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Efficiency of developing 15–17-year weightlifters' training process for a one-year macrocycle with the use of various speed and strength training methods

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Purpose: *developed and experimentally tested the construction of the training process of weightlifters of 15–17 years during a one-year macrocycle with the use of various speed and strength training methods.*

Material & Methods: *to the experiment were attracted 30 young weightlifters at the age of 15–17 years, they all had II and III sports categories.*

Results: *it was found that the athletes of the experimental group who used the unconventional training method, using different training regimes – isokinetic, plyometric, half-dynamic, impact method with speed-strength training, which included jumping with various devices in depth and jumping out, after the experiment, they improved their strengths in the amount of the duathlon by 16,5 kg, and also set their own records in contrast to the control group that trained by the traditional method and improved the power results by 7,2 kg.*

Conclusion: *it is established that the use of non-traditional methods for the development of speed-strength qualities of weightlifters, namely, different training regimes – isokinetic, plyometric, half-dynamic, shock method, contributes to the more efficient development of speed-strength qualities, and, consequently, leads to an increase in sports performance in weightlifting.*

Keywords: *training weightlifters, year-long macrocycle, shock method, speed-strength training, and athletic result.*

Introduction

The modern system of training requires constant improvement of the technical preparedness of athletes weightlifters, aimed at implementing effective technical actions of young weightlifters in preparation for competitive activities. Strengthening competition in the competition requires coaches and athletes to search for new ways to increase the effectiveness of competitive activities (V. M. Platonov, 2015).

Weightlifting exercises are very difficult in the technique of execution, since the lifting of the maximum weight is associated with the maximum tension of the muscles of the trunk and extremities, the rapid change in the mode of their work, and most importantly the preservation of equilibrium in the supporting phases of the movement of young athletes. For equipment performing weightlifting exercises also influence the constitution and typological features of the structure of the body of young weightlifters. (N. A. Laputin 2004; Y. Gaverdovskii, 2007).

Speed-strength training in weightlifting sport occupies a leading position, as the level of development of power-speed in the majority determines the achievement of good results in the classical exercises, or weightlifters must have not only high strength, but also the ability to express it in a short time.

To develop strength in weightlifting, at the present time, mainly dynamic exercises are used, mainly with large burdens. As shown in the studies of well-known scientists (Y. V. Verkhoshanskii, 2013; L. S. Dvorkin 2005), with a 120 kg spurt the athlete performs thrust with a weight of 130–140 kg. In this case, a large weight increase provides an increase in the strength of the muscles, but does not contribute to the development of the ability to rapidly reduce them.

It is generally believed that with the help of large weights, we increase the muscle power potential necessary for the development of a high speed of movement. But, as shown by the studies of famous Russian scientists (N. A. Laputin, 1973, A. S. Medvedev, 1980, V. G. Oleshko, 2011), in explosive phases of snatching and jerking (undermining and pushing from the chest) working soft muscles do not have time to exercise maximum power. This indicates that a weightlifter needs higher speed-strength training to achieve higher sports results [4; 5; 8;11]

It should be noted that the scientific and methodological literature does not adequately address the problem of constructing the training and training process of speed-strength training for weightlifters, which determined the relevance of the chosen research topic.

Many researchers found that the development of speed-strength qualities are most effective in adolescence under 16 years. (M. S. Ippolitova 1975, V. S. Farfel, 1963, S. I. Filin, 1970 and others). On the basis of experimental data, V. S. Filin (1970) made the following conclusions: the means and methods for the development of speed-strength qualities among athletes aged 15–17 are highly effective at the stage of preliminary basic training [14 ;15].

Development of speed-strength abilities of weightlifter begins with mastering the technique of weightlifting exercises. To do this, it is necessary to achieve accuracy, economy of movements, performed first at a slow pace, and then – at the

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maximum. As mastering the technique of lifting the bar is the task of increasing its weight while maintaining the speed and accuracy of the exercises [7].

Shock method of developing the explosive force of muscles is based on a sharp (shock) mechanical stretching of strained muscles, preceding their active working contraction. As a factor stimulating the activity of muscles, it does not use encumbrances, but the kinetic energy of the fall of the body of an athlete or training apparatus (Y. V. Verkhoshanskii, 2013). Positive effect of stretching strained muscles on the following work effect of their reduction was shown in a number of experimental studies by leading domestic [6; 18] and foreign scientists [20–23].

Relationship of research with scientific programs, plans, themes. The scientific research was carried out on the theme of the Consolidated plan of research work in the field of physical culture and sports for 2011–2015. On the topic 3.7 "Methodological and organizational-methodological basis for determining the individual norm of a person's physical condition" (state registration number 0111U000192).

The purpose of the research: developed and experimentally tested the construction of the training process of weightlifters of 15–17 years during a one-year macrocycle with the use of various speed and strength training methods.

Material and Methods of the research

In this study, the students of the Youth Sports School "KhTP" took part. The experiment involved 30 young weightlifters aged 15–17 years, all of whom had II and III sports categories. Participants were distributed according to sports qualification into two groups – control and experimental. Participants of the experiment practiced 5–6 times a week.

Experiment was carried out at the training base of the municipal enterprise Youth Sports School "KhTP" short-circuit during the year macrocycle (2015–2016).

To realize the purpose, the sportsmen of the control group performed the training assignments for the weight-lifting program for the Youth Sports School, without using the means of speed-force direction, experimental – according to the author's method of constructing the training process of weightlifters of 15–17 years during a one-year macrocycle using speed-strength means. In the construction of the training process of the experimental group athletes to apply recommended (Y. V. Verkhoshansky, 2013; L. S. Dvorkina, 2005) the principles of integrated use of methods of development of speed-strength.

Taking into account the recommendations of the leading experts in the field of building the process of training athletes at the stage of preliminary basic training (V. M. Platonov, 2004, L. P. Matveev, 1999), it is justified to construct a two-cycle training of weightlifters of 15–17 years during a one-year macrocycle using speedy power tools orientation at the stage of preliminary basic training.

Methods of research: according to the methodological approach to solving the problem and tasks, the research program included a set of research methods: analysis of scientific and methodological literature, determination of special physical preparedness through pedagogical testing of young weightlifters, pedagogical testing of the training process and methods of mathematical statistics.

Results of the research and their discussion

In our study, the construction of a one-year macrocycle for training weightlifters is based on the generally accepted theory of periodization (V. M. Platonov 2015), which provides for the separation of the macrostructure into preparatory, competitive and transitional periods.

Thus, the first macrocycle of the experimental group (lasting 24 weeks), (June 2015 – December 2015) had in its structure a preparatory period (June – October 2015), which consisted of two general and special preparatory stages, where the training load was performed in sequential increase.

Planning of the training process in the general preparatory stage (duration of 12 weeks) included one retractor and two basic mesocycles. The tasks of the mesocycle included the creation of prerequisites for further intensive work, directly related to the improvement of the training process and the improvement of strength indicators through the use of speed-strength training. The structure of the special preparatory stage (duration 4 weeks) had a formative character and included a "control-preparatory" mesocycle.

The special preparatory stage is characterized by the predominant use of highly specialized exercises and the use of special operating modes (static-dynamic, isometric, plyometric) and the shock method, which allow eliminating the identified individual "shortcomings" in the training process of weightlifters of 15–17 years. The special preparatory mesocycle consisted of retracting, shock and reducing microcycles.

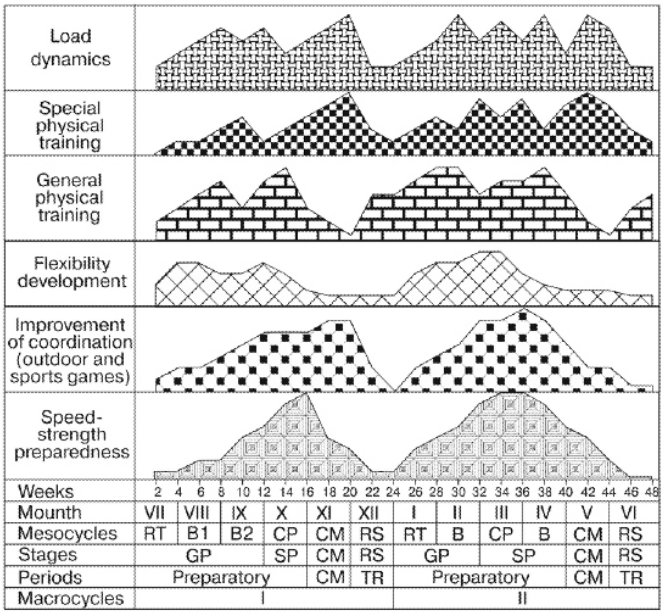

Fig. 1. Structure of the annual two-cycle macrocycle of weightlifters of 15–17 years, using means of speed-strength orientation: *Mesocycles: RT – retractor; B – basic; B1 – basic (general physical training), B2 – basic (special physical training); CP – control and preparation; CM – competitive; RS – restorative. Stages: GP – general-preparatory; SP – specially-preparatory; CM – competitive; RS – restorative. Periods: CM – competitive; TR – transitional.*

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Structure of the competition period (lasting 4 weeks, December 2015) of the annual cycle has a mesocycle (competitive), which includes retracting, intermediate and competitive microcycles.

Transition period involves the restoration of the body after training and competitive activities, as well as a link between the past and the subsequent annual training macrocycle. The duration of the transition period was 4 weeks (Figure 1).

Second macrocycle (with a duration of 24 weeks, January 2016 – June 2016) is an organic continuation of the first macrocycle, the preparatory period of which was 16 weeks (January 2016 – April 2016).

General preparatory stage (duration of 8 weeks, January-February) included two mesocycles – retractor and base. The basic mesocycle was of an experimental nature, where the means and methods for the development of speed-strength training were included in the training process, and also the tasks of the mesocycle were to create prerequisites for further hard work, connected directly with the improvement of the technique of competitive exercises. The structure of the preparatory stage (duration 8 weeks) was of a formative character and included a special preparatory and basic mesocycle.

The special preparatory stage is characterized by the predominant use of highly specialized exercises and the use of special methodical techniques (static-dynamic, isometric, plyometric and shock), which allow to eliminate the identified individual "shortcomings" in the training process of weightlifters of 15–17 years. Specially-preparatory and basic mesocycles consisted of a reconstructive microcycle, retractor, shock and recovery.

Structure of the competition period (duration 4 weeks) has a formative character. The volume of the load is reduced, special attention is paid to the development of the technique of competitive exercises and the volume is increased by means of speed-strength character. The task of this period is the achievement of the peak form of the athletes at the main competitions. The structure of the competition period of the annual cycle has mesocycles (competitive), which includes retracting, intermediate and competitive microcycles.

Transition period involves the restoration of the body after training and competitive activities, as well as a link between the past and the subsequent annual training macrocycle. The duration of the transition period was 4 Sundays.

In the author's experimental methodology, we showed that in the preparatory period, athletes also have an increase in competitive exercises due to speed-strength means.

As an example, in Figure 2 shows the dynamics of the load of competitive exercises and speed-strength means in the preparatory period of the general preparatory stage, which includes three mesocycles: a retractor and two basic ones, including retracting, shock and recovery microcycles.

On the graph (Figure 2) it is evident that with practically the same maximum load variations (30–90%), the author's technique is characterized by a fundamental reduction in the load in competitive and special-auxiliary exercises. This dynamic load also allows the athlete to stabilize training. In general, the

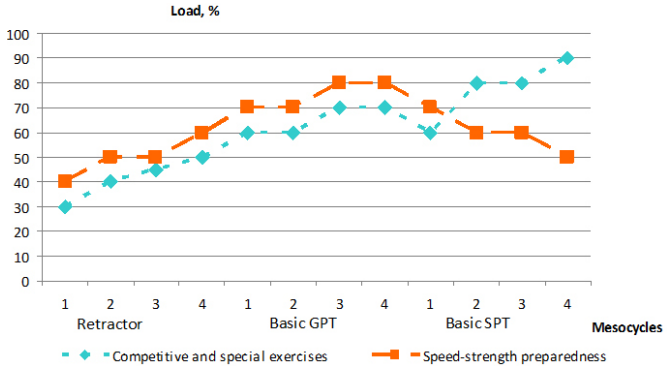

Fig. 2. Dynamics of the load of competitive exercises and speed-strength means (in percent of the maximum) in the preparatory period of the general preparatory stage of weightlifters of 15–17 years

experimental method proposed by us is characterized by a gradual increase in the load both in competitive exercises and in exercises for the development of speed-strength training of athletes. An important point of preparation is the fact that the gradual increase in exercises for the development of speed-strength training and static loads allows to ensure the prevention of overstrain and overtraining, which ultimately helps to keep the necessary form for weightlifters.

Table 1 shows a more detailed example of the construction of the training process in the shock microcycle of the basic mesocycle preparatory period of the general preparatory stage for weightlifters of 15–17 years using different operating modes and using speed-strength training.

The proposed experimental program of shock microcycle training included three sessions using speed-strength training, aerobic exercise, which is carried out by running a small intensity, which activates metabolic recovery and muscle relaxation after weight training.

Experimental results were expressed in the following.

Thus, at the beginning of a year-long macrocycle (Table 2), the difference is not likely in the classical snatch (control – 57,5 kg, experimental – 58,5 kg; $P>0,05$); classic clean and jerk (respectively – 67,1 kg, 69,5 kg; $P>0,05$); sum of biathlon (respectively – 124,6 kg, 128,0 kg; $P>0,05$); overhead squat (respectively – 90,1 kg, 88,7 kg; $P>0,05$); bench press (respectively – 56,1 kg, 60,1 kg; $P>0,05$) and deadlift (respectively – 96,5 kg, 99,9 kg; $P<0,05$).

Coefficients of variation of all the main indicators of special exercises separately for the control and experimental groups did not practically exceed the total output level. For example, for the classical snatch control group, it compiled V=13,7%, for experimental – V=14,0%. Accordingly, for the control and experimental groups, the coefficients of variation were the following values: classical clean and jerk – V=9,4%, V=7,7%; sum of biathlon – V=11,0%, V=9,8%; overhead squat – V=90,1%, V=88,7%; bench press – V=12,6%, V=9,8% and deadlift – V=8,6%, V=7,6%.

At the end of the study (Table 3), the difference between the indices: classical snatch (control – 72,5 kg, experimental – 80,5 kg; ($t=2,5$; $P<0,05$); classical clean and jerk (respectively – 87,5 kg, 97,8 kg; ($t=2,5$; $P<0,05$); sum of biathlon (respec-

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Table 1

An example of a training program for weightlifters 15–17 years of the experimental group in the shock microcycle of the base mesocycle during the preparatory phase of the general preparatory phase

Day	Time of the classesstart	Classes duration, min	Means of training	Load direction	Load value	Basic method of performing exercise
1	11:00	60	Exercises for the jerk of the classic and traction thrust	Anaerobic	Lg.	Interval
	19:00	30	Exercises with the use of speed-strength training	Mixed	Sm.	Interval
2	11:00	60	Exercises for push the classic and thrust jerk	Anaerobic	Lg.	Interval
3	11:00	60	Exercises for the jerk of the classic and traction thrust	Anaerobic	Lg.	Interval
	19:00	30	Exercises with the use of speed-strength training	Anaerobic	Lg.	Interval
4	Day off		Rehabilitation equipment (massage)	Restoration of the athlete's body		
5	11:00	60	Exercises for push the classic and thrust jerky	Anaerobic	Av.	Interval
	19:00	30	Exercises with the use of speed-strength training	Mixed	Av.	Interval
6	11:00	60	Exercises for the jerk of the classic and traction thrust	Anaerobic	Lg.	Interval
	19:00	30	Running, fast 8 km·h^{-1}	Aerobic	Sm.	Continuous
7	Day off		Rehabilitation equipment (sauna, massage)	Restoration of the athlete's body		

Remark. *Load value: Sm. – Small, Av. – average, Lr. – large.*

Table 2

Average indicators of the results of competitive and specially-preparatory exercises for weightlifters 15–17 of the control and experimental groups at the beginning of the annual macrocycle (n_1=n_2=15)

Indicators	CG		EG		t	P
	$\bar{X}_1 \pm m_1$	V, %	$\bar{X}_2 \pm m_2$	V, %		
Classical snatch, kg	57,5±1,7	13,7	58,5±1,8	14,0	0,4	>0,05
Classical clean and jerk, kg	67,1±1,6	9,4	69,5±1,3	7,7	0,2	>0,05
Sum of biathlon, kg	124,6±3,3	11,0	128,0±2,9	9,8	0,3	>0,05
Overhead squat, kg	90,1±1,8	7,5	88,7±1,2	5,4	0,7	>0,05
Bench press, kg	56,1±1,8	12,6	60,1±1,5	9,8	1,7	>0,05
Deadlift, kg	96,5±2,1	8,6	99,9±1,9	7,6	1,2	>0,05

Table 3

Average results of the increase in the results of competitive and specially-preparatory exercises for weightlifters of the control and experimental groups at the end of the annual macrocycle (n_1=n_2=15)

Indicators	CG	EG	t	P
	$\bar{X}_1 \pm m_1$	$\bar{X}_2 \pm m_2$		
Classical snatch, kg	72,5±2,4	80,5±1,6	2,2	<0,05
Classical clean and jerk, kg	87,5±3,0	97,8±2,7	2,5	<0,05
Sum of biathlon, kg	160,0±5,5	178,3±4,9	2,5	<0,05
Overhead squat, kg	119,8±1,6	125,3±1,5	2,5	<0,05
Bench press, kg	71,0±1,8	77,1±1,4	2,5	<0,05
Deadlift, kg	116,3±2,8	128,2±2,6	3,1	<0,01

tively – 160,0 kg, 178,3 kg; (t=2,5; P<0,05); overhead squat (respectively – 119,8 kg, 125,3 kg; (t=2,5; P<0,05); bench press (respectively – 71,0 kg, 77,1 kg; (t=2,5; P<0,05) and deadlift (respectively – 116,3 kg, 128,2 kg; (t=3,1; P<0,01).

So, at the end of the observation, which took place during the annual training at the stage of preliminary basic training, the athletes of the experimental group showed higher results than the control group, which was trained according to the usual method of the Youth Sports School (Table 3), without using the means of speed-power directivity. At the same time 10 athletes EG have established personal records in the sum of a biathlon and in separate specially-training exercises.

Conclusions

Proceeding from the results of the pedagogical experiment of constructing the training and training process of weightlifters using non-traditional methods for the development of speed-strength qualities of weightlifters, namely, the shock method, it can be said that using this method contributes to the more effective development of speed-strength qualities, and, consequently, leads to growth sports results in weightlifting.

To develop speed-strength qualities, an effective complement to existing traditional means is isokinetic exercises. They contribute to a more effective increase in effort in the final part of the boom lift, not always available in the natural conditions of lifting the bar. The development of speed-strength qualities is most effective in adolescence. That is why right after mastering the technique of performing weightlifting (competitive) exercises, it is necessary to develop speed and strength abilities with the use of special tools and methods, this is highly effective at the stage of preliminary basic training, as evidenced by the results of the study.

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At the end of the study, the difference between the indicators was also probable: classical snatch (control – 72,5 kg, experimental – 80,5 kg; (t=2,5; P<0,05); classical clean and jerk (respectively – 87,5 kg, 97,8 kg; (t=2,5; P<0,05); sum of biathlon (respectively – 160,0 kg, 178,3 kg; (t=2,5; P<0,05); overhead squat (respectively – 119,8 kg, 125,3 kg; (t=2,5; P<0,05); bench press (respectively – 71,0 kg, 77,1 kg; (t=2,5; P<0,05) and deadlift (respectively – 116,3 kg, 128,2 kg (t=3,1; P<0,01).

Further research: should include the development and justification of the training process of weightlifters 15–17 in the special preparatory stage of the preparatory preparation period.

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References

1. Verkhoshanskiy, Yu.V. (2013), *Osnovy spetsialnoy silovoy podgotovki v sporte* [Fundamentals of Special Strength Training in Sports], Sovetskiy sport, Moscow. (in Russ.)
2. Gaverdovskiy, Yu.K. (2007), *Obuchenie sportivnym uprazhneniyam. Biomekhanika. Metodologiya. Didaktika* [Training of sports exercises. Biomechanics. Methodology. Didactics], Fizkultura i Sport, Moscow. (in Russ.)
3. Dvorkin, L.S. (2005), *Tyazhelaya atletika* [Weightlifting], Sovetskiy sport, Moscow. (in Russ.)
4. Dzhim, V.Yu. (2013), "Comparative analysis of the technique of jerky exercises in weightlifting and kettlebell lifting", *Pedahohika, psykholohiia ta medyko-biolohichni problemy fizychnoho vykhovannia i sportu*, No. 11, pp. 10-16. (in Russ.)
5. Doronin, A. M. (1992), *Skorostno-silovaya podgotovka sportsmenov s ispolzovaniem mashiny upravlyayushchego vozdeystviya: avtoref. diss. na soiskanie uchenoy stepeni kand. ped. nauk* [Speed-strength training of athletes using a control machine: PhD thesis abstract], GTsOLIFK, Moscow, 28 p. (in Russ.)
6. Yevdokimov, B.S. (1971), "Assessment of the level of special training for physical fitness of a weightlifter. Weightlifting", *Fizkultura i sport*, Yearbook, pp. 118-123. (in Russ.)
7. Ippolitov, N.S. (1975), *Issledovanie prognosticheskoy znachimosti skorostno-silovykh kachestv u podrostkov pri otbore dlya zanyatiy tyazheloy atletikoy: avtoref. diss. na soiskanie uch. stepeni kand. ped. nauk* [Investigation of the prognostic significance of speed-strength qualities in adolescents in selection for weightlifting: PhD thesis abstract], Leningrad, 24 p. (in Russ.)
8. Korobkov, A.V. (1964), *Issledovanie vzaimosvyazi razvitiya fizicheskikh kachestv i obucheniya tekhnike tyazheloatleticheskikh uprazhneniy: avtoreferat. dis. kand. ped. nauk* [Investigation of the interrelation between the development of physical qualities and training in the technique of weightlifting exercises: PhD thesis abstract], Moscow, 25 p. (in Russ.)
9. Laputin, H.A. (2004), *Spetsialnye uprazhneniya tyazheloatleta* [Special weightlifter exercises], Fizkultura i sport, Moscow. (in Russ.)
10. Medvedev, A.S., Frolov, A.I. & Furaev, A.N. (1980), "Speed-strength qualities of heavy-lifters of high qualification and their interrelation with technical maystrystvom", *Fizkultura i sport*, Yearbook, pp. 33-34. (in Russ.)
11. Mikhaylyuk, M.P. (1977), "Speed-strength training of qualified weightlifters", *Fizkultura i sport*, Yearbook, pp. 46-48. (in Russ.)
12. Oleshko, V.H. (2011), *Pidhotovka sportsmeniv u sylovykh vydakh sportu* [Training of athletes in power sports], DIA, Kyiv. (in Ukr.)
13. Platonov, V.N. (2015), *Sistema podgotovki sportsmenov v olimpiyskom sporte. Obshchaya teoriya i ee prakticheskie prilozheniya* [System of training athletes in the Olympic sport. General theory and its practical applications], in 2 books., Book 1, Olimp. lit. (in Russ.)
14. Platonov, V.N. (2015), *Sistema podgotovki sportsmenov v olimpiyskom sporte. Obshchaya teoriya i ee prakticheskie prilozheniya* [System of training athletes in the Olympic sport. General theory and its practical applications], in 2 books., Book 2, Olimp. lit. (in Russ.)
15. Piven, O.B. & Dzhym, V.Iu. (2014), "Improvement of the training process of athletes of power sports on the basis of their biorhythms", *Slobozans`kij naukovo-sportivnij visnik*, No. 5(43), pp. 65-69, doi: 10.15391/snsv.2014-5.012. (in Ukr.)
16. Piven, O.B. & Dorofieieva, T.I. (2017), "Dependence of sports result from data of physical development, morphofunctional and special strength training of weightlifters at the stage of preliminary basic training", *Slobozans`kij naukovo-sportivnij visnik*, No. 4(60), pp. 75-85, doi: 10.15391/snsv.2017-4.015. (in Ukr.)
17. Farfel, B.C. (1963), *Tribuna masterov tyazheloy atletiki* [Tribune of Masters of Weightlifting], Fizkultura i sport, Moscow. (in Russ.)
18. Filin, V.P. (1970), *Problema sovershenstvovaniya dvigatelnykh (fizicheskikh) kachestv detey shkolnogo vozrasta v protsesse sportivnoy trenirovki: avtoref. diss. na soiskanie uch. stepeni d-ra. ped. nauk* [The problem of improving the motor (physical) qualities of school-age children in the process of sports training: Doctor of Science thesis abstract], Moscow, 55 p. (in Russ.)
19. Chernyak, A.V. (1970), "Speed-strength training athletes, dischargers", *Tyazheloatlet: sbornik statey v pomoshch treneru*, FiS, pp. 28-36. (in Russ.)
20. Cornelius, A.E., Brewer, B.W. & Van Raalte, J.L. (2007), "Applications of multilevel modeling in sport injury rehabilitation research", *International Journal of Sport and Exercise Psychology*, Vol. 5(4), pp. 387-405, doi: 10.1080/1612197X.2007.9671843.
21. Visek, A.J., Watson, J.C., Hurst, J.R., Maxwell, J.P. & Harris, B.S. (2010), "Athletic identity and aggressiveness: A cross-cultural analysis of the athletic identity maintenance model", *International Journal of Sport and Exercise Psychology*, Vol. 8(2), pp. 99-116, doi: 10.1080/1612197X.2010.9671936.
22. Huijing, P.A. (1992), "Elastic Potential of Muscle", *Strength and Power in Sport*, Blackwell Scientific Publications, pp. 151-168.
23. Komi, P.V. (1992), "Stretch-Shortening Cycle", *Strength and Power in Sport*, Blackwell Scientific Publications, pp. 169-179.

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