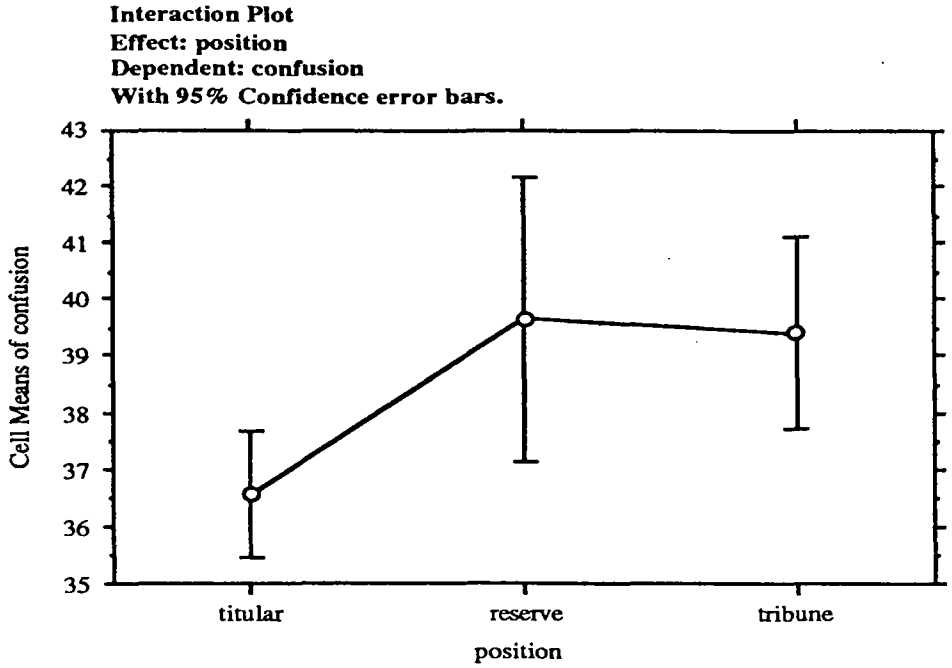

Fig.5. Interaction between player's positions and confusion scale

DISCUSSION

Having more differences between titular-players and reserves the discussion has been oriented toward the role of this second sub-group. Particularly, their position as reserve-players put themselves in a more negative mood states, conditioning their readiness to play in the best way at the moment they have to play during the match.

These results have identified, among these three groups of players, differences in the prematch situation and not postmatch differences. This finding points out the role played by the match to stimulate specific mood states and that the player's reaction depends from his position during the match.

Examining the significant differences in the prematch condition it can be seen that titular players show lower scores of Depression, Anger, Fatigue and Confusion and higher scores on Tension than reserves. Titular-players also show lower scores on Confusion than players in tribune. Therefore it appears

that the condition of reserve negatively influences the players' mood, even though compared with that of the players in tribune.

From the practical perspective these results could be interesting for the coaches. In fact the mood profile, showed in this study by the reserves, could be interpreted as the athlete's negative response to this condition. Goal of the reserves is to be mentally ready to get on to the match but they do not seem in this mental condition. Thus, aim of the coach is to face this situation improving the mood self-regulation processes of his players. In order to reach this goal he could give to each reserve specifics and clearly defined tasks during the prematch talk. In this way the players will be more motivated to live actively the match also if they do not play since the beginning. With these new tasks players more probably will left their negative mood states for the positive ones and they will be mentally ready to get on to the match.

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