

## ASSESSMENT OF CONATIVE CHARACTERISTICS OF YOUNG TABLE TENNIS PLAYERS

Snežana Vujanović<sup>1</sup>, Branko Đukić<sup>1</sup>, Mane Mirković<sup>1</sup>, & Mihailo Miletić<sup>1</sup>, Ivana Ivanek<sup>2</sup>

<sup>1</sup>Provincial Institute of Sport and Sports Medicine, Novi Sad, Serbia

<sup>2</sup>Srednja muzička škola Čestmir Mirko Dušek, Tuzla, BiH

### Abstract

The aim of this study was to analyze the conative personality traits of young table tennis players aged 15–19 years. The assessment of conative characteristics was carried out using the PIE test, completed by the best cadet boys and girls, and junior boys and girls who were preparing for the European Youth Championships in Sweden. Based on the analysis of conative dimensions, it was determined that pronounced values prevail in the dimensions of incorporation and protection, which indicates a strong need for acceptance, cooperation and respect for authority, accompanied by emotional sensitivity, tension and the possibility of developing competitive anxiety. Elevated values in the dimensions of exploration and reproduction confirm conscientiousness, planning and self-control, which is favorable for sports success. Lower values in orientation, aggression and rejection suggest good emotional and behavioral control, but also potential passivity in situations that require decisiveness, energy and combativeness in achieving one's goals. The obtained results indicate that the emotional–conative characteristics of table tennis players represent an important segment of their sports success and that understanding these characteristics is crucial for adequate planning of psychological preparation and individualization of the training process.

**Key words:** table tennis, personality dimensions, sports performance

### Introduction

Achieving success in a particular sport is determined by a large number of factors, abilities, and characteristics that are necessary for athletes to meet the specific demands and structure of a given sport. Knowledge of the hierarchy of anthropological characteristics and abilities that are dominant for a particular sport should serve sports professionals as a starting point for managing the training process (Đukić, Vujanović, Strajnić & Ivanek, 2018).

Mental and emotional strength, alongside an adequate level of other performance components, enables athletes to attain a high level of competitive efficiency. Focus, emotional stability and composure are psychological attributes that are necessary for the successful execution of specific technical and tactical tasks in both training and competition.

The great complexity of table tennis, the presence of numerous technical–tactical elements, and the very short time frames in which players exchange strokes require all abilities to be at a high level. High-quality execution of movements and strokes used to win points demands excellent technical–tactical, physical

and mental preparation of players. If one link in this chain of preparation fails, there is a high probability that the athlete will not be successful in winning points, sets, matches or tournaments.

How a player behaves in a given situation depends on how he or she perceives and evaluates that situation, on various abilities and reactions to the situation, but also on internal factors that are characteristic of that individual, which drive activity and direct and regulate it (Ivanek, P., Mikić & Ivanek, V., 2023).

Sports competitions are at the same time physical and technical–tactical, but also mental battles. The importance of psychological factors is confirmed in every competition (Lazarević, 2003). The aim of our study is to analyze the conative personality traits of young athletes aged 15–19 years who are successfully engaged in table tennis.

### Conative abilities in table tennis

Performance in table tennis is determined by the quality and quantity of motor skills and by those anthropological characteristics that are most important for this sport. Knowledge of the hierarchy of significant determinants of success in table tennis is the primary precondition that sports experts and players must know in order to design adequate training (Đukić, Ivanek, Vujanović & Glamočić, 2018).

Table tennis is one of the fastest ball games, with ball speeds reaching up to 170 km/h, which, in addition to well-developed motor abilities and cognitive characteristics, also requires good conative abilities. Emotional stability, combativeness, persistence and self-confidence are some of the conative characteristics that must be at a high level for a table tennis player to be successful and efficient in competition.

Victory in a table tennis match goes to the player who first wins 11 points, or two points more in situations when both players have 10 points. Points last only a few seconds, that is, a few exchanges of strokes. The next point is played 5–20 seconds after the previous one. For the player to remain focused and psychologically stable for the next point, concentration and composure must be at a level that allows the execution of movements and strokes in the best possible way.

The competitive structure of table tennis sometimes implies that a major competition lasts 5–8 days, during which athletes compete continuously. Over the course of one competition day, table tennis players may play 6–7 matches, that is, around 30 sets, which represents a substantial psychophysical workload. All these demands of table tennis point to the importance of certain conative traits that have an equally important role in the final result.

Table tennis is a sport characterized by high dynamics, rapid changes of situations and a demand for precise motor reactions, which creates the need for an individualized approach in the training process. Each player has specific motor, technical, tactical and psychological characteristics that affect his or her efficiency in the game.

Therefore, individual work is necessary to identify and improve specific weaknesses, develop players' dominant strengths and optimize their technical-tactical repertoire. Especially in younger age

categories, individualization of training enables the proper acquisition of basic technical elements and the formation of stable motor habits, which is a prerequisite for later achieving a high level of sports success.

### **The PIE–JRS test as a psychodiagnostic instrument**

The study used the Profile Index of Emotions (PIE) by Robert Plutchik and Henry Kellerman, whose Yugoslav revision and standardization was carried out by psychologist Petar Kostić. The PIE–JRS is based on Plutchik's theory of eight basic emotions, which aims to encompass the entire personality, whereby emotions are combined and structured into personality traits.

The PIE is a classic forced-choice test – it consists of 62 pairs of traits, and the respondent's task is to circle the one that describes him or her better in each pair. It is interesting that in this way respondents directly evaluate the presence of 12 selected personality traits, on the basis of which a profile is obtained, composed of eight basic emotions and a BIAS scale. This way of responding is more difficult to control and differs from the standard approach where personality traits are inferred indirectly by responding to a series of statements (Kurbalija, 2006).

According to Kostić (2003), Plutchik's model of emotions is based on the following assumptions:

- a) There are eight basic emotions common to humans and animals. As with Darwin, Plutchik defines emotions as phylogenetically significant for higher animal species. However, unlike Darwin, in Plutchik's view emotions are neither useless nor "fossilized": in humans they are enriched by reason and verbal expression.
- b) Emotions serve as "building material" for structuring countless personality traits: two or more emotions become "cemented" and function as relatively stable, consistent and autonomous behavioral dispositions.
- c) Emotions are a "complex consequence of a chain of events" that begins with the perception of emotional stimuli. When emotional stimuli are cognitively processed, an impulse arises for behavior and action on the environment in order to adapt.

Plutchik (2006) believes that personality traits are essentially stable manifestations of emotional tendencies and fundamentally stem from them.

There are eight primary emotions, and in the test they represent the examined personality dimensions: Incorporation – the emotional state of acceptance; Protection – fear; Orientation – the emotional state of impulsivity; Rejection – the state of refusal; Exploration – the state of planning and anticipation; Deprivation – sadness; Aggression – anger; Reproduction – joy. The test also contains a scale for assessing socially desirable responding.

The test includes 12 different personality trait terms combined into pairs that represent the items of the personality test. The categories for evaluation are defined in accordance with the theory of emotions. The results show the representation of each of the eight basic emotions and make it possible to gain insight into personality traits and analyze personality structure (Milanović & Šupljika, 1997).

In the Manual for the PIE–JRS Profile Index of Emotions, Yugoslav Revision and Standardization (Kostić, 2003), it is stated that the test is administered so that respondents circle in each pair of traits one of the two offered traits that best describes them. Before circling one of the two traits in a pair, they must read the definitions of those traits. The most important rule is that, in each of the 62 pairs, only one trait should be circled. Each pair of traits is considered separately, independently of all the others. Therefore, it is normal that one does not have to choose the same trait when encountering it again.

In this study, the degree of expression of dimensions obtained on the PIE–JRS test was divided into three categories: (1) the trait is “below average”, meaning below the 40th percentile; (2) the trait is “within the average”, meaning between the 40th and 60th percentile; (3) the trait is “above average”, meaning above the 60th percentile.

## Methods

The study was conducted on a sample of 8 (eight) table tennis players aged 15–19 years who compete for the national table tennis team of Serbia. The assessment of conative characteristics was carried out using the PIE test, completed by the best cadet boys and girls (players under 15 years of age) and the best

junior boys and girls (players aged 15 to 19 years) who were preparing for the European Youth Championships in Sweden. Testing was conducted during the national team training camp in July 2025 in Subotica.

For planning the training process, it is crucial for coaches to have insight into the current psychophysical status of the athletes. Coaches apply different training methods and loads to improve the most important abilities and characteristics of athletes, and they measure and control them with the help of specific measuring instruments (Đukić & Vujanović, 2023).

To assess conative characteristics, the PIE–JRS (Profile Index of Emotions) was used, which is a standardized and validated instrument for examining emotional–motivational personality dimensions. In previous research, this test has shown high reliability and applicability not only in sports, but also in other fields of social and behavioral sciences. PIE–JRS has been used, among other things, in research on the personality of inmates of the Foča Correctional Facility who did not commit murder (Jovanović, Novaković, Petrović, & Salamadić, 2012) and in analyzing the profile of school bullies (Vukčević, 2018), which confirms its broad use and psychometric validity.

## Results and Discussion

In the presentation of results, the dimensions of conative characteristics of younger age-category table tennis players were analyzed, with the aim of determining their level of expression and differences between cadets and juniors. The Profile Index of Emotions by Robert Plutchik and Henry Kellerman was used, with Yugoslav revision and standardization by Petar Kostić. This instrument enables a comprehensive assessment of conative status through nine dimensions: incorporation (INK), protection (ZAŠ), orientation (ORI), deprivation (LIŠ), rejection (ODB), aggression (AGR), exploration (IST), reproduction (REP) and tendency to give socially desirable responses (BIAS).

Vukčević (2018) described these nine personality dimensions as follows:

- **Incorporation** is associated, among other things, with acceptance of the norms and values of the socio-cultural environment,

based on prior experiences that such acceptance is pleasant and useful. It indicates the trust a person has in relationships with significant others. A person with developed incorporation strives to present a favorable image of himself or herself to others and to be accepted in the environment in which he or she lives. Excessively developed incorporation indicates gullibility or excessive suggestibility. A person with insufficient incorporation lacks experiences of trust in relationships with people and is indifferent to the values and conventions of his or her environment (Kostić, 1997; Lamovec, 1997).

- **Protection** refers to an individual's attitude towards various forms of threat. Concern for one's own health, progress and development is part of protection. A person with excessively developed protection is often tense, as many neutral stimuli or situations are interpreted as possible threats. Such a person usually has acquired phobias or anxiety, or is at risk of developing them. A person with very low protection does not sufficiently care about life's dangers and is prone to risky behaviors (Kostić, 1997; Lamovec, 1997).
- **Orientation** encompasses the emotion of surprise and is linked to openness to new experiences and self-control. A person with excessively expressed orientation poorly controls inner impulses, overly seeks new experiences and does not pay attention to moral and social norms, disliking planning and clearly structured situations. An individual with low orientation is someone who finds it difficult to change life routines, lacking spontaneity, adaptability and openness to novelty (Kostić, 1997; Lamovec, 1997).
- **Deprivation** involves an individual's interpretation of situations in which he or she perceives being deprived of something valuable that others have, or having had and lost something considered significant, along with similar ideas. These ideas are accompanied by emotions of sadness, deprivation, fragile self-esteem and negative mood. Persons with pronounced deprivation are desperate because they experience great personal losses or deprivation; those with low deprivation are very self-satisfied, have a high opinion of themselves, and mainly seek to

satisfy themselves, believing they get "more out of life" than others (Kostić, 1997; Lamovec, 1997).

- **Rejection** indicates how inclined a person is to criticize other people, their traits, actions or ideas. Rejection includes experiences of mistrust in close interpersonal relationships and suspicion that developed in the person's past due to receiving something from significant others that he or she appropriated as personal but that was very unpleasant or harmful. Rejection encompasses disgust, devaluation and similar feelings. A person with pronounced rejection is overly critical of others and rarely critical of himself or herself; stubborn and inclined to prematurely reject others' ideas. A person with very low rejection is usually perceived as indecisive, dependent, suggestible and easily led (Kostić, 1997; Lamovec, 1997).
- **Aggression** indicates how an individual reacts in a state of frustration and how he or she controls anger. Aggression refers to the quality and degree of offensiveness in achieving one's goals and needs. A person with excessively expressed aggression tends to react in socially undesirable ways in frustrating situations: destructively attacking obstacles, inclined to quarrels and discharging negative energy regardless of social norms. A person with very low aggression lacks vigor in pursuing desires and intentions, does not defend himself or herself adequately when necessary, and is often passive when decisive action is needed, appearing "weak" or "lifeless" to others (Kostić, 1997; Lamovec, 1997).
- **Exploration** refers to behaviors through which individuals collect and process information from the environment, which they then use in organizing their thinking and behavior. The purpose of this dimension is to predict the outcome of one's own actions as well as events in the environment that do not depend on the individual. Exploration is reflected in conscientiousness, ambition and self-control, and includes anticipation and curiosity. A person with excessively expressed exploration invests too much energy in planning, is overly meticulous or prone to unnecessary detailing, which reduces the capacity for effective action. A person with

low exploration is disorganized in thinking and behavior, does not plan or set long-term goals, and “lives from day to day” (Kostić, 1997; Lamovec, 1997).

- **Reproduction** refers to the way a person reacts in close interpersonal relationships and is reflected in all pleasant emotions that arise in joint activities with other people. Reproduction is associated with sociability, cooperativeness and sexuality and is related to extraversion. The frequency and degree of life satisfaction and joy largely depend on reproduction. Excessively expressed reproduction on the PIE-JRS test indicates excessive sociability or seeking physical closeness to people, whereas low reproduction indicates distancing from others (Kostić, 1997; Lamovec, 1997).

Each dimension shown in Tables 1 and 2, describing athletes' personality traits, is defined by combinations of several traits in the test. The dimension **Incorporation** is determined by the traits warm-hearted, sociable and obedient. **Protection** is defined by the traits cautious, obedient, shy and insecure. **Orientation** is defined by the traits impulsive and adventurous. **Deprivation** is defined by the traits dejected and brooding. **Rejection** is defined by the traits resentful, quarrelsome and insecure. **Aggression** is defined by the traits quarrelsome and resentful. **Exploration** is defined by the traits cautious, shy and obedient. **Reproduction** is defined by the traits warm-hearted and sociable.

Below are basic descriptive indicators for the nine dimensions of conative characteristics of table tennis players obtained by applying the PIE-JRS Profile Index of Emotions (Kostić, 2003).

Table 1. Distribution of conative personality dimensions in male table tennis players

Man	Dimension	INK	ZAŠ	ORI	LIŠ	ODB	AGR	IST	REP	BIAS
Player 1	Raw score	42	33	14	12	8	8	20	35	35
	Percentiles	77	75	22	43	32	36	59	46	52
Player 2	Raw score	43	26	12	4	3	5	12	36	41
	Percentiles	100	81	29	51	19	26	48	72	63
Player 3	Raw score	45	35	15	11	4	3	22	40	39
	Percentiles	92	79	23	36	14	13	64	71	77
Player 4	Raw score	24	19	22	20	24	24	14	22	23
	Percentiles	23	43	36	74	87	99	36	15	16

Legend: INK – incorporation; ZAŠ – protection; ORI – orientation; LIŠ – deprivation; ODB – rejection; AGR – aggression; IST – exploration; REP – reproduction; BIAS – tendency to give socially desirable responses.

Based on the presented results, it can be observed that male table tennis players show predominately high (above-average) values in the dimensions of incorporation (INK) and protection (ZAŠ), which indicates a pronounced need to be accepted, to trust and respect authority, but also the presence of emotional sensitivity, concern about others' opinions, and feelings of tension and anxiety. Elevated values in the dimensions of exploration (IST) and reproduction (REP) indicate conscientiousness, planning, self-control and organization, while high percentile values in reproduction indicate empathy, sociability and cooperativeness.

For the athlete designated as Player 4, a specific profile was obtained with pronounced dimensions of deprivation (LIŠ), aggression (AGR) and rejection

(ODB), along with lower values in incorporation, reproduction and protection. These personality dimensions indicate an athlete with very fragile self-confidence, self-beliefs accompanied by negative emotions, overly strong critical attitudes towards others, and poor acceptance of criticism of his own behavior. Particularly noteworthy is the high value in the aggression dimension (99th percentile), which may represent a manifestation of energy and competitive drive, but also difficulty in directing emotional control in a sports context.

The BIAS dimension (tendency to give socially desirable responses) shows moderate values in all participants.

After presenting the results related to the male sample, the values of conative dimensions in the

female sample, that is, in female table tennis players, are shown below.

Table 2. Distribution of conative personality dimensions in female table tennis players

Women	Dimension	INK	ZAŠ	ORI	LIŠ	ODB	AGR	IST	REP	BIAS
Player 1	Raw score	27	30	10	13	0	1	22	38	25
	Percentiles	70	99	12	84	2	3	94	38	25
Player 2	Raw score	35	27	25	11	7	8	21	41	37
	Percentiles	83	66	38	49	22	47	56	65	52
Player 3	Raw score	38	22	33	5	12	4	18	45	41
	Percentiles	100	53	59	27	42	24	44	91	71
Player 4	Raw score	30	43	9	25	0	0	41	29	24
	Percentiles	47	95	8	84	2	3	94	24	17

Legend: INK – incorporation; ZAŠ – protection; ORI – orientation; LIŠ – deprivation; ODB – rejection; AGR – aggression; IST – exploration; REP – reproduction; BIAS – tendency to give socially desirable responses.

Analysis of the results presented in Table 2 shows that female table tennis players also have above-average values in the dimensions of incorporation (INK) and protection (ZAŠ), indicating a pronounced need for acceptance by others, respect for authority, obedience, but also the presence of emotional instability, concern about others' opinions, and feelings of tension and anxiety. Exploration (IST) is high in two players, suggesting conscientiousness, analysis of situations and planning in solving sports tasks, but also a lack of spontaneity and adaptability.

High deprivation (LIŠ) indicates unstable self-confidence and negative beliefs accompanied by emotions of sadness and deprivation. Lower scores in the dimensions of orientation (ORI), aggression (AGR) and rejection (ODB) suggest a lower level of impulsivity and better self-control, but also passivity when decisive and combative behavior is required. The BIAS dimension shows moderate values in all players.

Table 3. Basic descriptive statistics of conative characteristics of male and female table tennis players

Dimension	N	Min	Max	AS	SD	CV (%)
INK	8	23	100	74.00	27.02	36.5
ZAS	8	43	99	73.88	19.30	26.1
ORI	8	8	59	28.38	16.22	57.2
LIS	8	27	84	56.00	21.96	39.2
ODB	8	2	87	27.50	27.66	100.6
AGR	8	3	99	31.37	31.33	99.9
IST	8	36	94	61.88	21.69	35.1
REP	8	15	91	52.75	26.27	49.8
BIAS	8	16	77	46.63	24.28	52.1

Legend: INK – incorporation; ZAŠ – protection; ORI – orientation; LIŠ – deprivation; ODB – rejection; AGR – aggression; IST – exploration; REP – reproduction; BIAS – tendency to give socially desirable responses; N – number of participants; Min – minimum value; Max –

maximum value; M – mean; SD – standard deviation; CV – coefficient of variation.

Based on the descriptive indicators, it can be seen that the mean values of incorporation (M = 74.00) and protection (M = 73.88) are the highest, indicating a

pronounced need for acceptance by others, respect for authority and obedience, accompanied by emotional instability, concern about others' opinions and feelings of tension and anxiety. The exploration dimension ( $M = 61.88$ ) is also pronounced, indicating conscientiousness, analysis of situations and planning in solving sports tasks, though with a possible lack of spontaneity and adaptability.

On the other hand, the lowest mean values were recorded in orientation ( $M = 28.38$ ), rejection ( $M = 27.50$ ) and aggression ( $M = 31.37$ ), suggesting a lower level of impulsivity and better behavioral control, but also passivity when decisive and combative behavior is needed, as well as dependence, reduced combativeness and a lack of spontaneity and adaptability to new and unfamiliar situations.

Particularly high coefficients of variation in ODB (100.6%) and AGR (99.9%) indicate pronounced heterogeneity among participants, meaning that there are large individual differences in emotional responding and control of impulsivity. A moderate degree of variability was observed in reproduction ( $CV = 49.8\%$ ) and BIAS ( $CV = 52.1\%$ ), which suggests a certain uniformity of responses and stability in socially desirable responding.

Based on the descriptive indicators and individual profiles, it can be concluded that young male and female table tennis players are characterized by dominant dimensions of incorporation and protection, indicating a strong need for acceptance, belonging and respect for authority, along with emotional sensitivity and tension. At the same time, elevated values in exploration and reproduction reflect conscientiousness, planning and self-control, which contribute to an organized approach to sports tasks. Lower mean values in aggression, orientation and rejection suggest reduced impulsivity and better behavioral control, but also possible passivity in

situations that require decisiveness and competitive drive.

The observed individual profiles, especially in participants with elevated scores in aggression and deprivation, confirm the existence of significant individual differences in emotional responding and self-confidence. The obtained results indicate that the emotional-conative characteristics of table tennis players represent an important segment of their sports success, and understanding them is crucial for adequate planning of psychological preparation and individualization of the training process.

## Conclusion

Based on the analysis of conative dimensions, it was found that in 8 (eight) young male and female table tennis players who represented the national team of Serbia at the European Championships in Sweden in July 2025, pronounced values prevail in the dimensions of incorporation and protection. This indicates a strong need for acceptance, cooperation and respect for authority, along with emotional sensitivity, tension and the possibility of developing competitive anxiety.

Elevated values in exploration and reproduction confirm conscientiousness, planning and self-control, which is favorable for sports success. Lower values in orientation, aggression and rejection suggest good emotional and behavioral control, but also potential passivity in situations that require decisiveness, energy and combativeness in achieving one's goals.

Overall, the emotional-functional profile of the participants indicates disciplined, socially adjusted but emotionally sensitive athletes, whose differences in conative traits should be taken into account when individualizing training and psychological approaches in table tennis.

## References

- Đukić, B., Ivanek, V., Vujanović, S., & Glamočić, G. (2018). Relacije kompozicije tela i maksimalne potrošnje kiseonika mladih stonoteniserki. In *Zbornik radova*, Panevropski univerzitet, Banja Luka: Osmu međunarodna konferencija „Sportske nauke i zdravlje“
- Đukić, B., & Vujanović, S. (2023). Merenje koordinacije i psihomotorne brzine stonoteniserki primenom CRD baterije testova. In *21. godišnja međunarodna konferencija "Kondicijska priprema sportaša"* (UKTH). Zagreb, Hrvatska.

Đukić, B., Vujanović, S., Strajnić, B., & Ivanek, V. (2018). Differences in mental potential of young female athletes. *Sport Scientific and Practical Aspects: International Scientific Journal of Kinesiology*, 15(2), 15–19.

Ivanek, P., Mikić, B., & Ivanek, V. (2023). *Pedagoško-metodički aspekti stolnoteniske igre*. Misija d.o.o.

Jovanović, D., Novaković, M., Petrović, N., & Salamadić, A. (2012). Analiza osobina ličnosti štićenika Kazneno-popravnog zavoda Foča koji nisu počinili ubistvo. *Biomedicinska istraživanja*, 6(1), 1–10.

Kostić, P. (2003). *Priručnik PIE–JRS profil indeks emocija*. Centar za primenjenu psihologiju.

Kurbalija, D. (2006). Struktura testa Profil indeks emocija. *Psihologija*, 39, 343–359.

Lamovec, T. (1997). *Emocije i odbrambeni mehanizmi: Teorijska dopuna za priručnik PIE–JRS* (Lj. Trlaja, Prev. i pril.). Društvo psihologa Srbije, Centar za primenjenu psihologiju.

Lazarević, Lj. (2003). *Psihološka priprema sportista*. Viša škola za sportske trenere.

Milanović, M., & Gabelica Šupljika, M. (1997). Psihodijagnostika u funkciji procjene psihosocijalnog statusa članova sportske ekipe. In *Međunarodno savjetovanje Dijagnostika treniranosti sportaša* (pp. 203–209).

Plužik, R. (2006). *Emocije u psihoterapijskoj praksi: Kliničke implikacije teorije afekta*. Centar za primenjenu psihologiju.

Smith, R. E., & Christensen, D. S. (1995). Psychological skills as predictors of performance and survival in professional baseball. *Journal of Sport and Exercise Psychology*, 17(4), 399–415.

Vukčević, B. N. (2018). Profil školskog nasilnika na osnovu testa PIE–JRS. *Učenje i nastava*, 4(3), 45–56.

**Correspondence to:**

Dr sc Branko Đukić

Pokrajinski zavod za sport i medicinu sporta

Novi Sad, Srbija

branko.djukic@pzsport.rs