Improvement of technical and tactical training of young table tennis players in foreign practice

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Abstract

Objective of the study was to identify areas for improving the technical and tactical training of young table tennis players in foreign practice.

Methods and structure of the study. In the course of the study, an analysis of foreign scientific theoretical, methodological literature on the issues of sports training in table tennis was carried out.

Results and conclusions. It was revealed that among the modern foreign trends aimed at improving technical and tactical skills, the following stand out: the development of perceptual-motor skills, and the possibility of their predictive value for future results, the formation, improvement and development of skills using the VR environment, as well as psychological support in the form of mindfulness training.

Keywords: *modern foreign trends, table tennis, young players.*

Introduction. Table tennis is characterized by highly developed motor skills, such as agility, reaction speed, coordination. According to A. Bankos [13], table tennis skills include such features as serving, playing position, as well as types of strokes and foot movements.

Modern sport makes more and more demands on the player, his sports training [2]. The foundations laid down in youth sports are a prerequisite for further progression and an opportunity to achieve high sports results. First of all, the success of these prerequisites is determined by a correctly constructed training process and the direction of training influences [4].

It should be noted that foreign countries have rich experience and developed methods of teaching table tennis to children. The study and analysis of these methods can be used to improve training programs and approaches in domestic sports.

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Results of the study and their discussion. Analysis of trends in improving the technical and tactical actions of young table tennis players allows us to highlight such as: the development of perceptual-motor skills, and the possibility of their predictive value for future results, the formation, improvement and development of skills using the VR environment, as well as psychological support in the form of mindfulness training.

Perceptual-motor skills, their development, prognostic significance. Perceptual-motor skills are considered fundamental for the development of technical

skills in table tennis (i.e., the success of hitting under various circumstances) [11, 12]. Faber I.R., Elferink-Gemser M.T., Faber N.R. et al. suggest that the assessment of these skills reflects the future potential of the player better than the specific sports skills themselves, which depend on familiarity with the sport itself, in this case table tennis [4-6,11,13,15]. In the course of the study, the authors sought to answer the following questions: can the results of the assessment of perceptual-motor skills predict the future participation of young table tennis players in competitions and can the results of the assessment of perceptual-motor skills predict the future performance of young table tennis players in competitions?

During the study, Faber I.R., Elferink-Gemser M.T., Faber N.R. et al. used perceptual-motor tasks: "Sprint", "Agility", "Vertical jump", "Speed during dribbling", "Aiming at the target", "Ball handling skills", "Throwing the ball", "Eye coordination and hands". Analysis of the generalized scoring equations, including the test tasks "aiming at the target", "throwing the ball" and "eye-hand-coordination" showed that the results of the assessment of perceptual-motor skills were significant predictors of successful competition results (R2 = 51%) affects the results of the assessment of perceptual-motor skills, another multivariate model was proposed, including the age of the subject as a covariate (R2 = 53%).

Research results Faber I.R., Elferink-Gemser M.T., Faber N.R. et al. are consistent with the conclusions made by Vandorp, Vandendrisch, Weyens, Pion, Lefebvre, Philippeerts et al. (2013) [6]. The authors showed that non-sport-specific perceptual-motor skills are significant predictors of performance in young professional gymnasts, explaining more than 40% of competition outcomes two years later.

Despite the fact that the relationship between perceptual-motor skills and future competitive results is confirmed by the above studies, it is necessary to take into account the multidimensionality of talent development [1]. The Perceptual-Motor Skills Assessment only measures potential in the perceptual-motor domain. It is assumed that mental aspects, such as motivation, self-efficacy, volitional regulation, as well as environmental factors, such as learning conditions and parental support, have a significant impact on the outcome. This probably also explains the prediction of future participation in competitions.

Mental and muscular fatigue during the training process. In foreign literature, fatigue resulting from mental stress is traditionally referred to as mental fatigue (Marcora, Staiano, & Manning, 2009), and fatigue resulting from physical exertion as muscle fatigue (Gandevia, 2001). While both mental and muscle fatigue increase subjective feelings of fatigue and lack of energy (Marcora et al., 2009; Poulus, Docter, & Westra, 1974) and effort during subsequent physical tasks, muscle fatigue reduces the ability to work. muscles to the full strength of the corresponding muscles (Martin, Thompson 2015).

Several studies have recently demonstrated the negative impact of mental and muscle fatigue on performance during purposeful movements (Duncan, Fowler, George, Joyce, & Hankey, 2015; Missenard, Mottet, & Perrey, 2009) By measuring the relationship between movement speed and accuracy, the authors demonstrated that mental and muscular fatigue reduces the speed of movement. Because in many sports, such as racquet sports, actual performance is primarily related to the ability of athletes to perform goal-directed movements or sport-specific motor skills, the above studies suggest a negative effect of fatigue on athletic motor skills (i.e., multi-joint movements).

Several studies have focused on the effect of muscle fatigue on athletic motor skills. These studies have shown conflicting results, with some reporting a negative effect of muscle fatigue on athletic motor skills (Apriantono, Nunome, Ikegami, & Sano, 2006; Lyons, Al-Nakeeb, Hankey, & Neville, 2013), while others have reported about the lack of influence (Aune, Ingvaldsen and Ettema, 2008; Lyons et al., 2013).

Apriantono et al. (2006) demonstrated that decreased knee extensor and flexor strength resulted in decreased ball speed during football kicking. With regard to the impact of mental fatigue on athletic motor skills, Smith and colleagues have identified its negative impact on technical performance in football as well as decision-making skills (Smith et al., 2016). However, studies on the simultaneous study of mental and muscle fatigue and their impact on athletic motor skills are extremely scarce.

Iino, Kojima examines the impact of mental and muscle fatigue on table tennis performance (i.e. ball speed and accuracy). Because table tennis hitting requires coordination between the upper and lower extremities (Iino & Kojima, 2009, 2011), the authors suggested that mental fatigue, biceps fatigue, and quadriceps fatigue should be monitored to assess fatigue. The results of the study also indicate that an

athlete, experiencing fatigue, both mental and muscular, begins to exert more volitional efforts to perform a similar amount of work. three indicators of fatigue studied increased the volitional efforts applied by the athlete. Thus, the results support the importance for coaches of using self-reported measures to monitor an athlete's response to training (Saw, Main, & Gastin, 2016). While the effects of quadriceps fatigue were less pronounced, biceps fatigue and mental fatigue reduced the athlete's punching accuracy to the same extent. While accuracy decreased in both states of fatigue, mental fatigue reduced ball speed, while this parameter increased in the presence of bicep fatigue. The different effects of mental fatigue and biceps fatigue on athletic motor skills suggest a difference in how the central nervous system adapts to these two states of fatigue to ensure successful movement performance [9, 16].

Striking training in virtual reality (VR-environment). Many competitive sports involve high-speed, complex movements that require fast reactions. One example of such a movement is the fast kick in table tennis, the maximum rotation speed in world class matches exceeds 8000 rpm, while the most frequent rotation speed in amateur level matches is about 3000-5000 rpm [14] (which 3 times faster than tennis). Unlike other skills that could be learned gradually in slow motion, table tennis kicking back is a discrete action. It is difficult for the coach to serve the spinning ball at a slow pace to make it easier for the student, as this is physically impossible (spinning serves require a lot of friction and initial speed). Usually the trainer only instructs the correct form of the stroke for the various spins, the technical side of the execution is further realized through a large number of hours of training with another player or a robot. and the rest is just hundreds of hours of training against a robot or another player. However, in the course of such trainings, the required speed of ball delivery and rotation cannot always be achieved, which only increases the time for mastering the skill. E. Wu, M. Piekenbrock, T. Nakumura suggest the use of virtual reality to solve this problem. The authors have developed a training system in a VR environment, within which an athlete can train return rotational feeds. Studies using the VR environment in sports have already shown the effectiveness of this teaching method in various sports [6, 8, 9]. The results of the study showed the effectiveness of immersing an athlete in a VR-environment and practicing the skills of retaliatory strikes [17].

Awareness. Mindfulness issues in elite sports have become increasingly popular in recent years. The development of awareness is aimed at helping athletes maintain concentration, regardless of the sensations and thoughts that arise during the performance. Studies have been conducted to evaluate the effectiveness of the application of mindfulness techniques in the youth national basketball teams and table tennis teams in France. A study in a group of basketball players showed that the concentration and accuracy of free throws during basketball games increased more in the experimental group than in the comparison group. Table tennis results showed that participants who showed the highest percentage of adherence to this support program had more rating points [15].

Conclusions. Thus, modern trends in improving technical and tactical skills in children's and youth table tennis include the desire to determine the variables that can predict the success of athletes' performances in competitions, the development of perceptual-motor skills, the use of immersion in a VR-environment to work out complexly modeled under normal conditions of the training components, the development of awareness of young players, which allows them to better maintain concentration and tune in to the pre-start state. In addition, the coach must also monitor the mental and psycho-physiological state of the players, trying to prevent the development of muscle and mental fatigue of the athlete.

References

1. Afanasiev V.V., Shcherbachenko V.K. Ideomotornaya trenirovka v nastolnom tennise [Ideomotor training in table tennis]. Pedagogics, psychology, medical-biological problems of physical training and sports. 2009. No. 11. pp. 3-5.
2. Afanasiev V.V., Shcherbachenko V.K. Teloslozheniye studentov uchebnogo otdeleniya nastolnogo tennisa [Physique of students of the educational department of table tennis]. Pedagogics, psychology, medical-biological problems of physical training and sports. 2099. No. 1. pp. 10-12.
3. Barchukova G.V., Arutyunov R.G. Osobennosti peredvizheniy silneyshikh aziatskikh i rossiyskikh igrokov v nastolnyy tennis [Features of the movements of the strongest Asian and Russian players in table tennis]. Uchenye zapiski universiteta im. P. F. Lesgafta. 2021. No. 2 (192). pp. 16-21.
4. Guba V.P. Osobennosti individualizatsii dvi-

gatelnykh sposobnostey v podgotovke yunykh sportsmenov [Features of individualization of motor abilities in the training of young athletes]. Fizicheskaya kultura: vospitaniye, obrazovaniye, trenirovka. 2009. No. 2. pp. 41-44.
5. Davronov N.I., Ergashev A.U., Khodzhiev M.Kh. Organizatsionno-pedagogicheskiye usloviya rannego zanyatiya nastolnym tennisom v detsko-yunosheskikh sportivnykh shkolakh [Organizational and pedagogical conditions of early table tennis lessons in children's and youth sports schools]. Problemy nauki. 2021. No. 5 (64). pp. 60-62.
6. Kuznetsov G.M., Tsinis A.V. Metodika ispolzovaniya nastolnogo tennisa dlya uluchsheniya, razvitiya zreniya ili ogranicheniya yego ukhudsheniya [Methods of using table tennis to improve, develop vision or limit its deterioration]. StudNet. 2022. No. 5. pp. 272-280.
7. Ba kosz Z., Winiarski S. The kinematics of table tennis racquet: differences between topspin strokes. J Sports Med Phys Fitness. 2017. No. 57. pp. 202-213.
8. Carrasco L., Pradas F., Martínez A. Somatotype and body composition of young top-level table tennis players. Int. J. Table Tennis Sci. 2010. No.6. pp. 75-77.
9. Chatterjee P., Goswami A., Bandyopadhyay A. Somatotyping and some physical characteristics of trained male and female young table tennis players. Am. J. Sport Sci. 2016. No. 4. pp. 15-21.
10. Coelho-e-Silva M.J., Konarski J.M., Krzykała M., Galas S., Beata P., Żurek, P. Growth and maturity status of young male table tennis players. Research in Sports Medicine. 2021. No.1. pp. 1-19.
11. Kondrič M., Zagatto A.M., Sekulić D. The physiological demands of table tennis: a review. J Sports Sci Med. 2013. No.12. pp. 362-370.
12. Lanzoni I.M., Bartolomei S., Michele R.D, Fantozzi S. A kinematic comparison between longline and cross-court top spin forehand in competitive table tennis players. J Sports Sci. 2018. No. 36. pp. 637-2643.
13. Ryu D., Abernethy B., Park S.H., Mann D.L. The Perception of Deceptive Information Can Be Enhanced by Training That Removes Superficial Visual Information. Front. Psychol. 2018. No.9. pp. 11-32.
14. Sánchez-Muñoz C., Muros J.J., Cañas J., Courel-Ibáñez J., Sánchez-Alcaraz B.J., Zabala M. Anthropometric and Physical Fitness Profiles of World-Class Male Padel Players. Int. J. Environ. Res. Public Health. 2020. No.17. pp. 508-511.
15. Tebourski K., Bernier M., Ben Salha M., Souissi N., Fournier J.F. Effects of Mindfulness for Performance Programme on Actual Performance in Ecological Sport Context: Two Studies in Basketball and Table Tennis. Int J Environ Res Public Health. 2022. No. 19(19). pp. 12-25.
16. Teo M.M.J., Chang F.H., Lin Y.N. Sports injuries and risk factors for table tennis among nonprofessional collegiate athletes: A cross-sectional study. Medicine (Baltimore). 2021. No.50. pp. 28-41.
17. Wu E., Piekenbrock M., Nakumura T., Koike H. (2021). SPinPong - Virtual Reality Table Tennis Skill Acquisition using Visual, Haptic and Temporal Cues. IEEE Transactions on Visualization and Computer Graphics. 2021. No. 27(5). pp. 2566-2576.