



Gender-specific issues of sports training of elite female athletes in modern sports

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Abstract

The problematic issues regarding women's sports remain in various countries of the world. Because of that our purpose was to identify gender-specific issues to assist in the planning of training and competition loads of female elite athletes in modern sports. In particular, specific focus was given to the psychophysiological state and balance function to increase the efficiency of competitive activities. For this case the relationships of individual typological properties of the higher nervous system and sensorimotor reactions with psychophysiological indicators of highly qualified athletes of different sexes were established. The sexual peculiarities of the formation of psychophysiological functions of elite athletes, the functional peculiarities of psychomotor and mental activity, as well as the peculiarities of the psychophysiological organization of information processing in highly qualified athletes, taking into account sexual dimorphism, were revealed. The nuances regarding the indicators of maintaining balance among elite athletes, depending on gender, are revealed, which is primarily related to the location of the centres of gravity: in women, it is located in the hips, and in men, it is much higher. This knowledge about the sex differences will be very useful for our future measurements in project "DigitalTwin", especially for the strength exercises "squat with a barbell".

Key words: elite female athletes; gender characteristics; special physical preparation; sport of high achievements; expert evaluations.

Анотація

Гендерні проблеми спортивної підготовки висококваліфікованих атлеток в сучасному спорті

Проблемні питання щодо жіночого спорту залишаються актуальними в різних країнах світу. Тому нашою метою було виявити гендерні проблеми, щоб допомогти у плануванні тренувальних і змагальних навантажень висококваліфікованих спортсменок у сучасному спорті. Зокрема, особливу увагу було приділено функції психофізіологічного стану та рівноваги для підвищення ефективності змагальної діяльності. Для даного випадку встановлено зв'язки індивідуально-типологічних властивостей вищої нервової системи та сенсомоторних реакцій з психофізіологічними показниками висококваліфікованих спортсменів різної статі. Виявлено статеві особливості формування психофізіологічних функцій спортсменів високої кваліфікації, функціональні особливості психомоторної та психічної діяльності, а також особливості психофізіологічної організації обробки інформації у спортсменів вищої кваліфікації з урахуванням статевого диморфізму. Виявлено нюанси щодо показників функції рівноваги у елітних спортсменів залежно від статі, що пов'язано насамперед із розташуванням центрів ваги: у жінок він розташований у стегнах, а у чоловіків значно вище. Ці знання про статеві відмінності будуть дуже корисні для наших майбутніх вимірювань у проекті «DigitalTwin», особливо для силових вправ «присід зі штангою».

Ключові слова: висококваліфіковані спортсменки; гендерні особливості; спеціальна фізична підготовка; спорт вищих досягнень; експертні оцінки.



Introduction

Modern high-achieving sports require full commitment and professionalization of the chosen field of activity from the athlete. Using the achievements of modern sports science helps to optimize the training of elite athletes and preserve the athlete's physical and mental health. But currently there are still some "problematic topics" in the practice of sports training of elite athletes. And one of these topics is women's sports. Sports scientists from all over the world have revealed insights into topics of women's sports such as: the dependence of the functional state on the phases of the menstrual cycle (Shakhlina L. 2021; Findlay R.G. et al. 2020), the peculiarities of psychological and tactical preparedness (Borysova O. et al. 2020), gender-specific anthropological and morphological features (Abe T. et al. 2003), the specifics of technical training and formation on motor qualities (Emmonds S. et al. 2019), the influence of hormonal changes on sports performance (Hackney A.C. et al. 2019) [1-6].

Purpose: to identify gender-specific issues to assist in the planning of training and competition loads of female elite athletes in modern sports. In particular, specific focus was given to the psychophysiological state and balance function to increase the efficiency of competitive activities.

Material and methods

Bibliometric techniques were applied in this study to gather highly cited papers in sport sciences published during 2005-2022. The method of expert evaluations was used to determine the modern problems of women's elite sports. From 160 respondents, an expert group of sports scientists, coaches of national teams (n=20) were selected, who had experience working with elite female athletes. Psychophysiological (indicators of the efficiency of attention, volume of voluntary attention, productivity, coefficients of motivational, volitional and typological components, stress resistance) and biomechanical (balance function) methods were

used for this purpose (women, n=17 and men, n=24). Mathematical and statistical processing and data analysis were carried out using the computer programs "Statistica" and Microsoft Excel 2010.

Results

Content analysis of the literature-based information allowed us to identify the leaders in sports science in the following countries: America, Canada, England, Switzerland, Norway, China, South Africa. In addition, the analysis of scientific publications and dissertations in the field of "Sport" in recent years allowed us to add Ukraine and Poland to the list of countries with the most cited authors. The officials and the national teams' coaches (n=20) of these countries were included in the expert group. The analysis of the experts' analytical notes allowed us to obtain individual information about the state of women's sports in each country and different kinds of modern sport, as well as to identify general issues regarding the planning of training and competition loads for female athletes. The following factors were identified based on the experts' answers as the main problems in female sports: outdated systems of training female athletes without taking into account their biological cycles (80%); old injuries or illnesses that arose as a result of the incompetence of the previous/youth coaches (55%); transferring the training models of male athletes to the training of women (60%); insufficient pharmacological and medico-biological support of women's national teams during training, competitions and recovery (60%); load planning during special physical training is the same as for men (70%); less attention to women's sports in financial and organizational aspects (65%).

The psychophysiological functions for men and women were shown to have gender-specific characteristics. For men, it is a predominance of attention, and for women, mobility and strength of nervous processes, respectively. As for the quality of the balance function, significantly higher indicators ($p < 0,05$) are observed for women when performing an attempt with closed eyes (Fig. 1).

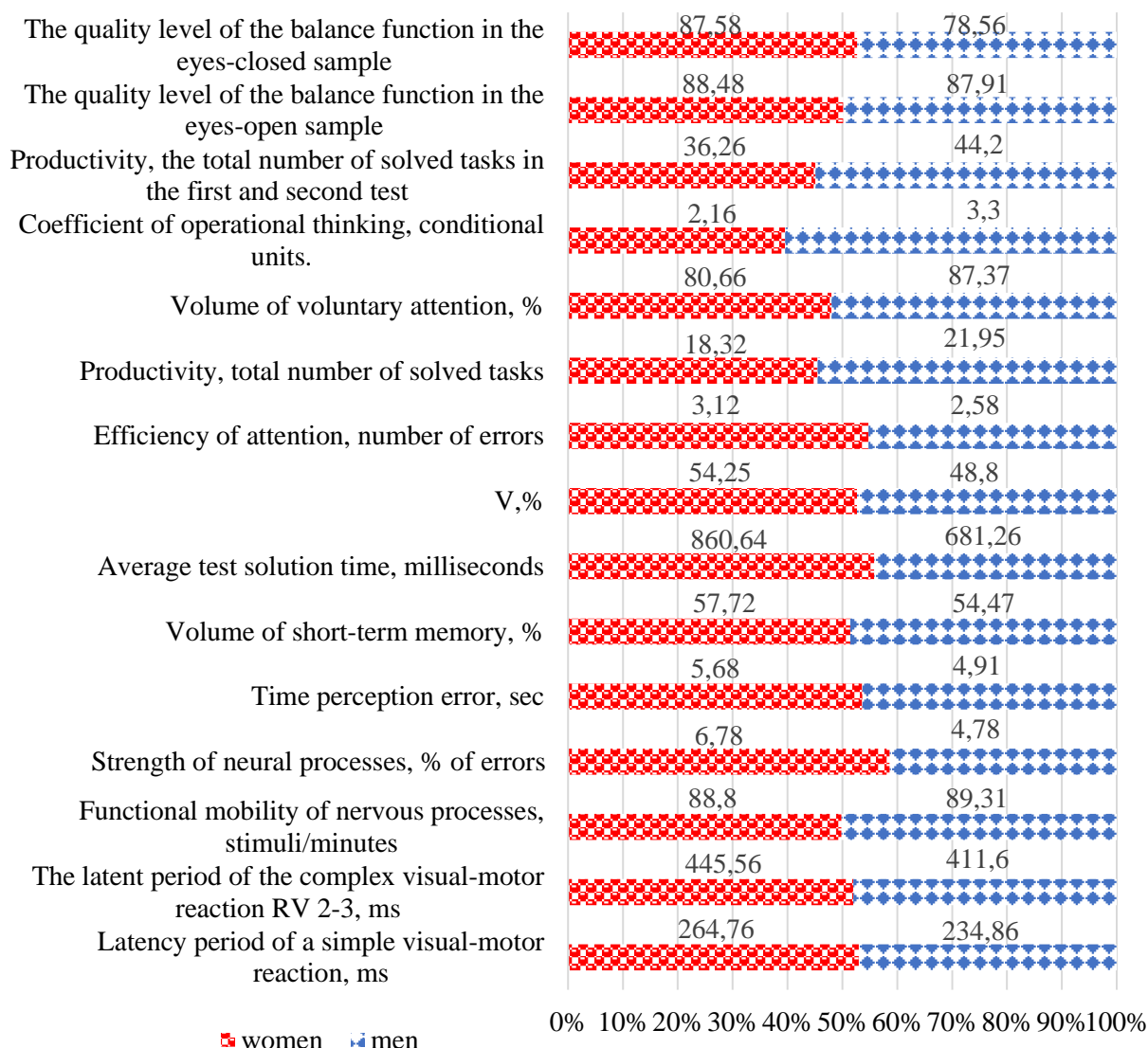


Figure 1. Statistical values of indicators of the psychophysiological state and the balance function of elite athletes (women, n = 17; men, n = 24).

Conclusions

It is shown that gender-specific issues regarding women's elite sports remain in various countries of the world. We determined that the psychophysiological state in male athletes is formed due to increased attention and speed of the sensorimotor response. In female athletes, in contrast, the psychophysiological state can be expressed by the ratio: speed and productivity of information processing - properties of the main nervous processes - attention. Taking these gender differences into account for planning loads in special physical training is expected to have a positive effect on the athlete's performance in competitive sports. Furthermore, the present results on gender-

specific differences in balance and biomechanical parameters of stable stance in female athletes emphasize the need to take into account these nuances, in particular when performing strength exercises to prevent injuries of female athletes.

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