MOTOR AND MORPHOLOGICAL CHARACTERISTICS OF FEMALE UNIVERSITY STUDENTS AND THE EFFICIENCY OF PERFORMING FOLK DANCES

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Abstract:

The aim of the paper was to determine the relation between the motor abilities and morphological characteristics on one hand, and the successfulness in doing folk dances on the other, that is, to prove whether it is possible to anticipate the rate of success in the practical part of the subject *Dances* by the means of assessing some of the motor and morphological features. 113 third-year students of the Faculty of Kinesiology, Zagreb University, who had passed the exam of the subject *Dances,* were measured by 15 motor tests and 4 anthropometric measurements. Three competent experts estimated the efficiency of performing folk dances. Regression analysis has shown a statistically significant multiple correlation of the predictor variables with all five criterion variables. The relationship between success in dance performance and motor abilities was defined by the following independent variables: *drumming with feet and hands* (MKRBNR), *drumming without the rhythm* (MKRBUB) for the evaluation of rhythm, *side steps with a 360° turn* (MAGKUS360) for coordination, *Sargent test* (MFESVM) for explosive strength, and *touch-toe with feet spread* (MFLPRR) for flexibility. The relationship between the success in dance performance and morphological characteristics was defined by *body weight* (TTEŽINA), *body height* (TVISINA) and total *body fat* (KG/MASTI).

Key words: *motor abilities, morphological characteristics, dancing efficiency, female students, regression analysis*

Introduction

Dancing as a conventional and aesthetic movement has a special function in the life of people. Namely, dancing exists in everyday life at times when people celebrate different occasions (the birth of child, a wedding, etc.), or especially in people's leisure time or active holidays when it is used as a means of entertainment and abilities transformation. Without question, dances are applicable as a kinesiological operator in physical education classes as well as in working with physically inactive people and the elderly.

The transformation of anthropological characteristics, motor and physiological abilities is not the only purpose of implementing dances in a school curriculum. Dancing structures contribute to the development of the sense of aesthetic experiences, independent creativity and to performing aesthetic and harmonious movements. Besides, getting to know and learning dances from different parts of one's homeland and the world encourages an awareness of the national identity and broadens the general comprehension of the cultures of the world.

In short: "through dancing a person satisfies his/her need to socialise with other individuals, he or she develops a sense of belonging to a group and finally, he or she confirms himself/herself, which is important in adolescence. Pedagogic values of dancing are demonstrated through the development of the sense for free, rhythmic movement, which at the same time implies aesthetic and rational movements. Educational values of dance become evident in the formation of new motor stereotypes. The forming of new motor stereotypes represents a relevant contribution to the motor knowledge of humans as an inevitable part of general culture." (Oreb, 1992)

Recent research on the relationship between morphological features, estimated by 19 anthropometric measures, and success in rhythmic gymnastics and dances, evaluated by 9 criterion variables (3 rhythmical compositions, 3 specific technical elements of rhythmic gymnastics and 3 dances) was established by Miletić, Katić and Srhoj (1998) on a sample of 100 eleven-year-old female pupils. Canonical correlation analysis identified the statistically significant canonical correlation (0.67) between the groups of variables. Canonical dimensions in morphological space were well above average and defined by the transverse dimensions of the skeleton, by the volume and the mass of

the body, as well as by the percentage of body fat. The canonical dimensions of efficiency in rhythmic gymnastics and dancing are bipolar and discriminate the girls successful in performing rhythmical rope-skipping exercises and the ones successful in performing folk dances.

The authors conclude that morphological structure of the transverse dimensionality and volume of the body with a moderate quantity of relative body fat has a negative influence on performing the rope-skipping exercises where the whole body is engaged and aesthetic moment is essential. In folk dances where leaps dominate and the aesthetic component is not as emphasised, such a morphological structure has a positive influence on the female students.

Miletić (1999) applied 40 motor tests on a sample of 100 eleven-year-old female students with the aim of determining the connection between the morphological characteristics and motor abilities on the one hand, and success in performing folk dances on the other. Performance of folk dances was evaluated through two authentic folk dances included in the obligatory curriculum of the physical education classes. The results have shown that the major influence on dance performance efficiency can be attributed to the element of speed, whereby the limiting factor is the frequency of simple movements, that is, the beat in the corresponding rhythm. The author concludes that dances, especially folk dances, should be used in physical education classes with the purpose of contributing to motor skills development.

Miletić, Srhoj and Sekulić (2003) established the connection of some motor tests with performance of some dancing structures in the physical education classes (seventh- and eighth-graders), on a sample of 112 female students. The aim of the study was to estimate the applicability of the original Croatian folk (*Šotić, Falila se Jagica, Klinčec stoji pod oblokom* and *Kontradanca*) and social dances (*Cha – cha – cha* and *Cowboys' Polka*) in classes, as well as their association with the motor skills. Five experts evaluated by video recording the effectiveness of the female students in performing each of the mentioned dances.

Regression analysis produced statistically significant multiple correlations for the three applied dances (*Šotić*, *Cha – cha – cha* and *Cowboys' Polka*) so that the use of these is recommended for application in transitive testings for dancing structures acquisition evaluation in the physical education class. The feet movement frequency test (MBFTAN) had a predictive value for performing *Šotić* in the seventh grade. The authors concluded that when choosing the dances to be applied in the physical education class, the dancing structures that are based on the national tradition and culture, and also the ones that have significant influence as the kinesiological operators on the transformation of some anthropological features of students should be preferred.

Successfulness in kinesiological activities (in dancing as well) depends on several dimensions. We speak of anthropological, morphological, physiological, motor, cognitive and conative space, i.e., status of the athlete. The representation of each of these dimensions depends on the structure of the activity itself and it is not equal for the entire dimension. The field of dancing, especially the category of folk dance, has not been researched well from the aspect of defining dimensions that contribute to the efficiency of the dancing activity.

Oreb and Matković (1986) found the relation between the morphological characteristics and the rate of success in dancing (N=168) of the students of the Faculty of Physical Education. Data on 32 morphological characteristics, collected by applying standard measurement procedures according to the International Biological Programme, projected on 4 latent dimensions (longitudinal dimensionality of the skeleton, transversal dimensionality of the skeleton, body mass and subcutaneous fatty tissue) made up the predictor variables set. The set of criterion variables was formed on the basis of the examination in the subject *Dances*, where three obligatory and five optional dancing structures as well as theoretical knowledge (the total of 4 variables) were evaluated. It was established by the canonical correlation analysis that no significant correlation existed between the morphological dimensions and dancing efficacy, and the reason for that was a positively selected sample as well as the insensitivity of the criterion variables to the finer differences in dancing performance.

Several authors have tried to define motor space that presumes success in dancing.

Oreb (1984) did research directly connected to these problems. The author established the relation between primary motor skills and each individual criterion variable used to evaluate the efficiency in dancing in a sample of 112 subjects, the male university students.

Afterwards the author found that only one criterion variable could not have been anticipated at a more significant level by the system of primary motor dimensions, and that the part of the explained variability of all other criterion variables is primarily under the influence of coordination, rhythmical structures realisation, balance and explosive strength.

Oreb and Kilibarda (1996) found relations between rhythmic abilities and dancing efficiency, in a sample of 104 university students (57 female students and 47 male students) of the Faculty of Physical Education. Data on rhythmic abilities were collected by a rhythm test consisting of three rhythmical examples, whereas the data on dancing efficiency were collected by the standard procedure

for evaluating practical and theoretical knowledge in the subject *Dances.*

The results of the research showed that it was possible to predict, to a relatively large extent, dancing efficiency on the basis of a rhythmical abilities assessment.

The selection, the choice of kinesiological operators and the very transformational process in present dancing praxis is executed on the basis of the subjective evaluation and experience of experts. Many dancing instructors working at schools have very little or no experience at all in working with children (Gilbert, 2005), which is inconceivable in a time of modern diagnostics and programming of the training process. The experience-based approach implies mistakes, too; however, such an approach is by no means typical for the modern kinesiological activities. It is therefore necessary to find new and to improve the current measurement procedures in order to avoid the previously mentioned disadvantages.

The basic aim of this research was to determine the relation between the motor abilities and morphological characteristics of the third-year female students of the Faculty of Kinesiology (University of Zagreb) with their dancing efficiency, and consequently, to find whether it is possible, on the basis of the evaluation of some motor skills and morphological characteristics, which are assumed to be connected to success in dancing activities, to anticipate the success in the practical part of the subject *Dances.*

The reason why this research has been initiated, among other things, is not only the small number of research into this problem, but also the fact that the majority of the previous research has been based on primary school female children (Miletić, Katić, & Srhoj, 1998; Miletić, 1999; Miletić & Srhoj, 1999; Miletić, Srhoj, & Sekulić, 2003) and the university male students population (Oreb, 1984; Oreb & Matković, 1986) so that it has been a challenge to determine the connection of the two sets of variables in female university students.

An additional aim has also been set in order to achieve the basic aim and it concerns determining the metric characteristics of motor abilities assessment tests. The reason for this is the sample on which the tests have been applied (female university students) and the use of some motor tests (*Oreb's rhythm test*, OREBMR; *side-steps with a 360^o turn*, MAGKUS360) that have been developed for the purpose of this research.

Methods

Subjects. The sample of subjects consisted of 113 (N=113) third-year full-time female students of the Faculty of Kinesiology, University of Zagreb, in the academic year 2002/2003 and 2003/2004. The basic condition for forming the sample was that they had passed the practical part of the examination of the subject *Dances.*

Variables. Predictor variables set was made up of the motor abilities assessment variables: *figure of eight with a bend* (MAGOSS), *obstacle course backwards* (MREPOL), *side-steps* (MAGKUS), *side-steps with a 360^o turn* (MAGKUS360) (coordination), *drumming without the rhythm* (MKRBUB), *drumming with feet and hands* (MKRBNR), *Oreb's rhythm test* (OREBMR) (realisation of rhythmical structures), *standing on a foot on the balance bench with eyes open* (MBAU1O), *standing on both feet on the balance bench with eyes closed* (MBAU2Z) (balance), *hand tapping* (MBFTAP), *foot tapping* (MBFTAN) (frequency of movement), *sit-and-reach* (MFLPRK), *touch-toe with feet spread* (MFLPRR) (flexibility), *standing long-jump* (MFESDM), *Sargent test* (MFESVM) (explosive strength)*. The sample of variables for morphological characteristics assessment was defined by four anthropometric measures: *body height* (TV), *body mass* (TT), *body fat percentage* (%MASTI) and the *total body fat* (KG/MASTI) (measured as recommended by International Biological Program).

The sample of criterion variables was made up of the marks the students achieved in the practical part of the exam of the subject *Dances*, these being the marks for the five folk dances. Three judges evaluated each dance's realisation, i.e., the efficiency of each of the students in performing the dances: the subject teacher, the fellow-teacher and another fellow- teacher from another faculty.

Procedure. Data on the motor abilities of the students were obtained in the first week of classes of the subject *Dances* which is an obligatory subject of the sixth semester (the third study year) at the Faculty of Kinesiology, University of Zagreb. Data collection was performed by experts experienced in such and similar testings and according to a previously scheduled testing plan. The students were tested in groups and according to a timetable. The students were divided into groups of five, so that they had enough time to rest between the testing of the same or new exercise. All 15 motor tests were completed within four classes. The obtaining

* The description of the tests MAGKUS360 and OREBMR can be found in: Horvatin-Fučkar, M. (2002). Connection of rhythm and success in doing sports and rhythmic gymnastics (Master's degree paper). Zagreb: Faculty of Kinesiology, University of Zagreb. The description of other texts is in: Metikoš, D, Hofman, E., Prot., Pintar, Ž.,. & Oreb, G.. (1989). Measuring of basic motor dimensions of athletes. Zagreb: Faculty of Physical Education, University of Zagreb.

of students' anthropometric measures was also done in groups and according to the previously set schedule during the spring semester and the expert fellow teachers of the Faculty of Kinesiology, qualified to do such measuring, conducted it.

The criterion variables were recorded as the marks the students got at the practical part of the subject *Dances.* Three marks were obtained and noted by three judges, experts in dancing, at the end of the semester by testing the students when performing the dances as a part of their examination procedure.

The dancing efficiency of the students was evaluated in groups of 5 formed arbitrarily by students in which each of them received one dancing task. After recognising the music of the dance successfully, the student demonstrated the dance. After a successful demonstration and evaluation of the presented dance, the identical procedure followed for each student in the examination group. If the student failed to demonstrate the dance, the procedure continued so that another candidate substituted her. Each student recognised and demonstrated one dance, and the other four dances were performed after all other students had finished their demonstration successfully.

Even though the dances are in the subject *Dances* presented to students within the dancing zones, when evaluating the students the complexity was regarded as a guiding principle (from simpler to more complicated ones). Since each student was evaluated with five marks (criterion) for folk dance, all the dances were, according to their structure, relegated into five categories. So, the mark N1 is actually the mark of the one dance that belongs to the first category, and so forth for all the other marks (criteria).

kolo) and doing the dancing movement in different directions (*Šokačko kolo, Došla sam vam japa dimo*), with turns in couples (*Poskočica*). The second category consists of the dances rich in jumps and leaps (emphasised vertical movements) within somewhat less complicated rhythmical patterns but also with different movement directions of the dancers within the dancing formation (wheel dance, line). The third category includes mostly dances in pairs in which the stress is on the aesthetic component of performing dancing structures (figures) with less demanding rhythmical structure but with more emphasised spatial dimension. In the dances of the fourth category the dancing expressiveness and the grade of skill in performing some dancing structures is revealed since these are the dances in which slower musical tempos must be synchronised with relatively simple dancing steps that have to be performed in meticulous detail. The fifth category consists of the rhythmically and structurally simplest dancing structures by the realisation of which it is necessary to sustain the dancing formations of the wheel dance in the dancing pairs (*Šrotež, Ciciljona, Pritilica*) and threes (*Jabučice*).

Data processing

The data obtained were analysed by the programme package Statistica for Windows, ver. 5.0, at the Faculty of Kinesiology, University of Zagreb. Metric characteristics of the motor abilities tests were determined by Momirović's programme RTT (statistical programme for determining the metric characteristics of composite measurement instruments) that was written in the programme language Statistica Basic by Dizdar (1999) and implemented in the statistical package Statistica for Windows, version 5.0.

Table 1. Folk dances distribution according to categories (complexity criteria)

N1	N2	N3	N4	N5
Slavonsko kolo	Ćire	Staro sito	Kalendara	Oj, Ivane, Ivaniću
Presjekača	Dučec	Grizlica	Haj'd na levo	Jabučice
Šokačko kolo	Ranče	Igrajte nam japa	Ličko kolo	Sitne bole
Došla sam vam japa	Bunjevačko kolo	Potkolo	Jelica kolce vodila	Šrotež
Poskočica	Vrličko kolo	Manfrina	Žena išla na gosti	Ciciljona
	Prigorski drmeš	Lepe naše senokoše	Sotiš	Pritilica

Abbreviations: N1 – folk dances of the first group, N2 – folk dances of the second group, N3 – folk dances of the third group, N3 – folk dances of the fourth group, N5 – folk dances of the fifth group.

Table 1 shows which category each of the dances belongs to. The dances of the first category are rhythmically and structurally the most demanding folk dances in the curriculum of the subject *Dances.* Rhythmical complexity is manifested in syncope rhythms (*Presjekača*), changes in tempo (*Slavonsko*

On the basis of the correlation matrix between the particles the following reliability standards were calculated by implying the classical measurement model: RTT (reliability standard), ALPHA (reliability standard), ALPHA 1 (bottom reliability limit), ALPHA 2 (top reliability limit). On the basis of

the covariance matrixes transformed into image and Harris' metrics and under Guttman's model the following standards were calculated: LAMBDA6 (Guttman-Nicewander's reliability standard), ROH1 (bottom reliability limit), ROH2 (top reliability limit), TAU (Momirović's bottom reliability limit), MSA (Kaiser-Rice's particles representative quality standard), AVR (average correlation between the particles that can be used as a homogeneity standard), HOM1 (Momirović's homogeneity coefficient). For all the predictor variables the basic statistical parameters were determined by means of descriptive analysis. Measures of central tendency and dispersion parameters were calculated: arithmetic means (AM), standard deviations (SD), minimum values of the results (Min), maximum values of the results (Max), results span (Range) as well as the asymmetry (Skew) and peakedness of the distribution (Kurt). The normality of the distribution was tested by Kolmogorov–Smirnov test (K-S).

The objectivity of the judges was tested by the correlation analysis, while the distribution normality of the judges' marks of the individual dances was tested by Kolmogorov-Smirnov (K-S) test. Relations between motor abilities and morphological characteristics, on the one hand, and five criterion variables (five dances), on the other hand, were determined by regression analysis. Five forward stepwise regression analyses were applied by which multiple correlation (R), determination coefficient (RS), multiple correlation standard error (Std. Err.), unstandardised regression coefficient (B), standard error B (Std. Err. B), standardised regression coefficient (BETA), as well as the t-test (t) were determined.

Results

The metric characteristics of the motor abilities tests used in this research had to be established due to the fact that they were applied for the first time on this population, while the *Oreb's rhythm test* (OREBMR) and *side steps with a 360^o turn* (MAGKUS360) were constructed for the purpose of this research. The analysis of motor tests metric characteristics (Table 2) clearly showed that only the balance assessment test *standing on both feet on the balance bench with eyes closed* (MBAU2Z) did not have the satisfactory coefficients for reliability, representative quality and homogeneity. Normality distribution testing (Table 3) of the results of the motor abilities and anthropological characteristics assessments tests showed a deviation from the normal distribution only in the test *standing on a foot on the balance bench with eyes open* (MBAU1O). However, since this deviation was minimal, the test was used in further analysis.

Descriptive parameters analysis (Table 4) proved the negatively asymmetric distribution (Skew) of the results, that is, an accumulation of

Table 2. Reliability, homogeneity and representative quality coefficients of motor skills estimation tests

TEST	RTT	Alpha	Alpha1	Alpha2	Lambda6	Rho1	Rho2	Tau	MSA	AVR	Hom1
MAGOSS	0.83	0.84	0.31	0.80	0.80	0.64	0.96	0.64	0.91	0.63	0.92
MREPOL	0.94	0.94	0.39	0.86	0.92	0.85	0.99	0.85	0.99	0.84	0.97
MAGKUS	0.89	0.89	0.35	0.84	0.88	0.77	0.98	0.76	0.97	0.73	0.95
MAGK360	0.92	0.92	0.38	0.85	0.91	0.82	0.99	0.82	0.98	0.79	0.96
MKRBUB	0.86	0.86	0.33	0.82	0.81	0.66	0.96	0.66	0.93	0.67	0.93
MKRBNR	0.91	0.91	0.37	0.85	0.88	0.78	0.99	0.78	0.97	0.78	0.96
OREBMR	0.92	0.92	0.38	0.85	0.89	0.80	0.99	0.80	0.98	0.80	0.96
MBAU1O	0.82	0.82	0.30	0.79	0.78	0.61	0.95	0.61	0.90	0.60	0.92
MBAU2Z	0.53	0.53	0.13	0.59	0.44	0.19	0.69	0.19	0.50	0.28	0.79
MBFTAP	0.89	0.89	0.35	0.84	0.88	0.78	0.99	0.77	0.97	0.73	0.95
MBFTAN	0.53	0.67	0.20	0.69	0.80	0.64	0.96	0.64	0.85	0.27	0.88
MFLPRR	0.99	0.99	0.43	0.88	0.99	0.98	1.00	0.98	1.00	0.97	0.99
MFLPRK	0.99	0.99	0.43	0.88	0.98	0.97	1.00	0.97	1.00	0.96	0.99
MFESDM	0.94	0.94	0.39	0.86	0.92	0.84	0.99	0.84	0.99	0.83	0.97
MFESVM	0.97	0.97	0.42	0.88	0.97	0.93	1.00	0.93	1.00	0.92	0.99

Abbreviations: RTT – reliability standard, Alpha - reliability standard, Alpha1 – bottom reliability limit, Alpha2 – top reliability limit, Lambda6 – Guttman-Nicewander's reliability standard, Rho1 - bottom reliability limit, Rho2 - top reliability limit, Tau - Momirović's bottom reliability limit, MSA – Kaiser-Rice's particles representative quality standard, AVR – homogeneity standard, Hom1 - Momirović's homogeneity coefficient, MAGOSS - figure of eight with a bend, MREPOL – obstacle course backwards, MAGKUS – side-steps, MAGK360 – side-steps with a 360° turn, MKRBUB – drumming without the rhythm, MKRBNR – drumming with feet and hands, OREBMR - Oreb's rhythm test, MBAU1O – standing on a foot on the balance bench with eyes open, MBAU2Z – standing on both feet on the balance bench with eyes closed, MBFTAP – hand tapping, MBFTAN – foot tapping, MFLPRR – touch-toe with feet spread, MFLPRK – sit-and-reach, MFESDM – standing long-jump, MFESVM – Sargent test.

Table 3. Kolmogorov-Smirnov normality distribution predictor variables test

	N	max D	P
MAGOSS	113	0.07	P > .20
MREPOL	113	0.08	P > .20
MAGKUS	113	0.07	P > .20
MAGK360	113	0.06	P > .20
MKRBUB	113	0.08	P > .20
MKRBNR	113	0.05	P > .20
OREBMR	113	0.08	P > .20
MABU1O	113	0.28	P > .20
MABU2Z	113	0.09	P > .20
MBFTAP	113	0.08	P > .20
MBFTAN	113	0.08	P > .20
MFLPRR	113	0.09	P > .20
MFLPRK	113	0.10	P < .20
MFESDM	113	0.07	P > .20
MFESVM	113	0.08	P > .20
TVISINA	113	0.10	P > .20
TTEZINA	113	0.11	P < .15
%MASTI	113	0.03	P > .20
Kg/MASTI	113	0.11	P < .15

Abbreviations: N – number of subjects, max D – maximal deviation of relative cumulative empirical frequency from relative cumulative theoretical frequency, P – significance level, MAGOSS - figure of eight with a bend, MREPOL – obstacle course backwards, MAGKUS – side-steps, MAGK360 – side-steps with a 360° turn, MKRBUB – drumming without the rhythm, MKRBNR – drumming with feet and hands, OREBMR - Oreb's rhythm test, MBAU1O – standing on a foot on the balance bench with eyes open, MBAU2Z – standing on both feet on the balance bench with eyes closed, MBFTAP – hand tapping, MBFTAN – foot tapping, MFLPRR – touch-toe with feet spread, MFLPRK – sit-and-reach, MFESDM – standing long-jump, MFESVM – Sargent test, TVISINA – body height, TTEŽINA – body weight, %MASTI – relative body fat, Kg/Masti – total body fat

Table 4. Descriptive parameters of the predictor variables; number of subjects (N), arithmetic mean (AM), minimum (Min) and maximum value (Max), results span (Range), standard deviation (SD), asymmetry coefficient (Skew) and distortion coefficient (Kurt)

	N	AM	Min	Max	Range	SD	Skew	Kurt
MAGOSS	113	18.58	16.16	22.02	5.86	1.16	0.26	-0.37
MREPOL	113	9.59	6.65	16.08	9.44	1.63	**1.33**	2.87
MAGKUS	113	8.91	7.42	11.40	3.98	0.68	0.59	1.48
MAGKUS360	113	10.64	8.60	13.44	4.84	1.03	0.31	-0.05
MKRBUB	113	15.58	11.33	21.67	10.33	2.13	0.49	0.27
MKRBNR	113	14.52	6.33	21.00	14.66	3.03	***-0.18***	-0.37
OREBMR	113	5.19	4.51	6.34	1.82	0.38	0.65	0.03
MBAU1O	113	10.57	1.61	76.11	74.50	12.23	**2.95**	***9.87***
MBAU2Z	113	1.91	0.94	5.04	4.10	0.62	**1.71**	***5.66***
MBFTAP	113	36.36	28.00	45.00	17.00	3.01	***-0.25***	0.30
MBFTAN	113	44.47	36.66	55.67	19.00	3.44	0.68	0.60
MFLPRR	113	71.38	46.00	99.00	53.00	10.75	0.33	0.36
MFLPRK	113	56.28	34.33	69.67	35.33	5.90	***-0.94***	1.78
MFESDM	113	204.88	176.00	241.67	65.66	15.33	0.35	-0.27
MFESVM	113	39.16	23.33	56.33	33.00	5.82	0.29	0.12
TVISINA	113	169.41	152.00	188.80	36.80	5.86	0.17	0.97
TTEŽINA	113	60.28	49.00	88.00	39.00	6.65	**1.08**	2.48
%MASTI	113	16.68	8.80	26.80	18.00	3.63	0.26	0.16
Kg/MASTI	113	10.25	4.60	23.60	19.00	3.09	**1.09**	2.81

Abbreviations: N - number of subjects, AM - arithmetic mean, Min – minimum value, Max – maximum value, Range – results span, SD - standard deviation, Skew - asymmetry coefficient, Kurt - distortion coefficient, MAGOSS - figure of eight with a bend, MREPOL – obstacle course backwards, MAGKUS – side-steps, MAGK360 – side-steps with a 360° turn, MKRBUB – drumming without the rhythm, MKRBNR – drumming with feet and hands, OREBMR - Oreb's rhythm test, MBAU1O – standing on a foot on the balance bench with eyes open, MBAU2Z – standing on both feet on the balance bench with eyes closed, MBFTAP – hand tapping, MBFTAN – foot tapping, MFLPRR – touch-toe with feet spread, MFLPRK – sit-and-reach, MFESDM – standing long-jump, MFESVM – Sargent test, TVISINA – body height, TTEŽINA – body weight, %MASTI – relative body fat, Kg/Masti – total body fat

the average results in the higher values zone with the rhythmical structures realisation assessment tests (*drumming with feet and hands*, MKRBNR), movement frequency (*hand tapping*, MBFTAP) and flexibility (*sit-and-reach*, MFLPRK).

The reason for such a distribution is probably due to the fact that these motor tests are frequently used during physical education classes in school and at the university so that the students are familiar with the tasks. Positively asymmetric results distribution probably implies a too difficult motor task, which was evident by the coordination (*obstacle course backwards*, MREPOL) and balance (*standing on a foot on the balance bench with eyes open*, MBAU1O; *standing on both feet on the balance bench with eyes closed*, MBAU2Z) evaluation tests, which indicates the complexity of the motor tasks. Results accumulation in the somewhat lower values area was observed in the anthropometric measurements of *body weight* (TTEŽINA) and the *total body fat* (KG/MASTI) which is comprehensible regarding the sample of subjects – active female athletes. The distortion of the curve (Kurt) points at a higher subjects' homogeneity, which was evident with the balance assessment tests (*standing on a foot on the balance bench with eyes open*, MBAU1O and *standing on both feet on the balance bench with eyes closed*, MBAU2Z). It is therefore possible to state that these tests are of lower sensitivity.

Criterion variables normality distribution testing (five marks in dancing) showed a significant distortion from the normal distribution (Table 5). Such a distortion can be explained by the fact that the marks belong to the ordinal scale, which means that the real differences between neighbouring marks are not the same. It is well known that the actual difference between the failing mark (1) and pass D (2) is considerable, and depends on the criteria of a particular evaluator; the difference between pass C (3) and B (4) is greater than between the grades B (4) and top, A grades (5).

Table 5. Kolmogorov-Smirnov normality distribution test of the criterion variables

	N	maxD	P
N1S	113	0.18	P<0.01
N2S	113	0.20	P<0.01
N3S	113	0.20	P<0.01
N4S	113	0.16	P<0.01
N5S	113	0.18	P<0.01

Abbreviations: N – number of subjects, max D – maximal deviation of relative cumulative empirical frequency from relative cumulative theoretical frequency, P – significance level, N1S – arithmetic mean of the marks of judges for folk dances number 1, N2S – arithmetic mean of the marks of judges for folk dances number 2, N3S – arithmetic mean of the marks of judges for folk dances umber 3, N4S – arithmetic mean of the marks of judges for folk dances number 4, N5S – arithmetic mean of the marks of judges for folk dances number 5.

To assess the level of objectivity of the performance of each dancing structure the average interrelation of the marks of the three evaluators was calculated: R=0.834 (P<0.05) (Table 6), which implies the objective evaluation of the students' knowledge. Namely, the coefficient of the average interrelation of 0.834 implies 69.5% common factors, that is, agreeing on the mark is over 60 %.

Table 6. Correlation of the evaluator's ratings

	R=0.83	P<0.05			
	N1S	N2S	N3S	N4S	N5S
N1S	1				
N2S	0.78	1			
N3S	0.84	0.82	1		
N4S	0.87	0.79	0.86	1	
N5S	0.86	0.78	0.86	0.88	1

Abbreviations: R – multiple correlation, P – significance level, N1S – arithmetic mean of the marks of judges for folk dances number 1, N2S – arithmetic mean of the marks of judges for folk dances number 2, N3S – arithmetic mean of the marks of judges for folk dances umber 3, N4S – arithmetic mean of the marks of judges for folk dances number 4, N5S – arithmetic mean of the marks of judges for folk dances number 5.

To establish the relation between the predictor variable set and each individual criterion the forward stepwise regression analysis method was applied, where firstly the independent variable with the highest independent contribution to the explanation of the dependent variable was analysed, then the next highest and so on for all the variables that had significant values of BETA coefficients.

Insight into the regression analysis results (Table 7) enables us to note statistically significant connection (R=0.40) of the predictor set and the first criterion variable N1. Predictor set explained 16% (R^2) of the variable (P<0.00). Significant contribution in explaining the connection of the predictor set with the N1 criterion was noticeable of the variable *drumming with feet and hands* (MKRBNR) (BETA=0.27) and *body mass* (TTEŽINA) (BETA=-0.29). The values of the variable *sidesteps with a 360^o turn* (MAGKUS360) (coordination) at the level of statistical significance of 0.05 (p<0.02), also contributed to (BETA=-0.20) criterion explanation.

The results of the regression analysis of the predictor set with the second criterion variable (N2) (Table 8) imply a statistically significant connection between the predictor set and the criterion (R=0.45). Predictor set explained 20% (R^2) of the common variance at the level of statistical significance of 0.01 (P<0.00). The predictor that contributed the

Table 7. Regression analysis of the predictor and criterion variable N1

R=0.40 R^2=0.16 Adj. R^2=0.13						
F(4.108)=5.20 P<0.00 Std. Err. est.: 2.57						
		St. err.		**St. err.**		
	BETA	**BETA**	**B**	**B**	**t(108)**	**P-level**
Intercpt			18.74	3.64	5.13	1.24
MKRBNR	***0.27***	***0.09***	***0.25***	***0.08***	***2.97***	***0.00***
TTEZINA	***-0.29***	***0.11***	***-0.12***	***0.04***	***-2.70***	***0.00***
MAGK360	-0.20	0.09	-0.54	0.24	-2.20	0.02
%MASTI	0.22	0.11	0.17	0.08	1.99	0.04

Abbreviations: R – multiple correlation, R^2 - coefficient of determination, Adj. R^2 – adjusted coefficient of determination, F – value of F-test, P – value of significance threshold of F-test, Std. Err. est. – standard error of estimation, BETA – partial standard coefficient of regression, St. err. BETA – standard error of partial coefficient of regression, Intercpt – intercepts, t – degree of freedom, P – significance level, MKRBNR – drumming with feet and hands, TTEŽINA – body weight, MAGK360 – side-steps with a 360° turn, %MASTI – relative body fat.

Table 8. Regression analysis of the predictor and criterion variable N2

R=0.45 R^2=0.20 Adj. R^2=0.14						
F(8.104)=3.37 P<0.00 Std. Err. est.: 2.25						
		St. err.		**St. err.**		
	BETA	**BETA**	**B**	**B**	**t(104)**	**P-level**
Intercpt			6.33	5.28	1.19	0.23
MKRBUB	***0.22***	***0.10***	***0.25***	***0.11***	***2.16***	***0.03***
MFESVM	***0.20***	***0.09***	***0.08***	***0.03***	***2.17***	***0.03***
TTEŽINA	***-0.47***	***0.15***	***-0.17***	***0.05***	***-3.04***	***0.00***
KG/MASTI	***0.32***	***0.15***	***0.25***	***0.12***	***2.09***	***0.03***
MKRBNR	***0.19***	***0.10***	***0.15***	***0.08***	***1.91***	***0.05***
MFLPRR	0.11	0.09	0.02	0.02	1.29	0.19
OREBMR	0.16	0.10	1.08	0.66	1.61	0.10
MAGKUS	-0.11	0.10	-0.41	0.37	-1.11	0.26

Abbreviations: R – multiple correlation, R^2 - coefficient of determination, Adj. R^2 – adjusted coefficient of determination, F – value of F-test, P – value of significance threshold of F-test, Std. Err. est. – standard error of estimation, BETA – partial standard coefficient of regression, St. err. BETA – standard error of partial coefficient of regression, Intercpt – intercepts, t – degree of freedom, P – significance level, MKRBUB – drumming without the rhythm, MFESVM – Sargent test, TTEŽINA – body mass, KG/MASTI – total body fat, MKRBNR – drumming with feet and hands, MFLPRR – touch-toe with feet spread, OREBMR – Oreb's rhythm test, MAGKUS – side-steps.

Table 9. Regression analysis of the predictor and criterion variable N3

R=0.27 R^2=0.077 Adj. R^2=0.05						
F(3.109)=3.05 P<0.03 Std. Err. est.: 2.55						
		St. err.		**St. err.**		
	BETA	**BETA**	**B**	**B**	**t(109)**	**P-level**
Intercpt			25.13	7.73	3.25	0.00
MAGK360	-0.17	0.09	-0.44	0.24	-1.82	0.07
TVISINA	-0.15	0.09	-0.06	0.04	-1.61	0.10
MKRBUB	0.14	0.09	0.17	0.11	1.47	0.14

Abbreviations: R – multiple correlation, R^2 - coefficient of determination, Adj. R^2 – adjusted coefficient of determination, F – value of F-test, P – value of significance threshold of F-test, Std. Err. est. – standard error of estimation, BETA – partial standard coefficient of regression, St. err. BETA – standard error of partial coefficient of regression, Intercpt – intercepts, t – degree of freedom, P – significance level, MAGK360 – side-steps with a 360° turn, TVISINA – body height, MKRBUB – drumming without the rhythm.

Table 10. Regression analysis of the predictor and criterion variable N4

R=0.32 R^2=0.10 Adj. R^2=0.08						
F(3.109)=4.33 P<0.00 Std. Err. est.: 2.70						
		St. err.		**St. err.**		
	BETA	**BETA**	**B**	**B**	**t(109)**	**P-level**
Intercpt			31.72	8.04	3.94	0.00
MAGK360	***-0.20***	***0.09***	***-0.56***	***0.25***	***-2.19***	***0.03***
TVISINA	***-0.19***	***0.09***	***-0.09***	***0.04***	***-2.15***	***0.03***
MKRBNR	0.16	0.09	0.15	0.08	1.73	0.08

Abbreviations: R – multiple correlation, R^2 - coefficient of determination, Adj. R^2 – adjusted coefficient of determination, F – value of F-test, P – value of significance threshold of F-test, Std. Err. est. – standard error of estimation, BETA – partial standard coefficient of regression, St. err. BETA – standard error of partial coefficient of regression, Intercpt – intercepts, t – degree of freedom, P – significance level, MAGK360 – side-steps with a 360° turn, TVISINA – body height, MKRBNR – drumming with feet and hands.

Table 11. Regression analysis of the predictor and criterion variable N5

R=0.33 R^2=0.11 Adj. R^2=0.07						
F(4.108)=3.37 P<0.01 Std. Err. est.: 2.48						
		St. err.		St. err.		
	BETA	BETA	B	B	t(108)	P-level
Intercpt			24.51	7.53	3.25	0.00
MAGK360	***-0.17***	***0.09***	***-0.43***	***0.23***	***-1.82***	***0.07***
MFLPRR	***0.19***	***0.09***	***0.04***	***0.02***	***2.06***	***0.04***
TVISINA	-0.18	0.09	-0.08	0.04	-1.97	0.05
MKRBUB	0.14	0.09	0.17	0.11	1.50	0.13

Abbreviations: R – multiple correlation, R^2 - coefficient of determination, Adj. R^2 – adjusted coefficient of determination, F – value of F-test, P – value of significance threshold of F-test, Std. Err. est. – standard error of estimation, BETA – partial standard coefficient of regression, St. err. BETA – standard error of partial coefficient of regression, Intercpt – intercepts, t – degree of freedom, P – significance level, MAGK360 – side-steps with a 360° turn, MFLPRR – touch-toe with feet spread, TVISINA – body height, MKRBUB - drumming without the rhythm.

most to the explanation of the relation with the criterion was *body mass* (TTEŽINA) (BETA=-0.47) at the level of statistical significance of 0.01 (p<0.00). The other predictors that explained the connection of the predictor set and criterion N2 were *drumming without the rhythm* (MKRBUB) (rhythmical structures realisation) (BETA=0.22), *Sargent test* (MFESVM) (explosive strength) (BETA=0.20), the *total body fat* (KG/MASTI) (BETA=0.32) and *drumming with feet and hands* (MKRBNR) (rhythmical structures realisation) (BETA=0.19), at the level of the statistical significance of 0.05.

The connection between the predictor set and the third criterion N3 was very low (R=0.27) and explained only 7% (R^2) of the total variance but it was statistically significant at the level of statistical significance of 0.05 (P<0.03) (Table 9).

The connection between the predictor set and the fourth criterion variable N4 (Table 10) was also rather low (R=0.32) and accounted for only 10% of the total variance at the level of statistical significance of 0.01 (P<0.00). Statistically significant relation, at the level of 0.05 (P<0.03), was shown by the tests *side-steps with a 360° turn* (MAGKUS360) (coordination) (BETA=-0.20) and *body height* (TVISINA) (BETA=-0.19).

Regression analysis established a statistically significant relation of the predictor set with the fifth variable N5 (R=0.33) (Table 11), at the level of statistical significance of 0.01 and only 11% (R^2) of the total variance. The predictors that explained the connection of the predictor set with the criterion N5 (P<0.05) with the largest share were *touch-toe with feet spread* (MFLPRR) (flexibility) (BETA=0.19) and *body height* (TVISINA) (BETA=-0.18).

Discussion and conclusion

Regression analysis results showed a statistically significant correlation between the set of predictor variables and all five criterion variables of the folk dance (N1, N2, N3, N4 and N5).

Important contribution in explaining the connection of the predictor variables with the first criterion variable N1 was noticeable only in the variable *drumming with feet and hands* (MKRBNR) and *body mass* (TTEŽINA). Such a contribution of these variables was caused by the composition of the dances of the first criterion (N1 category) that are rhythmically the most complicated of all the dances in the curriculum of the subject *Dances.* The successful realisation of these dances is conditioned by the ability of a student to realise rhythmical structures as well as by her lower body mass. The results of the research performed by Žganjer (1978) and Kostić (1994) pointed to the rhythm as the main element in music and dance, therefore the fact that *drumming without the rhythm* (MKRBUB), used for the evaluation of rhythm realization, had been singled out was expected. In addition, Kostić (1996) proved that the successful realization of dance structures depends upon the abilities that comprise memorizing the dance sequence and the technically correct performance of the sequence in a given rhythm. The same abilities are important for a successful realization of the mentioned test. The fact that the lower body weight is important for success in dancing can be proven by the comparison of ballet and modern dances dancers and non-dancers (Dolgner, Spasoff, & St. John, 1980), where the groups did not differ in height but the dancers were far lighter than non-dancers. A somewhat smaller contribution in explaining the connection of the predictor variable and the first criterion variable is evident for the variable *side-steps with a 360° turn* (MAGKUS360) variable due to the importance of coordination for the successful realisation of the dancing structures of the first category.

The predictor that contributed the most to the explanation of the connection of the set of predictor variables with the second criterion variable (N2) was *body mass* (TTEŽINA), and the reason lies in the fact that the high body mass is counterproductive to the successful realisation of the dances.

The other predictors that explained the connection of the predictor set and the second criterion variable (N2) were *drumming without rhythm* (MKRBUB), *Sargent test* (MFESVM), the *total body fat* (KG/MASTI) and *drumming with feet and hands* (MKRBNR). This connection may be explained by

the nature of dances of the second criterion (N2 category) that are rich in jumps, leaps and hops; here the tests of rhythm abilities and explosive strength are important for a successful realisation. Other than coordination and balance, rhythm and explosive strength are the abilities that should be considered when selecting the children for dance (Oreb, 1984; Srhoj, 2002).

The connection of the predictor variables with the third criterion variable (N3) was quite small, but still statistically significant. Neither of the predictors were singled out in the explanation of this connection and this could possibly be interpreted by the aesthetic component that was primary for the successful performance of the dances of the third category (N3). The aesthetic component of dance is the component that is the hardest to evaluate. Namely, the judges' knowledge and experience comes into play in the objectivity of the evaluation of the aesthetic component in the dance structure performance. For that reason, such a low relationship between the independent variables and the criterion variable (N3) is justified.

The tests *side-steps with a 360° turn* (MAGKUS360) and *body height* (TVISINA) showed a statistically significant contribution in explaining the connection of the predictors with the fourth criterion variable. This variable consists of the dances of the fourth category (N4) in which a slower musical beat was synchronised with the simpler dancing steps, but also with the movement of other body parts (trunk, arms). The subjects should keep in mind the dance layout form and the position of the couples in formation, for which good spatial orientation is required. Furthermore, these dances are rich in vertical oscillations (three-step, hop and jump; Panonian and Alpine dancing zone), whose efficiency depends upon shorter levers. That is the case in praxis, so that in professional troupes these dances are performed by shorter dancers.

The predictors that in the largest portion explained the connection of the predictor set with the fifth criterion variable N5 were *touch-toe with feet spread* (MFLPRR) and *body height* (TVISINA). The high correlation of the test for the evaluation of flexibility and success in performing the dances of the fifth criterion (*Ciciljona*) was confirmed on the sample of 11-year-old girls (Srhoj, 2002). The reason for this are probably the dances of the fifth category that make up the fifth criterion variable, characterised by small steps, lots of oscillations and turns after which the movements with relatively high amplitudes follow – all typical features of folk dances. The performance of these dances requires the regulation of muscle tonus of the body, especially the trunk muscles. The laws of physics and biomechanics imply that such dance movements will be performed more harmoniously by shorter and more flexible persons.

The obtained correlation of the predictor set (motor and anthropometric dimension) with the criterion set (folk dances) definitely confirmed the statistically significant connection that had already been proven in previous research (Oreb, 1984; Oreb & Kilibarda, 1996; Srhoj, 2002; Miletić, Srhoj, Sekulić, & Oreb, 2003), and moreover, in the same motor space. This can surely be attributed to the movement complexity of the presented folk dances and the difficulty with which the selected sample of the university female students had to cope with in accordance with their motor abilities. The results indicated that in modern dancing experience special attention should be paid precisely to motor rhythm abilities, co-ordination, explosive strength and flexibility when choosing children for dancing. It is unquestionable that the existing research results should be confirmed on a sample of the female folk dancers, which would attribute even greater importance to the connection of the motor and anthropometric space with dancing efficiency. Also, this research confirmed that the aesthetic component, which is very significant in dance, is neglected in evaluating the dance performance. The evaluation of the aesthetic impression is left to the judges who, despite their knowledge and experience, are still prone to subjectivity. In future research attention should be paid to that aspect as well.

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POVEZANOST MOTORIČKIH I MORFOLOŠKIH OBILJEŽJA STUDENTICA S USPJEŠNOSTI U NARODNIM PLESOVIMA

Sažetak

Uvod

Ples kao konvencionalno-estetsko gibanje ima posebnu funkciju u životu čovjeka jer je prisutan u svečanim trenucima obilježavanja različitih životnih prilika. Isto je tako neupitna primjenjivost plesa kao kineziološkog operatora u nastavi tjelesne i zdravstvene kulture te u radu s netreniranim i starijim osobama. Osim transformacije obilježja i sposobnosti plesnim strukturama, ples kod učenika razvija smisao za svjesno estetsko doživljavanje, samostalno stvaralaštvo i oblikovanje lijepih i skladnih pokreta, te potiče svijest o nacionalnom identitetu.

Uspješnost u kineziološkim aktivnostima ovisi o nekoliko dimenzija: antropološkim, morfološkim, funkcionalno-motoričkim, kognitivnim i konativnima. Zastupljenost dimenzija ovisi o strukturi aktivnosti i nije jednaka za sve dimenzije. Područje plesa, osobito narodni ples, slabo je istraženo s aspekta definiranja dimenzija koje utječu na uspješnost. Selekcija, izbor kineziloških operatora i transformacijski proces u današnjoj plesnoj praksi obavljaju se na osnovi subjektivne procjene i iskustva stručnjaka. Kako bi se izbjegla subjektivnost, potrebno je utvrditi nove i unaprijediti dosadašnje mjerne postupke.

Osnovni cilj istraživanja bio je utvrditi relacije između motoričkih sposobnosti i morfoloških karakteristika studentica treće godine Kineziološkog fakulteta s uspješnosti u plesu. Postavljen je i dodatni cilj koji se odnosio na utvrđivanje metrijskih karakteristika testova za procjenu motoričkih sposobnosti.

Metode

Uzorak ispitanica sastojao se od 113 (N=113) studentica treće godine Kineziološkog fakulteta Sveučilišta u Zagrebu. Temeljni uvjet za ulazak u uzorak ispitanica bio je položen praktični dio ispita iz kolegija Ples. Uzorak prediktorskih varijabli činio je skup varijabli za procjenu motoričkih sposobnosti, i to: *osmica sa sagibanjem* (MAGOSS), *poligon natraške* (MREPOL), *koraci u stranu* (MAGKUS), *koraci u stranu s okretom za 360º* (MAGKUS360) (koordinacija), *neritmičko bubnjanje* (MKRBUB), *bubnjanje nogama i rukama* (MKRBNR), *Orebov test ritma* (OREBMR) (realizacija ritmičkih struktura), *stajanje na jednoj nozi uzdužno na klupici za ravnotežu s otvorenim očima* (MBAU1O), *stajanje na dvije noge uzdužno na klupici za ravnotežu sa zatvorenim očima* (MBAU2Z) (ravnoteža), *taping rukom* (MBFTAP), *taping nogom* (MBFTAN) (frekvencija pokreta), *pretklon na klupi* (MFLPRK), *pretklon raznožno* (MFLPRK) (fleksibilnost), *skok u dalj s mjesta* (MFESDM) i *skok u vis s mjesta* (MFESVM) (eksplozivna snaga). Uzorak varijabli za procjenu morfoloških karakteristika bio je definiran četirima antropometrijskim mjerama, i to: *visinom tijela* (VT), *masom tijela* (TT), *postotkom masnog tkiva* (%MASTI) i *ukupnom količinom masti* (KG/MASTI) (izmjerene prema preporuci IBP-a; International Biological Program). Uzorak kriterijskih varijabli činile su ocjene koje su studentice dobile na praktičnom dijelu ispita iz kolegija Ples (5 narodnih plesova). Realizaciju plesova ocijenila su tri suca, a pri procjeni znanja uvažavao se princi složenosti plesova. S obzirom na to da je svaka studentica ocijenjena petorim ocjenama (kriterij) za narodni ples, svi su narodni plesovi svrstani prema svojoj strukturi u pet kategorija kompleksnosti (N1-N5).

Rezultati su obrađeni programskim paketom Statistica for Windows, ver. 5.0. na Kineziološkom Fakultetu Sveučilišta u Zagrebu. Metrijske karakteristike testova motoričkih sposobnosti utvrđene su Momirovićevim programom RTT. Za sve su varijable prediktorskog skupa deskriptivnom analizom određeni osnovni statistički parametri distribucije varijabli. Normalnost distribucije testirala se Kolmogorov-Smirnovljevim testom (*K-S*). Objektivnost sudaca provjerena je korelacijskom analizom, a normalnost distribucije sudačkih ocjena po pojedinom plesu Kolmogorov-Smirnovljevim testom (*K-S*). Relacije između motoričkih sposobnosti i morfoloških obilježja i pet kriterijskih varijabli utvrđene su regresijskom analizom.

Rezultati

Analiza metrijskih karakteristika motoričkih testova pokazuje kako jedino test za procjenu ravnoteže *stajanje na dvije noge uzdužno na klupici sa zatvorenim očima* (MBAU2Z) nema odgovarajuće vrijednosti koeficijenata pouzdanosti, reprezentativnosti i homogenosti. Testiranjem normaliteta distribucije rezultata testova za procjenu motoričkih sposobnosti i antropoloških obilježja jedino je kod testa *stajanje na jednoj nozi uzdužno na klupici sa otvorenim očima* (MBAU1O) postalo vidljivo odstupanje od normalne distribucije, no kako je to odstupanje bilo minimalno, test je korišten u daljnjoj analizi. U analizi deskriptivnih parametara vidljiva je akumulacija prosječnih rezultata u zoni viših vrijednosti u testovima za procjenu realizacije ritmičkih struktura (MKRBNR), brzine naizmjeničnih pokreta (MBFTAP) i fleksibilnosti (MFLPRK). Akumuliranje prosječnih rezultata u području nižih vrijednosti vidljivo je u testovima za procjenu koordinacije (MREPOL) i ravnoteže (MBAU1O, MBAU2Z) te kod antropometrijskih mjera TTEŽINA i KG/MASTI, čemu je razlog uzorak ispitanika, aktivnih sportašica. Izduženost krivulje ukazuje na veću homogenost ispitanica u testovima za procjenu ravnoteže (MBAU1O i MBAU2Z) te je moguće reći kako ti testovi imaju nižu osjetljivost. Testiranje normaliteta distribucije kriterijskih varijabli pokazalo je značajnije odstupanje od normalne distribucije. Prosječna interkorelacija ocjena triju sudaca, R=0,834 (p<0,05), ukazuje na objektivnu procjenu znanja studentica. Rezultati

regresijske analize pokazuju statistički značajnu povezanost prediktorskog skupa varijabli sa svih pet kriterijskih varijabli. Značajan doprinos objašnjavanju povezanosti prediktorskog skupa s kriterijem N1 vidljiv je za varijable MKRBNR (realizacija ritmičkih struktura) (BETA=0,27) i TTEŽINA (BETA=-0,29). Vrijednosti varijable MAGKUS360 (koordinacija) na razini statističke značajnosti od 0,05 ($p<0,02$), također pokazuju doprinos objašnjavanju kriterija (BETA=-0,20). Prediktor koji najviše doprinosi objašnjavanju povezanosti prediktorskog skupa s kriterijem N2 je varijabla TTEŽINA (BETA=-0,47) ($p<0,00$). Ostali prediktori koji objašnjavaju povezanost prediktorskog skupa i kriterija N2 jesu: MKRBUB (realizacija ritmičkih struktura) (BETA=0,22), MFESVM (eksplozivna snaga) (BETA=0,20), KG/MASTI (BETA=0,32) i MKRBNR (realizacija ritmičkih struktura) (BETA=0,19), ($p<0,05$). Statistički značajnu povezanost prediktorskog skupa i kriterija N4 ($p<0,03$) pokazuju varijable MAGKUS360 (koordinacija) (BETA=-0,20) i TVISINA (BETA=-0,19). Prediktori koji s najvećim udjelom u objašnjavanju povezanost prediktorskog skupa s kriterijem N5 ($p<0,05$) jesu MFLPRR (fleksibilnost) (BETA=0,19) i TVISINA (BETA=-0,18).

Rasprava i zaključak

Rezultati povezanosti prediktorskog i kriterijskog skupa definitivno su potvrdili statistički značajnu povezanost, što je u skladu s prethodnim istraživanjima u istom motoričkom prostoru. Ovu pojavu moguće je objasniti kretnom složenošću narodnih plesova i zahtjevima koje postavlja ta složenost na motoričke sposobnosti motorički selekcioniranog uzorka studentica. Rezultati istraživanja ukazuju na to da bi pri odabiru djece za ples pažnju trebalo posvetiti motoričkim sposobnostima ritma, koordinacije, eksplozivne snage i fleksibilnosti. Neupitno je da bi rezultate ovog istraživanja bilo potrebno potvrditi i na uzorku plesačica narodnoga plesa čime bi povezanost motoričkog i antropometrijskog prostora s plesnom uspješnosti dobila još veći značaj. U budućim bi istraživanjima pri procjeni plesne uspješnosti trebalo posvetiti pažnju i estetskoj komponenti plesa.