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PSIHOLOŠKA OBILJEŽJA I CRTE KOD RUKOMETAŠA – PRIMJENA VIŠEDIMENZIONALNOG UPITNIKA PSIHOLOŠKIH SPORTSKIH TALENATA

PSYCHOLOGICAL CHARACTERISTICS AND TRAITS IN MALE HANDBALL PLAYERS – THE APPLICATION OF MULTIDIMENSIONAL PSYCHOLOGICAL SPORTS TALENTS SCALE

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SUMMARY

The main goal of the research is to determine the latent structure of the psychological questionnaires within Multidimensional Scale of Sports' Psychological Talents (MSSPT): Mental Energy Scale (MES), Modified Big Five Inventory (MBFI), Athletic Engagement Scale (AES) and Optimism Scale (OS). Second goal was to determine the correlation between the dimensions in all examined psychological characteristics in MSSPT, as well as with several relevant sport-related variables. The sample of 127 male handball players was examined, members of the teams Prvo plinarsko društvo, Metalac (Zagreb) and Zamet (Rijeka), in the beginning of 2015. In this study, four instruments from the battery MSSPT are used. The results show that 12 latent dimensions are revealed after the application of PCA, named: Openness/ Agreeableness/ Consciousness, Neuroticism/ Openness and Extraversion/ Agreeableness/ Consciousness (from MBFI), Enthusiasm/ Energy, Dedication and Self-esteem (from AES), Energy as motivator, Energy as strength during errors, Energy which lowing pressure and Energy as stable performance (from MES), Optimism/ Happiness and Energy (from OS). Almost all the dimensions in all the questionnaires showed satisfactory validity and reliability. Statistically significant correlations between the dimensions of MSSPT with relevant variables are very few (6 out of 72), mostly related with handball experience. The number of intercorrelations indicate that some of psychological characteristics within MSSPT are mostly positively but low correlated.

Key words: measuring instruments, psychological talents, sport performance

SAŽETAK

Osnovni cilj istraživanja bio je utvrditi latentne strukture psiholoških upitnika unutar Višedimenzionalne Skale Psiholoških Sportskih Talenata (MSSPT): Skale mentalne energije (MES), Modificiranog Big Five Inventara (MBFI), Skale sportskog zalaganja (AES) i Skale optimizma (OS). Drugi cilj bio je utvrditi povezanost između dimenzija u svim ispitivanim psihološkim obilježjima u MSSPT, kao i s još nekoliko za sport relevantnih varijabli. Ispitan je uzorak od 127 rukometaša, članova momčadi timova Prvo plinarsko društvo, Metalac (Zagreb) i Zamet (Rijeka), početkom 2015. godine. U ovoj studiji, koristila su se četiri instrumenta iz baterije MSSPT. Rezultati su pokazali postojanje 12 latentnih dimenzija, nakon primjene PCA, pod nazivom: Otvorenost / ugodnost / savjesnost, Neuroticizam / otvorenost i Ekstraverzija / ugodnost / savjesnost (iz MBFI), Entuzijazam / energija, Predanost i Samopoštovanje (iz AES), Energija kao motivator, Energiziranost kao snaga tijekom pogrešaka, Energiziranost koja smanjuje pritisak i Energiziranost kao stabilna izvedba (od MES), Optimizam / sreća i Energičnost (iz OS). Skoro sve dimenzije u svim anketama su pokazale zadovoljavajuću valjanost i pouzdanost. statistički značajnih povezanosti između dimenzija MSSPT s relevantnim varijablama je vrlo malo (6 od 72), a uglavnom su vezane uz rukometno iskustvo. Broj interkorelacija ukazuje na to da su neke od psiholoških karakteristika unutar MSSPT uglavnom pozitivno, ali nisko povezane.

Ključne riječi: mjerni instrumenti, psihološki talenti, sportska izvedba

INTRODUCTION

Handball, as the dynamic sports game requests high-level demands on the athletes. Highly intensive motor activity needs high level of basic and specific motor abilities, such as explosive strength, agility and speed. On the other hand, high-level cardio-respiratory capacities are infallible for the performance of specific motor tasks and space orientation, as well as which are indispensable for the efficient solving of game situations (25). Holistic and interdisciplinary approach in certain sport is necessary for sport development of the athletes, and for fulfilling the tasks that they have to do during the processes of sport competition or/and sport training (1) (19). Elite athletes in certain sports are very often similar or equalized among themselves in many relevant elements of sport fitness and sport-related characteristics (morphological, psychological, motor, etc.) (25). Among these sport-related characteristics, psychological factors could have decisive role in a competition and training, by differentiating between successful and less successful teams and/or individual athletes. Therefore, many studies are conducted to investigate important psychological characteristics of athletes, as the essential determinants of sport efficiency. Focus in these studies was the motivation of the athletes (27) (17), as well as on the psychological characteristics, such as are the traits and moods (3). Psychological characteristics are strongly influenced by the cultural and social environment of the athletes. Except in essential mainly motivational factors, particularly important are athletes' behaviors in critical situations during a competition and during training process (11) (34), or in situations, which emphasize anxiety (6). In this study, several psychological characteristics have been chosen to be examined in male handball players, within new battery of potential measuring instruments called Multidimensional Scale of Sports' Psychological Talents (MSSPT), used for the first time in the study of Sindik, Missoni and Horvat (30), but without examination of construct validity of some questionnaires within the battery MSSPT.

Mental energy (ME) is a construct that describes specific biological processes involved in the capacity of brain neurons to do physical work, i.e. to perform physical activity. ME is related to the mood or motivational and cognitive processes (29). Self-reported feelings could be the best method for assessing mood (21). The performance in the sport competition requires form an athlete to be focused upon the task, trying to achieve success. Attention allows selecting information, sensations and perceptions that are relevant in the moment. Namely, vigilance and choice reaction time are convenient for assessing mental energy. Sleepiness, fatigue, alertness etc. are associated with mood states corresponding to mental energy. Therefore, the tests of reaction time and vigilance are approximately equivalent to the sensitivity. In previous research of the author(s) (29), ME is used for the estimation of the mood, within Multidimensional Inventory of Sport Excellence (MUSI). However, ME could be perceived as stable psychological characteristic. Hence, it is included in both batteries, MUSI and MSSPT.

Five-Factor Model (FFM) and the Big Five Model (BFI) assume that personality can be divided into a smaller number of fundamental constructs (15). Following the theory BFI, personality can be described in terms of five factors: extraversion, agreeableness, conscientiousness, emotional stability and openness to experience (23). Extraversion describes inclination to intensive and frequent social interaction, high activity level, the need for external stimulation and the feature of joy (32). Agreeableness describes the quality of interpersonal orientation towards the others. It is a personality trait manifested in individual behavioral characteristics that are perceived by the others as kind, sympathetic, cooperative, warm and considerate (23). Conscientiousness is manifested in task-oriented and goal-oriented behavior and socially required impulse control. Conscientious people are efficient and organized, opposite than easy-going persons. Neuroticism describes persons who tend to feel negative emotions (anxiety, bitterness, sorrow), together with applying maladaptive stress-coping strategies (the opposite is emotional stability). Intellect (with the synonym openness to experience) describes persons who are proactive, who are seeking and appreciate the experience for its own sake, showing the tolerance for the unknown and exploration of the unfamiliar (23).

Athlete engagement (AE) in a sport environment is a concept studied by Lonsdale, Hodge and Jackson (14). In the elite sport context, the antecedents (basic psychological needs) and consequences (dispositional flow) of AE were identified (10). Namely, expert performance results from a long-term systematic engagement in a deliberate practice in a domain (13). Following that stream, examining the role of AE in different competitive levels may appear as very important factor to understand how they are driven to improve their skills, or to be persistent in practicing their sports (8) (16). Self-reported measures of athletes' cognitive engagement has appeared as extremely important in understanding the multidimensional nature of engagement in different sport environments (2). Therefore, several studies became focused on the development of measurement tools to assess athletes' perceived engagement with sports activities (13) (14). An exploratory study examined New Zealand elite athletes, and developed the Athlete Engagement Questionnaire (AEQ) consisting of four dimensions: confidence, dedication, vigor, and enthusiasm (14). Lately, Lonsdale, Hodge, and Raedeke (13) examined the proposed factor structure using a larger sample of New Zealand and Canadian elite athletes. In these studies, AEQ demonstrated good psychometric properties to assess engagement in sport competitive environments and to understand the relationship between burnout and AE.

Finally, optimism (O) is defined as expectancies for the future. While the pessimists are more doubtful, hesitant, and anticipate disaster, optimists assume adversity can be handled successfully (28). Optimism

appeared as very important feature in the project about the development of psychological talents in U.S. Olympic champions (9).

Recently, just a few studies are conducted in Croatia with the examination of psychological characteristics in handball players, especially about psychological constructs, which are included in Multidimensional Scale of Sports' Psychological Talents (MSSPT) battery. One pilot study where some subscales of MSSPT was conducted on a sample of the members of one (the most successful) handball team (Prvo plinarsko društvo from Zagreb), in the beginning of 2015. In this study, three instruments from MSSPT are used for the first time. The results show that none differences are found between age groups of handball players in optimism and personality traits. Seniors perceived themselves as the best mentally prepared. The youngest handball players (age of 12) were the most motivated, confident and concentrated, as compared with other age groups. However, the Optimism Scale (OS) and Psychological Skills Scale showed satisfactory reliability (except the subscale Team emphasis), while Big-Five personality Scale (MBFI) showed unsatisfactory reliability in all subscales (30). This study is the extension of this pilot study.

The main goal of the research is to determine the latent structure of the psychological questionnaires within MSSPT (MES, MBFI, AES and OS). Second goal was focused to determine the correlation between the dimensions of all examined psychological characteristics in MSSPT, as well as with several relevant sport-related variables.

METHODS

Subjects

The research was conducted on a purposeful sample of 127 subjects, members of three handball teams: Prvo plinarsko društvo (N=78) and Metalac (N=14) from Zagreb, and Zamet from Rijeka (N=14), in the beginning of 2015. Average age of the subjects was 13.88±4.14 years, while their experience of training handball was 5.38±3.67 years. Only three players won a medal in senior state championship, 22 of them won medals in junior state championship, 7 of them won medals on junior European championship, while 18 of them are members of junior national team.

Measuring instruments

In this study, four instruments from Multidimensional Scale of Sports' Psychological Talents (MSSPT) are used. The theoretical frameworks of these three instruments are obtained from belonging measuring instruments, but with significant modifications: Revised Life Orientation Test (LOT-R) (26), Big Five Inventory-10 (BFI-10) (24), Athlete Engagement Questionnaire (AEQ) (14) and Mental Energy Scale (MES) (29). MES consists of 14 items based on the self-evaluation of the level of mental energy (29). Optimism Scale (OS), a 10-item scale that assesses individual levels of optimism, follow the framework of LOT-R (26). Big-Five personality Scale (MBFI, 10 items) is based on BFI-10 framework (24), and measures Big-Five personality factors: Extraversion (E), Agreeableness (A), Conscientiousness (C), Emotional Stability (ES) and Intellect (I). Athlete Engagement Scale (AES) follow AEQ framework, comprising 16 items which are measuring the aspects of AE: dedication, self-esteem, enthusiasm and energy (14). In all the questionnaires, the five-point Likert-type scale is used.

Procedure

According to the Ethical Codex of the Croatian Psychological Chamber, psychologists conducted the measurement of psychological characteristics. The subjects voluntarily and anonymously took part in the research, with the consent of their coaches, clubs' managements and themselves, as well as with the parents' informed consent for the players younger than 18 years of age.

Statistical analysis

The structures of the questionnaires in MSSPT are determined using Principal Component Analysis (PCA) with Varimax rotation. Cronbach alpha coefficients are used to determine internal consistency reliability of the principal components (PCs), obtained by PCA. In extracting PCs, the Guttman-Kaiser criterion, Scree Plot and interpretability criteria are used. The overall results for certain PCs have been defined as regression factor scores. Pearson's product moment coefficients of correlations are used for calculating intercorrelations between the latent dimensions of psychological characteristics in MSSPT, as well as the correlations between these dimensions and other relevant characteristics (sport-related variables). The correlations of the variables that describe winning medals or membership in national team with MSSPT variables are in fact point-biserial, but could be reduced on Pearson's correlations. Statistical analyses were performed using the statistical program IBM SPSS 20.0, while all statistical significances are commented on the level of $p<0.05$.

RESULTS

Results of Principal Components Analysis (PCA) with Varimax rotation and the reliability of Big-Five personality Scale (MBFI), applied at male handball players, are presented in Table 1. Kaiser-Meyer-Olkin's Measures of Sampling Adequacy and Bartlett's Tests of Sphericity indicate that correlation matrix is adequate for factorization. Application of PCA, as well as the scree plot, indicates a steep drop of eigenvalues, which revealed three-component structure. Three principal components (PCs) account about 49% of the total variance explained for male handball players. First PC is named Openness/ Agreeableness/ Consciousness (4 items), second PC is named Neuroticism/ Openness (2 items), while third is named Extraversion/ Agreeableness/ Consciousness (3 items). Reliabilities type internal consistency (Cronbach's

alpha) are very low but still satisfactorily only for first and third PC. However, the second PC is unreliable, but tends to the lowest limit of still satisfactorily reliability (0.50). Therefore, it is included in further analysis only as the direction for future improvement of MBFI.

Table 1. Results of Principal Components Analysis (PCA) with Varimax rotation and reliability of the Big-Five personality Scale (MBFI), applied at male handball players
Tablica 1. Rezultati analize glavnih komponenata (PCA) s Varimax rotacijom i pouzdanosti Big-Five Skale ličnosti (MBFI), primijenjene kod rukometaša

Items	openness, agreeableness, consciousness	neuroticism, openness	extraversion, agreeableness, consciousness	Communalities
... withdrawn, reserved (R)		.408	**.705**	.664
……trustworthy	**.676**			.548
…quite lazy (R)	.304	-.320	**.605**	.561
…interested in different things and happenings	**.791**			.689
…sociable and open	**.632**	.431		.588
…tends to see only the negative at people (R)			**.820**	.700
…very thorough and diligent in business	**.700**	-.315		.589
…very explosive and easily annoyed		**.730**		.540
…vivid imagination		**.656**		.434
Eigenvalue	2.075	1.627	1.611	
Variance Explained	23.059	18.075	17.900	
Reliability (Cronbach's Alpha)	0.664	0.427	0.539	
Kaiser-Meyer-Olkin Measure	0.626			
Bartlett's Test of Sphericity (χ^2)	172.857	df=36	p<0.000	

Results of Principal Components Analysis (PCA) with Varimax rotation and the reliability of Athlete Engagement Scale (AES), applied at male handball players, are presented in Table 2. Kaiser-Meyer-Olkin's Measures of Sampling Adequacy and Bartlett's Tests of Sphericity indicate that correlation matrix is adequate for factorization. Application of PCA, as well as the scree plot, indicates a steep drop of eigenvalues, which revealed three-component structure. Three principal components (PCs) account about 72% of the total variance explained for male handball players. First PC is named Enthusiasm and Energy (9 items), second PC is named Dedication (4 items), while third is named Self-esteem (4 items). Reliabilities type internal consistency (Cronbach's alpha) are high or very high and satisfactorily for all three Pcs.

Table 2. Results of Principal Components Analysis (PCA) with Varimax rotation and reliability of the Athlete Engagement Scale (AES), applied at male handball players
Tablica 2. Rezultati analize glavnih komponenata (PCA) s Varimax rotacijom i pouzdanosti Skale sportskog zalaganja (AES), primijenjene kod rukometaša

Items	enthusiasm and energy	dedication	self-esteem	Communalities
I know I can accomplish what I had set out in the sport.			**.738**	.704
I am sure that my sporting abilities are sufficiently developed.			**.892**	.824
I am skilled and technically "gifted" to achieve success in my sport.			**.877**	.802
I have enough confidence in my skills.		.480	**.651**	.726
I have dedicated to my sport goals.	.394	**.706**		.743
I have strongly decided that I want achieve my sport goals.		**.763**		.691
I am fully dedicated to the sport.	.314	**.719**		.659
I work hard because I want to achieve my goals in the sport.		**.589**	.319	.536

I feel full of energy when I play sports.	**.775**			.702
I am "firing of power" when I doing sports.	**.723**	.332		.637
While doing sports, I have a lot of energy.	**.717**	.439		.721
When you play sports, I feel truly alive.	**.788**	.309		.733
When you play sports, I always focused on what I am doing.	**.616**	.490		.651
Sport brings me joy and fun.	**.880**			.859
Sport excites and encourages me.	**.764**	.310		.749
Sport fills me with a sense of pleasure.	**.834**			.794
Sport amuses me.	**.835**			.767
Eigenvalue	5.993	3.225	3.078	
Variance Explained	35.252	18.973	18.106	
Reliability (Cronbach's Alpha)	0.948	0.853	0.868	
Kaiser-Meyer-Olkin Measure	0.898			
Bartlett's Test of Sphericity (χ^2)	1756.967	df=136	p<0.000	

Results of Principal Components Analysis (PCA) with Varimax rotation and the reliability of Mental Energy Scale (MES), applied at male handball players, are presented in Table 3. Kaiser-Meyer-Olkin's Measures of Sampling Adequacy and Bartlett's Tests of Sphericity indicate that correlation matrix is adequate for factorization. Application of PCA, as well as the scree plot, indicates a steep drop of eigenvalues, which revealed four-component structure. Four principal components (PCs) account about 71% of the total variance explained for male handball players. First PC is named Energy as motivator (4 items), second PC is named Energy as strength during errors (3 items), third is named Energy which lowing pressure (3 items), while fourth is named Energy as stable performance (3 items). Reliability type internal consistency (Cronbach's alpha) are moderate to high and hence satisfactorily for all four Pcs.

Table 3. Results of Principal Components Analysis (PCA) with Varimax rotation and reliability of the Mental Energy Scale (MES), applied at male handball players

Tablica 3. Rezultati analize glavnih komponenata (PCA) s Varimax rotacijom i pouzdanosti Skale mentalne energije (AES), primijenjene kod rukometaša

Items	energy as motivator	energy as strength during errors	energy lowing pressure	energy as stable performance	Communalities
I feel the energy in the body and readiness for competition.	**.722**		.384		.760
I feel the energy that makes me tough.	.540			**.600**	.760
I feel the energy that makes me brave.	**.804**				.764
Because of the energy in the body, I do not have the feeling of fatigue.	.332			**.646**	.610
I know how to distribute power throughout the match.				**.879**	.801
When I feel that I am "fit",I can make every effort to perform a task easier, that my coach asked.	.401		**.735**		.709
When I feel the energy, I enjoy the competition.	**.632**		.319		.553
When I feel that I am "fit", I can easier deal with the pressure.			**.843**		.784
When I feel that I am "fit", errors less affect to my performance.		.493	**.679**		.740
When I feel that I am "fit", I do not fear about mistakes.		**.742**			.679
When I feel that I am "fit", it is easier to accept my own mistakes.	.308	**.809**			.762
When I feel that I am "fit", I'm not afraid if I make a mistake.		**.838**			.785
When I perform with a sense that I am "fit", I can easier accept the result of the match.	**.547**	.462			.536

Eigenvalue	2.641	2.618	2.146	1.836	
Variance Explained	20.316	20.142	16.511	14.120	
Reliability (Cronbach's Alpha)	0.786	0.820	0.758	0.737	
Kaiser-Meyer-Olkin Measure	0.866				
Bartlett's Test of Sphericity (χ^2)	780.462	df=78	p<0.000		

Results of Principal Components Analysis (PCA) with Varimax rotation and the reliability of Optimism Scale (OS), applied at male handball players, are presented in Table 2. Kaiser-Meyer-Olkin's Measures of Sampling Adequacy and Bartlett's Tests of Sphericity indicate that correlation matrix is adequate for factorization. Application of PCA, as well as the scree plot, indicates a steep drop of eigenvalues, which revealed two-component structure. Two principal components (PCs) account about 57% of the total variance explained in male handball players. First PC is named Optimism/ Happiness (6 items), while the second PC is named Energy (2 items). Reliabilities type internal consistency (Cronbach's alpha) are moderate and satisfactorily for the first PC and very low but still satisfactorily for the second PC.

Table 4. Results of Principal Components Analysis (PCA) with Varimax rotation and reliability of the Optimism Scale (OS), applied at male handball players

Tablica 4. Rezultati analize glavnih komponenata (PCA) s Varimax rotacijom i pouzdanosti Skale optimizma (OS), primijenjene kod rukometaša

Items	optimism and happiness	energy	Communalities
Life to me is a pleasant surprise every day.	**.624**		.416
When I take everything into account, life is beautiful.	**.764**		.599
I am often in a cheerful mood.	**.493**	.476	.470
I am often full of energy.		**.767**	.642
It's hard to me to get tired.		**.859**	.743
In general, I can say that the life provides me a lot of good opportunities and possibilities.	**.610**	.326	.478
I feel happy and satisfied.	**.763**		.594
I am happy that I live.	**.773**		.607
Eigenvalue	2.827	1.722	
Variance Explained	35.343	21.524	
Reliability (Cronbach's Alpha)	0.777	0.576	
Kaiser-Meyer-Olkin Measure	0.793		
Bartlett's Test of Sphericity (χ^2)	245.836	df=28	p<0.000

In the following analysis, we have calculated intercorrelations between the dimensions of Multidimensional Scale of Sports' Psychological Talents (MSSPT) in male handball players (Table 5). In handball players, out of 66 intercorrelations between the variables of MSSPT, included in this study, 24 of these correlations were statistically significant (only one negative-directed, while the others were positive), and mainly low or moderate high (Table 5). Zero-ordered correlations between the dimensions of the same construct (e.g. athletic engagement) are caused by regression factor scores, in which the results in certain dimensions are expressed. First PC of (Openness/ Agreeableness/ Consciousness) from MBFI, Optimism and Happiness from OP, Energy as motivator from MES and Self-esteem from AES, showed the highest number of intercorrelations.

Moreover, the correlations between the dimensions of MSSPT in male handball players with relevant variables in research have been calculated (Table 6). In handball players, out of 72 correlations between the variables of MSSPT and chosen relevant variables, included in this study, only 6 of these correlations were statistically significant (four negative-directed, while two of them were positive), and mainly very low or low (Table 6). Most of statistically significant correlations with the dimensions of MSSPT are found with the variable sport experience (years in a sport).

Table 5. Intercorrelations between the dimensions of Multidimensional Scale of Sports' Psychological Talents (MSSPT) in male handball players

Tablica 5. Interkorelacije između dimenzija Višedimenzionalne skale psiholoških sportskih talenata (MSSPT) kod rukometaša

Items	opennes	neurot icism	extra version	enthusi asm and energy	dedica tion	self-esteem	energy-mo tivator	energy-strength errors	energy lowing pressure	energy-stable per formance	optimism /happiness	optimistic energy
openness/ agreeableness/ consciousness	1	.000	.000	.372**	.305**	.346**	.358**	.061	.323**	.342**	.426**	.427**
neuroticism/ openness		1	.000	-.053	-.037	.114	-.123	-.073	.216*	-.033	-.095	.199*
extraversion/ agreeableness/ consciousness			1	-.125	-.021	-.117	-.245**	.156	.172	-.028	-.026	.077
enthusiasm and energy				1	.000	.000	.425**	-.089	.165	.131	.323**	.139
dedication					1	.000	.383**	.007	.210*	.107	.201*	.137
self-esteem						1	.341**	.252**	.155	.284**	.309**	.141
energy as motivator							1	.000	.000	.000	.289**	.071
energy as strength while errors								1	.000	.000	.077	-.008
energy lowing pressure									1	.000	.218*	.133
energy as stable performance										1	.182*	.198*
optimism/ happiness											1	.000
optimistic energy												1

*Correlations significant at p<0.05; **Correlations significant at p<0.01

Table 6. Correlations between the dimensions of Multidimensional Scale of Sports' Psychological Talents (MSSPT) and relevant variables in male handball players

Tablica 6. Korelacije između dimenzija Višedimenzionalne skale psiholoških sportskih talenata (MSSPT) i relevantnih varijabli kod rukometaša

Items	opennes	neuroticism	extraversion	enthusiasm and energy	dedication	self-esteem
age	-.114	-.062	.228**	-.150	-.033	-.136
years in a sport	-.178*	.013	.120	-.220*	-.087	-.108
medals in senior state championship	-.102	.098	-.173	-.117	.089	-.047
medals in junior state championship	.011	-.054	.027	.056	.086	-.070
medals in junior European championship	-.006	.062	.240**	-.070	.010	-.085
member of a junior national team	-.008	-.075	.153	.089	.019	-.115
Items	**energy-motivator**	**energy-strength in errors**	**energy lowing pressure**	**energy-constant performance**	**optimism and happiness**	**optimistic energy**
age	-.170	.126	-.012	-.088	-.098	-.014
years in a sport	-.212*	.051	-.098	-.029	-.234**	-.106
medals in senior state championship	.019	-.098	.030	-.074	-.172	-.153
medals in junior state championship	.092	-.132	.030	.081	.083	-.048
medals in junior European championship	-.150	-.008	.033	.078	.080	-.092
member of a junior national team	-.017	-.048	.028	.037	.103	-.032

*Correlations significant at p<0.05; **Correlations significant at p<0.01

DISCUSSION

Construct validity and reliability are examined in four questionnaires, which are mostly used for the first time, in a sample of male handball players. The results revealed that almost all the dimensions in all the questionnaires showed satisfactory validity and reliability. The exception is Neuroticism/ Openness scale

in MBFI, which is defined only with two items. However, except this fact, relatively small number of participants in this study could cause lower reliability, also. In previous study, when only reliability of this preliminary version of MBFI is used, the reliability was much more bellow desirable for all original scales of MBFI (30). Increasing number of items and application of MBFI on larger and more homogenous samples of participants could improve psychometric properties of this instrument.

The highest number of intercorrelations between the dimensions of MSSPT Openness/ Agreeableness/ Consciousness (from MBFI), Optimism/ Happiness (from OP), Energy as motivator (from MES) and Self-esteem (from AES). All these characteristics could be interpreted in terms of general satisfaction with sport (31) and/or satisfaction with life (22), as well as psychological skills, especially motivation and self-confidence (4) (5) (7). The intercorrelations between psychological characteristics within MSSPT are mostly positively but low correlated. It means that it is correct to use all four constructs in the battery MSSPT. Namely, it could be expected that some constructs are very similar, for example athletic engagement and mental energy. However, low correlations between the dimensions of these two constructs mean that each of the constructs represent different feature, more or less.

The correlations between the dimensions of MSSPT with relevant variables are very few (6 out of 72), and the correlations with sport-related variables are mostly related with handball experience. Energy as the motivator, Optimism/ Happiness, Enthusiasm and energy as well as the dimension Openness/ Agreeableness/ Consciousness, lowly but negatively and statistically significantly correlate with handball experience. This finding could be explained in terms of decreasing sport enthusiasm during time. Although some previous studies show that scores in similar concentration scales indicate that concentration skills (such as mental energy) are improving with age (12) (20), particular sport experience in certain sport during longer periods could have just opposite direction (for example, in handball). On the other hand, the motivation and mental preparation (the psychological states that could be also described by MSSPT) proved to could be used as useful indicators, which differentiates between elite and sub-elite athletes (18) (31) (33). We could carefully assume that all concepts used in this study could be unified through the constructs of motivation and mental preparation, which appeared as the most important concepts in numerous studies (7) (31). The motivation could be perceived as the most important factor in the psychological preparation of athletes (29).

The benefit of this research is the application and initial validation of these (new) questionnaires for the first time, which provide an preliminary insight in main psychometric properties of four scales. The biggest benefit of this research is the fact that preliminary application of MSSPT revealed psychometrically satisfying and encouraging results, with the exception of one subscale in MBFI.

The main shortcoming of the research is its still pilot feature, performed on relatively heterogeneous sample of participants. Namely, this initial validation of the questionnaires was performed on the sample stratified only by gender (male) and type of sport (handball), but not on other several relevant factors mentioned before: characteristics of the activity (the training or competition); level of sport excellence; stages of athletes' sports development; age, etc. However, the authors already mentioned that it is only preliminary validation of certain measuring instruments, which have to be improved and adjusted, according to all abovementioned criteria (for example, the study conducted by Sindik, Missoni and Horvat (30) is conducted only on handball players who play on high level of sport excellence).

In future research it would be useful to verify the psychometric characteristics of other scales in MSPPT, as well to improve the quality of MBFI (in terms of its psychometric properties), on a larger and more representative samples of athletes. All scales of MSPPT should be applied to different samples of athletes, who are engaged in different types of sports, differentiated by gender, level of sport excellence, age group, etc. Practical implication of this study could be focused on determining orientation standards, arising from this initial application of these scales, AES, MBFI, OS and MES energy in certain group of athletes. This information could be useful for sport coaches or/and for sport psychologists, as the start point to develop training programs to improve these skills, particularly in elite training centers around the world (20). The results from this study could be good starting point for improving already used and remaining scales in the battery MSPPT.

CONCLUSION

The construct validity and reliability were preliminary examined in four scales of MSSPT, in male handball players. twelve latent dimensions are revealed after the application of PCA with varimax rotation, named: openness/ agreeableness/ consciousness, neuroticism/ openness and extraversion/ agreeableness/ consciousness (from MFBI), enthusiasm/ energy, dedication and self-esteem (from AES), energy as motivator, energy as strength during errors, energy which lowing pressure and energy as stable performance (from MES), optimism/ happiness and energy (from OS). Almost all the dimensions in all the questionnaires showed satisfactory validity and reliability (in range from very low to high size). The number of statistically significant correlations between the dimensions of mssptwith relevant variables is very low (6 out of 72), while four of these correlations are related with handball experience. The number of intercorrelations (excluding zero-ordered intercorrelations of the dimensions within the same scales) indicate that some of psychological characteristics within MSSPT are mostly positively but low correlated. This study is excellent starting point for improvement these and other scales in the battery MSSPT.

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