

THE IMPORTANCE OF COORDINATION AND STRENGTH TRAINING IN COMBINATION WITH METHODS OF SELF-REGULATION OF MENTAL STATES IN THE PREVENTION OF INJURIES IN RACING SKIERS

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Abstract. This article presents the results of a study examining the development of sensorimotor coordination, combined with psychological resilience, in the training process of junior cross-country skiers. The causes of mental strain during challenging terrain sections of the trail are substantiated. The results of testing the coordination fitness of junior cross-country skiers are presented. The importance of coordination and strength training, combined with mental self-regulation techniques, in preventing cross-country skier injuries is highlighted.

Keywords: Cross-country skiers; sensorimotor coordination; mental strain; coordination readiness; injuries.

Many researchers have studied the mechanisms of development of coordination abilities in athletes: V.I. Lyakh, N.A. Bernstein, V.K. Balsevich, N.A. Fomin, A.G. Kravtsev, I.Yu. Gorskaya, A.G. Karpeev, A.V. Maslyukov, O.N. Urlova, and others. The research of these scientists, and specifically the work of V.I. Lyakh, examines issues largely related to the general study of the concept of "coordination abilities" and the characteristics of their development at different age periods. Coordination is associated primarily with sports in which the shift nature of activity prevails, primarily in team sports and martial arts. At the same time, many questions concerning the relationship between coordination abilities and psychological qualities remain relevant and require in-depth study.

In cross-country skiing, the specific nature of the activity is primarily cyclical and repetitive, requiring coordination stability while navigating challenging sections of the course at high speed, despite mental and physical fatigue. This combination often leads to dangerous situations that athletes fail to cope with, falling and sustaining injuries and bruises. Frequent falls upset the athlete's mental balance, leading to withdrawal from the race and subsequent development of phobias regarding challenging sections of the course. Such situations most frequently arise in the training of junior cross-country skiers. Therefore, studying the development of sensorimotor coordination in combination with psychological stability in cyclical activities is a pressing issue.

Based on the analysis of scientific research by Uzbek and European colleagues on issues of modern training in skiing, we came to the conclusion that the success of Russian and Norwegian skiers largely depends on the scientific basis of training programs for the development and improvement of strength coordination and psychological resistance to stressful situations.

In the research of specialists (A.V. Gursky; A.I. Golovachev; E.L. Butulov; V.I. Kolykhmatov; A.V. Shishkina; Yu.M. Zubarev; R.A. Istomin), special attention is paid to the structure of movement and the combination of strength and coordination qualities that ensure rational technical preparedness of a cross-country skier .

To improve the effectiveness of training for junior cross-country skiers, we systematized all methods used in athlete training. These methods allow us to understand physiological adaptation to cyclic loads, on the one hand, and mental resilience to sudden stressful situations, on the other, allowing us to combine a comprehensive technology for developing sensorimotor coordination. Based on an analysis of research by Uzbek specialists (I.B. Zhuraev), we introduced experimental additions to the structure of the cross-country skiers' training process.

To conduct the study, an experimental group of cross-country skiers aged 13–14 (classes II and I) was formed. During two training cycles, this group underwent psychological testing for both competitions and the entire macrocycle. A study was conducted to examine gender differences in persistence, the degree of determination of cross-country skiers, and differential self-assessment of the athlete's functional state, personal anxiety, and situational anxiety. Participants in the experimental group underwent a pedagogical experiment to introduce stress adaptation techniques.

During a pedagogical experiment conducted during the pre- and post-competition mesocycles, we identified the main causes of falls that result in athletes suffering injuries and bruises. The experimental work also established connections between self-management processes, mental state, and improved sensorimotor coordination. We introduced training programs to develop stabilizer muscles and specialized coordination exercises to prevent injuries in cross-country skiers , and developed methodological techniques for regulating excessive muscle tension in cross-country skiers.

During the research it was established that one of the causes of injuries among cross-country skiers during the competitive period is mental stress and the emergence of a state of frustration.

Frustration in cross-country skiing can include: fear of losing to stronger competitors; fear of an unfamiliar ski track with difficult terrain; fear of falling on dangerous turns of the ski track (damage to ski equipment during the race); injury during a collision with an opponent or a fall during the race; unfavorable weather conditions for the competition; changing weather conditions during the competition (when the ski equipment has already been prepared).

To study the mechanisms of mental strain and self-regulation in cross-country skiers while tackling challenging terrain, we conducted a survey of junior-level cross-country skiers. The survey revealed that the main reasons for their hesitation in navigating challenging sections of the course during competitions are fear, increased anxiety arising from increased fatigue, and a lack of mental preparedness for tactical competition.

Respondents also noted that due to mental stress they were unable to quickly control their movements, which prevented them from changing their technique and tactics in time to respond to suddenly changing track terrain during the race.

The main reasons respondents cited for their fear of skiing downhill and over uneven surfaces were a lack of mastery of single-leg sliding techniques, stiffness due

to significant musculoskeletal fatigue, and the occurrence of "tremors." Respondents also noted that repeated falls on difficult sections of the trail are one of the causes of their fear, which can be attributed to a phobia characterized by a lack of reaction to a suddenly emerging obstacle.

Participants in the experiment believe that one of the reasons for falls is a low level of coordination. This aspect served as the basis for testing the athletes' coordination skills and studying the specifics of the training process for developing coordination skills important for cross-country skiers.

To determine the development of sensorimotor coordination, the following tests were used: "Bondarevsky Test", "Yarotsky Test", "Romberg Test (heel-toe pose)", "Romberg Test (stork pose)".

The Bondarevsky Test is a coordination test that assesses the state of the vestibular analyzer. The Yarotsky Test is a rotational test for assessing the state of the vestibular analyzer. The Romberg Test (complex) assesses the static coordination of athletes.

The results of the study on the specified tests allowed us to conclude that the level of development of coordination abilities is not high enough.

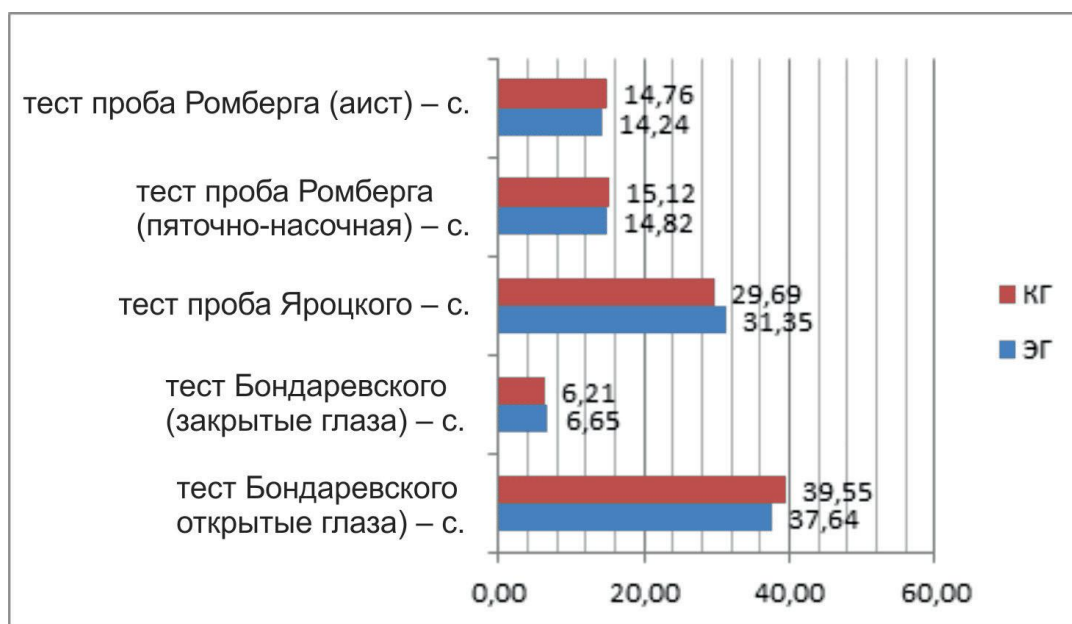


Figure 1. – Results of testing the coordination readiness of junior level cross-country skiers

Coordination testing conducted during a pedagogical experiment allowed us to establish a correlation between psychological and coordination skills. Insufficient sensorimotor coordination development prevents athletes from developing a special state of psychological confidence and resilience to stressful situations.

The data obtained indicate that insufficient coordination and strength training, coupled with a lack of mental self-regulation techniques, negatively impacts the overall physical and psychological fitness of junior cross-country skiers. Therefore, it can be concluded that coordination and strength exercises to develop core muscles using various training equipment, including BOSU, as well as various gymnastic

exercises performed under balance, should play an important role in the training process for cross-country skiers. Specially organized coordination and strength training sessions, combined with mental self-regulation techniques, result in the development of psychological resilience to stressful situations during competition and the prevention of injuries in junior cross-country skiers.

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