

MOTOR STATUS OF COMPETITIVE YOUNG SPORT DANCERS – GENDER DIFFERENCES

Slavoljub Uzunović¹, Radmila Kostić¹ and Đurđica Miletić²

¹ Faculty of Sport and Physical Education, Niš, Serbia

² Faculty of Kinesiology, Split, Croatia

Original scientific paper

Abstract

The regression analyses were applied to determine the impact of motor abilities on the success in standard sport dancing separately for female and male competitive dancers. The sample of subjects numbered 48 male and 47 female sport dancers aged 15 to 18 who were members of junior dance categories. The study used 21 measuring instruments for the evaluation of motor abilities and physical fitness as predictor variables and on the basis of the number of points that each of the dancers acquired at dance competitions the criterion variable is formed. The variables for assessing coordination, (Beta=0.59; $p<0.01$); frequency of movement (Beta=0.53; $p<0.05$); balance (Beta=0.46; $p<0.05$); rhythm coordination (Beta=0.46; $p<0.05$) and flexibility (Beta=0.38; $p<0.05$) explains 66% of variance of the success in standard sport dance for females ($R=0.81$; $p<0.05$) and the variables for assessing frequency of movement (Beta=0.59; $p<0.05$); explosive strength (Beta=0.46; $p<0.05$), static balance (Beta=0.35; $p<0.05$), flexibility (Beta=0.32; $p<0.05$) and aerobic stamina (Beta=- 0.30; $p<0.05$) explains 71% of variance of the success in standard sport dance for males ($R=0.84$; $p<0.01$). The results obtained illustrated the formation of ideal motor complexes in female and male sport dancers, and along with detected gender differences (in test for assessing power, flexibility and specific and general stamina), should be respected in dance training process.

Key words: motor abilities, dancers, standard sport dance

Introduction

The study of dance as a discipline demands the development and understanding of the nature of dance, its function inside of culture, rational judgment and information about the "panel" judging and the most recent development in dance forms. Sport dance is a special competitive discipline (a part of social dances) which has both the characteristics of sport and of art. Sport dances are part of the competition program at tournaments which are organized all over the world, have been standardized and are now performed in accordance with international rules of the international amateur sport dance association IDSF (International Dance Sport Association). Dance sport competitions usually include the standard dances (the English Waltz, the Tango, the Viennese Waltz, the Slow fox and the Quickstep) and Latin-American dances (the Cha-cha-cha, the Samba, the Rumba, the Pasodoble and the Jive). Different dances require different movements. During certain moments of a dance, the body changes its position which on the one hand develops the speed of the response, and on the other, demands a certain speed so that the very move or the change in position can be performed correctly.

The way a competition is organized (from the qualifications to the semi-finals and finals) demands good condition, or in other words the ability to dance for long periods of time, which leads to extended work of the cardio, respiratory and other systems. This creates favorable conditions for the development of stamina (Wigaeus et al. 1980; Oreb et al. 2006; Kostić et al. 2004.) both general and specific, considering the fact that some dances are carried out with sub maximal intensity. It is undeniable that the specific way in which some dance disciplines are trained can contribute to dance success, and it is a fact that it is necessary to develop motor abilities so as to achieve certain success. This was indicated by the research in the field of dance training Uzunović & Kostić, 2005). But, intensive dance training along with development of certain motor abilities, if it is not organized properly, can cause injuries among dancers (Scialom, et al. 2006; Koutedakis & Jamurtas, 2004; Noh & Morris, 2004; Ramel et al. 1997.). The frequency of medical problems is related to the level of dance training (Mittleman et al. 1992) and most of the injuries occurred to the lower back, knee and foot (Kerr & Krasnow, 1992.).

The pain caused negative effects on training intensity or caused faulty technique, while insufficient training leads to poor performance. In this manner, investigated relations of motor abilities and gender specifics should be carefully implemented in dance training process. Previous research also indicate that certain anthropologic status have a significant influence on the success with which certain dance structures are performed (Oreb et al. 2006; Kostić et al. 2004.), but the majority of the mentioned authors and studies, however, dealt with female dancers. Therefore, the need to determine the characteristic effect of particular motor abilities on the performance of competitive male dancers is still an actual research issue. This paper deals with male and female competitive dancers. The aim of the study was to determine the impact of motor abilities on the characteristic performance separately for female and male competitive dancers. The authors presumed it might be very interesting and useful, especially from the aspect of training process, to determine the possible influence of certain basic motor abilities on the successful performance in Standard Sport Dance competition. The establishment of differences in motor abilities between genders and their physical fitness status may be very helpful in the final stages of dance training process as well as in the pair selection process.

Methods

Subject sample

The sample of subjects consisted of 48 male and 47 female sport dancers aged 15 to 18 ± 6 m belonging to the "junior" and "older junior" categories. The dancers encompassed in these sub samples trained at least three times a week and competed in "B" rank competitions. All of the dancers had to participate in at least 50% of all of the competitions held during the one year competitive season in Serbia and Monte Negro. Many of the couples also competed in international tournaments.

Variable sample

The sample of variables encompassed a group of predictor, motor variables and one criterion variable. Motor variables were so chosen as to provide the best possible assessment of basic motor abilities considered to be most relevant for successful dance performance (Kostić et al. 2004; Uzunović & Kostić, 2005.).

The sample of variables used to assess physical fitness consisted of 20 motor tests: for assessing frequency of movement (TAPPING AGAINST WALL- f/15 sec, TWIST - TOUCH- f/20 sec, HAND-TAPPING - f/15 sec); power

tests (STANDING JUMP - cm, MED-BALL- THROW -dm), strength test (SIT-UPS - f/ per min), tests assessing flexibility (BEND- cm, SHOULDER FLEX- cm, SIT-AND-REACH - cm); tests assessing agility and coordination (SIDE STEPS-s, TWIRLING A BATON-s, SKIPPING JUMP ROPE- f/ per 20 s); tests assessing balance (STANDING ON ONE LEG -EYES CLOSED- s, WALKING ON A BALANCE BEAM - s, BALANCE IN A TURN- s); tests assessing coordination in rhythm (SKIPPING IN THREE SQUARES - s, TURNING IN SIX SQUARES- f/ per 28 s, HAND-FOOT-DRUMMING - f/ per 20 s) and tests assessing specific and general stamina (SIDEWAYS JUMP f/ per 60 s, 60 m RUN - s, QUEEN'S COLLEGE - f): All tests to assess the frequency of movement, power, flexibility, agility and coordination, balance and coordination in rhythm, subjects were performed three times and only best results were taken for analysis. The tests assessing strength, one test assessing balance (walking on a balance beam) and test assessing stamina were performing only once.

The criterion variable is the competitive success at dance sport competitors. Dance couples competed in the following dances: the English Waltz, the Tango, the Viennese Waltz, the Slow fox and the Quickstep. It was obtained by adding up all of the points acquired at KV tournaments at the end of the season, as well as national and international tournaments in standard dance. The number of acquired points from the competitions was added to the points which the competitor 'lost' by his advance into a higher rank or another age category. At every dance competition in Serbia and Monte Negro, there were judges delegated by the Competitors Commission. They judged according to the rulebook accepted by the international dance federation (IDSF).

Statistical analysis

The methods used on data analysis included basic statistical parameters, analysis of variance (ANOVA) and correlation regression analysis. The basic variable parameters (mean ± SD), for each group of subject (female and male) were calculated separately. One - way ANOVA was used to determine the differences between genders. The standard linear regression analysis was performed to determine relations between motor variables as predictors and Success in Standard Sport Dance as criteria. The BETA partial regression coefficient, predictor to criterion correlation coefficient, i.e. multiple correlations (RO), and significance of regression coefficients and multiple correlations are presented. For data processing the "SPSS 8" and "Statistica 5" packages were used.

Results

Table 1. Basic descriptive parameters and ANOVA

Variable	FEMALE (N= 47)	MALE (N= 48)	F ^A	p ^A
Tapping against wall	26.19 ± 4.04	27.50 ± 4.26	2.35	0.12
Twist - touch	20.12 ± 3.11	20.48 ± 3.67	0.27	0.60
Hand-tapping	56.23 ± 8.41	56.04 ± 8.30	0.01	0.91
Standing jump	188.08 ± 23.14	223.77 ± 20.66	62.90	0.00
Sit-ups	42.08 ± 11.34	39.72 ± 10.01	1.15	0.28
Med-ball-throw	41.85 ± 7.31	61.72 ± 13.36	80.39	0.00
Bend	31.46 ± 5.54	30.77 ± 5.04	0.41	0.52
Shoulder flex	46.85 ± 13.97	57.75 ± 12.87	15.64	0.00
Sit and reach	74.29 ± 9.89	67.12 ± 13.98	8.29	0.00
Side steps	10.53 ± 0.84	10.17 ± 1.16	2.91	0.09
Twirling a baton	10.63 ± 1.16	10.70 ± 1.55	0.05	0.83
Skipping jump rope	19.51 ± 4.67	19.72 ± 4.84	0.05	0.82
Standing on one leg (eyes closed)	6.96 ± 2.12	7.10 ± 1.66	0.12	0.73
Walking on a balance beam	7.38 ± 0.85	7.50 ± 0.89	0.45	0.50
Balance in a turn	10.66 ± 0.82	11.00 ± 0.95	3.29	0.07
Skipping in three squares	2.27 ± 0.25	2.28 ± 0.22	0.07	0.79
Turning in six squares	7.65 ± 0.47	7.66 ± 0.47	0.00	0.94
Hand-foot drumming	14.57 ± 2.51	14.66 ± 3.04	0.02	0.87
Sideways jump	48.53 ± 4.65	48.82 ± 6.32	0.07	0.79
60 m run	9.76 ± 1.23	8.86 ± 0.74	18.66	0.00
Queen's college	36.76 ± 4.79	34.10 ± 5.49	6.31	0.01
Success in Standard Sport Dance	299.91 ± 127.46	626.33 ± 252.00	0.13	0.71

F^A - F test for ANOVA, p^A - probability for ANOVA

Table 2. Regression analysis

Variables	Female	Male
	Beta	Beta
Tapping against wall	0.20	0.59*
Twist - touch	-0.05	-0.52*
Hand-tapping	0.53*	0.20
Standing jump	-0.13	-0.09
Sit-ups	0.02	0.12
Med-ball-throw	0.14	0.46*
Bend	0.28	0.08
Shoulder flex	-0.02	0.32*
Sit and reach	0.38*	0.30
Side steps	0.10	1.17
Twirling a baton	0.59**	-0.12
Skipping jump rope	-0.24	-0.00
Standing on one leg	0.01	0.35*
Walking on a balance beam	-0.21	0.01
Balance in a turn	0.46*	-0.21
Skipping in three squares	-0.34	0.15
Turning in six squares	0.45*	0.18
Hand-foot drumming	0.18	0.25
Sideways jump	0.35	-0.18
60 m run	0.19	0.08
Queen's college	0.01	-0.30*
RO	0.81*	0.84**

BETA = regression coefficient; RO = multiple correlation; *P< 0.05; **P<0.01

The following group of motor variables were chosen so as to assess the basic motor abilities identified in previous studies to be relevant for success in dance (Oreb et al. 2006; Kostić et al. 2004; Srhoj et al. 2006; Uzunović & Kostić, 2005) psychomotor speed, strength (explosive and repetitive), flexibility, agility and coordination, balance, rhythmic coordination and stamina. On the basis of the descriptive statistics of the applied variables for the

evaluation of physical fitness of male and female dancers (Table 1.), the homogeneity of the samples can be determined. At the same time, it can be concluded that the measuring characteristics of these samples are better than the average results which are obtained at the measuring carried out on the general population. In comparison with active sport population (Oreb et al. 2008) it can be concluded that competitive female and male dancers are characterized by prominent frequency of movement along with good flexibility. These are also the expected results considering that selected sections of the population were chose for the research. We are dealing with representational samples. To determine differences in physical fitness for female and male competitive dancers Analysis of variance (ANOVA) was calculated. Results showed significant differences (table 1) between female and male dancers in tests for assessing power (med-ball throw), flexibility (shoulder-flex and sit- and - reach) and specific and general stamina (60 m run and queens college). Female dancers are more flexible than male dancers, and male dancers achieved better results in tests for assessing power, specific and general stamina. Other investigated segments of dancer's physical fitness status or motor abilities have not showed statistically significant differences. On the basis of the values of the multiple correlation coefficient (R=.81), it can be concluded that a very strong linear connection exists between the predictor variables and the criterion variable, the success in standard

dance for females (Table 2). The greatest influence on the criterion variable (BETA-coefficients) comes from the predictor variable for the assessments of coordination, (twirling the baton); the variable for the assessment of speed, used to evaluate the frequency of movement (hand-tapping), the variable for assessing balance (balance in a turn) the variable for assessing rhythm coordination (turning in six squares) and the variable for assessing flexibility of the spinal column and the lower extremities (sit and reach). On the basis of the regression coefficient analysis and its significance obtained from the value of BETA-coefficients for males (Table 2), it can be concluded that the greatest projections on the criterion come from variable for assessment of speed which measures movement frequency (tapping against wall and twist - touch), the variable for assessing explosive strength (med-ball-throw), the variable for assessing static balance (standing on one leg - eyes closed), the variable for assessing shoulder flexibility (shoulder flex) and the variable for assessing aerobic stamina (Queen's college).

Discussion and conclusion

Hierarchically, the contributions of certain variables indicate that the greatest contribution to the aforementioned significance comes from the variable for assessing coordination with quick changes of centre of body gravity and from the variable for assessing frequency of movement, which has already been proven by the research carried out up to now, but on a sample of female subjects which was going through a period of intense growth and were not competitive dancers. For the successful execution of standard dance, speed is of tremendous importance. This applies especially to the Viennese Waltz and the Quickstep. Modern tendencies for doing the Tango (an extremely staccato action and syncopated rhythms) lead us to the same conclusion. It is impossible to meet all of the aforementioned demands successfully if the dancers don't have above average psychomotor speed. Performance of mentioned dances predominantly occurs at the sub cortical level, with the explosive strength (especially for male dancers) and movement frequency prevailing over coordination. Due to the great genetic determination of psychomotor speed, could not be explained by impact of training process, but must have been due to the process of selection for competitive dancers. Agility and coordination, in contrast to movement frequency can be influenced upon after puberty, generally through the component of force. The variable for assessing flexibility of the spinal column and the lower extremities

had a significant predictive value (BETA coefficient) on successful dance performing with female dancers and the variable for assessing flexibility of shoulders had a significant predictive value (BETA coefficient) on successful dance performing with male dancers. This indicator is expected if we take into consideration that standard dances abound in elements of technique such as various „poses“ with large amplitude of movements. Flexibility defines proper performance of the large amplitude of movements, which are specifically scored in dance competition, and enhanced flexibility along with appropriate balance abilities is a precondition for proper performance dance routines. Specific turns and again characteristic „poses“ could not be properly performed without above average ability of remaining balance positions, and the female dancers should be stretched properly. Position of the female dancer when her partner is holding her in standard dance is such that it demands a high degree of mobility of the spinal column. Due to those findings, flexibility training should be one of the most important segments of dancers training. But, it should be point out that most common soft tissue injuries among dancers were detected at hamstring strain. According to Askling et al. (2002) every third dancer (34%) reported that they had acute injuries and every sixth dancer (17%), had overuse injuries to the rear thigh. The majority of injuries (88%) located to an area (close to the tuber ishiadicum) occurred during slow activities in flexibility training. Authors suggested that the partial tendon rupture close to the tuber ishiadicum, is probably caused by inappropriate training method aimed to increase flexibility. Considering the overall duration of the dances and the conditions imposed by the competition, a general stamina and special speed stamina are both necessary. Here we find the explanation for the statistically significant influence of the stamina variable on the standard dance sport results. The speed at which the Quickstep and the Viennese Waltz are performed is 50 or 60 beats per minute. It is important to be in possession of good stamina in order to perform these dances with quality and precision. During the standard dances, the male dancers hold the female dancers and in that way make it possible for a certain pose to be carried out. This requires a certain strength and especially static balance. This fact points out that the variable for the evaluation of static balance has a significant influence on the dancer's competitive success. What was not expected was that the variables for the evaluation of coordination and rhythm coordination would not be statistically significant. This certainly does not mean that these abilities are not

significant for the dancers, but can be interpreted as the fact that the subjects were already, to a certain extent, in possession of these abilities, which enabled them to obtain a certain ranking. The variables for agility are not statistically significant for the success in dance sport considering that this ability is more pronounced in female dancers, due to their morphological structure, and also due to the very demands of the dance technique. Yet, unlike the case of male dancers, the variables for the evaluation of stamina have not shown statistical significance which can be interpreted as the female dancers' not being in possession of a certain stamina (especially anaerobic stamina) which enables them a certain ranking at competitions. Competitions require a certain degree of anaerobic stamina considering the fact that all of the dancers dance for up to two minutes. Female dancers only need training to develop this ability. The results obtained in present study illustrated the formation of ideal motor complexes in female and male sport dancers. Coordination, frequency of movement, balance, rhythm coordination and flexibility could be postulated to be mostly integrated motor abilities in competitive female dancers, 15-18 years of age, allowing them to quickly change movement directions, while performing turns and elements with large amplitudes in spinal column and in according with required rhythm, while frequency of movement, explosive strength, static balance, flexibility

and aerobic stamina could be postulated to be most integrated motor abilities in competitive male dancers 15-18 years of age. As extended conclusion to the findings of the previous researches, our study demonstrated that enhanced coordination in rhythm and good balance abilities with female dancers and enhanced power along with aerobic stamina and again good balance abilities with male dancers, might be of the practical importance from the aspects of sport achievements in competitive sport dance. High quality of dance technique is a precondition for top contest results and technically demanding dances, especially those performed in fast rhythm (Viennese Waltz and the Quickstep) initiate dancers to maximally use their motor abilities. Based on the results of this study, gender differences in motor abilities in tests for assessing power, flexibility and specific and general stamina) and their specific influence on the successful sport dances performance, should be respected in training process. In accordance with all presented findings, and facts that competitive dancers continually faces the challenges of dealing with specific injuries which are probably and mostly caused by their training program (Scialom, et al. 2006; Koutedakis & Jamurtas, 2004; Noh & Morris, 2004), future studies based on anthropologic features of competitive dancers correlated with detected specific injuries, training methods and dance success are necessary.

References

- Askling, C., Lund, H., Saartok, T., & Thorstensson, A. (2002). Self reported hamstring injuries in student – dancers. *Scand J Med Sci Sports*, 12: 230-235.
- Koutedakis, Y., & Jamurtas, A. (2004). The dancers as a performing athlete: Physiological considerations. *Sports Med*, 10:651-661.
- Kerr, G., Krasnow, D., & Mainwaring, L. (1992). The nature of dance injuries. *Med Probl Perform Art*, 7: 25-29.
- Kostić, R., Zagorc, M., & Uzunović, S. (2004). Prediction of success in sport dancing based on morphological characteristics and functional capabilities. *AUPO Gymnica*, 34 (1), 59-64.
- Mittleman, K.D., Keegan, M., & Collins, C.L. (1992). Physiological, nutritional, and training profile of university modern dancers. *Med Probl Perform Art*, 7:92-96.
- Noh, Y.E., & Morris, T (2004). Designing research-based interventions for the prevention on injury in dance. *Med Probl Perform Art*, 19:82-89.
- Oreb, G., Ružić, L., Matković, B., Mišigoj – Duraković, M., Vlašić, J., & Ciliga, D. (2006). Physical fitness, menstrual cycle disorders and smoking habit in Croatian National Ballet and National Folk Dance Ensembles. *Coll antropol*; 30(2):279-283.
- Oreb, G., Zović, M., & Marelić, N. (2008). Evaluation of the results assessing motor abilities of boys and girls aged 11-14 during selection in rowing. *Acta Kinesiologica*, 2(1):47-51.
- Scialom, M., Goncalves, A., & Padovani, C.R. (2006). Work and Injuries in dancers. *Med Probl Perform Art*, 21:29-33.
- Srhoj, Lj., Katić, R., & Kaliterna, A. (2006). Motor abilities in dance structure performance in female students. *Coll antropol*; 30(2):335-341.
- Ramel, E., Thorsson, O., & Wolimer, P. (1997). Fitness training and its effect on musculoskeletal pain in professional ballet dancers. *Scand J Med Sci Sports*, 7:293-298.
- Uzunović, S., & Kostić, R. (2005). A study of success in Latin American sort dancing. *Facta Universitatis, Series: Physical Education and Sport*, 3 (1), 23-35.
- Wigaeus, E., & Kilborn, A. (1980). Physical demands during folk dancing. *Eur J Appl Physiol*, 45 (2-3):177-83.

MOTORIČKI STATUS MLADIH NATJECATELJA SPORTSKIH PLESAČA – SPOLNE RAZLIKE

Sažetak

Regresijskom analizom utvrđen je utjecaj motoričkih sposobnosti na uspjeh u sportskom plesu, zasebno po spolu, na uzorku 48 plesača i 47 plesačica (u natjecateljskoj kategoriji juniora) u dobi između 15 i 18 godina. Za procjenu motoričkih sposobnosti, te kao prediktorski set, primijenjen je 21 mjerni instrument, a prema broju bodova postignutih na natjecanju formirana je kriterijska varijabla. Varijable za procjenu koordinacije ($Beta=0.59$; $p<0.01$); brzine frekvencije pokreta ($Beta=0.53$; $p<0.05$); ravnoteže ($Beta=0.46$; $p<0.05$); koordinacije u ritmu ($Beta=0.46$; $p<0.05$) i fleksibilnosti ($Beta=0.38$; $p<0.05$) objašnjavaju 66% varijance uspješnosti u standardnim natjecateljskim plesovima kod plesačica ($R=0.81$; $p<0.05$), a varijable za procjenu brzine frekvencije pokreta ($Beta=0.59$; $p<0.05$); eksplozivne snage ($Beta=0.46$; $p<0.05$), statičke ravnoteže ($Beta=0.35$; $p<0.05$), fleksibilnosti ($Beta=0.32$; $p<0.05$) i aerobne izdržljivosti ($Beta=-0.30$; $p<0.05$) objašnjavaju 71% varijance uspješnosti u standardnim natjecateljskim plesovima kod (R=0.84; $p<0.01$). Dobiveni rezultati predstavljaju model idealne motoričke strukture posebno po spolu za natjecatelje u sportskom plesu, te zajedno sa definiranim razlikama u motoričkim sposobnostima po spolu (u snazi, fleksibilnosti i izdržljivosti) imaju značajnu praktičnu važnost u trenažnom procesu plesača - natjecatelja.

Ključne riječi: motoričke sposobnosti, plesači, standardni sportski ples

Received: January 16, 2009.
Accepted: May 26, 2009.
Correspondence to:
Assoc.Prof. Đurđica Miletić, Ph.D.
University of Split
Faculty of Kinesiology
Teslina 6..21000 Split, Croatia
Phone: +385 (0)21 302 440
E-mail: mileticd@kifst.hr