COMMITTEE FOR THE ASSESSMENT OF DOCTORAL DISSERTATION

TO THE TEACHING AND SCIENTIFIC COUNCIL OF THE UNIVERSITY OF BELGRADE - FACULTY OF SPORT AND PHYSICAL EDUCATION

Subject: Review and assessment report of doctoral dissertation of Života Stefanović, a doctoral program student.

Based on the decision that was made on the 12th teaching and scientific meeting which took place on May 9th, 2024 on the University of Belgrade - Faculty of Sport and Physical Education, in accordance with the article 40 of the Doctoral academic studies Rulebook - revised version number 02-бр.532/22-4 from November 9th, 2022, and articles 41-43 of the University of Belgrade-Faculty of Sport and Physical Education Statute - revised version (02-бр. 188/23-2 from February 13th, 2023), on the proposal of the Doctoral Academic Studies Council (02-бр. 885/24-3 from April 29th, 2024) it was decided to form the committee for the assessment of doctoral dissertation written by Života Stefanović titled:

"NEUROMUSCULAR QUICKNESS ASSESSMENT – TEST OPTIMIZATION AND SENSITIVITY EVALUATION (PROCENA BRZINE NEUROMIŠIĆNOG ODGOVORA – OPTIMIZACIJA TESTA I ISPITIVANJE NJEGOVE OSETLJIVOSTI)".

Committee was formed from the following members:
1. Dr. Olivera Knežević, assistant professor, University of Belgrade, Faculty of Sport and Physical Education, chair;
2. Dr. Radivoj Mandić, associate professor, University of Belgrade, Faculty of Sport and Physical Education, member;
3. Dr. Vladimir Mrdaković, associate professor, University of Belgrade, Faculty of Sport and Physical Education, member;
4. Dr. Amador García-Ramos, associate professor, University of Granada, Faculty of Sport Science, member.
5. Dr. Filip Kukić, assistant professor, University of Banja Luka, Faculty of Physical Education and Sport, member.

The doctoral dissertation was completed under the supervision of:

- Dr. Dragan Mirkov, full professor, University of Belgrade - Faculty of Sport and Physical Education, mentor.

After evaluating the doctoral dissertation, biography, and bibliography of the candidate, Committee is handing in to the Teaching and Scientific board the following:

REPORT OF THE ASSESSMENT OF DOCTORAL DISSERTATION

BIOGRAPHY OF THE CANDIDATE

Personal data

Života Stefanović was born on 1st of March in 1996 in Priština, Serbia. In 1999 he moves to Danilovgrad, Montenegro where he finished elementary school "Vuko Jovović" and one of the top secondary schools in country, Gymnasium "Petar I Petrović Njegoš". In both schools he won prestigious "Luča" award, given to students who finish their education with an excellent average grade. After finishing secondary school, he moves to Serbia, and starts studying at the "Faculty of Sport and Physical Education, Leposavić, University of Priština". He finished his Bachelor studies in the year 2018, and a year later Master studies with the highest grades in generation (average grade: 9.91 and 10). During his Bachelor and Master studies, he worked on the mentioned faculty for a year as a demonstrator on the subject "Basics of anthropomotoric". He also received prestigious "Vidovdan" award, given to the best students of the university. He was awarded with grant of the Ministry of Education, Science and Technological Development, given to the students with the average grade higher of 9.0 in the country. For two years he was awarded with the prestigious grant "Dositeja – Fund for Young Talents", given to only 500 best students in the country. In the 2019/20 school year he enrolled into doctoral programme on "Faculty of Sport and Physical Education – University of Belgrade". Currently he is working as a research assistant on the mentioned faculty on the project financed by Ministry of Science, Education and Technological Development of Republic of Serbia called "Muscular and neural factors of human movement and their adaptive changes" (#175037). He is an author of more than 10 papers published in scientific journals as well as publications on scientific conferences.

SCIENTIFIC PRODUCTION AND COMPETENCE OF THE CANDIDATE

Života Stefanović published one paper in M22 journal category as a first author, 12 papers in domestic scientific journals, and 3 conference proceedings.

M22

Stefanović, Ž., Kukić, F., Knežević, O.M., Šarabon, N., Mirkov, D.M. (2023). Evaluation of the Reduced Protocol for the Assessment of Rate of Force Development Scaling Factor. *Symmetry, 15*,1590. https:// doi.org/10.3390/sym15081590

M33

Stefanović, R., Lilić, L., Stefanović, Ž. (2014). The influence of load volume on the result in competition period of representative middle-distance runners by microcycles. Challenges in contemporary sport management, 290.

Stefanović, R., Lilić, L., Stefanović, Ž. (2014). Common characteristics of different load intensities in the first mesocycle of preparatory period of active middle distance runners. Challenges in contemporary sport management, 284.

Stefanović, Ž., Stefanović, R., Okiljević, D. (2016). Razlika između inicijalne i finalne vrednosti srčane cene rada pri različitim opterećenjima u krosu. 11th International Scientific Conference MANAGEMENT, SPORT, OLYMPISM, Proceedings MANAGEMENT AND SPORT, 168.

M51

Drljević, V., Šiljak, V., Stefanović, Ž., Toskić, D., Aleksić, D. (2019). Prirodni potencijali Lovćena za ekološki sportski turizam. Ecologica, 96, 475-481.

Šiljak, V., Stefanović, R., Toskić, D., Stefanović, Ž., Milošević, S., Mitić, D. (2019). Istraživanja u naučnim publikacijama u oblasti sporta i očuvanja životne sredine. Ecologica, 96, 552-559.

Stefanović, R., Toskić, D., Stefanović, Ž., Milošević, S., Mitić, D., Isaković, M. (2019). Informisanost učenika srednjih škola u Srbiji o interakciji sporta i očuvanja životne sredine. Ecologica, 96, 571-577.

Stefanović, Ž., Šiljak, V., Perović, A., Đurović, D., Isaković, M., & Vajić, S. (2020). Nanotehnologija u sportu. Ecologica, 98, 281-287.

M52

Stefanović, R., Stefanović, Ž. (2015). Some indicators of sports training which can influence achieving more efficient sports results (reference to athletics). Activities in Physical Education & Sport, 5(1).

Stefanović, R., & Stefanović, Ž. (2015). Contribution to definition of success of middle-distance athletes on the basis of scope and intensity of training and other characteristics. Activities in Physical Education & Sport, 5(1).

Mekić, B., Stefanović, R., Stefanović, Ž. (2019). Influence of athletic movements on motor skills improvement when directing children towards sports disciplines. Activities in Physical Education & Sport, 9.

Lilić, Lj., Stefanović, Ž., Stefanović, R. (2019). The impact of athletic movement on programming in training of karate practitioners in the first phase of the preparation period. Research in Kinesiology, 47.

Lilić, Lj., Stefanović, Ž., Stefanović, R. (2019). The influence of proper release on the javelin flight distance. Activities in Physical Education & Sport, 9.

Stefanović, R., Stefanović, Ž. (2018). Influence of different training models on deviation of speed of running from the mean. Research in Kinesiology, 46.

Mekić, B., Stefanović, R., Stefanović, Ž. (2018). Methods and means of development of aerobic endurance of athletes. Research in Kinesiology, 46.

Stefanović, R., Stefanović, Ž., Mekić, B. (2018). Influence of a training plan and programme in the second phase of preparatory period of the athletes on achieving results in 1500 m discipline. Activities in physical education & sport, 8.

BASIC DATA ABOUT DOCTORAL DISSERTATION

The final version of the dissertation is presented on 65 pages, A4 format, using the English alphabet and English language, with 4 tables, 16 figures, and 183 bibliographic units. The dissertation has been presented through the following chapters and subchapters: Introduction; Muscle biomechanical relationships and mechanical characteristics; Rate of force development scaling factor; Problem, scope, aims and hypotheses of the research; Methods; Results; Discussion; Conclusions; References; Supplementary Documents; Biography and Statements.

Introduction

The candidate starts the introduction by describing motor abilities in general with emphasis on strength and speed as key features for understanding the studied topic. Chapter 2 outlines the importance of different biomechanical relationships such as force-length, force-velocity and force-power, and neurological components in muscle function expression. Subsequence paragraphs explain the types of most typically used test to assess neuromuscular function, their metric characteristics including validity and sensitivity, with emphasis on isometric testing procedures and maximum voluntary contraction (MVC) that are sustained by nature. Importance and limitations of strength characteristics testing is highlighted at the end of the chapter where he states that there is a need to create tests which simulate conditions where subjects perform rapid consecutive contractions at maximum speed, matching the contraction frequency and producing short, rapid contractions at various percentages of peak force. These types of tests can address some of the limitations, such as being based on shorter force exertions, involving moderate muscle force intensities compared to maximum force, reducing the number of testing attempts, and allowing for the evaluation of rate of force development in the muscle activation pattern. This chapter also explains the limb symmetry index and its relation to risk for injury and rehabilitation.

Rate Of Force Development Scaling Factor

In the third chapter, the rate of force development scaling factor, the main problem of the dissertation is brought to attention. A measure of neuromuscular quickness, a variable independent of maximum force, has recently been re-introduced to the research. The introduction of RFD-SF began a few decades back (Freund & Büdingen, 1978), but only recently has the protocol been systematized (Bellumori et al., 2011), with some adjustments being made until this day. Namely, when performing a series of most rapid submaximal contractions, a strong linear relationship between peak muscle force (F) and peak rate of force development (RFD) occurs. The slope of this relationship has been named rate of force development scaling factor (RFD-SF) (Bellumori et al., 2011), while the linearity of this relationship (R2) describes the consistency of contractions. In most cases, this value is > 0.9 (Bellumori et al., 2013). RFD-SF has a measurement unit of s-1, which allows it to compare characteristics of individuals and muscle groups, independent of sex, size and strength of muscle group (Bellumori et al., 2011). Up-to-date RFD-SF has been assessed in several muscle groups, including knee, ankle, wrist, elbow and hip joints (Bellumori et al., 2011; Boccia, Brustio, et al., 2018; Šarabon, Čeh, et al., 2020; Klass et al., 2008b; Smajla, Knezevic, et al., 2020; van Cutsem et al., 1998, Casartelli et al., 2014).

The candidate then thoroughly explains the methodology of assessing RFD-SF and issues arising from it. Namely, to assess RFD-SF, the subjects are asked to perform the fastest isometric contractions, against different intensity levels. To determine intensity levels, maximum voluntary contraction (MVC) needs to be assessed first, from which the force (or torque) intensity level is calculated. Most often, intensities to which the subjects perform contractions are 20 –, 40 –, 60 – and 80% of MVC (sometimes even 100%). Here the candidate explains the first limitation of the protocol that has been observed by Casartelli et al. (2014) - some participants were simply unable to perform highest intensity contractions in the most rapid manner. Therefore, the authors decided to compute regression lines for these 2 muscle groups for contractions with peak torques up to 60% MVC, which was defined arbitrarily as the threshold for obtaining linear relationships. This has been observed for several leg muscle groups, whereas some subjects have difficulty performing the contractions set to highest intensity. The idea for a potential solution to obtain a linear relations relationship between peak F and peak RFD may be to reduce the intensities arouse from the modeling of a force-velocity relationship (F-V). In short, when compared to standard i.e., multiple-point method for F-V relationship modelling where four or more sets of loads is used to assess F and V values, method based on only two distinct loads ("two-point method") can differentiate between maximal muscle capacities in less time and without the influence of fatigue. Thus, it would be interesting to investigate whether the standard RFD-SF protocol may be optimized similarly to the F-V relationship protocol, where the two-point method was proved as feasible in many motor tasks.

The author then elaborates on the reliability parameters of various RFD-SF protocols. Specifically, previous studies showed good absolute and somewhat smaller but acceptable relative reliability RFD-SF protocol for knee extensors, the most tested muscle group. However, lower relative reliability (ICC = 0.64 – 0.68%) for those muscle groups was present. Aside from dynamometer setup and rigidity of fixation, total number of contractions is yet another factor influencing the reliability of the outcome (Smajla et al., 2021). Majority of studies used approximately 125 contractions (Bellumori et al., 2011, 2017; Bozic et al., 2013; Casartelli et al., 2014; Mathern et al., 2019) and although some used smaller number of contractions it is concluded that no less than 75 contractions should be used since it significantly decreases the reliability (Bellumori et al., 2011; Boccia, Brustio, et al., 2018; Smajla et al., 2021). Recently Smajla et al. (2022) showed that as little as 28 pulses across four levels of intensities are sufficient to produce acceptable reliability in knee extensors, however this study included tighter fixations and more rigid dynamometer setup, which could be the reason for their results. Nevertheless, more studies are needed to prove that fewer contractions can be used as well to assess the between-day reliability of this method. Regarding the sensitivity of RFD-SF, previous studies have shown that this parameter can be used to distinguish among young and old adults (Bellumori et al., 2013; Klass et al., 2008a) or between adults and individuals with some form of neurological disorder such as Parkinson's disease or multiple sclerosis (Wierzbicka et al., 1991). Specifically, the older adults and patients with some form of neurological disorder had lower value of RFD-SF, and especially lower consistency of contractions (R2), even though they had indistinguishable average agonist muscle activation. RFD-SF has also been shown as sensitive to ankle dorsiflexors power training which increased RFD-SF (Van Cutsem et al., 1998), but to low-intensity neuromuscular fatigue as well (Boccia, et al., 2018). Therefore, the feasibility of both measures to detect among various populations is warranted. Since only one study of RFD-SF assessment in patients with musculoskeletal disease exists, future studies should investigate if these measures are sensitive enough to track progress of rehabilitation but to distinguish among other categories of subjects with respect to their physical activity level, training history or injury status.

The candidate brings attention to the fact that the standard RFD-SF protocols are lengthy and could be fatigue-prone which opens the idea for the protocol optimization. Thus, based on the literature review, he presented the problem, scope, aims and hypotheses of the research in **chapter 4.**

Problem of the research

The problem of this research was the assessment of neuromuscular quickness by using the rate of force development scaling factor. Often used maximum voluntary contraction tests do not provide enough information regarding the neural component of muscle strength. Additionally, standard RFD-SF protocol can be time-consuming and, in some cases, fatigue-prone. With everything stated, there is a need to apply and further optimize the RFD-SF testing protocol to evaluate both contractile and neural components of muscle strength.

Scope of the research

This research's scope is optimizing the test for the assessment of neuromuscular quickness in isometric conditions. Also, the feasibility of optimized RFD-SF test protocol for investigating differences between different subject groups will be investigated.

Aims and hypotheses of the research

Based on the problem and scope of this research, the main aim is further evaluation of the RFD-SF testing protocol and the feasibility of protocol optimization. The idea behind the reduced protocol incorporated in this study was to reduce the levels to the bare minimum so the subjects' focus can shift on the explosiveness of the contractions rather than precision to mitigate potential fatigue effects.

Specific aims and corresponding hypotheses are as follows:

1) The first aim of this study is to confirm the linearity of the peak force – rate of force development relationship in the fastest contractions (Casartelli et al., 2014).

Hypothesis 1: The relationship between peak force – rate of force development in the fastest contractions is approximately linear.

2) The second aim is to evaluate the validity and between-day reliability of the two-point RFD-SF protocol (two intensity levels) with respect to the standard protocol based on the four force levels.

Hypothesis 2: The two-point protocol has acceptable validity and reliability compared to the standard protocol.

3) The third aim is to assess the sensitivity of standard and two-point protocols to distinguish between subjects with different physical activity levels, training background, or history of injury.

Hypothesis 3: RFD-SF protocols can differentiate between subjects of different physical activity levels.

Methods

The Methods section was described in chapter 5. Regarding the study design, this research was conducted as a repeat-measure design where subjects completed three testing sessions separated by 48 hours. In each session, they first performed maximal voluntary contraction (MVC) followed by RFD-SF protocol, with the only difference being that in the first session, they performed standard RFD-SF protocol, while in the second and third sessions, they performed reduced RFD-SF protocol. The dominant leg (preferred kicking leg) was always tested first.

Under the *Subjects* subsection the candidate described the samples that were employed to test the hypotheses. Eighteen physically active subjects, 20.8 ± 0.6 years of age (6 females and 12 males), were included in the study for the assessment of the first and second aim. Thirty subjects, 21.2 ± 0.7 years of age (11 females and 19 males), were included in the study for the assessment of the third aim. Subjects were divided into two groups based on their activity levels: active and sedentary with respect to their involvement in regular physical activity on a weekly basis over the 12-month period. All subjects signed the informed consent. The Institutional Review Board approved the study (02-1854/21-1). The study protocol was designed in accordance with the Declaration of Helsinki.

Further on, detailed and reproducible explanation of the *Testing setup and familiarization* was provided, along with all necessary details regarding *The standard and two-point RFD-SF protocol, Data acquisition and analysis* and calculations that provided variables of interest: RFDpeak (peak of the first derivative of the force-time signal) (Mathern et al., 2019). The RFD-SF was computed as a slope (b) of linear regression (Y=a+bX) of Fmax and RFDmax (Bellumori et al., 2011). The coefficient of determination (R2) in the regression analysis checked the strength of this regression (linearity of Fpeak and RFDpeak relationship). Interlimb asymmetry was calculated using the equation (RFD-SF of the dominant leg/RFD-SF of the non-dominant leg) − 1) × 100 (Smajla et al., 2020). An inter-limb difference of >15% was used as a criterion to identify inter-limb asymmetry (Green et al., 2018). Statistical analysis was presented with respect to the aims of the study.

Results

The Results of the study are presented in chapter 6. The coefficient of determination (R2) showed a nearly perfect mean association between the Fpeak and RFDpeak for both legs. For dominant leg results were very high, R2 = 0.95 and 0.98 for standard and reduced protocol, respectively. Similar results were obtained for non-dominant leg, R2 = 0.94 and 0.98, for standard and reduced protocol, respectively. The correlation between RFD-SF obtained in standard and reduced protocol was very large ($p < 0.001$) for both the dominant and non-dominant leg, whereas the mean values were similar with no significant difference between the protocols for the dominant ($t = -0.722$, $p = 0.480$) and non-dominant leg ($t = -1.295$, $p = 0.213$). The Bland-Altman plot revealed that most subjects provided the RFD-SF values within the limits of agreement. Indices of absolute and relative reliability were acceptable for the dominant and non-dominant leg, with no between-day difference for the dominant ($t = -0.875$, $p = 0.393$) and non-dominant leg ($t = -0.796$, $p = 0.436$). Sensitivity results for the data obtained by both protocols are presented in Table 4. Statistically significant differences in both protocols between the groups of trained and non-trained subjects are present ($p < 0.05$). Again, there was no significant difference between the two protocols ($t = 0.835$; $p = 0.415$; $d = 0.19$).

Discussion

Discussion of the results is presented in chapter 7, with all the three hypotheses being confirmed. An apparent linearity, represented by R^2 value, can be observed regarding the relationship between Fpeak and RFDpeak. As the F value increases, so does the RFD value. Linearity of the Fpeak – RFDpeak relationship has been confirmed with this study, which is in line with the findings of others (Bellumori et al., 2011; Smajla et al., 2020). The validity of the reduced protocol with respect to the standard protocol for RFD-SF assessment has been confirmed with this study. Since Fpeak – RFDpeak linearity has been shown to be high in most of the reduced protocols up until now, two distant points of 30% and 70% of MVC were chosen for this protocol. Since high linearity is perquisite for investigating RFD-SF, it is necessary to assess it whenever a new protocol is introduced. Intensity levels selected for the reduced RFD-SF protocol were neither too low not to be explosive enough nor too high to reach linearly, thus these intensities present the optimal values for expressing neuromuscular quickness (i.e., muscle force and corresponding RFD in pulse contractions). The second hypothesis of this research was related to evaluating the between-day reliability of the reduced RFD-SF protocol. The obtained indices of absolute and relative reliability indicate very good day-to-day reliability of the proposed protocol, suggesting the protocol's ability to be utilized in repeated measurements with the same subjects. The third hypothesis of this research regarding the sensitivity of both standard and reduced RFD-SF protocol for the detection of differences between different groups of subjects has also been confirmed. Monitoring training and rehabilitation regularly is essential for minimizing injury risk. Therefore, it is important to develop and use tests that accurately and reliably assess both F and RFD with minimal effort, applicable in both practical and clinical contexts. Both standard and reduced RFD-SF protocols can differentiate between physically active and sedentary students. No differences were found in inter-limb asymmetries when the common and reduced RFD-SF protocols were compared. Candidate's results related to asymmetry are in line with previous research by Smajla et al. (2020) who reported that the RFD-SF protocol with 20–25 rapid contractions for each of the four intensity levels (20%, 40%, 60%, and 80% of previously measured maximal isometric torque) could be a valuable tool for the identification of inter-limb asymmetries. Like the findings of Mirkov et al. (2016), Smajla et al. (2020) confirmed that measures other than the Fpeak and RFDpeak (i.e., interval RFD or RFD-SF) could be more sensitive in identifying individuals with asymmetries in capacities for rapid force rise. Considering this, results suggest that the reduced protocol provides a valid assessment of inter-limb asymmetries. At the end of the Discussion section the candidate outlines the potential limitations of his research. The homogeneity of the sample may be one of several. Namely, the study sample included a narrow age span; all subjects were healthy, without injuries, and with a similar training level. However, the obtained validity, reliability, and sensitivity of this homogenous sample suggest an excellent representation of neuromechanical characteristics of human muscle, whereby a more diverse sample may show even better metrics of our protocol. Larger and more diverse samples could solve the problem of generalizability. As far as the testing procedure, this study hasn't used a gold standard device for the assessment of neuromuscular properties, electromyography (EMG), so future studies should include this measurement device. Somewhat lower ICC value of reduced RFD-SF protocol for the dominant leg, could be partly explained by inability to totally control the external factors contributing to the subjects' readiness for the testing, such as completely control external activities that may have induced neuromuscular fatigue.

Conclusions

Candidate reported conclusions in chapter 8 stating all three hypotheses have been confirmed. This study was designed to assess the linearity of Fpeak – RFDpeak relationship in a series of brief submaximal contractions, to explore validity and reliability of the reduced RFD-SF protocol, and to check both protocols' sensitivity. The results of this study suggest that the reduced protocol could be used as a valid and reliable alternative to the standard protocol, allowing for a more efficient and cost-effective method to assess neuromuscular quickness. Even though the linearity of the Fpeak – RFDpeak relationship has been confirmed in several studies, R^2 results that describe this relationship were assessed in this study since new protocol was employed and high linearity is needed for an adequate assessment of RFD-SF. Additionally, both protocols can differentiate between active and sedentary students, which means that this test could be used to assess one's physical activity level. Moreover, it could be used to identify inter-limb asymmetries. In practical applications, this could be beneficial in clinical and sports performance settings where time and resources are limited, while quick and accurate measurements are necessary. The reduced protocol is relatively short, non-fatiguing, and submaximal in intensity, which makes it safe and comfortable for a wide range of subjects.

References were presented in the volume of 183 bibliographic units, all written in English. The reference list suggests that the literature used is actual and referent to write this dissertation. Bibliographic units are correctly mentioned in the text and in the bibliography.

Supplementary Documents (pages 60 – 65) contains the data required by the Regulations of Doctoral studies of the Faculty of Sports and Physical Education and the Instruction on Formation repository of doctoral dissertations: (1) The Approval of the Ethics Committee for implementation of the research; (2) Title page of the published work paper; followed by Biography; Statement of authorship; Statement on the identity of printed and electronic versions of doctoral thesis; Statement of Use.

Material presented in this dissertation is based on the results of the paper published in international scientific journal (M22 category):

1. <u>Stefanović, Ž.,</u> Kukić, F., Knežević, O.M., Šarabon, N., Mirkov, D.M. (2023). Evaluation of the Reduced Protocol for the Assessment of Rate of Force Development Scaling Factor. *Symmetry, 15*,1590. https:// doi.org/10.3390/sym15081590

On April 9th, 2024, authenticity check of Života Stefanović's doctoral dissertation was completed by University Library Svetozar Marković. The summary report states 33% similarity index. This additionally confirms the authenticity of Zivota Stefanović's doctoral dissertation.

CONCLUSION

This doctoral dissertation provides the evidence that the design of the study is the first that included the assessment of validity and reliability of measuring the RFD-SF with a protocol consisting of only two intensity levels. Also, this is one of the few studies that assessed sensitivity to discriminate between active and sedentary groups. Furthermore, this study checked the possibility of leg asymmetry identification by using RFD-SF. However, besides the great potential of the reduced protocol demonstrated within this research, future studies should try to reduce the protocol even further by reducing the contraction number, and removing the MVC testing by employing self- selected intensity levels. Additionally, EMG device should be used alongside dynamometer so to explore face validity of the RFD-SF protocol parameters. Finally, the assessment of rate of force development relaxation (RFR-SF) could prove to be very useful and insightful, so researchers should focus on exploring properties achieved by analysing relaxation phase of the contraction.

COMMITTEE'S PROPOSAL TO TEACHING-SCIENTIFIC COMMITTEE

Candidate Života Stefanović has fulfilled all legal requirements for acquiring the right to defend his doctoral dissertation. His scientific background and professional work in the field of physical education and sport are clearly defining him as an adequate candidate. Regarding his future work he plans to continue his research in biomechanics, motor control and related topics.

Teaching-Scientific Council of the University of Belgrade - Faculty of Sport and Physical Education on the 12th teaching and scientific meeting which took place on May 9th, 2024 on the University of Belgrade - Faculty of sport and physical education, in accordance with the article 40 of the Doctoral academic studies Rulebook - revised version number 02-бр.532/22-4 from November 9th, 2022, and articles 41-43 of the University of Belgrade-Faculty of sport and physical education Statute - revised version (02-бр. 188/23-2 from February 13th, 2023), on the proposal of the Doctoral Academic Studies Council (02-бр. 885/24-3 from April 29th, 2024) decided to form the committee for the assessment of the doctoral dissertation written by Života Stefanović.

The committee has a uniform opinion that the presented doctoral dissertation is the author's original and independent scientific work, with significant value for sports sciences and particularly the assessment of neuromuscular function i.e., it further contributes to applicability of RFD-SF testing protocols. Based on the qualitative and quantitative analysis of the candidate's professional, scientific and practical work, the committee has a uniform opinion that Života Stefanović has fulfilled all legal and scientific requirements for the defence of the doctoral dissertation, therefore, we are suggesting Teaching-Scientific Council to accept the Committee's positive assessment report of doctoral dissertation titled "NEUROMUSCULAR QUICKNESS ASSESSMENT – TEST OPTIMIZATION AND SENSITIVITY EVALUATION (PROCENA BRZINE NEUROMIŠIĆNOG ODGOVORA – OPTIMIZACIJA TESTA I ISPITIVANJE NJEGOVE OSETLJIVOSTI)", and, in accordance with legal rights, to further direct it to the Social-Humanistic Scientific Council of the University of Belgrade for assessment and acceptance.

In Belgrade, 18.06.2024. године

Committee members:

1. Dr. Olivera Knežević, assistant professor, University of Belgrade, Faculty of Sport and Physical Education, chair;

2. Dr. Radivoj Mandić, associate professor, University of Belgrade, Faculty of Sport and Physical Education, member;

3. Dr. Vladimir Mrdaković, associate professor, University of Belgrade, Faculty of Sport and Physical Education, member;

4. Dr. Amador García-Ramos, assicuate professor, University of Granada, Faculty of Sports Sciences, member.

5. Dr. Filip Kukić, assistant professor, University of Banja Luka, Faculty of Physical Education and Sport, member.