

## ORIGINAL SCIENTIFIC PAPER

# Training Process Structure of Highly Skilled Players in Mini-Football during the Competitive Period

Wang Leibo<sup>1</sup>, Gennadii Lisenchuk<sup>2</sup>, Ivan Stasiuk<sup>3</sup>, Arkadiusz Marzec<sup>4</sup>, Gennadii Zhigadlo<sup>2</sup>, Vitalii Leleka<sup>2</sup>, Konstantin Bogatyrev<sup>5</sup>, Viktor Derkach<sup>6</sup>, Oksana Adamenko<sup>7</sup> and Oleg Slavitiak<sup>8</sup>

<sup>1</sup>National University of Ukraine on Physical Education and Sport, Football Department, Kyiv, Ukraine, <sup>2</sup>V.O. Sukhomlynskyi National University of Mykolaiv, Theory and Methodology of Physical Culture Department, Mykolaiv, Ukraine, <sup>3</sup>Kamianets-Podilsky Ivan Ohienko National University, Physical Culture Faculty, Kamianets-Podilsky City, Ukraine, <sup>4</sup>Jan Dlugosz University in Czestochowa, Faculty of Health Sciences, Czestochowa, Poland, <sup>5</sup>South Ukrainian National Pedagogical University named after K. D. Ushynsky, Theory and Methodology of Physical Culture and Sport Disciplines Department, Odessa, Ukraine, <sup>6</sup>Admiral Makarov National University of Shipbuilding, Sports Department, Mykolaiv, Ukraine, <sup>7</sup>Admiral Makarov National University of Shipbuilding, Theoretical Basics of Olympic and Professional Sports Department, Mykolaiv, Ukraine, <sup>8</sup>V.O. Sukhomlynskyi National University of Mykolaiv, Sports Department, Mykolaiv, Ukraine

## Abstract

According to the competition calendar, a one-cycle training process for highly skilled mini-football players in the annual macrocycle was selected. Participants: 15 players of the First League of Ukraine in the futsal mini-football team "Fortetsya" (Kamianets-Podilskyi City), among them 1 player – Honored Master of Sports, 1 – Master of Sports of International Class, 4 – Candidate to Master of Sports, 9 – players of 1st rank. In the competitive period, non-specific means of highly skilled players in mini-football amounted to 40.2%, specific means - 59.8%, including special-preparatory – 6.6%, leading – 30.9% and competitive – 22.3%. Aerobic loads ranged from 40.3 (4-day inter-cycle micro-cycle) to 53.6% (4-day competitive micro-cycle) during competitive and inter-gaming micro-cycles of this period. The use of mixed (aerobic-anaerobic) loads in the competitive period of futsal players training ranged from 45.0 (7-day inter-game micro-cycle) to 53.1% (4-day inter-game micro-cycle). The ratio of training means during the competitive period, the volume of training loads of different orientation in micro-cycles of competitive mezcycles of preparation, the ratio of training loads of different orientation: aerobic (49.2%); mixed (46.1%); anaerobic alactatic (2.4%); anaerobic glycolytic (2.3%) have been identified. Taking into account the structure and content of a single-cycle variant of training process structure for the players of the first league team of Ukraine, the volumes of training loads of different orientation, the ratio of the training means of the players in the competitive period were determined.

**Keywords:** futsal, competitive period, micro-cycle, training loading

## Introduction

According to the provisions of the theory of periodization, one of the main criteria for choosing the options for training process constructing in an annual macrocycle is a calendar of major competitions (Reilly, Bangsbo, & Franks, 2000; Platonov, 2005; Owen, Wong, & Delal, 2012). It is established that the planning of the training process in team game sports in the annual training cycle is carried out on the basis of different variants of periodization (Manasis & Ntzoufras, 2014;

Y. Adambekov, Iljasova, Achmetova, & K. Adambekov, 2015). The analysis of more than 100 references on football testified there are extremely small amount researches on mini-football (futsal). The current practice of mini-football leads to the transition to the programmed principle of training organization (Stasiuk, 2016; Kostiukevych et al., 2019). The problem of constructing a training process in the annual cycle in mini-football is still unresolved and requires the necessary development and implementation of effective methods in the training pro-



Correspondence:

G.A. Lisenchuk  
V.O. Sukhomlynskyi National University of Mykolaiv, Theory and Methodology of Physical Culture Department, Nikolska st., 24,  
Mykolaiv, 54030, Ukraine  
E-mail: gennadii.lisa@gmail.com

cess, which will optimize the futsal player's training for further progress at all levels. In order to develop and experimentally justify the structure and content of the training process during the competitive period, a systematic analysis of the content of the competitive activity and the process of preparation for it is required.

One of the authors of this study, Gennadii Lisenchuk was heading the Ukrainian association of futsal and managed Ukrainian National teams and Student teams during 20 years. Ukrainian futsal team won 11 (3 gold, 3 silver and 5 bronze) medals in World and Europe Championships for this period. Another author Ivan Stasiuk coached futsal team "Fortetsya" (Kamianets-Podilsky City). Ukrainian futsal coaches use still the results of this research although the data is 12 years old.

The purpose of the study is to substantiate experimentally the structure and content of training process for highly skilled players in mini-football in an annual macrocycle during the competitive period, taking into account the basic provisions of the periodization theory of sports training.

## Methods

Researchers used theoretical analysis and generalization of literary sources; pedagogical observations; pedagogical experiment; method of pedagogical control tests (testing); methods of mathematical statistics: basic descriptive statistics, such as means, standard deviations; frequency tables and histograms. Statistica 10.0 (StatSoft) was used as statistical software.

### Subjects

15 players of the First League of Ukraine in the futsal mini-football team "Fortetsya" (Kamianets-Podilsky City), among them 1 player – Honored Master of Sports, 1 – Master of Sports of International Class, 4 – Candidate to Master of Sports, 9 – players of 1st rank. Everyone of futsal players gave their written consent to participate in this research, in accordance with the recommendations of the Committee on Ethics of Biomedical Research.

### Design

In the process of observing, 35 training sessions have been analyzed during the competition period. Researchers studied the construction of both individual training sessions and their series. The following parameters were examined: the duration of exercise, their intensity, intervals of rest between exercises and series of exercises, heart rate during the exercise, the total duration of the exercises. These indicators determine the predominant orientation of individual exercises and training session as a whole, the value of the load, as well as the coefficients of the value and intensity of the training load that was calculated by following formulas:

$$LI = \frac{CVL}{T}$$

Legend: CVL – coefficient of the value of load, in points; I – intensity of loading, in points; t – the time duration of the exercise, in minutes.

The scale was used to determine the intensity of loading (Tiulenkov, 2007):

$$CVL = \sum_{i=1}^n I \cdot t$$

Legend: LI – the coefficient of the training load intensity, in points·min<sup>-1</sup>; CVL – coefficient of the value of load, in points; T – the duration of training session, in minutes.

## Results

On the basis of the 2008-2009 competition calendars for the teams of the first league in mini-football, a single-cycle variant of the training process was chosen, which included the planning of three periods of the annual macrocycle – preparatory (85 days), competitive (191 days) and transitional (89 days). The competition period lasted more than 6 months (191 days) from October 2008 to April 2009. It consisted of 4 mezo-cycles, each of which consisted of a series of competitive, inter-game and recovery micro-cycles. A sufficiently long competitive period required the use of various means of the training process to maintain the level of sports condition. Therefore, the structure of each competition mezo-cycle was composed not only of competitive and restorative micro-cycles, but also inter-game, which solved the problem of maintaining the player's physical and functional preparedness. According to the calendar of competitions and tasks that were solved in the competition period, 4-, 5-, 6-, 7-day competitive and inter-game micro-cycles were developed.

Under constructing competitive micro-cycles, as a rule, three tasks were solved: bringing the players in the optimum physical, functional and game tonus to the calendar game, conducting at the high motor and emotional level of the calendar game itself, restoring the player's performance after the calendar game. Based on this, four types of training sessions were used in competitive micro-cycles namely a calendar game, an evolving, supportive, and restorative training. In addition, depending on the duration of the competitive micro-cycle, one-time and two-times training sessions were used throughout the day. Thus, in the 4-days micro-cycle, only one-time training was used, in the 5-days two-day training only two-times sessions were used in the second day, in the 6-days and 7-days micro-cycles such training was repeated twice (Figure 1). Thus, in the construction of competitive micro-cycles, depending on their duration, researches followed the appropriate sequence of alternating evolving, supportive and recovery training sessions. For example, during the 4-days competitive micro-cycle, supportive training sessions were conducted in the 1st and 2nd training days, the calendar game – on the 3rd and the recovery training – on the 4th (see Figure 1a).

In the 5-days competitive micro-cycle, one supportive training session was conducted during the first day, one supportive and one evolving training was held on the second day, a supportive training session – on the third day, a calendar game – on the fourth day, and a recovery training session – on the fifth day (see Figure 1b).

A similar trend was observed in the construction of 6-days and 7-days competitive micro-cycles (Figure 1c; Figure 1d). That is, two days prior to the calendar game, evolving training sessions were held, on the eve of the calendar game – supportive training, and the day after the calendar game – recovery training. It should also be noted that each competing micro-cycle started with a supportive load of medium value as presented in Figure 1.

Therefore, the following approaches were used in the construction of competitive micro-cycles:

- one supportive training of small volume was planned before each calendar game, and after that – a recovery training of small volume was planned;
- in order to bring players in optimal physical and psychological condition, evolving training sessions were used only in 5-, 6- and 7-days micro-cycles. Thus there was one such train-

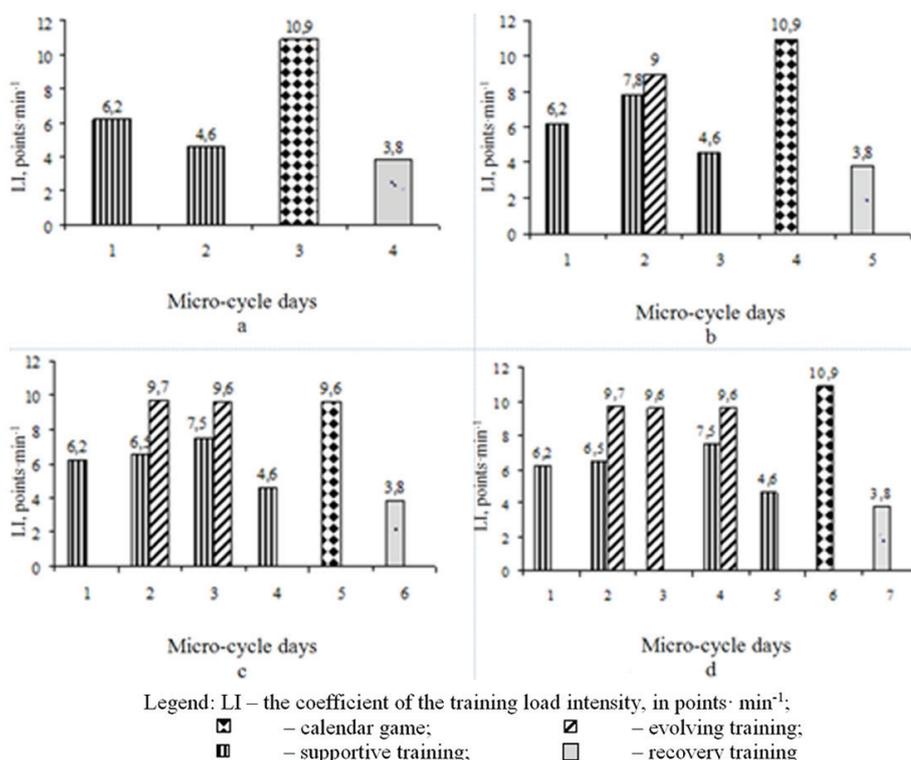


FIGURE 1. Options for constructing of competitive micro-cycles for highly skilled players in mini-football: a) 4-days, b) 5-days, c) 6-days, d) 7-days micro-cycles;

ing session in 5-days micro-cycles, two – in 6-days micro-cycles, three – in 7-days micro-cycles. That allowed to maintain the optimum level of player’s sports condition during the competitive period;

- it was assumed that the intensity of training loads in separate training sessions should be less than in the calendar game. In this case, the psychological tension was in the calendar game. On the other hand, if there were not one but two or three peaks in the intensity of training and competitive loads during a com-

petitive micro-cycle, this, in our view, would lead to incomplete recovery of players before the calendar game, which in turn would affect the efficiency of player’s competitive activity.

In the competitive period, non-specific means of training work of highly skilled players in mini-football amounted to 40.2%, specific means – 59.8%, including special-preparatory means – 6.6%, leading exercises – 30.9% and competitive exercises – 22.3% (Figure 2).

The use of training means caused a certain ratio of player’s

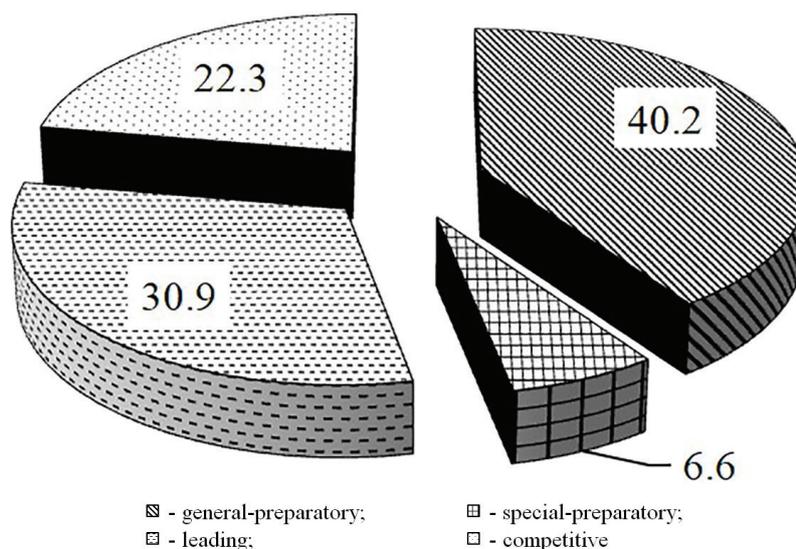


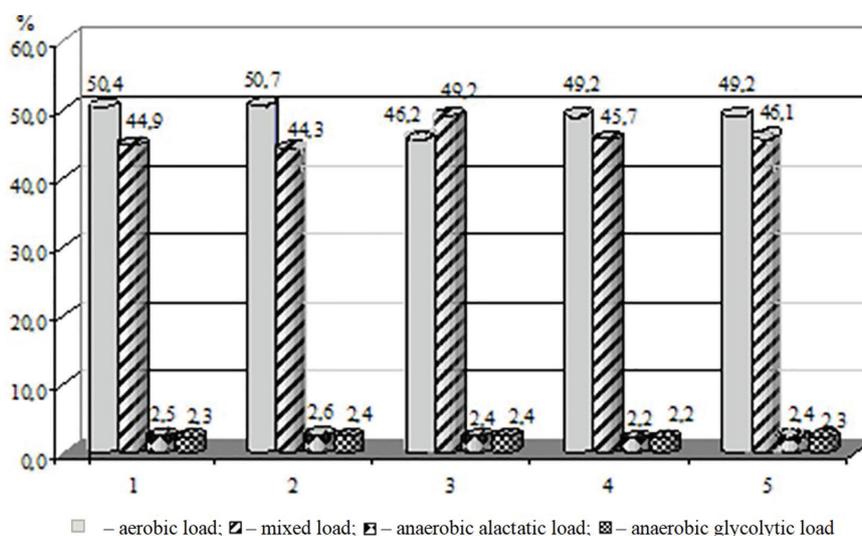
FIGURE 2. The ratio of training exercises of highly skilled players in mini-football during the competition period,%:

training loads in the competitive period (Table 1). The analysis of the Table 1 certifies that during competitive and inter-game micro-cycles in this period aerobic loads ranged from 40.3 % (4-days inter-game micro-cycle) to 53.6 % (4-days competitive

micro-cycle). The use of mixed (aerobic-anaerobic) loads in the competitive period of futsal player’s training ranged from 45.0 % (7-days inter-game micro-cycle) to 53.1 % (4-days inter-game micro-cycle).

**Table 1.** The volume of training loads of different directions in the micro-cycles of competitive mezo-cycles training for highly skilled players in mini-football

Micro-cycles	The number of micro-cycles	Load volume, in minutes (%)				Total, in minutes
		aerobic	mixed	anaerobic alactatic	anaerobic glycolytic	
<b>The first competitive mezo-cycle</b>						
4- day competitive	1	16.2 (53.6)	140 (46.4)	–	–	302
5- day competitive	2	448 (47.4)	456 (48.4)	20 (2.1)	20 (2.1)	944
6- day competitive	1	296 (43.7)	351 (50.5)	20 (2.9)	10 (1.4)	677
7- day competitive	1	316 (41.8)	399 (53.0)	20 (2.6)	20 (2.6)	755
7- day inter-game	2	870 (48.4)	806 (45.0)	60 (3.3)	60 (3.3)	1796
3- day recovery	2	290 (100)	–	–	–	290
Total	9	2382 (50.4)	2138 (44.8)	120 (2.5)	110 (2.5)	4764
<b>The second competitive mezo-cycle</b>						
4- day competitive	1	162 (53.6)	140 (46.4)	–	–	302
5- day competitive	1	224 (47.4)	228 (48.4)	10 (2.1)	10 (2.1)	472
6- day competitive	1	296 (43.7)	351 (50.5)	20 (2.9)	10 (1.4)	677
7- day competitive	1	316 (41.8)	399 (53.0)	20 (2.6)	20 (2.6)	755
7- day inter-game	1	182 (40.3)	239 (53.1)	15 (3.3)	15 (3.3)	451
7- day inter-game	2	870 (48.4)	806 (45.0)	60 (3.3)	60 (3.3)	1796
3- day recovery	3	435 (100)	–	–	–	435
Total	10	2485 (50.7)	2163 (44.3)	125 (2.6)	115 (2.4)	4888
<b>The third competitive mezo-cycle</b>						
4- day competitive	1	162 (53.6)	140 (46.4)	–	–	302
7- day competitive	4	1264 (41.8)	1596 (53.0)	80 (2.6)	80 (2.6)	3020
4- day inter-game	1	182 (40.3)	239 (53.1)	15 (3.3)	15 (3.3)	451
6- day inter-game	1	324 (44.9)	337 (46.7)	30 (4.2)	30 (4.2)	721
3- day recovery	2	290 (100)	–	–	–	290
7- day recovery	1	285 (66.2)	145 (33.8)	–	–	430
Total	10	2407 (46.2)	2557 (49.0)	125 (2.4)	125 (2.4)	5214
<b>The fourth competitive mezo-cycle</b>						
5- day competitive	2	448 (47.4)	456 (48.4)	20 (2.1)	20 (2.1)	944
7- day competitive	2	632 (41.8)	798 (53.0)	40 (2.6)	40 (2.6)	1510
3- day recovery	2	290 (100)	–	–	–	290
Total	6	1370 (49.9)	1254 (45.7)	60 (2.2)	60 (2.2)	2744
Total for competitive period	35	8644 (49.2)	8126 (46.1)	430 (2.4)	410 (2.3)	17610



**FIGURE 3.** The ratio of training loads of different directions in the competitive period of highly skilled players in mini-football: 1 – the first competitive mezo-cycle, 2 – the second competitive mezo-cycle, 3 – the third competitive mezo-cycle, 4 – the fourth competitive micro-cycle; 5 – in total for the competitive period

Anaerobic loads in the micro-cycles of the competitive period were used in the range of 4-5%, including anaerobic alactate from 2.1 (5-days competitive micro-cycle) to 4.2% (4-days inter-game micro-cycle).

In general, 49.2% of aerobic load, 46.1% of mixed load, 2.4% of anaerobic alactate and 2.3% of anaerobic glycolytic loads accounted during the competitive training period of mini-football players (Figure 3).

## Discussion

The competition period usually consists of several tournament stages, separated by 1-2 training micro-cycles. A similar model of the annual training cycle was developed by Aleshin (2004) for skilled handball players, who proposed to lay the one-cycle construction of the training process with a 4-week transition period, short (8-9 weeks) preparatory period and long (about 9 months) competitive period as the basis of the annual training structure.

Among the classic types of micro-cycles, researches presented the planning of inter-game micro-cycles mainly in the competitive period in the construction of the training process in mini-football, that were wide spread in the practice of training teams in sports games (Clemente, Martins, & Mendes, 2014; Lisenchuk et al., 2019). Their expediency is determined by the calendar of competitions. The rational use of the inter-gaming micro-cycle allows to maintain a high level of special readiness throughout the competitive period of the annual training cycle, as well as to avoid the long-term loss of sports condition in the transition period.

B. Krsmanovic, Krulanovic, T. Krsmanovic and Kovacevic (2010) studied the aerobic and anaerobic loading of football players of "Spartak-Zlatibor voda" as a 1st-league club of Serbia and the methodology of programming training work. It is necessary to note that researches on futsal adhered to the theoretical and methodological approaches for alternating the phases of loading and rest during the respective cycles of the training process in constructing of competitive micro-cycles with different duration (Stasiuk, 2013), and also researches based on scientific data on the recovery of athlete's performance after loads of different volume and orientation (Lisenchuk, 2003).

According to the developed training programs, it is esti-

mated that the total amount of motor activity of highly skilled players of the I-League mini-football team in the annual training cycle is 598 hours, of which 150 hours of training time is allocated for preparatory period, 294 hours – for competitive period and 149 hours – for transitional periods. Those data complement the research of Polurenko (2009) in mini-football and are comparable to the studies of this problem in other team sports games, in particular in football by Tiulenkov (2007) and Kostyukevich (2019), according to which the volume of direct motor work of the 1st League team players during the annual training cycle is 829 hours.

Our materials confirmed the data of Babkin (2004) on the use of organizational forms of technical and tactical training of qualified players in mini-football; Manasis and Ntzoufras (2014); Voronova et al. (2020) on comprehensive control over the level of player's and team's preparedness in football; Hudec (2002) on the means of player's testing in mini-football.

Our study supplement and expand the data of Vyprikov (2008) on the peculiarities of a training process constructing on the basis of external and internal characteristics of loads in mini-football; Skorovich (2012) on the rational planning of special means in the training process of players in mini-football; Lisenchuk (2003) on the training specifics of players with different qualification in mini-football.

The results of our research complement the data both about the peculiarities of the three-cycle training process planning (Lisenchuk, 1989; Tiulenkov, 2007; Platonov, 2013), and also concerning to the ratio of training loads of highly skilled football players during the competitive period of the macrocycles (Stasiuk, 2016; Kostyukevych et al., 2019).

Based on the periodization theory of sports training, researches have chosen a one-cycle construction of the training process in the annual macrocycle for highly skilled players in mini-football. The structure and content of the competitive period in training process of highly skilled players in mini-football have been developed and experimentally substantiated: the ratio of training means during the competitive period, the volume of training loads of different directions in the micro-cycles of competitive mezo-cycles, the ratio of training loads of different directions: aerobic, mixed; anaerobic alactate; anaerobic glycolytic.

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## Conflict of Interest

The authors declare that there are no conflicts of interest.

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