

DECREASE IN COMPETITION EFFICIENCY IN 13-14-YEAR-OLD FOOTBALL PLAYERS: THE RELATIONSHIP BETWEEN PSYCHOPHYSIOLOGICAL FATIGUE AND THE QUALITY OF DECISION- MAKING

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Abstract

The paper presents a secondary, sport-psychological analysis of pedagogical observation data on the competitive activity of 13-14-year-old football players (310 passes, 89 ball losses, 440-480 technical-tactical actions per match). Four derived indices were computed: error index, progressive-play share, "safe play" coefficient and zonal cognitive-load gradient. In the second half the volume of actions decreased by 22.9%, whereas the error index rose from 22.3% to 37.0% (a relative increase of 66.2%). This dissociation between quantity and quality indicates that the decline cannot be attributed to peripheral muscular fatigue alone: central (mental) fatigue and depletion of attentional resources play a substantial role. The zonal distribution of losses (16.8% / 36.0% / 42.4%) supports the time-pressure account of decision errors. The predominance of backward and lateral passes (67.7%) is interpreted through fear of failure and an ego-involving motivational climate. A practical model for integrating a psychological component into youth football preparation is proposed.

Keywords

youth football, sport psychology, mental fatigue, attentional resources, decision-making, technical-tactical actions, fear of failure, self-efficacy, motivational climate.

13-14 YOSHLI FUTBOLCHILARDA MUSOBAQA FAOLIYATI SAMARADORLIGINING PASAYISHI: PSIXOFIZIOLOGIK CHARCHOQ VA QAROR QABUL QILISH SIFATI O'RTASIDAGI BOG'LIQLIK

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Annotatsiya

Maqolada 13-14 yoshli futbolchilarning rasmiy musobaqa faoliyatida qayd etilgan texnik-taktik harakatlar (310 ta to'p uzatish, 89 ta to'p yo'qotish, 440-480 ta jami harakat) sport psixologiyasi nuqtai nazaridan qayta tahlil qilinadi. Pedagogik kuzatuv ma'lumotlari asosida to'rtta hosila ko'rsatkich — xatolik indeksi, o'yin

progressivligi ulushi, “xavfsiz o‘yin” koeffitsiyenti va zonal kognitiv yuklama gradiyenti hisoblab chiqildi. Natijalar shuni ko‘rsatdiki, ikkinchi taymda harakatlar hajmi 22,9% ga kamaygan holda xatolik indeksi 22,3% dan 37,0% gacha, ya‘ni nisbiy hisobda 66,2% ga oshgan. Hajm va sifat dinamikasi o‘rtasidagi bunday nomutanosiblik pasayishni faqat periferik (mushak) charchog‘i bilan izohlab bo‘lmasligini, unda markaziy – kognitiv charchoq va diqqat resurslarining tugashi omili muhim rol o‘ynashini ko‘rsatadi. To‘p yo‘qotishlarning zonalar bo‘yicha taqsimlanishi (I zona – 16,8%, II zona – 36,0%, III zona – 42,4%) qaror qabul qilish vaqti qisqarishi bilan xatolik ehtimoli ortishi haqidagi psixologik qonuniyatni tasdiqlaydi. Uzatishlarning 67,7% ini orqaga va yonga yo‘naltirilgan “xavfsiz” uzatishlar tashkil etgani xatodan qo‘rqish motivatsiyasi va ego-yo‘naltirilgan motivatsion iqlim bilan izohlanadi. Maqolada yosh futbolchilar tayyorgarligiga psixologik komponentni integratsiya qilishning amaliy modeli taklif etiladi.

Kalit so‘zlar

yosh futbolchilar, sport psixologiyasi, psixofiziologik charchoq, kognitiv charchoq, diqqat resurslari, qaror qabul qilish, texnik-taktik harakat, xatodan qo‘rqish, o‘z-o‘ziga ishonch, motivatsion iqlim.

Аннотация

В статье данные педагогического наблюдения за соревновательной деятельностью футболистов 13–14 лет (310 передач, 89 потерь мяча, 440–480 технико-тактических действий) подвергаются вторичному анализу с позиций психологии спорта. Показано, что во втором тайме объём действий снижается на 22,9%, тогда как индекс ошибок возрастает с 22,3% до 37,0% (относительный прирост 66,2%). Такая диспропорция указывает на ведущую роль центрального (когнитивного) утомления и истощения ресурсов внимания. Распределение потерь по зонам поля (16,8% / 36,0% / 42,4%) подтверждает зависимость точности решения от дефицита времени. Преобладание «безопасных» передач назад и поперёк (67,7%) интерпретируется как проявление мотивации избегания неудачи и эго-ориентированного мотивационного климата. Предложена модель интеграции психологического компонента в подготовку юных футболистов.

Ключевые слова

юные футболисты, психология спорта, когнитивное утомление, ресурсы внимания, принятие решений, технико-тактические действия, страх неудачи, самоэффективность, мотивационный климат.

Introduction

Modern football requires a player not only high physical fitness, but also the ability to quickly process information and make the right decisions in conditions of time constraints. In domestic studies devoted to the methodology of training young football players (R.A. Akramov, M.A. Godik, I.A. Koshbakhtiyev, A.I. Talipjanov, K.B. Mukhammadiyev), the main attention is paid to the physical and technical-

tactical components, and the psychological determinants of game performance have not been practically studied.

At the moment, the decrease in competition performance in the second half is traditionally explained only by physical fatigue. In sports psychology, two types of fatigue are distinguished: peripheral (muscular) fatigue and central, that is, cognitive (mental) fatigue. Studies by S.M. Marcora and co-authors have shown that cognitive fatigue reduces the readiness to perform work without changing the maximum strength indicators. M.R. Smith et al. found that cognitive fatigue significantly impairs the accuracy and speed of football-specific decision-making. A systematic review by J. Van Cutsem et al. confirmed that the effect of cognitive fatigue on technical skills is stronger than its effect on physical performance.

Based on this, the following scientific problem is formed: if during the game the decrease in the volume of actions and the increase in the percentage of errors occur at the same rate, this is considered the effect of peripheral fatigue; if the percentage of errors increases significantly faster than the decrease in volume, this indicates the dominance of the cognitive component.

The purpose of the study is to re-analyze the pedagogical observation data collected on the competitive activities of 13-14-year-old football players from the perspective of sports psychology and to identify the psychological determinants of the effectiveness of technical and tactical actions.

Scientific hypothesis. The observed decrease in efficiency in the second half of the game in young football players is characterized by volume-quality dissociation; ball losses are concentrated in zones with high cognitive load; the directional structure of passes reflects the motivation to avoid errors.

Research materials and methods

Research contingent. 13-14-year-old boys engaged in the initial preparatory groups of football clubs at secondary schools of the Tashkent region. The pedagogical experiment was organized in two stages (2022-2023 and 2023-2024 academic years) with the participation of experimental and control groups. In addition, data from a team of 16-year-old football players (n=15) were used as comparative material to assess the level of special physical training.

Methods. Theoretical analysis of scientific and literary sources; pedagogical observation (based on the protocol developed by L.V. Volkov and V.P. Klimin); pedagogical testing; pedagogical experiment; mathematical and statistical processing (arithmetic mean, standard deviation, coefficient of variation, percentage increase in proportion).

The following technical and tactical actions were recorded as the subject of observation: ball passes (by direction - back, side, forward, to a partner moving forward; by method of execution - from the ground and air), ball carrying, deception actions, ball withdrawal, heading, shots on goal, use of free throws. The field was conditionally divided into three zones (I - defense, II - center, III - attack).

Derived indicators for psychological interpretation. Based on the primary observation data, the following indices were calculated: (1) error index - the ratio of the number of ball losses to the number of passes (%); (2) the percentage of game

progression – the percentage of forward transfers in total transfers (%); (3) the coefficient of “safe play” – the percentage of backward and lateral transfers (%); (4) the zonal cognitive load gradient – the change in the error index across zones.

Limitations. In this study, psychological constructs were assessed indirectly through behavioral markers, rather than directly through psychodiagnostic techniques. This determines the probabilistic nature of the interpretation and requires validation with standardized questionnaires at a later stage.

Results

Observations have shown that a 13–14-year-old football player performs an average of 440–480 technical and tactical actions during one game, and more than half of them are passes of various types. The structure of passes in the half-time section is presented in Table 1.

Table 1

Volume and structure of passes in the half-time section

Type of transfer	I time	II time	Total	II/I change, %
Backwards	58	48	106	–17,2
Sideways	62	42	104	–32,3
Forward	42	34	76	–19,0
To a partner in forward motion	13	11	24	–15,4
From the ground	111	78	189	–29,7
From the air	64	57	121	–10,9
TOTAL	175	135	310	–22,9

The total volume of passes decreased by 22.9% in the second half. At the same time, the structure of the passes remained stable: during the entire match, passes directed backward and sideways amounted to 210, that is, 67.7% of the total volume, while forward progressive passes made up only 32.3%.

Table 2

Dynamics of ball losses and error index by half

Indicator	I Time	II Time	Total	Relative change, %
Number of passes	175	135	310	–22,9
Number of turnovers	39	50	89	+28,2
Error index, %	22,3	37,0	28,7	+66,2

The data in Table 2 reveal the central result of the study: with a reduction in the volume of moves by 22.9%, the error index increased by 66.2% in relative terms. In other words, in the second half, the player makes fewer moves, but the probability of failure of each move increases significantly.

Table 3

Distribution of passes and turnovers by field zones

Zonal taqsimot aniq gradiyentni ko'rsatadi: o'z himoya zonasidan hujum zonasi tomon xatolik indeksi 16,8% dan 42,4% gacha, ya'ni 2,5 barobar oshadi. Shu bilan birga uzatishlar hajmi teskari yo'nalishda — 44,2% dan 19,0% gacha kamayadi.

The highest failure rate was recorded in two categories of actions: dribbling (75% ineffective) and heading (65% ineffective). Both actions are associated with direct contact, one-on-one combat with the opponent, and the possibility of receiving a physical blow.

At the end of the pedagogical experiment, the effectiveness of the developed methodology was assessed. The efficiency coefficient of shots on goal was 0.44 in the control group and 0.56 in the experimental group, i.e., a relative increase of 27.3%. In the experimental group, a significant difference was also noted in the number of attacks organized from the wings and from the center and in their technical efficiency.

Discussion

1. Volume-quality dissociation and central fatigue. If the decrease in the second half was associated only with muscle fatigue, the volume of movements and their accuracy would be expected to decrease at approximately the same rate. In our data, with a decrease in volume by 22.9%, the error index increased by 66.2% - this is almost a threefold difference. Such an imbalance is explained by the so-called central (cognitive) fatigue in sports psychology: the allocation of attention, working memory and executive control resources are exhausted, as a result of which not motor execution, but decision-making itself is impaired. M.R. Smith and co-authors experimentally showed that cognitive fatigue reduces decision accuracy in situations specific to football.

2. Zonal gradient and time deficit. The 2.5-fold increase in the error index from zone I to zone III is not accidental. In the attack zone, the player has the shortest decision time, the largest number of alternatives, and the highest pressure from the opponent. According to the Hick-Hyman law, reaction time increases logarithmically with an increase in the number of alternatives; in time-limited conditions, this is directly manifested as an error. In addition, 13-14 years of age is a period when the frontal lobe and executive functions of the brain are still in the formation stage, so rapid switching between broad-external and narrow-external types of attention (R.M. Nideffer's model) is much more difficult for young football players than for adults.

3. "Safe play" and fear of failure motivation. The fact that 67.7% of passes are directed back and to the side is not a purely tactical decision, but a motivational choice. The fear of failure construct is associated in D.E. Conroy's research with the athlete's expectation of the consequences of failure — loss of reputation, a decrease in the assessment of the coach and teammates. According to the theory of motivational climate developed by J. Nicholls and C. Ames, in an ego-oriented climate (punishment for mistakes, evaluation only by the result), the athlete

chooses the action with the lowest risk level. It is precisely such a climate that inhibits the formation of progressive passing, cheating and non-standard solution skills in a young player – as D. Memmert notes, tactical creativity develops only in an error-tolerant environment.

4. Contact actions and self-confidence. The 75% inefficiency rate in passing and 65% in heading is not just a technical defect. According to A. Bandura's theory, self-efficacy is formed from four sources: personal experience of success, observational learning, verbal persuasion and physiological-emotional state. Regular experience of failure creates a negative cycle: low confidence → avoidance of action → lack of experience → even lower confidence. In heading, this is accompanied by anticipatory anxiety - a reflex to protect the head and eyes before a collision with the ball, which prevents the implementation of the correct technique (hitting with the forehead, keeping the eyes open).

5. Psychological mechanism of growth in the experimental group. The main feature of the methodology used in the experimental group was the use of exercises that reflect the competition system. From a psychological point of view, this corresponds to the model of gradual stress inoculation: an emotional and cognitive load close to the competition conditions is created during training, as a result of which the situation in the competition becomes less “unfamiliar” and the level of anxiety decreases. It is therefore reasonable to interpret the increase in hitting efficiency from 0.44 to 0.56 as the result of not only physical adaptation, but also psychological adaptation.

Practical recommendations

Based on the results obtained, the following model of integrating the psychological component into the training of young football players is proposed:

- training decision-making under fatigue conditions – conducting small-area games (3×3, 4×4) in the final part of the training session, after the load, which forms resistance to central fatigue;
- task-oriented motivational climate (TARGET model) – encouraging attempts at progressive passing regardless of the result, analyzing errors instead of punishing them;
- pre-performance routines and positive self-talk;
- attention-switching exercises (based on the Nideffer model) – training in expanding and narrowing the scope of attention through keywords;
- ideomotor exercises (imagery) – mental repetition of head-playing and passing movements 3 times a week for 3–5 minutes;
- gradual formation of success experience – increasing the complexity of head-playing, starting with a light, slow ball;
- introduction of a breathing regulation and emotional readjustment protocol during the break between halves;
- psychodiagnostic monitoring – seasonal monitoring using the methods of competition anxiety (CSAI-2R), fatigue and recovery (RESTQ-Sport), motivational orientation (TEOSQ).

Conclusion

1. In 13–14-year-old football players, the error index increases from 22.3% to 37.0% (66.2% in relative terms) with a decrease in the volume of movements in the second half of the game by 22.9%. This imbalance indicates that central (cognitive) fatigue and exhaustion of attentional resources occupy an important place among the causes of the decrease.

2. The zonal distribution of ball losses forms a clear gradient (16.8% → 36.0% → 42.4%), which is associated with a decrease in decision-making time and an increase in information load.

3. 67.7% of passes are “safe” passes directed backward and sideways. This indicator is interpreted as a behavioral marker of the presence of error-avoidance motivation and an ego-oriented motivational climate.

4. The high inefficiency of contact technical movements (deception - 75%, head play - 65%) is associated with low self-confidence and anticipatory anxiety, and cannot be eliminated by technical training alone.

5. In the experimental group, where exercises modeling competition conditions were used, the coefficient of impact efficiency was 0.56 (in the control group - 0.44), which indicates the effect of psychological adaptation along with physical adaptation.

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