

Original Article

The concept of building control for certain components of the system for training handball players

VALERIA TYSHCHENKO¹, GENNADIILISENCHUK², TETIANA OBYEDKINA^{3,4}, INNA
CHEREDNICHENKO⁵, OLGA LYTVYNENKO², NATALIABORETSKA², ZORYANASEMERYAK⁶

¹Department of Theory and Methods of Physical Training and Sports, Zaporizhzhia National University, UKRAINE

²Department of Theory and Methodology of Physical Culture, Mykolaiv V.O. Sukhomlynskyi National University, UKRAINE

³Department of Physical Rehabilitation, Khortytsia National Academy, Zaporizhzhia, UKRAINE

⁴Department of Theory of Sport and Physical Culture, Lviv State University of Physical Culture, Lviv, UKRAINE

⁵Physical Culture and Sport Management Department, National University «Zaporizhzhia Polytechnic», Zaporizhzhia, UKRAINE

⁶Department of Fencing, boxing and national single combat, Lviv State University of Physical Culture, UKRAINE

Published online: July 31, 2019

(Accepted for publication: June 25, 2019)

DOI:10.7752/jpes.2019.s4200

Abstract

The purpose of the research – to find developed similarity in concepts of training systems control for high qualified handball players and demands of their training and competitive activity. *The methodology of the work.* The expert assessment was conducted for direct participants, such as trainers of the training and competitive process of Super League Ukrainian teams, "Motor" and "ZTR". *Results.* According to the generalized estimations of experts, which we interpret as a holistic assessment of control system in training and competitive activity for highly qualified handball teams in the annual training macrocycle 2017-2018. It has been defined by its compliance with the essential task of the training system. Most assessments of the criteria were within full compliance with their requirements. Thus, the highest scores recorded for the purpose and validity of the criteria (by 3.78 and 3.81 points); presentation of information and coordination of control components (by 3.74 and 3.67 points); costs (by 3.59 points); completeness of the information (by 3.56 points); the value of information (by 3.41 points); determinism (by 3.19 points) and speed of decision (by 3.11 points). Another two assessments of criteria were closer to the high level and accounted for the continuity of the content of information and the frequency of control 2.96 and 2.78 points. *Conclusions.* The confirmed effectiveness of the development on the basis of our concept, control system of training and competitive activity of highly qualified handball teams in the annual preparation of the macrocycles. It has been recommended to use separate scientific and methodological guidelines, the concept of control components, as well as those that are based on a theoretical and practical level means and methods of control in long-term training for highly qualified handball teams.

Keywords: handball, control, expert assessment, macrocycle

Introduction

An important element to manage training practices of athletes is a complex control system, due to which the effectiveness of the chosen direction of the training process can be estimated [Zech et al, 2012; Paillard & Noé, 2006]. The major significance in modern sports has a properly organized system of control, solves the problem to select promising athletes, their evaluation and timely correction of the course of their training and staffing teams to participate in important competitions [Kujala, 1995; Lebed & Bar-Eli, 2013; Valeria & Olexander, 2015].

However, the choice of these methods often hasn't been done well, arbitrary, and might resulting in low information content of data, or even a distorted view of the state of athletes' preparedness. In some cases, control has been monitored for one or two sides of the preparation process. In this regard, at the current stage of development in sports there is the necessity for comprehensive preparation of control [Tishchenko, 2016; Evhen & Valeria, 2017; Tyshchenko, Hnatchuk et al, 2018]. The goal of which is to implement dynamic monitoring based on comparison of biomedical and pedagogical monitoring data of control, as well as the effectiveness of qualified athletes [Yuriy et al, 2016; Hoffman & Kaminsky, 2000]. There are various methods

for evaluating preparedness of athletes in different sports. Therefore, it is necessary to choose the appropriate method or methods that match the specificity of sport and opportunities to researchers, the theoretical validity of the requirements and its reliability of the methods. The choice of specific methods should be objective, reliable, informative, fast enough and easy to use, which is caused by each survey task and capabilities of individual methods. It would be useful to experimentally determine the factors of success of the possibility to achieve high level skills, the degree of their influence on the result, to develop performance criteria, and characterizing the level and stability of sports results or the effectiveness of sports activities [Gatzemann, Schweizer & Hummel, 2008]. However, there are not the same methodical installations when selecting the most informative criteria and methods diagnostics, which determined the relevance of our research.

Materials and Methods

Participants

As a matter of a result of the implementation of the control system of training and competitive activity of highly qualified handball teams in the annual cycle 2017-2018 years of training, we conducted an expert evaluation. The goal – to determine how we have chosen the concept of building control for certain components of the system for training handball players, and how their qualifications can meet the requirements for the practice to organize training and competitive activity.

The expert's review involved only direct participants, such as coaches in training process and competitive processes of teams, "Motor" and "ZTR". Thus, that let us to obtain a reliable and objective evaluation of our proposed solutions of scientific and applied problems of the system of training athletes and highly qualified handball teams, and on the other hand – opposite effect of the proposed action control system of training and competitive activity of highly qualified handball teams.

Methods

Scientific information has given us reason to assert the need to study the effectiveness of the proposed control system of training and competitive activity of highly qualified handball teams for several different content of criteria's [Chaouachi et al, 2009; Valeria et al, 2017]. The content of the criteria agreed with the scientific and methodological data [Bayios, 2001; Marques & González-Badillo, 2006; Póvoas et al, 2012], as well as it was known before by the experts involved in the study.

Therefore, the main criteria for evaluation of the control system of training and competitive activity for highly qualified handball teams made the level of requirements for individual ones. Whereas, other criteria to be used in the evaluation, belonged purpose, reliability, value of information, frequency, completeness of information, determinism, continuity of its receipt, the speed of decision-making, costs, presentation of information and coordination of control components.

Satisfaction of the criteria differentiated into four levels. Among them there are those that fully and partially meet the requirements, and some that do not meet certain criteria. The level, which partially satisfies the requirements, we divided into two kinds: that requires some criteria and providing a significant correction.

All evaluations experts carried out for the individual types of control, operational, current, and a landmark, because of differences in their objectives, structure and content.

Statistical analysis

A generalized assessment of control system in training and competitive activity of highly qualified handball teams was obtained from the basis of mathematical and statistical calculations. To confirm the authenticity of the written examination, we determined the degree of expert opinion's consistency in connection with this use of multiple correlation coefficient (coefficient of concordance) Kendall's ranks, which is determined by the formula:

$$W = \frac{12S}{m^2(n^2 - n)}$$

where m – the number of experts in the group, n – the number of questions, the S – sum of squares of differences of ranks (deviations from the mean), determined by the formula:

$$S = \sum_{i=1}^n (R_i - \bar{R})^2$$

$$R_{\text{cp}} = \frac{1}{n} \sum R_i$$

$$R_i = \sum_{j=1}^m r_{ij}$$

where r_{ij} – rank, j -th applied by the expert i -th indicator.

In a sense, W is a measure of union. For all studies within a good consistency and a very high ($W = 0.51-0.75$). According to conventional algorithms, the determination in the degree of expert opinion's coherence, the largest concordance rate was performed [Kostiukevych et al, 2016].

Results

To determine the degree of expert judgment on the consistency of all criteria, we calculated concordance rates for some types of control. The highest consistency of expert opinion is generalized indicators assessment of the monitoring system of training and competitive activity of highly qualified handball teams. The coefficient of concordance for these indicators is $W = 0.80$, and shows a high degree of coaches' (experts) opinions consistency. The average degree of expert judgment consistency observes the provision of operational and current control system evaluation. Thus, for the operational control of the coefficient of concordance $W = 0.50$, and the current – $W = 0.65$. The lowest level of expert opinion found consistency in the process of determining the assessment of staged control. According to criteria of indicators the coefficient of concordance of this type of control is $W = 0.31$ (Table).

Table Entire evaluation of performance control system of training and competitive activity of highly qualified handball teams

Criteria for evaluation	Types of control			Generalized evaluation
	Operational	Current	Staged	
Special purpose	3,56	3,89	3,89	3,78
Accuracy	3,89	3,89	3,67	3,81
Value of information	3,56	3,22	3,44	3,41
Frequency	2,56	3,78	2,00	2,78
Completeness of information	3,00	3,78	3,89	3,56
Deterministic information	3,22	3,89	2,44	3,19
Continuity of information	3,89	3,22	1,78	2,96
Speed of making decision	3,89	3,33	2,11	3,11
Cost	3,67	3,67	3,44	3,59
Presentation of information	3,33	3,78	3,89	3,67
Consistency control components	3,89	3,78	3,56	3,74
Mean	3,49	3,66	3,10	3,42
Standard deviation	0,43	0,27	0,84	0,36
Coverage error	0,15	0,09	0,30	0,13
Coefficient of concordance W	0,50	0,31	0,80	0,65
The criterion of consistency Pearson χ^2	45,23	28,20	72,05	58,76

To achieve a better presentation of the results of this research direction, we decided to consider types of control and their expert opinion in comparison, and do not separate from each other and the sequence of the criteria. This factor was underlined based on expert review.

Therefore, it is possible for the intended purpose, that we have chosen the strategy of building current and staged control, receive approval from the experts. According to these two indicators, they have earned high scores of 3.89 points. The low score was recorded for operational control (3.56 points). This led subsequently to a slight decrease in the generalized assessment, which is calculated, the arithmetic means of expert assessments of all types of control. The arithmetic mean was 3.78 points. After analyzing the result obtained by the criterion

of purpose, we concluded that the experts in the evaluation of operational control pointed out that it is necessary to conduct a small correction and harmonization of different orientation means and methods at different points of the meeting for the annual preparation of the macrocycle. It can be considered a high-level assessment of the validity of all types of control on this criterion (purpose) because in our view the operational control is the most difficult of the planning.

On the criterion of authenticity, which is determined by the degree of subjective expert's point of view with the data obtained from the position of the scientific validity, and it is contained not only in results but also in the implementation of the algorithm corresponding to a set of measures for each type of control, it also can be argued about such data. All the experts for all types of control were giving high praise for our suggested approach. High (maximum) estimates were obtained for the operational and current control (by 3.89 points) and slightly lower for staged control. It pointed out that you need to spend a small correction the actual implementation of the algorithm of staged control.

We elaborate on the point that this approach could also be due to the fact, that the experts assessed the proposed components of control system of training and competitive activity for highly qualified handball teams. They were involved in the role as a direct participant. There were several unexpected results in the expert evaluation of the various types of control on the criterion of information value. So, for operational and current evaluation, it was at 3.56 and 3.44 points, and below it was a stage of control – 3.22 points. However, the value of the information related to its importance for future training and competitive activity of highly qualified handball players, required clarification of the situation.

The next set of criteria, which was the basis of the expert review of control system of training and competitive activity of highly qualified handball teams in the annual training macrocycle, formed such as: frequency, completeness, determinism and continuity of information.

It has been established, that experts provided for the criteria of the periodicity one of the lowest ratings (from 2.00 to 3.78 points). In our opinion, the low points of the frequency of the provided graded control associated with the existing contradictions. It is characterized by the fact that this type of control includes the largest number of means and methods of information and a valuable source of data for the coaching team. However, on the other hand, a variety of tools and techniques point at a comprehensive and holistic study of the level of athletes, their condition more difficult to use in a limited period of time that occur between the individual competitive rounds. It also is necessary to take into the consideration views of experts, who point out that to carry out staged control can lead to the exhaustion of energy and psycho-emotional features [Godik&Skorodumova, 2010].

In our opinion, there was a predictable situation in completeness of the information for criteria. Thus, certain information was coming through organized and constructed by us operational control. Experts have given an average rating of 3,0 points. One step above the settled assessment of the completeness of the information obtained through the routine control (3.78 points) and according to the experts, the criteria-stage control was organized within the annual macrocycles of training highly qualified handball players.

It should be noted that the experts assessed the different types of controls on the criterion of determination. The maximum number of points from all the experts at the maximum level of consistency was the current control (3.89 points). This is valuable because at different points of the meeting was aimed at identifying different tasks, although they certainly had a recurring character in the annual preparation of the macrocycles. A little bit smaller estimate (3.22 points) experts provided for operational control. In this situation, it is important to emphasize that at a sufficiently high level of received emergency information, the experts consider it necessary to carry out a minor correction of proper test methods of the procedure.

Unfortunately, the lowest rating on the criterion of determinism experts provided a staged control (2.44 points). Furthermore, it should be focus on making more research in this direction. However, we reached to the conclusion that such an assessment may be the facts of the staged control in annual macrocycles of training highly qualified handball teams season 2017–2018. It was a little repetitive, and mainly differed in structure and content, as carried out in the different orientation of the structural formations of the preparation process (general training stage preparatory period, control and preparation mesocycle).

The result indicated grounds for generalized assessment of the control system of training and competitive activity of highly qualified handball teams in the annual macrocycles and their performance at the level of 3.19 points.

The final result was criteria of continuity of information in this group. To be noted that criteria which characterized our control system from the perspective of the coverage of micro-, mesostructure of the training and competitive process, we received relatively predictable results, as it was confirmed by experts.

Based on the experts, whom we agree with, the level of continuity of the information has a clear consistency with the facts of the respective types of control. Thus, the continuity of data for operational control in the system that was offered by us in the annual training macrocycle experts estimated at 3.89 points.

Experts' estimates were slightly lower and amounted to 3.22 points for the current control. In our opinion, it is directly related to the aspects that the facts of the current control occurred significantly less operative. However, the amount of the studied parameters, due to objective reasons, we have been able to increase.

The lowest estimate of the experts obtained the lowest by analyzing the continuity of their information, while phasing control in annual training macrocycle of highly qualified handball players (1.78 points). The concept for criteria can be traced by experts' opinion that the presence of long periods between the facts of different types of control, the information content is reduced. The reasons for this can be waviness patterns state of athletes' preparedness, the presence of bio-energy rhythms of activity, etc.

According to the results of the expert evaluation of the control system of highly qualified handball teams' training and competitive activity in the macrocycle of training, we determined that a high impact on the performance of the decision, the coaches use operational control (3.89 points). Current control is a little bit lower than current control – 3.33 points, and the lowest scores stage control – 2.11 points. It indicates that the results by type of control for different effects on the planning of the training athletes' system and highly qualified handball teams in the annual training macrocycle.

The experts in almost all cases had a similar thought regarding different types of control. As a result, they determined a qualitative assessment of the ratio of the received information and material resources, time, etc. attracted to its production in the implementation of different (separate) control of forms in annual macrocycles of training at the level of 3.44-3.67 points regardless of the type of control. In our opinion, it indicates two main points while designing the control system of training and competitive activity of highly qualified teams in the preparation of the annual macrocycles. This first relates to the fact, that at the present level of development of handball and sports in general, the subjects of training and competitive activity are fully aware of the need to obtain quality information on preparedness and other aspects of the athlete's condition. The control is connected to the financial and resource costs, which the coaches are ready to go in anticipation of getting the best results of their activities. The second point refers to the fact that we in the construction of this control system was able to balance the costs and level of information, which according to the testimony hosts that experts have been involved in the study. Therefore, the means and methods that we have proposed, even with their costs do not come into conflict with the policy of highly qualified handball teams.

Expert assessment, on the criterion of the presentation of information has been distributed on growth from 3.33 to 3.89 points from the operational control to the staged. A slight difference between the types of control attributed to the data obtained under the operational control must also work out for further ease of use, and it is difficult due to the time limit. At the same time, staged control of actual data given to their coaches, relatively more time in which we process and interpret qualitative information to the needs of the training and competitive processes.

Integral criteria that was relatively self-represented in the expert survey performed consistency control's components. According to the experts, we have developed the control system that had a high level of quality (from 3.56 to 3.89 points), a combination of tools and techniques, their sequence and accessories properly to a certain kind of control, and was realized at certain points of the annual macrocycle of qualified handball players and their teams.

Discussion

The generalization of scientific information has given us a reason to assert the need to study the effectiveness of the proposed control system of training and competitive activity of highly qualified handball teams on several different criteria for the content. Their structure was determined by the available scientific and methodical literature, which has been previously analyzed.

Synthesis and study programs, tests and indicators, analysis of scientific and methodical literature suggest and teach: how to improve training process, and control of training and competitive activity of athletes [Boychuk, 2015]. At the present time, there are a number of common features and significant differences approaching the preparation of athletes [Stankiewicz, 2013; Zech et al, 2012]. However, there are not the same methodical installations when selecting the most informative criteria and methods diagnostics, which determined the relevance of our research. Therefore in this article we have chosen the concept of building control for certain components of the system for training handball players, and how their qualifications can meet the requirements for the practice to organize training and competitive activity.

According to the generalized estimations of experts, which we interpret as a holistic assessment of the control system of training and competitive activity of highly qualified handball teams in the annual training macrocycle, defined its compliance with the main task of training. It gives reason to recommend the use of individual scientific and methodological guidelines, the components of the concept of control to be established in the theoretical and practical levels of resources and control methods, in a long-term training of highly qualified handball teams.

Conclusions and prospects for further research

Most assessments of the criteria were within full compliance with their requirements. As a result, the highest scores recorded for the purpose and validity of the criteria (by 3.78 and 3.81 points); presentation of information and coordination of control components (by 3.74 and 3.67 points); costs (by 3.59 points); completeness of the information (by 3.56 points); the value of information (by 3.41 points); determinism (by 3.19 points) and speed of decision (by 3.11 points). Another two assessments of criteria were closer to the high

level and accounted for the continuity of the content of information and the frequency of control 2.96 and 2.78 points.

Therefore, we have received confirmation of the effectiveness that was developed on the basis of our concept of the control system of training and competitive activity for highly qualified handball teams in the annual preparation of the macrocycles.

Conflicts of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

References

- Bayios, I. A., Anastasopoulou, E. M., Sioudris, D. S., & Boudolos, K. D. (2001). Relationship between isokinetic strength of the internal and external shoulder rotators and ball velocity in team handball. *Journal of Sports Medicine and Physical Fitness*, 41(2), 229-235.
- Boyчук, R. I. (2015). Theoretical substantiation of programs of targeted development of coordination abilities of pupils in lessons of physical training with elements of sports games. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 19(1), 7-12.
- Chaouachi, A., Brughelli, M., Levin, G., Boudhina, N. B. B., Cronin, J., & Chamari, K. (2009). Anthropometric, physiological and performance characteristics of elite team-handball players. *Journal of sports sciences*, 27(2), 151-157.
- Evhen, P., & Valeria, T. (2017). Peculiar properties and dynamics of physiological indicators in Handball team. *Journal of Physical Education and Sport*, 17(1), 335.
- Hoffman, J. R., & Kaminsky, M. (2000). Use of performance testing for monitoring overtraining in elite youth basketball players. *Strength & Conditioning Journal*, 22(6), 54.
- Gatzemann, T., Schweizer, K., & Hummel, A. (2008). Effectiveness of sports activities with an orientation on experiential education, adventure-based learning and outdoor-education. *Kinesiology*, 40(2).
- Godik M., Skorodumova A. (2010). Integrated control in sports games. *Soviet sport*; 330.
- Kostiukevych V., Voronova V., Shinkaruk O., Borysova O. (2016). Fundamentals of the research for undergraduate and graduate students in higher education. *Vinnitsia: Nilan – LTD*; 554.
- Kujala, U. M., Taimela, S., Antti-Poika, I., Orava, S., Tuominen, R., & Myllynen, P. (1995). Acute injuries in soccer, ice hockey, volleyball, basketball, judo, and karate: analysis of national registry data. *Bmj*, 311(7018), 1465-1468.
- Lebed, F., & Bar-Eli, M. (2013). Complexity and control in team sports: Dialectics in contesting human systems. *Routledge*; 248.
- Marques, M. A. C., & González-Badillo, J. J. (2006). In-season resistance training and detraining in professional team handball players. *Journal of strength and conditioning research*, 20(3), 563.
- Paillard, T. H., & Noé, F. (2006). Effect of expertise and visual contribution on postural control in soccer. *Scandinavian journal of medicine & science in sports*, 16(5), 345-348.
- Póvoas, S. C., Seabra, A. F., Ascensão, A. A., Magalhães, J., Soares, J. M., & Rebelo, A. N. (2012). Physical and physiological demands of elite team handball. *The Journal of Strength & Conditioning Research*, 26(12), 3365-3375.
- Stankiewicz, B. (2013). Status, problems and future directions of research in volleyball. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 17(12), 77-81.
- Tishchenko, V.A. (2016). Skilled handball player functionality variation in annual macrocycle. *Theory and Practice of Physical Culture*, 3, 72-73.
- Tyshchenko V., Hnatchuk Y., Pasichnyk V., Bubela O., Semeryak Z. (2018). Factor analysis of indicators of physical and functional preparation for basketball players. *Journal of Physical Education and Sport*, 18(4), 1839-1844.
- Valeria, T., & Olexander, P. (2015). Control of general and special physical preparedness by qualified handballers. *Journal of Physical Education and Sport*, 15(2), 287.
- Valeria, T., Pavel, P., Olena, B., Lia, G., Maria, S., Anna, S., & Olga, S. (2017). Testing of control systems of highly qualified handball teams during the annual training macrocycle. *Journal of Physical Education and Sport*, 17(3), 1977-1984.
- Yuriy, B., Maryan, P., & Valeria, T. (2016). Dynamics of changes in the functional state of qualified handballers during macrocycle. *Journal of Physical Education and Sport*, 16(1), 46.
- Zech, A., Steib, S., Hentschke, C., Eckhardt, H., & Pfeifer, K. (2012). Effects of localized and general fatigue on static and dynamic postural control in male team handball athletes. *The Journal of Strength & Conditioning Research*, 26(4), 1162-1168.