



## THE RELATIONSHIP BETWEEN SOME PSYCHOLOGICAL CHARACTERISTICS AND SPORT PERFORMANCE OF ELITE YOUNG BOWLING ATHLETES

POVEZANOST IZMEĐU NEKIH PSIHOLOŠKIH KARAKTERISTIKA  
I SPORTSKE IZVEDBE KOD VRHUNSKIH MLADIH KUGLAČA

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### SUMMARY

On the basis of selection of conative characteristics that are potentially significant for success in a large number of kinesiological activities, the relations between chosen theoretic constructs that describe the personality of bowling players and variables that describe the success in bowling championship have been ascertained. In other words, conative characteristics potentially important for success in bowling are correlated with the success in bowling competition. Significant correlation between conative characteristics and success in bowling was hypothesized.

Population from which the intentional sample is chosen is initially selected narrow circle of candidates for the Croatian junior team (N=24; 11 female and 13 male bowling players, aged from 15 to 23). They were examined with instruments that measure constructs of hardiness, perfectionism, locus of control, motivation for achievement, aggressiveness, goal orientation and competitive anxiety. Results have shown that there are certain significant correlations between conative characteristics and sport success, on the basis of which it is possible to suggest the procedures for a differentiated psychological approach to individuals, during training period. A relatively small number of significant correlations, can be explained with similarity of conative characteristics of the elite bowling players. The hypothesis could be only partially confirmed.

*Key words:* bowling players, conative characteristics, result, correlation

### SAŽETAK

Na temelju odabira konativnih karakteristika potencijalno bitnih za uspjeh u većem broju kinezioloških aktivnosti, utvrđen je odnos (relacije) između odabranih teorijskih koncepta koji opisuju karakteristike ličnosti kuglača, te varijabli koje su pokazatelji rezultatskog uspjeha kuglača u natjecanju, tj. dovedene su u vezu konativne karakteristike potencijalno bitne za uspjeh u kuglanju, s natjecateljskim učinkom kuglača. Pretpostavljena je značajna povezanost konativnih karakteristika i uspjeha u kuglanju. Populacija iz koje je uzorak izabran je cjelokupni širi krug kandidata za mladu reprezentaciju Hrvatske (N=24; 11 kuglačica i 13 kuglača, u dobi od 15 do 23). Oni su bili ispitani s instrumentima za mjerenje konstrukata mentalne čvrstoće, perfekcionizma, lokusa kontrole, motivacije za postignućem, agresivnosti, ciljne orijentacije te natjecateljske anksioznosti. Rezultati su pokazali da postoji određen broj značajnih korelacija konativnih obilježja i sportskog uspjeha, na temelju kojih se može sugerirati postupke za diferencirani psihološki pristup pojedincima, tijekom trenažnog rada. Manji broj značajnih povezanosti može se tumačiti ujednačenošću konativnih karakteristika vrhunskih kuglača. Hipoteza je samo djelomično potvrđena.

*Ključne riječi:* kuglači, konativne karakteristike, rezultat, povezanost

## INTRODUCTION

Psychological characteristics, hence durable characteristics or mood states contribute in average 20-30% to sport success in different sports (4). However, during long-term training process and during sport competition, psychological characteristics could frequently be crucial both for achieving sport results and for development of a young athlete, especially when motor and functional abilities of the athletes are at a similar level.

The relationship between the selected theoretic constructs that describe psychological characteristics of bowlers and their sport result was described but none of the available studies dealt directly with relation between success in bowling and psychological characteristics. However, it could be presumed that there might be a correlation of psychological characteristics and success in bowling, as other studies showed a relatively persistent correlation with success in many sports. Consequently, this research focuses on the constructs of hardiness, perfectionism, locus of control, motivation for achievement, aggressiveness, goal orientation and competitive anxiety.

People tend to react with an effort to control situation, describing this situation as a challenge, a stimulus for growth, when they are facing stressful events, when they are interrupted, or deprived of something (8). Hardiness construct consists of three elements, the so-called Three C (challenge, control and commitment). Commitment is an ability to resist in work: an individual believes that he is capable of achieving the goal, even when stress level rises up to uncertain levels. Control is an ability to feel and act powerfully in different life situations. Challenge is a belief that change is a part of normal life, more than stability, so the prediction of changes represents interesting stimulations for development, rather than dangers for security. The results have shown that elite athletes with high results in hardiness, commitment and control, show also low levels of anxiety, and more pro-active interpretation of same (3). Hardiness is an important personality trait in a specific sport situation.

Perfectionism is a drift to achieve very high standards. It could be «normal» when person feels satisfied in aspiring to perfection, but at the same time recognizes and accepts his own limits. Perfectionism becomes a problem when an individual has unrealistic expectations, and when he is never satisfied with his performance (6,9). This lead to Burns's Perfectionism Scale that consists of ten items, measuring self-focused perfectionism (6). Though self-focused perfectionism is an essential component of this construct, 15 years ago an idea was born that perfectionism had also interpersonal aspects, and that these aspects too are important for the existence of problems in adaptation.

Locus of control is a characteristic that describes how someone describes the results of his own activity cognitively, in this case the result in bowling championship (4,12). An athlete could attribute his own success to happiness or accidental circumstances, out of his own control (external) or the person can explain the

success mainly as a result of his own effort, engagement and ability (internal locus of control).

Motivation for achievement could be easily named «ambition». Motivation to achieve success is stronger than motivation to avoid failure and the result is confronting, positive motivation, which is independent of task difficulty (4,5). If motivation to avoid failure is stronger than the need for achievement, the result is avoiding motivation for tasks of any difficulty. Avoiding-motivated subjects find all tasks repulsive, especially those of average difficulty (in those tasks anxiety is the highest).

Aggressiveness. Normal aggressiveness or confrontation doesn't have antagonistic significance, so it's more "psychological", normal or expected (7,14). Such aggressiveness leads to independence and sharpness in social environment, as well as success in sport. Reactive aggressiveness is obvious in open hostility to the aim, and has two forms: heteroaggressive and auto aggressive. Suppressed aggressiveness appears when fear from punishment is very strong and it could have heteroaggressive form. Close to open aggressiveness, there is also passive aggressiveness. Passive aggressive athletes reject tasks given by coach, become withdrawn, don't listen to coach's instructions. Aggressiveness becomes a problem when it's too strong. The goal of strong aggressiveness is to dominate a situation, overcome a barrier or to destroy an object.

Goal orientation during sport competition (1,2) can be task orientation (developing skills) or ego orientation (demonstration of superior performance). Ego orientation is not desirable, because it isn't stimulative for desirable values like patience, effort, engagement, training process, but only the need for achieving the best results. As a consequence, athletes focused on result become too much excited with success and too much demotivated with failure.

Competitive anxiety is a characteristic which describes that competition could be experienced more or less stressful in form of „negative» thoughts (cognitions), as well as negative emotions, followed by physiological indicators (4,11,13). Successful confrontation with competitive stress causes lower incidence of competitive anxiety.

After careful review of the literature, it was to be expected that all stated characteristics could be associated with the success in bowling competition (10). The positive correlation with success in bowling could be expected in: all three dimensions and total mental hardiness, both dimensions of goal orientation, two dimensions and total internal locus of control, all dimensions and total motivation for success. All other characteristics and dimensions were expected to show a negative but significant correlation with success in bowling competition.

The research goal with belonging hypothesis was to define relations between the agglomerate of dimensions of conative characteristics with one indicator of sport success in bowling.

We hypothesised that a significant correlation between the agglomerate of dimensions of conative characteristics and one indicator of sport success in bowling was present.

**SUBJECTS AND METHODS**

The intentional sample comprised of candidates for the Croatian junior team (N=24; 11 female and 13 male bowling players, age 15 to 23). They were all healthy, able bodied, and according to their sport result may be addressed as elite male and female bowling players. All of them had been active in bowling training and

competitions for at least three years, and had participated in sport competition on the level of top elite teams in Croatian national championship. It was assumed that there is homogeneity between subjects in relation to some relevant factors, such as education and intellectual level.

Predictors in this research were dimensions of selected conative characteristics (Table 1).

Table 1. The list of variables (dimensions of selected conative characteristics)  
 Tablica 1. Popis varijabli (dimenzije izabranih konativnih karakteristika)

CONSTRUCT	VARIABLES (scales)	MEASURING INSTRUMENTS	NUMBER OF ITEMS
Hardiness (4 variables)	Commitment	Short Hardiness Scale (3)	5
	Control		5
	Challenge		5
	Hardiness total		15
Perfectionism (1 variable)	Perfectionism	Burn's Perfectionism Scale- BSP (6)	10
Aggressiveness (6 variables)	Verbal manifest aggressiveness	Aggressiveness Questionnaire A-87 (14)	15
	Physical manifest aggressiveness		15
	Indirect aggressiveness		15
	Verbal latent aggressiveness		15
	Physical latent aggressiveness		15
	Aggressiveness total		75
Goal Orientation (2 variables)	Task and learning orientation	Task & Ego Orientation in Sport Questionnaire -TEOSQ (cit.2)	7
	Result and ego orientation		6
Competitive Anxiety (3 variables)	Somatic competitive anxiety	Scale of the Competitive Anxiety Trait (11)	5
	Cognitive competitive anxiety		5
	Competitive anxiety total		10
Motivation for Achievement (5 variables)	Competition with the others	Motivation for Achievement Questionnaire -MOP2002 (5)	13
	Perseverance in achieving goal		13
	Achievement goal as a source of satisfaction		13
	Planning orientation		13
	Motivation for achievement total		55
Locus of Control (6 variables)	External locus	Locus for Control Questionnaire -LOK2003 (5)	16
	Internal locus		16
	Belief power of fate		8
	Belief personal power when outside family		8
	Belief personal power when within family		8
			8

**Hardiness.** The 15-item Short Hardiness Scale (SHS) (3) assesses mental hardiness. On a 4-point Likert-type scale ranging from not exact at all to completely accurate, individuals indicate how they generally feel and act about stress situations. Bartone et. al. (3) applied Short Hardiness Scale at sample of 700 subjects from high-stressed military population. They assessed a Cronbach's  $\alpha$  coefficient 0.93, for the whole instrument. For the specific scales (with 5 items, each), the Cronbach's  $\alpha$  coefficients were: 0,77 (commitment), 0,71 (challenge), 0,70 (control). Test-retest reliability at sample of the military veterans after three weeks period (3) was 0,52. The total score in Short Hardiness Scale is defined as a sum of the results in three scales (the results in scales are defined as a simple linear combination of belonging items). There were no referential investigations in Croatia with this instrument.

**Perfectionism.** Research appears to be suitable to use Burns Perfectionism Scale (BSP), which has already adapted to the Croatian population (Burns, 1984, 6). It contains 10 particles, in which respondents correspond to

the scale Likert-type with five-point scale version customized for the Croatian population: from 5 (strongly agree) to 1 (strongly disagree). The total result is formed as a linear combination of estimations in all items. Hewitt and Mittelstaedt (cit. 6) cite the reliability of Burns scale type inner consistency of 0.70. On a sample of the student population in Croatia (6), reliability type internal consistency was 0.62. Reliability of the scale increases to 0.70 if we remove the third, fourth and fifth item. The study made by Ivanov, Penezić and Gregov (6) used the short version of this scale and reliability of this short version (internal consistency) was 0.73, and test-retest reliability after two weeks 0.74.

**Aggression.** The 15-item Aggressiveness Questionnaire -A-87 (14) assesses different aspects of aggressiveness in provocation situations (impulsive aggressiveness). It consists of 15 items - situations, and for each situation there were 5 of possible reactions. Situations represent a sample of the provocation situations which we usually encounter in everyday life. Five responses are offered as the most common response for

each situation, which represents one of 5 modalities of the impulsive aggressiveness: the manifest verbal aggression, physical manifest aggression, indirect aggression, verbal latent aggression, physical latent aggression. On a 5-point Likert-type scale ranging from not exact at all to completely accurate, individuals indicate how they generally feel and act about provocation situations. The task of the participants was to mark a grade on each of the listed response forms (from a-e) on scale from 1 (never exactly the way you acted out) to 5 (very often behaves so). The results obtained by this questionnaire were formed so in way to form the linear summation response of 15 items for each of 5 types of aggressive behavior. For the specific scales, Cronbach's  $\alpha$  coefficients were from 0.88 to 0.91, and 0.97 for the whole questionnaire (7). Scores were defined for the each scale and as a sum of all scales (total).

**Goal Orientation.** The 15-item Croatian version of TEOSQ was used. Subjects responded on 5-point Likert-scale ranging from strongly disagree to strongly agree. Two factors with eigenvalues higher than 1.0 emerged in both sports with exactly the same factor structures as in the original version of the questionnaire (cit. 2). This means that each factor was comprised of the same 6 (ego) and 7 (task) items as was expected according to the original version of TEOSQ. Those two factors explained 60.84 % (handball) and 60.54 % (football) of variance. Cronbach's  $\alpha$  coefficients showed that two scales of the Croatian version of TEOSQ were highly reliable. If we compare the reliability coefficients from the original version (task 0.83 vs. ego 0.78) to the  $\alpha$  coefficients obtained in investigation made by Baric and Horga (2) that were 0.80 to 0.86, we may conclude that the Croatian version of TEOSQ is of similar reliability. The results obtained in their study confirmed the validity and reliability of CTEOSQ.

**Competitive Anxiety.** The 15-item Sport Competition Anxiety Test-Adult (SCAT-A) (11) assesses competitive trait anxiety. On a 3-point Likert-type scale ranging from often to hardly ever, individuals indicate how they generally feel about competitive situations. Total scores are obtained by summing across the 10 scored items (5 items are not scored but are included to reduce response bias), and can range from 10 (low competitive trait anxiety) to 30 (high competitive trait anxiety). The SCAT-A correlated significantly ( $r = 0.44$ ) with the Trait Anxiety Inventory for Adults (TAIA) (11), which suggests that the test tapped into the general construct of "trait anxiety," yet also assessed performance-specific trait anxiety. Consistent with theory, competitive trait anxiety has been related to stronger competitive state anxiety reactions across situations.

**Locus of Control.** The 36-item Locus of Control Scale (LOK2003) (5,12) assesses the locus of the control. On a 5-point Likert-type scale ranging from not at all to very much, individuals indicate how they generally feel and act about situations that include possibility for beliefs focused on own or external power. They got Cronbach's  $\alpha$  coefficient 0.85, for the whole instrument. Factor analysis of the scale LOK2003 found 4 factors, with beliefs in: juncture circumstances, power in a family situation, power in out-of-family situation and the power of other people. There are two total scores in LOK2003, defined as

sums of the results in juncture circumstances and power in a family situation (internal attribution) and sum of scores in power in out-of-family situation and the power of other people (external attribution).

**Motivation for achievement.** The 55-item Locus of Control Scale (MOP2002) (5) assesses the motivation for the achievement. On a 5-point Likert-type scale ranging from not at all to very, individuals indicate how they generally feel and act about situations that include possibility for beliefs focused on own or external power. They got Cronbach's  $\alpha$  coefficient 0.91, for the whole instrument. Factor analysis of the scale MOP2002 found 4 factors: competition with others, endurance in order to achieve targets, achieving targets as a source of satisfaction, orientation toward planning. Determined difference indicates that women in greater extent than men see the achievement of targets as a source of satisfaction. Another determined difference suggests that women endured more in order to achieve its objectives in relation to men. The total score in MOP200 is defined as a sum of the results in four scales.

Only one variable was used as criteria: average result in Junior Bowling Croatian Championship, in January 2008. The results have been computed using statistical program Statistica 5.0.

According to the Code of Ethics of the Croatian Psychological Society, we asked parents of the athletes their permission for the participation in research. Also, we asked the athletes to agree to be involved in research, with the guarantee of confidentiality. All characteristics were measured simultaneously (group application), with a randomized order of application of different measuring instruments in March 2008.

## RESULTS

To provide an answer to the first problem of research, Spearman rank-correlations were computed, between the predictors and criteria variables (Table 2).

Table 1. Significant rank-correlations between sport success of the male and female bowling candidates for Croatian junior national representation (n=25) and conative characteristics

Tablica 1. Značajne rang-korelacije između sporskog uspjeha kod kuglača i kuglačica koji su kanidati za hrvatsku mladu hrvatsku reprezentaciju (n=25) i konativne karakteristike

Variable	Rank correlation coefficient ( $\rho$ )	Significance ( $p <$ )
Verbal manifest aggressiveness	0.51	0.01
Physical manifest aggressiveness	0.41	0.04
Indirect aggressiveness	0.34	0.10
Physical latent aggressiveness	0.49	0.01
Competitive anxiety total	- 0.43	0.03
Somatic competitive anxiety	- 0.47	0.02
Cognitive competitive anxiety	- 0.44	0.03
Belief personal power outside family	0.45	0.02
Competition with the others	0.43	0.03



## DISCUSSION

A relatively small number (twelve out of possible twenty nine) of significant correlations between conative characteristics and success in bowling competition was found, therefore, the hypothesis could only be partially accepted. Nevertheless, the direction of stated statistically significant correlations sometimes differed from expected, i.e. for aggressiveness and its dimensions, and the dimension of external attribution (belief in power of other people). Most of the variables that were in positive correlation with a result in bowling were the variables that described aggressiveness. However, an insight in descriptive statistics indicates the aggressiveness of bowling players as generally low. Thus, aggressiveness of bowling players could be described as "combativeness", which is a positive, desirable, characteristic. Besides that, several significant negative correlations were found between all aspects of competitive anxiety and success in bowling. Significant positive correlation was found between success in bowling and an aspect of the internal locus of control, belief in personal power outside the family, but also with an aspect of the external locus of control, e.g. belief in power of other people. The aspect of motivation for achievement, trend for competition with the others is in a positive correlation with success in bowling. Thus, there is a certain correlation between success in elite bowling and chosen conative characteristics, mostly with aggressiveness, competitive anxiety, and some aspects of the locus of control and motivation for achievement.

Nevertheless, in spite of expectations for more numerous correlations between different conative

characteristics («logical» as well as on the basis of previous research) and success in bowling, only a few characteristics, mostly aggressiveness and competitive anxiety could truly contribute to better understanding of correlations between sport success in bowling and conative characteristics. Probable reason for such results could be the selection of subjects made not only by criteria of sport success, but at the same time by conative characteristics that probably partially enabled the aforementioned sport success. Therefore, with similar (but high) motor achievements, the candidates for the Croatian National Team might be similar in their required (but vital) conative characteristics. Even such results may present useful indicators for coaches, through a differentiated approach of coaches in their work with bowlers with various conative characteristics.

## CONCLUSIONS

A relatively small number (twelve out of possible twenty seven) of significant correlations between conative characteristics and success in bowling competition was found. So, the basic hypothesis of the research could be rejected or only partially confirmed. A relatively small number of significant correlations, can be explained with similarity of conative characteristics of the elite bowling players. Being aware of psychological characteristics of an athlete enables a coach to apply specific training methods for each athlete. That is why in future more research is needed in order to explain better the relation between psychological characteristics and the success in bowling.

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