ST open

RESEARCH ARTICLE

Relations of psychological characteristics and team performance level in female volleyball players aged 12 to 15 years (U15)

Ena Vrselja,
Mirjana Milić

University of Split Faculty of Kinesiology, Split, Croatia

Aim: To validate the *Psychological Skills Inventory for Sport – Youth* (PSIS-Y) questionnaire on a sample of youth Croatian female volleyball players, and to determine psychological characteristics of players aged 12 to 15 years, as well as possible differences according to team (competitive) performance level in variables: motivation, self-confidence, anxiety control, mental preparation, team emphasis, and concentration.

Methods: The sample included 328 participants from 28 clubs competing at the national volleyball championship. We used the PSIS-Y questionnaire consisting of 44 items in 6 dimensions. Data analysis included validation of the questionnaire, descriptive parameters, and ANOVA to determine the differences in psychological dimensions between players at different performance levels, with the significance level set at $P \leq 0.05$. To determine the common effect of all the measured variables in differentiating the performance level between the groups of players, a multivariate procedure of discriminant analysis was used.

Results: The participants showed a high level of motivation, medium levels of concentration, self-confidence, anxiety control, and a low level of mental preparation. According to team performance level, significant differences were found in concentration (P=0.001), anxiety control (P=0.002), mental preparation (P=0.002), and motivation (P=0.034). The applied discriminant analysis yielded two statistically significant discriminant functions: the first function ($\chi 2$=27.54; P=0.002) differentiated the group of players with the highest index of team performance level from the groups with lower indices, whereas the second function ($\chi 2$=10.39; P=0.034) differentiated the group of players with the lowest index from the three more successful groups due to higher levels of motivation and anxiety control.

Conclusion: In comparison to previous findings, a decline in correlation between most psychological skills of youth female volleyball players and different levels of competitive team performance is noticed. This negative trend may be influenced by the increased importance of competition and an increased pressure put on youth players by their environment.

Correspondence to:
Mirjana Milić
University of Split Faculty of Kinesiology,
Teslina 6, 21000 Split, Croatia
mirjana.milic@kifst.eu

Cite as:
Vrselja E, Milić M. Relations of psychological characteristics and team performance level in female volleyball players aged 12 to 15 years (U15). ST-OPEN. 2022; 3: e2022.1907.31.

DOI:
https://doi.org/10.48188/so.3.1

Introduction

Volleyball is a team sports game available to everyone. It is part of the curricular and extracurricular program of physical education for students of both elementary schools and high schools and it is gaining popularity as a student sport and recreational activity, especially among the female population (Milić, 2014). The objective of volleyball is to send the ball over the net with no more than three touches (between members of the same team) and ground it on the opponent's field, or to take advantage of the opponent making a mistake, thus winning a point (Grgantov, 2005). This can be achieved only in a positive and stimulating team environment, defined by the harmony between team members and the coach, which is the main requirement for team functioning. To achieve these sports goals, it is necessary to involve a sports psychologist, whose task is to educate and help the coach in shaping the desirable patterns of the motivational climate, to nurture open communication and interpersonal relationships in terms of acceptance and care for one's teammates (Orlick & Partington, 1988).

It is a fact that athletes in team sports are forced to spend the majority of their time as part of the group, which does not necessarily mean that they like spending time with their colleagues, or are all compatible as persons. Many studies have proven that team motivational climate and cohesiveness greatly determine athlete's motivation and athletic achievement (Orlick & Partington, 1988; Alexander & Krane, 1996; Cox, Russell & Robb, 1999; Duda, 2001; Roberts, 2001; Jurko, 2013; Milavić, 2013; Galić, Protić, Žvan & Kondrič, 2014; Stanović, 2017; Stanović, Milić & Grgantov, 2020). Furthermore, in sports practice, top athletic achievements or unexpectedly poor achievements are often attributed to athletes' psychological skills (Stipkov, 2018). A "positive" example of pronounced psychological skills is an athlete or a sports team that does not exhibit particular characteristics of success during training or preparation but achieves exceptional success or success above expected during an important competition. A possible "negative" example is an athlete or a sports team with a high level of sports achievement and great success during training who cannot reproduce that level of success in a competition (Stanović, 2017). Orlick and Partington (1988) state that a crucial difference between successful and less successful athletes at the elite level is their difference in mental and psychological skills, emphasizing that by the acquisition of necessary skills and techniques, an athlete can not only achieve some of the sports goals more easily but also achieve higher levels of personal success and joy of living.

Most scientific papers in sports psychology study professional and elite athletes, either in individual or team sports (Schurr, Ashley & Joy, 1977; Mahoney, Gabriel & Perkins, 1987; Feltz, 1988; Klein, 1990; Chartrand, Jowdy & Danish, 1992; Feltz, 1994; Jones, Hanton & Swain, 1994; Van den Auweele, Nys, Rzewnicki & Van Mele, 2001; Gould, Dieffenbach & Moffett, 2001; 2002; Woodman & Hardy, 2003; Weinberg & Gould, 2011), to investigate the relations between athletes' psychological skills and their sports results to predict top athletic achievements or unexpectedly poor performance. Two extensive studies were recently conducted with youth Croatian volleyball players, aimed to determine the relations between psychological skills using variables: sex, age, playing position, and individual player performance level. New questionnaires for measuring athletes' psychological skills were

constructed within doctoral dissertations, which determined the relations between psychological constructs of cohesion, perceived collective efficacy, coaching behavior (Jurko, 2013), and anxiety, motivation, concentration, self-confidence, perceived competence for volleyball, usage of state self-regulation techniques (Milavić, 2013), and other variables.

Furthermore, on a sample of youth and junior female volleyball players, Milavić, Grgantov, and Veličkovska (2013) determined no significant differences in the level of psychological characteristics between groups of players playing at different positions within their team. They measured psychological characteristics with the *Athletic Coping Skills Inventory* (ACSI-28), constructed by Smith, Schutz, Smoll, and Ptacek (1995). As opposed to ACSI-28, the *Psychology Skills Inventory for Sports – Youth version* (PSYS-Y), constructed by Elferink-Gemser (2005), was developed to measure the psychological skills of young athletes – distinguishing between more talented and less talented young athletes. The questionnaire measures six dimensions: *mental preparation, motivation, concentration, self-confidence, team emphasis*, and *anxiety control*. This measuring instrument differentiates male and female athletes, individual and team sports athletes, and groups of athletes with different athletic skill levels (Milavić, 2013).

Sindik, Novokmet, and Havaš-Auguštin (2013), Milavić, Jurko, and Grgantov (2013), and Sindik (2014) used the PSIS-Y questionnaire in their studies and, by using factorial structure, determined satisfactory reliability in youth Croatian table tennis players and youth male and female volleyball players. Stipkov (2018) and Milavić (2013) used the PSIS-Y on a sample of youth and junior female volleyball players and confirmed satisfactory metric characteristics for five of the total six scales of the questionnaire. The *team emphasis* scale had an inadequate level of reliability.

A new problem is imposed: will a repeated measurement by applying factor analysis after a certain time interval on a large sample confirm previous findings on reliability and sensitivity of the PSIS-Y, and what multiple effect will it have on the competitive success of youth Croatian volleyball players? The aim of this study was to determine psychological characteristics of youth female volleyball players aged 12 to 15 years, and the possible differences according to team (competitive) performance level in variables *motivation, self-confidence, anxiety control, mental preparation, team emphasis*, and *concentration*, and to validate the PSIS-Y questionnaire on a sample of youth Croatian female volleyball players.

Participants and methods

The sample included 328 youth female volleyball players aged 12 to 15 years (U15), members of 28 clubs from all Croatian regions, participating at the open national volleyball championship. To make the sample as representative as possible, volleyball players from all regions were included, especially members of the best clubs at the national level.

All players from the 7 best-ranked clubs, i.e., 76 players, participated in this study, as the group of most successful players, with Index 4. The second group included 89 players from 8 clubs ranked between 8th and 15th place, representing the group of more successful players, with *Index 3*. The third group included 77 players from 7 volleyball clubs ranked

from 16th to 23rd place at the youth national championship, representing the group of less successful players with *Index 2*. The group of least successful players is represented by 86 volleyball players from 8 clubs ranked between 24th and 32nd place at the youth Croatian volleyball championship (U15).

Participants' mean chronological age was 14.62±0.71 years, whereas their mean training age was 36.44±15.32 months. Participants' mean body height was 172.05±6.18 cm, and their mean body mass was 57.52±8.79 kg. All subjects had ID cards provided by the Croatian Volleyball Federation and verified by an authorized sports physician.

The variable sample included the items of the PSIS-Y, by Elferink-Gemser et al. (2005), which consists of 44 statements and measures 6 dimensions: motivation, self-confidence, anxiety control, mental preparation, team emphasis, and concentration. The scale is a 5-point Likert-type scale with levels of assessment ranging from 1 – *I strongly disagree* to 5 – *I strongly agree*.

There was one dependent, i.e., grouping variable defined in this study: *Competitive (team) success* of players was determined by team placement among the 32 youth volleyball teams that participated at the open Croatian championship.

Description of the experimental procedure

In the first phase of the research, the date of the survey was set in agreement with the responsible persons from the volleyball clubs (Youth National Volleyball Championship). The coaches informed the players' parents about the reasons for conducting the research and obtained written consent for their underage children to participate in the research. Besides parental consent, permission to conduct the research during the national championship was also obtained from the umbrella organization, the Croatian Volleyball Federation.

In the second phase, the PSIS-Y questionnaire was filled out the day before the national championship in Rovinj started. The participants filled out the questionnaire in sports halls and the researcher emphasized the importance of answering honestly. In case some of the participants needed help when filling out the questionnaire or asked for some additional information, the researcher was available at all times.

In the final phase, team success was assessed based on the results achieved in the Youth National Volleyball Championship (Official website of the Croatian Volleyball Federation, competition results). The collected data were analyzed using the *Statistica Ver. 13.00* (StatSoft, SAD) computer program.

Methods of data analysis

Data analysis included validation of the applied questionnaire and analysis of metric characteristics of variables: motivation, self-confidence, anxiety control, mental preparation, and concentration, on a sample of youth female volleyball players. Basic metric characteristics of the scales were calculated: reliability – coefficient of internal consistency Cronbach's alpha, total explained variance, and sensitivity – coefficients of asymmetry (Skew) and peakedness (Kurt) of result distribution, minimum result (Min), maximum re-

sult (Max), and MaxD value were calculated for each scale to determine if the results of the applied variables deviate significantly from normal distribution by using the Kolmogorov-Smirnov test (KS test). All further procedures were oriented towards determining the validity of each scale.

After the factor analysis, descriptive statistics was calculated to determine mean values (corrected arithmetic mean) and measures of dispersion (standard deviation) of results. To allow the comparison of the results in scales with a different number of items (statements), the corrected arithmetic mean of the results of each scale was calculated by summing up the results of all items of the scale and then dividing that sum with the number of items of the scale [AM=(v1+v2+v3+...+vN)/N].

Univariate analysis of variance (ANOVA) was used to determine the differences in *motivation, self-confidence, anxiety control, mental preparation, team emphasis*, and *concentration* between players with different competitive performance, with the significance level set at $P \leq 0.05$.

To determine the common multivariate "effect" of all the measured variables in possible differentiation of competitive success between groups of players, a multivariate procedure of *discriminant analysis* was applied.

Results

The results of validation of the scales of the PSIS-Y questionnaire by using factor analysis are presented in **Tables 1-6**.

Table 1. Validation of the *Psychological Skills Inventory for Sport – Youth version – motivation (PSIS_MOT)* scale after the selection of items*

Statements	After the selection of items Components†	
	1	2
I am very motivated to do well in my sport.	0.65	0.15
I sometimes lack motivation to train.‡	§	§
Winning is very important to me.	0.17	0.42
Right now, the most important thing in my life is to do well in my sport.	0.16	0.89
My sport is my whole life.	0.12	0.87
I want to train hard to belong to the top in my sport.	0.75	0.28
In my sport, I want to bring out the best in myself.	0.81	0.04
I want to succeed in my sport.	0.66	0.22
Eigen	2.14	1.89
%	30.57	26.97
Alpha	0.73	
Standardized Alpha	0.75	

* Eigen – component eigenvalue variance; % – the percentage of explained variance; Alpha – Cronbach's alpha coefficient of reliability; Standardized Alpha – standardized Cronbach's alpha coefficient of reliability.
† Isolated factors (dimensions) of statements.
‡ Inverted statement (item).
§ Selected (isolated) statement (item).

After selecting one statement (item), a satisfactory coefficient of reliability Cronbach's alpha of 0.73 was obtained for the *motivation* scale, whereas the total explained variance was 57.54% (**Table 1**).

Table 2. Validation of the *Psychological Skills Inventory for Sport – Youth version – self-confidence (PSIS_SC)* scale*

Statements	Components†	
	1	2
In most competitions, I go in confident that I will do well.	-0.01	0.71
It doesn't take much to shake my self-confidence.‡	0.66	0.11
A minor injury or a bad practice can really shake my self-confidence.‡	0.78	-0.04
I have frequent doubts about my athletic ability.†	0.77	-0.20
When I begin to perform poorly, my confidence drops very quickly.‡	0.69	-0.39
I can usually remain confident even through one of my poorer performances.	-0.12	0.65
My self-confidence jumps all over the place.	0.04	0.74
I have faith in myself.	-0.34	0.66
Eigen	2.24	2.13
%	28.06	26.59
Alpha	0.73	
Standardized Alpha	0.75	

* Eigen – component eigenvalue variance; % – the percentage of explained variance; Alpha – Cronbach's alpha coefficient of reliability; Standardized Alpha – standardized Cronbach's alpha coefficient of reliability.
† Isolated factors (dimensions) of statements.
‡ Inverted statement (item).

A satisfactory Cronbach's alpha coefficient of reliability of 0.73 was obtained for the *self-confidence* scale, whereas the total explained variance was 54.65% (**Table 2**).

Table 3. Validation of the *Psychological Skills Inventory for Sport – Youth version – anxiety control (PSIS_AC)* scale*

Statements	Components†
	1
I am more tense before I perform than I am during the performance.	-0.26
I am often panic-struck during those last few moments before I begin my performance.‡	-0.71
I spend a lot of energy trying to stay calm before a meet.‡	-0.70
I get nervous because I want to start performing.‡	-0.65
I am anxious to perform in strange places.‡	-0.67
Before a meet, I worry if I will do well.‡	-0.68
Before important meets, I feel intense anxiety.†	-0.69
The period right before a performance feels unpleasant.‡	-0.72
Eigen	3.41
%	42.68
Alpha	0.80
Standardized Alpha	0.80

* Eigen – component eigenvalue variance; % – the percentage of explained variance; Alpha – Cronbach's alpha coefficient of reliability; Standardized Alpha – standardized Cronbach's alpha coefficient of reliability.
† Isolated factors (dimensions) of statements.
‡ Inverted statement (item).

A good coefficient of reliability Cronbach's alpha of 0.80 was obtained for the *anxiety control* scale, whereas the total explained variance was 42.68%.

Table 4. Validation of the *Psychological Skills Inventory for Sport – Youth version – mental preparation (PSIS_MP)* scale*

Statements	Components†
	1
I often dream about competition.	-0.60
I often "rehearse" my performance in my head before I perform.	-0.71
When I mentally practice my performance, I "see" myself performing – just like I was watching a videotape.	-0.74
When I am preparing to perform, I try to imagine what it will feel like in my muscles.	-0.69
When I close my eyes, I can imagine what my muscles feel like.	-0.73
I prepare for a meet by making mental representations of my performance.	-0.71
Eigen	2.91
%	48.54
Alpha	0.79
Standardized Alpha	0.79

* Eigen – component eigenvalue variance; % – the percentage of explained variance; Alpha – Cronbach's alpha coefficient of reliability; Standardized Alpha – standardized Cronbach's alpha coefficient of reliability.
† Isolated factors (dimensions) of statements.
‡ Inverted statement (item).

A good coefficient of reliability Cronbach's alpha of 0.79 was obtained for the *mental preparation* scale, whereas the total explained variance was 48.54%.

Table 5. Validation of the *Psychological Skills Inventory for Sport – Youth version – team emphasis (PSIS_TE)* scale after the selection of items*

Statements	After the selection of items	
	Components†	
	1	2
I get very frustrated when a teammate is performing poorly.	0.78	0.05
I am more focused on my own performance than that of my team.	0.54	-0.33
I think team spirit is very important.	-0.04	0.61
When my team loses, I feel bad–no matter how well I did as an individual.	§	§
I think the performance of the team is more important than my individual performance.	0.08	0.50
If my teammates don't exert themselves to the utmost, I get angry.	0.78	0.25
If I decline the performance level of the team, I have to be replaced.	0.01	0.71
Eigen	1.52	1.31
%	25.29	
Alpha	0.36	
Standardized Alpha	0.35	

* Eigen – component eigenvalue variance; % – the percentage of explained variance; Alpha – Cronbach's alpha coefficient of reliability; Standardized Alpha – standardized Cronbach's alpha coefficient of reliability.
† Isolated factors (dimensions) of statements.
‡ Inverted statement (item).
§ Selected (isolated) statement (item).

After selecting one item, an unacceptable coefficient of reliability Cronbach's alpha of 0.36 was obtained for the *team emphasis* scale, whereas the total explained variance was 25.29%; thus, the scale was excluded from further analysis.

Table 6. Validation of the *Psychological Skills Inventory for Sport – Youth version – concentration (PSIS_CON)* scale after the selection of items*

Statements	After the selection of items Components†	
	1	2
I often have trouble concentrating during my performance.‡	0.70	-0.28
I experience frequent "hot streaks" in which my performance is unusually good.	§	§
When I am performing poorly, I tend to lose my concentration.‡	0.69	0.16
During my performance I am incommoded by comments of people surrounding me.‡	0.76	0.14
At the beginning of my performance, I have trouble forgetting things I was doing before.‡	0.73	0.22
During my performance, others distract me.‡	0.70	0.01
I can concentrate better on a difficult meet than on an easy one.	0.10	0.95
Eigen	2.59	1.08
%	43.13	17.95
Alpha	0.72	
Standardized Alpha	0.72	

* Eigen – component eigenvalue variance; % – the percentage of explained variance; Alpha – Cronbach's alpha coefficient of reliability; Standardized Alpha – standardized Cronbach's alpha coefficient of reliability.
† Isolated factors (dimensions) of statements.
‡ Inverted statement (item).
§ Selected (isolated) statement (item).

After selecting one item, a satisfactory coefficient of reliability Cronbach's alpha of 0.72 was obtained for the *concentration* scale, whereas the total explained variance was 60.08%.

Descriptive statistics parameters of 5 validated and acceptable scales of the PSIS-Y questionnaire are presented in **Table 7**.

Table 7. Descriptive parameters and metric characteristics of validated scales of the questionnaire: *Psychological Skills Inventory for Sport – Youth version**

Variables	Number of items	Am	Sd	Cronbach's Alpha	D (KS test)	Min	Max	Skew	Kurt
PSIS_Motivation	7	4.26	0.53	0.73	0.14	2.14	5.00	-1.08	1.51
PSIS_Self-confidence	8	3.48	0.65	0.73	0.06	1.50	5.00	-0.02	-0.37
PSIS_Anxiety†	8	3.23	0.80	0.80	0.08	1.13	5.00	-0.25	-0.46
PSIS_Mental preparation	6	2.88	0.91	0.79	0.05	1.00	5.00	0.08	-0.48
PSIS_Concentration†	6	3.22	0.83	0.72	0.07	1.00	5.00	-0.25	-0.46

*Abbreviations: Am – arithmetic mean; Sd – standard deviation; Cronbach's Alpha – coefficient of internal consistency; D – coefficient of the K-S test (significance of the K-S test coefficient); Skew – measure of distribution symmetry; Kurt – the measure of distribution shape.
† Inverted scale.

As shown in **Table 7**, the scales of *motivation, self-confidence*, and *concentration* had satisfactory coefficients of reliability Cronbach's alpha (0.72, 0.72, and 0.73, respectively), whereas the scales of *anxiety control* and *mental preparation* had good reliability (0.79 and 0.80, respectively). The team emphasis scale, which measures an individual's feeling of belonging to a group and personal contribution to the team, does not have acceptable and satisfactory reliability, and it is possible that this construct is still not fully developed among young players, thus it is excluded from further analysis.

Mean values of the scales show that young female volleyball players have high levels of *motivation* (4.26±0.53) for practicing volleyball, medium levels of *concentration* (3.22±0.83), *self-confidence* (3.48±0.65), and *anxiety control* (3.23±0.80), and low levels of *mental preparation* (2.88±0.91). Even though the distribution of results in two of the five scales deviates significantly from a normal distribution (*motivation* and *anxiety control*), considering the satisfactory results in other sensitivity indicators (range of results, skewness, and kurtosis), parametric statistical procedures will be used in further analysis of all variables to determine the differences between the groups.

The results of the analysis of differences (ANOVA) in psychological skills between the groups of youth players at different levels of *team performance* are presented in **Table 8**.

Table 8. Analysis of variance in the level of psychological skills in groups of youth players at different levels of team performance*

Variables	Categories of team (competitive) success								F	*P*
	Most successful N-76		More successful N-89		Less successful N-77		Least successful N-86			
	Am	Sd	Am	Sd	Am	Sd	Am	Sd		
PSIS_Motivation	4.18	0.61	4.30	0.45	4.39	0.50	4.18	0.54	2.93†	0.034
PSIS_Self-confidence	3.54	0.65	3.43	0.60	3.49	0.73	3.47	0.65	0.37	0.78
PSIS_Anxiety†	3.46	0.68	3.09	0.85	3.05	0.91	3.36	0.70	5.13‡	0.002
PSIS_Mental preparation	2.77	0.94	3.20	0.92	2.78	0.96	2.75	0.77	5.00‡	0.002
PSIS_Concentration†	3.50	0.66	2.98	0.95	3.26	0.91	3.19	0.69	5.71§	0.001

* Abbreviations: Am – arithmetic mean; Sd – standard deviation; F – coefficient of analysis of variance; *P* – level of statistical significance.
† Statistically significant at level *P*<.05.
‡ Statistically significant at level *P*<.01.
§ Statistically significant at level *P*<.001.
† Inverted scale.

By applying univariate analysis of variance on four groups of players at different levels of *team performance*, significant differences were found in four of the five measured psychological skills: *concentration* (*P*=0.001), *anxiety control* (*P*=0.002), *mental preparation* (*P*=0.002), and *motivation* (*P*=0.034). There were no significant differences between these groups of players in the *self-confidence* variable.

The discriminant analysis results of *psychological skills* between groups of youth players at different levels of *team performance* are presented in **Table 9**.

Table 9. Discriminant analysis of psychological skills in groups of youth players at different levels of team performance*

DF	λ	Rc	Wλ	χ^2	df	*P*
1	0.08	0.27	0.86	50.42	15	0.000†
2	0.07	0.25	0.92	25.95	8	0.001†
3	0.01	0.12	0.99	4.58	3	0.21

Variables	Structure matrix		
	1	2	3
PSIS_Motivation	0.26	0.56	-0.15
PSIS_Self-confidence	-0.20	0.02	-0.16
PSIS_Anxiety‡	-0.58	-0.55	0.05
PSIS_Mental preparation	0.70	-0.15	-0.66
PSIS_Concentration‡	-0.78	0.04	-0.55
Category of team success	**Group centroids**		
	1	2	3
Most successful	-0.35	-0.15	-0.14
More successful	0.42	-0.10	-0.07
Less successful	-0.04	0.47	0.02
Least successful	-0.08	-0.18	0.18

* Abbreviations: λ – eigenvalue of discriminant function; Rc – coefficient of canonical correlation; Wλ –Wilks' lambda coefficient of discriminant function; df – degrees of freedom; χ^2 – test of significance of discriminant function – χ^2 test; *P* – level of statistical significance of DF (χ^2 - test).
† Level of significance of DF set at *P*<.05.
‡ Inverted scale.

Multivariate discriminant analysis on a predictor set of psychological skills, with the aim to discriminate between groups of youth female volleyball players at different levels of team performance, yielded two statistically significant discriminant functions.

The first function discriminates the group of players at the second level, who have a higher team performance level, from the other three groups of players with lower indices of team performance and the highest level of team performance. By examining group centroids (group's projection on the discriminant function), it was determined that the two groups of more successful players were highly differentiated from the two groups of less successful players.

The group of players with the highest team performance index is characterized by a high level of difficulties with *concentration* (-0.78) and a higher level of anxiety (-0.58). Furthermore, more successful players are defined by a high level of *mental preparation* coefficient (0.70), which indicates they are more mentally ready to play than the other groups of young players.

The second function discriminates the group of less successful players from the other three groups of players. The group of less successful players is quantitatively characterized by higher levels of *motivation* (0.56) and *anxiety*, as the scale is inverted, negatively oriented (-0.55).

Discussion

By applying univariate analysis of variance on four groups of players at different levels of *team performance*, significant differences were found in four of the five measured psychological skills: *concentration* (*P*=0.001), *anxiety control* (*P*=0.002), *mental preparation* (*P*=0.002), and *motivation* (*P*=0.034). There were no significant differences between these groups of players in the *self-confidence* variable.

It can be assumed that a higher level of the previous success of players from the most successful teams leads to higher expectations regarding athletic results of those teams, which may put the players under higher pressure which they cannot easily "control". Hence, they exhibit higher levels of *anxiety*. It is also possible that in the most successful teams, precisely because of those high expectations within the team, there is a form of rivalry or a lower level of *cohesion*. Thus, the players are more anxious and worried about their performance. As team *cohesion* was not measured in this study, it is merely a speculation, which can be the subject of future studies, but the basis for this speculation is Cox's (1987, 2005) statement that *state anxiety* of athletes in teams that exhibit higher levels of cohesion is significantly lower than in teams with lower levels of cohesion. Hence, if a team achieves high levels of cohesion, all the players in that team will play more freely and with fewer reactions of their teammates on their possible mistakes. Generally, by observing the overall *anxiety* results in all four groups, it can be stated that *anxiety control* is not high, and it is necessary to work more on players' anxiety control in all the groups.

Validation of the PSIS-Y questionnaire scales revealed satisfactory coefficients of reliability in the scales of *motivation, self-confidence*, and *concentration*, and good reliability in the scales of *anxiety control* and *mental preparation*. The *team emphasis* scale, which measures an individual's feeling of belonging to a group and personal contribution to the team, does not have acceptable and satisfactory reliability, and it is possible that this construct is still not fully developed among young players. The same results were obtained by Stipkov (2018) in a study conducted at the National Volleyball Championship two years ago. Mean values of the scales show that youth female volleyball players have high levels of *motivation* for practicing volleyball, medium levels of *concentration*, *self-confidence*, and *anxiety control*, and low levels of *mental preparation*, which can be explained by the fact that young volleyball players are not familiar enough with the techniques which would prepare them for the matches or training to achieve better athletic results and achievements. By comparing these findings with the results obtained by Stipkov (2018), the results are similar. However, in a study conducted by Milavić (2013), junior and cadet female volleyball players had lower values of all four psychological variables, except for *concentration*. The other psychological variables (*motivation, self-confidence, anxiety control*, and *mental preparation*) are much lower in older age groups. Considering this is a cross-sectional study, causation between the analyzed variables cannot be determined. The possible reasons could be that in older age groups teams have already been selected, i.e., players are better specialized for their playing role, the competition between players is much stronger, and expectations are much higher (players are expected to perform at the top level, with very few mistakes due to poor performance of volleyball elements).

Multivariate discriminant analysis on a predictor set of psychological skills, with the aim to discriminate between groups of youth female volleyball players at different levels of team performance, yielded two statistically significant discriminant functions. The first function discriminates the group of players at the second level, who have a higher team performance level, from the other three groups of players with lower indices of team performance and the highest level of team performance. By examining group centroids (group's projection on the discriminant function), it was determined that the two groups of more successful players were highly differentiated from the two groups of less successful players. The group of players with the highest index of team performance is characterized by a high level of difficulties with *concentration* and a higher level of *anxiety*, i.e., greater feeling of pressure which cannot be controlled. The second function discriminates the group of less successful players from the other three groups of players. The group of less successful players is quantitatively characterized by higher levels of *motivation* and *anxiety*. These results are congruent with previous findings of Stipkov (2018), who conducted the study also on the sample of youth female volleyball players of approximately the same chronological age, and Milavić (2013), who performed research on male and female volleyball players with somewhat higher chronological age and found lower quantitative values of the measured dimensions.

The scientific contribution of this paper is the validation of the measuring instrument on a large sample of participants and the confirmation of previous findings on the psychological skills of youth female volleyball players. To properly understand the causal relationship between the analyzed psychological variables and competitive performance, it is necessary to conduct experiments to determine how changes in a psychological skill affect competitive performance and how changes in competitive performance affect psychological skills. By comparing the results of this study with previous studies investigating this problem, a decline in the level of correlation between most psychological skills of youth female volleyball players and different levels of competitive team performance is noticed. This negative trend may be influenced by the increased importance of competition and an increasing pressure put on youth players by their environment, and it should be investigated further. If it is established that the increased pressure from the environment actually does affect the decline of psychological skills, it will be necessary to work systematically on multiple levels to change that. The first level is to act educationally on persons who turn out to be the cause of stress (parents, coaches, club management), to relieve or eliminate the "source" of stress. The second level is to develop stress coping skills in youth female volleyball players, i.e., to develop psychological skills that could improve performance in a competition.

All of the above emphasizes the necessity of developing these psychological skills in youth players, but also of systematic work of the expert team, which should certainly include a sports psychologist.

Provenance: Submitted. This manuscript is based on the master's thesis by Ena Vrselja at the University of Split Faculty of Kinesiology, and deposited in the Dabar repository (https://urn.nsk.hr/urn:nbn:hr:221:743708).

Peer review: Externally peer reviewed.

Received: 1 May 2021 / **Accepted:** 20 October 2021 / **Published online:** 17 February 2022.

Acknowledgements: We are grateful to all players and coaches who participated in this study and the Croatian Volleyball Association for support of this study, which was carried out during the National Championships of the Age groups. Special appreciations to our colleague Boris Milavić, PhD in psychology, for helping us create this scientific graduation thesis.

Funding: This research received no specific grant from any funding agency in public, commercial or not-for-profit sectors.

Ethics approval: The Ethics Committee of the Faculty of Kinesiology has determined that the presented research project fully meets the ethical standards of research on human beings, and there are no legal and ethical obstacles to conducting scientific research on young volleyball players to determine the relationship between psychological characteristics and team performance.

Authorship declaration: AV has contributed in all study phases, such as acquisition, input, data analysis, data interpretation, and manuscript drafting. MM has contributed in all phases of the study, participated in study design, formulating hypothesis and title, creating and executing experimental methods, data analysis and interpretation of the results and drafting the manuscript. Both authors approved the final version of the manuscript.

Competing interests: The authors completed the ICMJE Unified Competing Interest form (available upon request from the corresponding author), and declare no conflicts of interest.

ORCID

Mirjana Milić https://orcid.org/0000-0002-6914-8666

References

Alexander, V., & Krane, V. (1996). Relationships among performance expectations, anxiety, and performance in collegiate volleyball players. *Journal of Sport Behavior, 19*(3), 246–269.

Chartrand, J. M., Jowdy, D. P., & Danish, S. J. (1992). The psychological skills inventory for sports: Psychometric characteristics and applied implications. *Journal of Sport and Exercise psychology, 14*(4), 405–413.

Cox, R. H. (1987). Relationship between psychological variables and player position in women's volleyball. *Unpublished manuscript, Kansas State University*.

Cox, R. H. (2005). *Psihologija sporta. Koncepti i primjene* [Sport psychology. Concepts and applications]. Jastrebarsko: Naklada Slap.

Cox, R., Russell, W., & Robb, M. (1999). Comparative concurrent validity of the MRF-L and ARS competitive state anxiety rating scales for volleyball and basketball. *Journal of Sport Behavior, 22*(3), 310–320.

Duda, J. L. (2001). Achievement Goal Research in Sport: Pushing the Boundaries and Clarifying Some Misunderstandings. In G. C. Roberts (Ed.), *Advances in Motivation in Sport and Exercise* (pp. 129–182). Leeds: Human Kinetics.

Elferink-Gemser, M. T., Visscher, C., Lemmink, K. A., & Mulder, T. W. (2004). Relation between multidimensional performance characteristics and level of performance in talented youth field hockey players. *Journal of Sports Science, 22*(11–12), 1053–1063.

Feltz, D. L. (1988). Self-confidence and sport performance. In K. B. Pandolf (Ed.), *Exercise and sport science reviews* (pp. 423–457). New York: Macmillan.

Feltz, D. L. (1994). Self-confidence and performance. In D. Druckman & R.A. Bjork (Eds.), *Learning, remembering, believing: Enhancing human performance* (pp. 173–206). Washington, DC: National Academy Press.

Galić, B., Protić, I., Žvan, M., & Kondrič, M. (2014). Psychological characteristics of young tennis players; Correlation with feedback and coaching leadership style. *Gymnasium, Scientific Journal of Education, Sports, and Health, 15*(2), 39–45.

Gould, D., Dieffenbach, K., & Moffett, A. (2001). *The Development of Psychological Talent in U.S. Olympic Champions - Final Grant Report.* Sport Science and Technology Division of the United States Olympic Committee (USOC).

Gould, D., Dieffenbach, K., & Moffett, A. (2002). Psychological Characteristics and Their Development in Olympic Champions. *Journal of Applied Sport Psychology. 14*(3), 172–204.

Grgantov, Z. (2005). *Identification of volleyball players' morphological-motor structures in relation with age and situation efficiency* (Unpublished doctoral dissertation). University of Zagreb, Faculty of Kinesiology, Zagreb.

Jones, G., Hanton, S., & Swain, A. B. J. (1994). Intensity and interpretation of anxiety symptoms in elite and non-elite sports performers. *Personality and Individual Differences, 17*(5), 657–663.

Jurko, D. (2013). *Construction and initial validation of a questionnaire assessing group properties in volleyball* (Unpublished doctoral dissertation). University of Split, Faculty of Kinesiology, Split.

Klein, D. (1990). Anxiety and sport performance: A meta-analysis. *Anxiety Research, 2*(2), 113–131.

Mahoney, M. J., T. J. Gabriel, T. S. Perkins. (1987). Psychological skills and exceptional athletic performance. *The Sport Psychologist, 1*(3), 181–199.

Milavić, B. (2013). *Construction and validation of a questionnaire assessing psychological characteristics in volleyball players*. Doctoral Thesis. Split: University of Split, Faculty of Kinesiology.

Milavić, B., Jurko, D., & Grgantov, Z. (2013). Relations of Competitive State Anxiety and Efficacy of Young Volleyball Players. *Collegium Antropologicum, 37*(Suppl 2), 83–93.

Milavić, G., Grgantov, Z., & Veličkovska, L. A. (2013). Age and positional differences in psychological coping skills of young female volleyball players. *Research in Physical Education, Sport and Health, 2*(1), 9–16.

Milić, M. (2014). *Intra-positional and inter-positional differences among young female volleyball players in some anthropological characteristics* (Unpublished doctoral dissertation). University of Split, Faculty of Kinesiology, Split.

Orlick, T., & Partington, J. (1988). Mental links to excellence. *The Sport Psychologist, 2*(2), 105–130.

Roberts, G. C. (2001). Understanding the Dynamics of Motivation in Physical Activity: The Influence of Achievement Goals on Motivational Processes. In G.C. Roberts (Ed.), *Advances in Motivation in Exercise and Sport* (pp. 1–50). Champaign, IL: Human Kinetics.

Schurr, K. T., Ashley, M. A., & Joy, K. L. (1977). A multivariate analysis of male athlete personality characteristics: Sport type and success. *Multivariate Experimental Clinical Research, 3*(2), 53–68.

Sindik, J., Novokmet, N., & Havaš-Auguštin, D. (2013). The application of psychological skills inventory for sports at Croatian coaches and recreational table tennis players. *Sports Sciences, 6*(1), 54–60.

Sindik, J. (2014). The Comparison of the Psychological Skills in Sport Trainers and recreational table tennis players. *Fizička kultura, 68*(2), 148–156.

Smith, R. E., Schutz, R. W., Smoll, F. L., & Ptacek, J. T. (1995). Development and validation of a multidimensional measure of sport-specific psychological skills: The Athletic Coping Skills Inventory-28. *Journal of sport and exercise psychology, 17*(4), 379–398.

Stanović, N. (2017). *Relations between self-esteem and psychological characteristics of youth female volleyball players* (Unpublished master's thesis). University of Split, Faculty of Kinesiology, Split.

Stanović, N., Milić, M., & Grgantov, Z. (2020). Competitive state anxiety and self-esteem in youth female volleyball players of different player roles and competitive efficacy. *Acta Kinesiologica, 14*(1), 64–66.

Stipkov, M. (2018). *Psychological characteristics of youth female volleyball players* (Unpublished master's thesis). University of Split, Faculty of Kinesiology, Split.

Van den Auweele, Y., Nys, K., Rzewnicki, R., & Van Mele, V. (2001). Personality and the Athlete. In Singer R.N., H.A. Hausenblas, & C.M. Janelle (Eds.), *Handbook of sport psychology* (2nd ed), (pp. 239–268). New York: John Wiley & Sons Inc.

Weinberg, R., & Gould D. (2011). *Foundations of Sport and Exercise Psychology* (5th ed). Champaign, Leeds: Human Kinetics.

Woodman, T., & Hardy, L. (2003). The relative impact of cognitive anxiety and self-confidence upon sport performance: a meta-analysis. *Journal of Sports Sciences, 21*(6), 443–457.