

# Hardiness and Situation Efficacy at Elite Basketball Players

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## ABSTRACT

*The main aims of the study were: to explore the latent structure of the construct of hardiness at Croatian top basketball players and to gain an understanding of the relationship between obtained hardiness dimensions and situation-related efficacy in basketball. Situation efficacy of individual basketball players in top teams is linked to the constellation of a number of relevant anthropological and specific psychological features that influence the behavior of basketball players in stressful situations during training, and especially during basketball games. One of the most important psychological characteristics for the resistance of an individual to these kinds of stress is hardiness. In the research is used a Short Hardiness Scale (SHS), which is metrically adapted to the sample of Croatian top basketball players. The questionnaire was applied to a group of 107 top basketball players, independently in all nine A-1 Croatian basketball league teams. The correlations of the hardiness dimensions with the standard and derived parameters of basketball players' situation efficacy are established, as well as with log variables. The analysis of instrument latent structure for hardiness measurement indicates the existence of two dimensions characteristic for the Croatian sample of top basketball players, which could be interpreted as a challenge and a control – commitment. A relatively small percentage of the explained variance (about 40%) suggests the possibility of defining the concept of hardiness specific for basketball situations. Low but statistically significant positive correlations were found between the dimension of control – commitment and a larger number of standard and derived parameters of situation efficacy. Statistically significant correlations between the dimension of challenge and the situation efficacy parameters or log variables are not found. This study has the main importance in cultural adjustment of hardiness to Croatian top basketball players, providing additional information about the relationship of hardiness and situation-related efficacy in basketball.*

**Key words:** basketball players, hardiness, latent structure, situation-related efficacy

## Introduction

The theories of successful play, based on actual quality, become more and more important nowadays because they directly correlate with the successful selection of options in a given game situation and with competitive results. The basketball game in its course is divided into three main phases: defense, offense and transition<sup>1</sup>. Basketball can be watched as a specific series of tasks that each player is doing having in mind the position and role in the team within a certain game concept<sup>2</sup>. The characteristics that determine success in basketball are defined by the specific equation, which determines optimal »sum« of anthropological characteristics representing correlates of maximum sport achievement<sup>3</sup>. In relation to the game characteristics and numerous limitations defined

by the rules of the game, playing basketball requires anthropological characteristics: morphological (the importance of player's height); functional capacities (physical fitness); motor characteristics (basic abilities, skills and knowledge) and psychological characteristics (personality) as one of major determinants of sport success<sup>4</sup>. More and more, sport experts seek various, but linked analyses of the sport itself, then of game events, matches, positions in the game, individual and/or team play, motion structures and physiological-anatomical analyses of a certain sport<sup>5</sup>. This paper analyses 12 FIBA official standard indicators of situation-related efficacy (in basketball practice known as indicators of performance) and 7 derived indicators of situation-related efficacy of top bas-

ketball teams that took part in Croatian A-1 league championship in season 2006/2007. The assumption was that such indicators, together with hardiness trait of personality, might contribute in modeling patterns of team efficacy, as well as patterns of individual players' efficacy. Bertram & Rao<sup>6</sup> conducted the study using the official NBA team statistics of the seasons in the period 1968 – 1973. They used the set of variables: seven basic (total number of field goals, total number of free throws, number of defensive rebounds, number of offensive rebounds, assists, personal fouls, and disqualifications) and eight transformed variables (field goal percentage, free throw percentage, number of assisted field goals, number of offensive put backs, number of free throws after the opponent's personal foul, interaction of the field goal and free throw percentages and interaction of rebounds and assists)<sup>6</sup>. The most important variables to distinguish between the participation and non-participation teams were: field goal percentage, free throw percentage, defensive rebounds, offensive rebounds and personal fouls<sup>6</sup>. Twelve indicators of situation-related efficacy differentiated between the winning and defeated top quality teams which played in the final tournaments of the European club championships from 1992 to 2000<sup>7</sup>. The obtained results suggested that the winning teams showed more tactical discipline and responsibility in controlling inside positions for defensive rebounds, as well as in controlling play on offense and the ball until the required open shot chance, which considerably reduced game risks and resulted in a lower number of turnovers and in a higher shooting percentage<sup>7</sup>. Such a type of decision-making in play requires a high degree of reciprocal help of players in both defense and offense and a higher level of concentration and self-confidence when shooting field goals and free throws. The common denominator of the winning teams was a lower number of imbalanced states in their play (the organized style of play in defense and offense implied) and a higher level of collective outplaying the opponents with the controlled system of play, which enabled entire potential of the victorious teams to be expressed<sup>7</sup>.

While the cognitive abilities are probably much more important for finding proper solutions in complex game situations, the diagnostics of player's conative characteristics is unavoidable, both for the selection process and during the targeted process of training of selected players. When researching the correlation between the successfulness of basketball players and their personal characteristics it is very important to consider choosing the type of successfulness evaluation models for the players (subjective and objective), as well as the type of personality models (partial or full). Some personality models attempt at interpreting the personality in a holistic way, while the other models analyze just some aspects of an individual's functioning (isolated personality traits, for example). The insight into the differences in certain conative characteristics could enable coach to correct unwanted deviations from desirable conative characteristics of basketball players, as well as to assist in obtaining

a more suitable definition of certain players' roles in individual teams<sup>1</sup>. A hypothetical structure of six categories of mostly psychological and social variables (among 17 specific characteristics in total) of elite athletes in team sports game was proposed: locus of control, specific competence, motivation, successful reactions in situation of high competitive pressure, coordinated teamwork and successful solutions of game situations.<sup>8</sup> These variables probably have influence on the functioning and performance of individual players and the whole team. For this research, hardiness has been chosen as a relevant personality trait included within the large project on the development of psychological talent in Olympic champions in USA<sup>9</sup>.

### *Hardiness*

The concept of hardiness has been used in an effort to explain different abilities of humans to face stress<sup>10</sup>. Hardiness explains why some individuals develop somatic and psychological illnesses when faced with stressful life situations, while others remain »healthy«. Hardiness is defined as a constellation of attitudes, beliefs, and behavioral tendencies<sup>11</sup> and it consists of three positively intercorrelated (but not the same) components: commitment, control and challenge<sup>12</sup>. Commitment is the ability to perceive what you are doing: a belief that an individual is capable of reaching a goal, even when the level of stress is beyond safe. Control is the ability to feel influential and on the basis of that belief to act in various (particularly in stressful) life situations. Challenge is the belief that change is normal in life, more than stability, and that foreseeing changes represents an interesting stimulus in development<sup>10</sup>. Since top sport is an extremely stressful milieu, hardiness is often used construct for the interpretation of top athletes' characteristics and rather often it has served as a predictor of success in sports competition. The study conducted on a sample of professional rugby players playing in the strongest leagues indicate the importance of training both aspects of mental strength (hardiness and toughness)<sup>13</sup>. Top athletes who have top results in hardiness, especially in dimensions commitment and control, showed desirable characteristics of athletes (less concerning about the result and proactively interpreting the competitive anxiety)<sup>14</sup>. In two studies about the relationship between hardiness and success in basketball it was found that mentally stronger individuals showed better success in basketball, i.e. in a larger number of situation efficacy indicators for a sample of players attending a high school in California<sup>12</sup>. In the second study, hardiness dimensions significantly positively correlated with the efficacy indicators in basketball at student male basketball teams in Southern California<sup>12</sup>. Consequently, on the basis of research in different sports (as well as in basketball) we can conclude that the correlation between hardiness and situation efficacy indicators is consistently positive.

The main aim of this research was to find latent structure of hardiness at Croatian top basketball players. The second aim was to establish the correlation between

the standard and derived situation-related efficacy of top basketball players in Croatia and hardiness latent dimensions. Finally, we wanted to find the correlation between hardiness latent dimensions and log variables. To achieve our main aim, we'll analyze two samples of top basketball players separately: permanent players in a team (who play more) and the players who play periodically (they play less). However, we can hypothesize that periodical players can show lower correlations between hardiness dimensions and situation-related efficiency, compared to permanent basketball players.

## Methods

### Subjects

Intentional sample of subjects was made up of top senior Croatian basketball players that were playing in nine male senior teams in A-1 Croatian Men Basketball League in 2006/2007 championship: »Cedevita«, »Svjetošlost«, »Borik«, »Kvarner«, »Dubrava«, »Dubrovnik«, »Alkar«, »Šibenik« and »Osijek«. The age range of subjects was relatively wide (17–40) with the average age of  $23.54 \pm 4.91$ . The final sample of subjects (74 basketball players) was selected from the initial (entire) sample of 107 subjects while the others formed the residual sample (33 players). The conditions for selecting the players from the entire sample in the final sample was the number of minutes in play (minimum ten minutes in play per game), i.e. the number of games played (minimum eight games in which the individual played). That's the reason why the players in final sample can be called permanent players, while the players from the residual sample can be called periodical.

### Variables

#### 1. Short Hardiness Scale (SHS)

For the purpose of measuring hardiness we used a shortened Croatian version of Bartone Dispositional Resilience Scale (DRS)<sup>15</sup>, the so-called Short Hardiness Scale (hereinafter the SHS)<sup>16,17</sup>. SHS consists of 15 items based on the self-evaluation of the level of »hardiness«. The subjects have to estimate their own behaviour on Likert 4-point scale ranging from strongly disagree (0) to strongly agree (3). Five items of the scale refer to the commitment dimension, 5 to control and 5 to challenge. The results are defined as a simple linear combination of the estimations for the items from each of the sub-scales. In eleven items higher estimation means higher emphasis on individual dimensions of hardiness, while remaining four items are recoded. In previous research SHS indicated very satisfactory metric characteristics<sup>11</sup>. Inter-correlations between hardiness dimensions obtained by Maddi et al.<sup>8</sup> were positive and statistically significant, ranging from 0.37 to 0.69. Translated and adapted, the Croatian version of SHS preliminary used SHS on 822 subjects from the average population showed the reliability  $\alpha=0.69$  (for the whole scale)<sup>16,17</sup>. In our study we used the Croatian version of SHS<sup>16,17</sup> preserving the original

three dimensions of SHS. Besides the dimension of commitment ( $\alpha=0.45$ ), the remaining two dimensions of the SHS had a low but satisfactory reliability: control ( $\alpha=0.52$ ) and challenge ( $\alpha=0.68$ ), the reliability of the whole questionnaire being ( $\alpha=0.74$ ). All three factors explained 46 % of the total variance in scale.

#### 2. Situation-related efficacy – standard and derived parameters

For assessing the overall quality of basketball players we used the partial weighted linear combination method<sup>5,19–21</sup>. There were thirteen standard situational efficacy parameters which include shooting performance successfulness data for one, two and three points, rebounds (offensive and defensive), turnovers and steals, assists, block shots, personal fouls. Based on the above mentioned standard parameters of situational efficacy, a combined model for assessing the actual quality of basketball players was designed replacing eight subjectively estimated variables with seven of the corresponding effects of situational variables in order to more objectively assess the overall quality of actual players<sup>22</sup>. Those seven variables name derived coefficients of situational efficacy are: the utilization of two-points shot, the utilization of three-point shots, free throw utilization, two-points shot efficacy, three-point shots efficacy, free throws efficacy and the overall situational efficacy<sup>5,19–21</sup>. In this study the data on the block shots is omitted as it is the rare event of presence of which we had no data. All the data about situational efficacy parameters was taken from the Croatian Basketball Association official website: [www.kosarka.hr](http://www.kosarka.hr). The total sample of games that were played (from which the data on the efficacy of situational players and teams were taken) included sixteen matches for each of the nine teams. Therefore, it is a 'runoff' system of competition in which each team played the other in one match at home and one match away.

#### 3. Log variables

Log variables that we analyzed were: games that one player began playing in first five team; minutes that a player spent in a game; team wins at the end of the championship; games that one player played in the whole championship; player's age; player's playing experience in this team; score of the team up to the examination.

### Procedure

Basketball players in the team were tested with the permission of the Croatian Basketball Association and the clubs within the period of the sixth and eighth round of the A-1 league championship (from December 2006 until the first half of January 2007). The subjects were informed about the questionnaires without being informed about the aim of the study. The players from different teams were tested separately before the training of each team.

### Statistical methods

Statistical analysis of the data was performed using the statistical program SPSS 7.5. Descriptive statistics

was calculated for all research data. For determining construct validity, we used exploratory factor analysis (Principle Components Analysis method with Varimax rotation) on the entire sample of 107 basketball players. At first, we fixed the number of factors to the three characteristic for the source of hardiness measuring instrument Short Hardiness Scale. Afterwards, we combined a few criteria during extracting factors while looking for the best solution: Guttman-Kaiser's criteria, Scree Plot and the interpretability. In the final result all criteria has to be satisfied. We have used factor analysis on the entire sample of basketball players (permanent and periodical players) with two methodological aims: to get more stable factor structure (because of the small number of participants in general, for performing factor analysis) and secondly, to enable direct comparison of two samples of participants, using the same common dimensions. The restriction in possible attempt to compare factor structures is practical and statistical cause: the number of participants in residual sample is too small to perform factor analysis. So, to estimate the relationship between the hardiness dimensions with standard and derived parameters of situation-related efficacy and log variables, Pearson's correlation coefficient was used separately for each sample: entire, final and residual.

## Results

### *Descriptive characteristics*

The highest values of arithmetic means were obtained for the parameters of standard situational efficacy (Table

1): successful shots for two points, personal faults, and defensive rebounds. The highest standard deviations were found for the variables: successful shots for two points, defensive rebounds and assists. Three variables are significantly deviating from the normal distribution; unsuccessful free throws ( $p < 0.01$ ), assists and offensive rebounds (both with  $p < 0.05$ ). The distributions of certain situational indicators were compatible with previous findings on the distribution of events in a basketball game and there was no reason to omit them from further analysis.

Considering derived parameters of situational efficacy (Table 1), the highest average values were obtained for the utilization coefficient for free throws and efficacy coefficient for two-points shot. The highest values of the standard deviations were obtained for the variables: utilization coefficient for the three-points shot and efficacy coefficient for two-points shot. None of the coefficients of utilization and none of the coefficients of efficacy significantly statistically deviates from the normal distribution.

In Table 2 mean values and standard deviations are shown with other descriptive statistics for the items of measuring instrument for hardiness trait (Short Hardiness Scale). Out of all hardiness items the highest means are found in the items: With hard work you can always achieve your goals and The effort to perform well is really worthwhile in the end. Out of all Short Hardiness Scale items the highest standard deviations are found in the items: I'm not inclined to change my daily schedule and I prefer to have an unmodified daily schedule.

**TABLE 1**  
DESCRIPTIVE STATISTICS FOR STANDARD AND DERIVED PARAMETERS OF SITUATIONAL EFFICACY FOR BASKETBALL PLAYERS

Variables	$\bar{X}$	Minimum	Maximum	Range	Std. Dev.	Skewness	Kurtosis
Successful shots – two points	34.03	2.00	115.00	113.00	22.71	1.07	1.14
Unsuccessful shots – two points	26.99	4.00	79.00	75.00	15.71	0.93	0.92
Successful shots – three points	12.00	0.00	39.00	39.00	9.23	0.74	0.07
Unsuccessful shots – three points	23.12	0.00	61.00	61.00	16.52	0.51	-0.56
Successful free throws	24.12	1.00	72.00	71.00	16.19	0.94	0.51
Unsuccessful free throws	10.22	0.00	97.00	97.00	12.38	4.90	33.01
Assists	22.51	1.00	105.00	104.00	19.27	2.23	6.13
Offensive rebounds	13.88	1.00	48.00	47.00	10.68	1.28	1.32
Defensive rebounds	31.20	2.00	87.00	85.00	19.40	0.84	0.35
Steals	14.45	0.00	34.00	34.00	7.77	0.24	-0.60
Personal fouls	33.23	4.00	64.00	60.00	12.10	0.08	-0.49
Turnovers	21.39	3.00	55.00	52.00	11.59	0.69	-0.31
Utilization coefficient – two-points shot	0.54	0.17	0.72	0.55	0.10	-0.72	1.05
Utilization coefficient – three-points shot	0.31	0.00	0.70	0.70	0.15	-0.39	0.68
Utilization coefficient – free throws	0.73	0.40	1.00	0.60	0.13	-0.12	-0.29
Efficacy coefficient – two-points shot	38.88	0.67	147.77	147.10	29.26	0.74	0.14
Efficacy coefficient – three-points shot	8.84	0.00	34.97	34.97	7.67	0.51	-0.44
Efficacy coefficient – free throws	17.52	0.50	55.74	55.24	12.12	1.99	7.35
Total situation-related efficacy	100.51	-1.41	287.68	289.09	64.94	0.72	0.34

**TABLE 2**  
DESCRIPTIVE STATISTICS FOR THE ITEMS OF SHORT HARDINESS SCALE FOR BASKETBALL PLAYERS

Variables	$\bar{X}$	Minimum	Maximum	Range	SD	Skewness	Kurtosis
1. Most of my life I spend carrying out valuable things. COM	1.82	0.00	3.00	3.00	0.60	-0.47	0.91
2. Planning ahead helps to avoid most future problems. CON	2.21	0.00	3.00	3.00	0.77	-1.00	1.12
3. I do not like to change my daily schedule CHA (R)	1.76	0.00	3.00	3.00	1.01	-0.28	-1.01
4. It is not worthwhile to work hard. because the only benefit from it goes to the bosses. COM (R)	0.29	0.00	3.00	3.00	0.64	2.23	4.21
5. Changes of daily activities are interesting. CHA	1.65	0.00	3.00	3.00	0.91	-0.09	-0.80
6. With hard work you can always achieve your goals. CON	2.71	2.00	3.00	1.00	0.46	-0.94	-1.14
7. I really look forward to my work. COM	2.59	1.00	3.00	2.00	0.55	-0.88	-0.27
8. When dealing with some difficult task. I know when to ask for help CON	2.00	0.00	3.00	3.00	0.74	-0.71	0.85
9. People usually listen carefully to what I say. CON	1.82	0.00	3.00	3.00	0.55	-0.80	1.77
10. The effort to do the job as good as possible. it really pays off in the end. COM	2.53	1.00	3.00	2.00	0.57	-0.75	-0.43
11. It bothers me when my daily routine is disrupted. CHA (R)	1.65	0.00	3.00	3.00	0.98	-0.23	-0.93
12. I find living usually interesting and exciting. COM	2.28	1.00	3.00	2.00	0.66	-0.36	-0.72
13. I find challenging doing more than one thing at the same time. CHA	1.64	0.00	3.00	3.00	0.96	-0.20	-0.86
14. I prefer daily routine without changes. CHA (R)	1.61	0.00	3.00	3.00	1.00	-0.30	-0.94
15. I can complete tasks as planned. CON	2.17	0.00	3.00	3.00	0.75	-0.70	0.41

CHA – challenge, COM – commitment, CON – control

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (0.665) and Bartlett’s Test of Sphericity ( $\chi^2 = 267.325$ ;  $DF=45$ ;  $p<0.01$ ) showed that the correlation matrix is good for factorization. Principal Component Analysis

(Table 3) and a screen plot of the component structure indicated a steep drop of height values that revealed a two-component structure with principal components named: Control / Commitment (1) and Challenge (2).

**TABLE 3**  
PRINCIPAL COMPONENT ANALYSIS WITH VARIMAX ROTATION FOR THE ITEMS OF SHORT HARDINESS SCALE FOR BASKETBALL PLAYERS

Items	Control / Commitment	Challenge	Communalities
I know when to ask for help when completing a difficult task.	0.733		0.541
I really look forward to my work.	0.673		0.456
When I have a plan, I am sure that I can complete it.	0.548		0.393
People usually listen very carefully to what I say.	0.545		0.303
I find living usually interesting and exciting.	0.458		0.239
Planning ahead helps prevent most of the future problems.	0.392		0.159
Effort to complete the tasks as good as possible really pays off in the end.	0.371		0.155
I prefer daily routine without changes.		0.835	0.701
It bothers me when my daily routine is disrupted.		0.785	0.617
I don't like to change my daily schedule		0.633	0.406
Reliability (Cronbach’s a)	0.592	0.648	0.408
Eigenvalue	2.096	1.874	
Variance Explained (%)	20.957%	18.737%	39.693%

Note: the lowest correlation between the item and principal component is fixed on 0.35

Both components accounted for 39.69 % of the total variance explained. Both components showed low but satisfying reliability. Other data, such as descriptive and communalities, can be seen in Table 3.

In Table 4 Pearson correlations between log variables and dimensions of Short Hardiness Scale are shown. Among 14 possible correlations in the correlation matrix for the entire sample only one coefficient is statistically significant at the level of at least  $p < 0.05$  (log variable minutes played with the hardiness dimension Control/ Commitment). The same statistically significant correlation is also found in the final sample but not in the residual sample of basketball players. This correlation is positive and very low. Not one statistically significant correlation is found with the hardiness dimension Challenge.

In Table 5 Pearson correlations between derived variables of situation-related efficacy and dimensions of Short Hardiness Scale are shown. Among 14 possible correlations in the correlation matrix for the entire sample four coefficients were statistically significant at the level of at least  $p < 0.05$  (situation-related derived variables: utilization coefficient – three-points shot, efficacy coefficient – three-points shot, efficacy coefficient – free throws and total situation-related efficacy with the hardiness dimension Control/ Commitment). Almost the same statistically significant correlations are also found in the final sample (except for the variable efficacy coefficient – three-points shot). In the residual sample of basketball players we found only one statistically significant correlation: between total situation-related efficacy and hardiness dimension Control/ Commitment). All these statistically significant correlations are positive and very low to low. Not one statistically significant correlation is found in hardiness dimension Challenge.

In Table 6 Pearson correlations between standard variables of situation-related efficacy and dimensions of Short Hardiness Scale are shown. Among 24 possible correlations in the correlation matrix for the entire sample, six coefficients were statistically significant at the level of at least  $p < 0.05$  (situation-related standard variables: unsuccessful shots – two points, successful shots – three points, successful free throws, assists, steals and turnovers with the hardiness dimension Control/ Commitment). The same trend of statistically significant correlations is found in the final sample (except for two va-

cient – three-points shot, efficacy coefficient – free throws and total situation-related efficacy with the hardiness dimension Control/ Commitment). Almost the same statistically significant correlations are also found in the final sample (except for the variable efficacy coefficient – three-points shot). In the residual sample of basketball players we found only one statistically significant correlation: between total situation-related efficacy and hardiness dimension Control/ Commitment). All these statistically significant correlations are positive and very low to low. Not one statistically significant correlation is found in hardiness dimension Challenge.

**TABLE 4**  
CORRELATIONS BETWEEN THE DIMENSIONS OF SHORT HARDINESS SCALE AND LOG VARIABLES AT BASKETBALL PLAYERS

Variables	Entire sample		Final sample		Residual sample	
	Control / Commitment	Challenge	Control / Commitment	Challenge	Control / Commitment	Challenge
Games started in first five	0.162	-0.017	0.158	-0.065	0.051	0.036
Minutes played in game	0.210*	-0.053	0.266*	-0.182	0.088	0.088
Team wins in championship	-0.032	0.044	-0.084	0.017	0.010	0.082
Games played in championship	0.125	0.102	0.138	0.121	-0.099	0.022
Age	0.053	0.007	0.026	-0.005	-0.025	-0.013
Playing experience	-0.046	0.174	-0.103	0.180	0.065	0.161
Score of the team while testing	0.026	0.072	-0.048	0.031	0.119	0.138

\* correlation is significant at the 0.05 level (2-tailed)

**TABLE 5**  
CORRELATIONS BETWEEN THE DIMENSIONS OF SHORT HARDINESS SCALE WITH DERIVED SITUATION-RELATED EFFICACY VARIABLES AT BASKETBALL PLAYERS

Variables	Entire sample		Final sample		Residual sample	
	Control / Commitment	Challenge	Control / Commitment	Challenge	Control / Commitment	Challenge
Utilization coefficient – two-points shot	0.058	0.008	0.010	-0.035	0.036	0.013
Utilization coefficient – three-points shot	0.251**	0.141	0.381**	-0.014	0.084	0.314
Utilization coefficient – free throws	0.109	0.029	0.129	-0.054	0.003	0.060
Efficacy coefficient – two-points shot	0.138	0.025	0.137	0.030	-0.031	-0.090
Efficacy coefficient – three-points shot	0.209*	0.043	0.214	0.021	0.199	0.174
Efficacy coefficient – free throws	0.216*	-0.080	0.231*	-0.150	0.143	0.002
Total situation-related efficacy	0.244**	0.000	0.263*	-0.056	0.360*	0.247

\* correlation is significant at the 0.05 level (2-tailed); \*\* correlation is significant at the 0.01 level (2-tailed)

**TABLE 6**  
CORRELATIONS BETWEEN THE DIMENSIONS OF SHORT HARDINESS SCALE WITH STANDARD SITUATION-RELATED EFFICACY VARIABLES AT BASKETBALL PLAYERS

Variables	Entire sample		Final sample		Residual sample	
	Control / Commitment	Challenge	Control / Commitment	Challenge	Control / Commitment	Challenge
Successful shots – two points	0.175	-0.039	0.168	-0.099	0.176	0.074
Unsuccessful shots – two points	0.193*	-0.048	0.213	-0.112	0.027	-0.024
Successful shots – three points	0.216*	0.057	0.227*	0.032	0.183	0.264
Unsuccessful shots – three points	0.172	0.039	0.173	0.019	0.056	0.127
Successful free throws	0.248**	-0.068	0.295*	-0.147	0.063	0.084
Unsuccessful free throws	0.121	-0.081	0.095	-0.119	0.179	-0.074
Assists	0.263**	-0.048	0.284*	-0.107	0.333	0.161
Offensive rebounds	0.111	0.082	0.087	0.097	-0.001	0.014
Defensive rebounds	0.119	0.002	0.089	-0.048	0.047	0.167
Steals	0.206*	-0.042	0.220	-0.110	0.162	0.005
Personal fouls	0.125	-0.040	0.144	-0.136	-0.173	-0.001
Turnovers	0.229*	-0.037	0.266*	-0.115	0.110	0.133

\* correlation is significant at the 0.05 level (2-tailed); \*\* correlation is significant at the 0.01 level (2-tailed).

riables: unsuccessful shots – two points and steals). In the residual sample of basketball players we did not find any statistically significant correlation. All statistically significant correlations are positive and very low to low. Not one statistically significant correlation is found with the hardiness dimension Challenge.

## Discussion and Conclusions

The main aims of the study were two-fold: firstly, to explore the latent structure of hardiness at Croatian top basketball players and secondly to gain an understanding of the relationship between obtained hardiness dimensions and situation-related efficacy in basketball. Using exploratory factor analysis technique, we found a two-component structure: Control / Commitment and Challenge. Different theoretical structure of three facets (commitment, control, and challenge) beneath the same super ordinate hardiness construct has been supported by confirmatory factor analysis in different cultures<sup>23</sup>. The Control / Commitment dimension is a mix between two »source« hardiness dimensions (control and commitment). It describes the belief that an individual is capable of reaching the goal together with the ability to feel influential in various life (in this case – basketball) situations. In other words, the person who has higher results in this dimension feels as capable and adjustable. However, both components that we obtained in this study accounted for a small percentage of the total variance explained (less than 40%). This result can contribute to arguing that the concept of hardiness is inherently problematic and plagued by definitional problems, problems of construct validity, measurement problems, and class, gender, and age biased<sup>24</sup>. The persistent appeal of hardiness con-

struct lies partially in researchers' desire to discover why some people are able to withstand the health-damaging effects of stress<sup>24</sup>, but very often with insufficient attention to important conceptual and methodological problems associated with this construct<sup>25</sup>. Additionally, one direction in the criticism of hardiness is not an all-mighty concept: studies of hardiness reflect the society-motivated trend that is easier to focus on individual problems and solutions rather than look for and try to change the social factors that affect health status and well-being<sup>24</sup>. In the case of basketball, hardly changeable social factors can be the relationships between coaches, players' managers, players, club government, sport policy, etc.

When considering the correlations between hardiness dimensions and situation-related efficacy parameters (standard and derived), as well as log variables, general findings can be summarized as following. There is a small number of statistically significant correlations between hardiness dimensions and situation-related efficacy parameters (standard and derived), as well as with log variables: all significant correlations are mainly very low or low and positively directed. Secondly, much more statistically significant correlations are found for the hardiness dimension Control / Commitment than for the dimension Challenge. Thirdly, the majority of statistically significant correlations are found in the final sample of basketball players rather than in the residual sample of players who played less: less than 10 minutes per game or less than 9 games in the championship. One general explanation of these results can lead to the possibility that multiple selected and several years trained basketball players may be very similar in many personal characteristics important for the success in sport, includ-

ing hardiness. Contrary to the fact that log variables in general are not significantly correlated with hardiness dimensions, it seems that more significant correlations appear in the final sample of basketball players, compared to the residual sample. Possible explanation can lead us to consider that more successful basketball players have higher hardiness, i.e. the dimension Control / Commitment. Both (better) situation-related efficiency and more desirable personality dimensions (in this case hardiness) could be reasons why the trainers choose permanent players to stay more in the game. However, most of the significant correlations are found in the entire sample: that fits to the previous explanation that multiple selected and high-level trained basketball players are a homogenous sample, in spite of smaller differences between two sub-samples. Moreover, the results of previous studies support the theory that it is difficult to distinguish between the players of different skill levels on the same competition level based solely on personality variables<sup>26</sup>. As it was found for hardiness and mental toughness<sup>13,27</sup>, the level of competition is a very important factor that can differentiate players in basketball. Low values and relatively small number of significant correlations between hardiness dimensions, situation-related efficacy parameters and log variables can be described in terms of overall influence of all psychological characteristics on sport performance that is only 20–30 percent<sup>28</sup>. If we avoid overestimating the differences in number of statistically significant correlations the in final and residual sample, this research stays in line with the results of these studies: the number of significant correlations in general is not so high, while their value is low to very low, although these differences are significant. Single psychological characteristic (in this case hardiness) is only one of the many factors that have influence on success in basketball<sup>28</sup>: top basketball players probably have a complex set of conative characteristics which are in their complex interactions, as well as in complex relationship with situation-related efficacy<sup>29</sup>. On the other hand, the dimension of Challenge can have an influence on tendency for accepting undesirable risk, for example, in game situation when some 'over-challenged' player shoots for three points in a very difficult game situation, in attempt to be responsible and help his team. From that point of view, the dimension Control / Commitment can reflect a more stable personality and more responsible approach to playing tendency. »Responsibility« point of view can be the explanation for the latent structure that we obtained in this research, where the items that represent the dimensions of Control and Commitment are unified in the same characteristic, a new dimension Control / Commitment, while the Challenge remains a separate dimension. However, much more significant correlations between situation-related efficacy with a dimension Control / Commitment can also reflect the specificity of basketball as a dynamic team sport, which requires a high-level of psychical and physical engagement of basketball players who have to be maximally responsible more than excessively brave. Of course, in a review of relevant stud-

ies about the issue of hardiness across cultures it is concluded that available evidence shows little or no cultural differences in the role of hardiness, which appears to be a factor in resilience under stress across cultures<sup>30</sup>. However, the challenge dimension can't have the same importance in different activities, during different types of stress events. For example, the challenge facet of hardiness predicts risk of alcohol abuse among respondents with recent deployment experience and this effect is greater for those with more difficult deployment experience<sup>32</sup>. The fact that the majority of statistically significant correlations between hardiness with situation-related efficacy and log variables, which we have found in the final sample of basketball players (who played more, on the level of game and on the level of the championship) can mean that players from the residual sample can have different approaches to playing that can be obvious in situation-related efficacy. The difference among final and residual sample is not found in the hardiness facets: Control / Commitment ( $t=-0.958$ ;  $p>0.20$ ) and Challenge ( $t=-0.306$ ;  $p>0.20$ ). Basketball players from the residual sample (mainly 'substitutes' or injured players) have to prove themselves to their coach trying to be persistent players in the first team, playing mostly during the basketball game. We can assume that they partially follow the instructions of the coach but simultaneously have their own strategies to make a good impression on the coach or trying to achieve the best contribution to team success.

The main advantage of this study is to examine the sample of top Croatian basketball players in which all available players in the A-1 Croatian basketball league were included<sup>18,32</sup>. The first shortcoming of this study may be a specificity of a particular event, i.e. 2006/2007 A-1 League Croatian Championship in basketball<sup>18,32</sup>. This championship showed a little uncertainty, because of the impossibility for any team to be relegated from the A-1 League (team »Zabok« dropped out immediately before the beginning of the championship). Secondly, from the beginning of the championship, two teams competitively dominated (»Cedevita« and »Svetlost«), so the rivalry for later Champions League was reduced, too. The disadvantage of this research may be the testing process, carried out in non-standardized conditions, performing testing hardiness in nine different Croatian cities separately. Researching only the players from A-1 league probably reduced the variability among the parameters of the situational efficacy as well as in hardiness. Examining four most successful Croatian teams (that play in regional ABA League) can increase the variability in situation-related efficacy, as well as in hardiness. One of the directions for future research can be the adjustment of the content of items of Short Hardiness Scale, specifically for the basketball situations, as a specific type of hardiness<sup>11</sup>. Likewise, improvements in future research can be done in few other directions: qualitative methodology could be used instead of quantitative<sup>26</sup>, the system of the evaluation of the successfulness of basketball players can be changed<sup>7,22</sup>.



From the practical aspect, basketball players with »unsatisfactory« hardiness profile can be trained in hardiness, during trainer's individualized methodical approach, using specific psychological preparations for sports competition (hardiness training, such as in the military context)<sup>33</sup>. Special attention has to be given to young, »substitute« (who play a short time in the game) or injured players, who have to be thought, but simultaneously very responsible. They don't have to be »blind followers« of coach's instructions, but don't have to accept risky playing strategies (for example, shooting for three points in inconvenient game situations). Especially, challenge facet stimulation has to be combined with improving stability of quality performance of individual players, projective-educational conversations, and increase of (perceived) team cohesion.

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## Acknowledgements

This article was supported by the Ministry of Science, Education and Sports of the Republic of Croatia (Grant No. 196-1962766-2751 to P.R., project »The population structure of Croatia – anthropogenetic approach«). The study was conducted as a by-product of a doctoral dissertation »Correlation between conative characteristics of top basketball players and the situational performance in basketball«. The support of my mentors PhD Vera Čubela Adorić and PhD Igor Jukić, as well as PhD Smiljka Horga and PhD Dražan Dizdar, who contributed with helpful comments during planning and writing the dissertation is gratefully acknowledged. I would like to thank Josip Lah, B.Sc. for his valuable comments and help in translation and PhD Igor Kardum, who gave a permission for using Croatian version of measuring instrument.

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## MENTALNA ČVRSTOĆA I SITUACIJSKA UČINKOVITOST VRHUNSKIH HRVATSKIH KOŠARKAŠA

### SAŽETAK

Glavni ciljevi istraživanja bili su: istražiti latentnu strukturu konstrukta mentalne čvrstoće kod hrvatskih najuspješnijih košarkaša i razumjeti odnos između dobivenih dimenzija mentalne čvrstoće i situacijske učinkovitosti u košarci. Situacijska učinkovitost pojedinih košarkaša u vrhunskim momčadima povezana je s konstelacijom niza relevantnih antropoloških i specifično psiholoških značajki, koje utječu na ponašanje košarkaša u stresnim situacijama sportskog treninga, a posebice tijekom košarkaške utakmice. Jedna od bitnih psiholoških značajki za otpornost pojedinca na ove oblike stresa jest mentalna čvrstoća košarkaša. U istraživanju je primijenjena Kratka skala čvrstoće (SHS), koja je metrijski prilagođena uzorku hrvatskih vrhunskih seniorskih košarkaša. Upitnik je primijenjen na uzorku od 107 najboljih košarkaša, neovisno u svih devet momčadi A-1 hrvatske košarkaške lige. Utvrđena je povezanost dimenzija mentalne čvrstoće sa standardnim i izvedenim parametrima situacijske učinkovitosti košarkaša, kao i sa zapisničkim varijablama. Analize latentne strukture instrumenta za mjerenje mentalne čvrstoće upućuje na postojanje dvije dimenzije karakteristične za hrvatski uzorak vrhunskih košarkaša, koje se mogu interpretirati kao izazov i kontrola-predanost. Relativno mali postotak objašnjene varijance (oko 40%) sugerira mogućnost dopunjavanja koncepta mentalne čvrstoće specifično za košarkaške situacije. Niske, ali statistički značajne pozitivne korelacije pronađene su između dimenzije kontrole – predanost i većeg broja standardnih i izvedenih parametara situacijske učinkovitosti. Nije pronađena niti jedna statistički značajna povezanost između dimenzije izazova i parametara situacijske učinkovitosti, kao ni zapisničkih varijabli. Ova studija ima glavnu važnost u kulturalnom prilagođavanju konstrukta mentalne čvrstoće najboljim hrvatskim košarkašima, pružajući dodatne informacije o odnosu mentalne čvrstoće i situacijske učinkovitosti košarkaša.