

Scientific Paper

**THE SIGNIFICANCE OF THE RELATIONS BETWEEN THE
QUALITY OF THE PERFORMANCE OF DANCE STRUCTURES
AND THE MOTOR COORDINATION SKILLS OF
PRESCHOOL CHILDREN**

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Abstract. *The aim of the research was to determine the relations between the quality of the performance of dance structures and coordination as a motor skill. The sample consisted of 80 young girls aged 6 ± 6 months, all of whom attended preschool in the town of Kruševac in Serbia, and all of whom attended organized dance activities. Their average body height was 120.46 ($SD \pm .35$), and average body mass was 23.81 ($SD \pm 4.30$). Their motor coordination was evaluated by means of five measuring instruments, and the quality of the performance of the Waltz, Polka and Moravac dance steps was evaluated by three judges. The results that were obtained were processed by means of a canonical correlational analysis. An analysis and discussion of the obtained factors enabled us to determine a root that indicated statistically significant relations between the quality of the performance of dance structures and motor coordination.*

Key words: *coordination, dance, canonical relations, preschool children*

INTRODUCTION

The preschool age is a time of the most intense growth and development of the anthropological characteristics of children. During this period of pronounced development, the development of basic motor skills and of the senses of children is especially pronounced. These skills and the senses work together to improve movement efficiency.

Body movement enhances the proper development of the body, which in turn leads to an improvement in the orientation of the body in space, better movement coordination, as well as an improvement in using movement as a means of expression, which indirectly

requires the development of the sense of hearing, including both rhythmic and melodic processing. We can thus refer to the preschool age as the critical period in the development of esthetic feelings, or to be more precise, the experience and understanding of expression which is manifested by means of the body, or to be more precise, by means of movement.

As part of the education of preschool children, consideration must be given to expression by means of movement via various forms of physical activity, especially by using dances which involve elementary movements. The basic steps of some traditional and folk dances are part of the curriculum in preschools throughout Serbia.

Studies into the relations between motor coordination and the success of the performance of dance structures among preschool children are rare. Most of the studies which have touched upon this topic have generally been carried out on much older subjects.

The results of the studies involving the motor skills of preschool children have indicated that they undergo change, and that their development is not linear. Certain differences have been noted between the motor skills of boys and girls (usually in favor of the boys), but they were not numerically great (Perić, 1991; Bala, 2003; Bala, Sabo, & Popović, 2005; Zurc, Pišot, & Stojnik, 2005).

The results of scientific investigations carried out with the aim of determining the unique nature of the motor skills of children have proved that results differ among children of various ages (Džinović–Kojić, 2000; Blažević, Katić, & Zagorac, 2002).

A pilot study carried out by Nieminen, Varstala, & Manninen (2001) with the aim of determining the factors of the purpose of dance, has identified the three most important factors: physical activity, being a good citizen, and achieving high standards. These conclusions support the belief that dancing should be used to promote a sense of well-being, to engage people in physical activity, enable them to set high standards and develop their mental strength.

Dance structures are a part of physical education. They play a large role in the emotional sphere and have an even greater role in the process of socialization (Neimein, 1997), in tradition and culture, (Kim & Cha, 1996; Venetsanou & Kambas, 2004).

The Polka and the Waltz as dance structures were the subject matter of research carried out by Miletić, Maleš, & Sekulić (2000), who reached the conclusion that a satisfactory level of dance step performance and a quicker learning process are the highest among female subjects with pronounced coordination in rhythm skills, above average movement speed and explosive strength.

The traditional Serbian dance, the Moravac, was studied as a criterion variable (Jocić, Uzunović, & Kostić, 2004), while the group of predictor variables consisted of motor skills. The results indicate that it is possible to predict the success of the performance of the Moravac folk dance on the basis of the implemented motor skills.

Oreb (1984) believes that the Moravac dance structure can be predicted with the help of a system of primary motor skills – coordination, balance, movement frequency, movement speed, precision, flexibility, explosive strength, strength and endurance.

The possibility of predicting the success of the performance of dance structures on the basis of the morphological, motor, cognitive and connative status was studied by Jocić (1991), who concluded that dance success was significantly influenced by the ability to perform rhythmic structures, and by general coordination and segmentary speed variables.

Overall success in dance depends on coordination, explosive strength and to a lesser extent on speed (Srhoj, Katić, & Kaliterna, 2006).

In the process of selecting children for dance classes, attention should be paid to motor skills such as rhythm, coordination, to explosive type strength, and flexibility (Vlašić, Oreb, & Furjan-Mandić, 2007).

Motor skills do affect the success of dance performance and the greatest contribution comes from the variables for the evaluation of speed, balance and endurance, and the variables for speed, agility, coordination, balance and coordination in rhythm have the greatest individual influence on a sample of subjects (Kostić, Miletić, Jocić, & Uzunović, 2002; Uzunović, 2004; Uzunović & Kostić, 2005; Nožinović, Ibrahimbegović-Gafić, & Nožinović, 2006).

Success in Latin American sports dancing can be predicted on the basis of the level of coordination skills (Uzunović, Kostić, Zagorc, Oreb, & Jocić, 2005).

The conclusions drawn from the results of the aforementioned studies have motivated us as authors to check the accuracy of the obtained results on a sample consisting of preschool children. The results of this study should give an answer to the question of whether there are any significant relations between the quality of the performance of dance structures and motor coordination.

The aim of this study is to determine whether there is a connection between the achieved quality of dance step performance of the Waltz, Polka and Moravac and the motor coordination of preschool girls.

METHOD

Sample of subjects

The sample of subjects was extracted from the population preschool children aged 6 (± 6 months) who spend time in organized day care centers in the town of Kruševac. The overall number of female subjects encompassed in this study was 80, and all of the girls attended day care at the "Naša Radost", "Leptirić", and "Pčelica" day care centers.

Their average body height was 120.46 cm ($SD \pm 5.35$), and body mass was 23.81 ($SD \pm 4.3$).

A random sample was extracted from the population, although the general conditions that the girls attended all of the dance classes which were organized in the facilities, that they were healthy during the measuring and that the authors had received consent from the administration and the parents were adhered to.

Sample of measuring instruments

The selection of measuring instruments for the predictor group of motor coordination skills was carried out on the basis of the results of the study carried out by Gredelj, Metikoš, Hošek, & Momirović (1975), as well as on the basis of the modifications of the tests used on samples of preschool children carried out by Bala (2003); Rajtmajer & Proje (1990); Zorc, Pišot, & Strojnik (2005).

In order to evaluate motor coordination the following measuring instruments were used:

- *Crawling with a ball, measured in sec,*
- *Coordination with a baton, measured in sec,*
- *Slalom two ball dribble, measured in sec,*
- *Horizontal jump rope and*
- *Walking backwards through a hoop, measured in sec.*

In order to evaluate the quality of the execution of the dance structures, we relied on the judgments of dance experts, which were made using the following instruments:

- *the Waltz step,*
- *the Polka step, and*
- *the Moravac step.*

The criterion variables were made up of the quality of the performance of the Waltz, Polka and Moravac dance steps. The motor-dance skills of the female subjects were evaluated by three dance step judges. The judges had to meet the following criteria: they had to have a degree in physical education and sport, had to have work experience with children and had to have theoretical and practical skills related to dance.

The subjects were given a 1 to 5 grade for each step.

Grade 5 was given to those subjects who performed the entire sequence correctly, with a high esthetic level (with feeling) and in tune to the music.

Grade 4 was given to those subjects who performed the entire sequence correctly, with a partial absence of movement amplitude and in tune to the music.

Grade 3 was given to those subjects who performed certain segments of the routine with mistakes which did not affect the performance, with an absence of movement amplitude, with minor movement irregularities and with slight (partial) discrepancy in regards to performing in tune to the music.

Grade 2 was given to those subjects who performed the sequence with mistakes that caused disruptions in the performance, with consistent irregularities in regards to body posture, with a significant absence of movement amplitude and pronounced lack of performing in tune to the music.

Grade 1 was given to those subjects who performed the sequence with difficulty and who deviated from technique, who performed with frequent irregularities in body posture, without the necessary movement amplitude and with a pronounced lack of performing in tune to the music.

For the Waltz step criterion: each of the judges gave each of the girls a grade for each of the two-steps, which came up to a total of six grades which were then added up, and the final score was used as their average grade.

For the Polka step criterion: each of the judges gave each of the girls a grade for each of the two-steps, which came up to a total of six grades which were then added up, and the final score was used as their average grade.

For the Moravac step criterion: each of the judges gave each of the girls a grade for each of the two-steps, which came up to a total of six grades which were then added up, and the final score was used as their average grade.

The statistical analysis

The canonical correlational analysis was used to determine the relations between the two systems: the motor coordination skills and the quality of the performance of the dance structures: the Waltz, the Polka and the Moravac.

THE RESULTS

Three canonical factors were analyzed using the canonical correlational analysis, of which the first one is statistically significant (Table 1).

The first canonical factor explains the connection between the set of predictor and set of criterion variables (Can. R = .59) and it explains 35% (Can. R² =.35) of the shared variability of the set of the motor coordination skills variables and the variables for the evaluation of the quality of the performance of dance structures.

Table 1. The matrix of the characteristic roots and the coefficients of the canonical correlation

	Can. R	Can. R ²	Chi-sqr.	df	P	Lambda
0	0.597	0.357	39.36	15	0.001	0.590
1	0.284	0.081	6.49	8	0.593	0.917
2	0.055	0.003	0.23	3	0.973	0.997

Legend: Can.R – Extent of the canonical correlation; Can.R²- Canonical root of determination; Chi-sqr. – Barlett's Lambda test; Df – Degree of freedom; p – Significance level, Lambda

Table 2. The cross-correlational matrix of the motor coordination and the variables for the evaluation of the quality of the performance of dance structures

	Waltz step	Polka step	Moravac step
Crawling with a ball	-0.56	-0.39	-0.46
Coordination with a baton	-0.32	-0.26	-0.37
Slalom two ball dribble	-0.25	-0.27	-0.39
Horizontal jump rope	0.32	0.27	0.30
Walking backwards through a hoop	-0.32	-0.26	-0.33

We used a cross-correlation in order to determine the connection between the motor coordination skill and the criterion variables for the quality of the performance of dance structures such as the Waltz, Polka and the Moravac (Table 2).

By reviewing the correlation coefficients, we can determine that the correlations have an average numeric value. The Waltz step has a high correlation with the crawling with a ball variable (-0.56), while the remaining variables have showed average statistically significant negative correlations and positive average statistically significant correlations with the horizontal jump rope variable.

The Polka step shows a negative average correlation with the crawling with a ball variable (-0.39), the slalom two ball dribble variable (-0.27), coordination with a baton variable and moving backwards through a hoop variable (-0.26), and a positive correlation with the horizontal jump rope variable (0.27).

The Moravac step shows a high correlation with the crawling with a ball variable (0.46) and a negative average correlation with the slalom two ball dribble variable (-0.39), coordination with a baton variable (-0.37), walking backwards through a hoop variable (-0.33), and a positive average correlation with the horizontal jump rope variable (-30).

By analyzing the canonical factor in the motor coordination variable space, we have determined that all of the variables show a significant correlation with the significant isolated canonical dimension (Table 3). In this space, the function is defined by the crawling with a ball variable (-0.95), coordination with a baton variable (-0.61), walking backwards through a hoop variable (-0.58), the slalom two ball dribble variable (-0.54) and horizontal jump rope variable (0.57). This factor can be interpreted as the general factor of motor coordination.

Table 3. The canonical factor of motor coordination

	Root 1
Crawling with a ball	-0.95
Coordination with a bat	-0.61
Slalom two ball dribble	-0.54
Horizontal jump rope	0.57
Walking backwards through a hoop	-0.58

By analyzing the canonical factor, in the evaluation of the quality of the performance of the dance structures variable space, the function is defined by the Waltz step (0.96), the Moravac step (0.84) and the Polka step (0.70), (Table 4).

This factor can be defined as the general factor of the overall quality of the dance structure performance.

Table 4. The canonical factors of the quality of the performance of the dance structures

	Root 1
the Waltz step	0.96
the Polka step	0.70
the Moravac step	0.84

DISCUSSION

The motor coordination skill has been evaluated by means of five measuring instruments. The results for the crawling with a ball have shown almost identical values as those obtained by Zurec, Pišot, & Strojnik in their 2005 research. The average time for the boys was 11.62 sec, and for the girls it was 12.44 sec, while in the research carried out by Zurec, Pišot, & Strojnik (2005), the average times were 11.60 sec and 12.41 sec respectively. For coordination with a baton, the times we measured were better than those recorded by Bala, Sabo, & Popović (2005). For the walking backwards through a hoop test, the numeric results were lower than those recorded in the aforementioned study.

A significant canonical factor was determined between the motor coordination skill and the performance of the dance structures ($p = 0.00$), while the interrelationship within the isolated pair was statistically significant ($p = 0.00$) and had a value of Can. $R = 0.59$. The analysis of canonical functions has enabled us to draw the conclusion that the quality of the performance of the dance structures depends on the motor coordination skill. In the structure of the quality of the performance of the dance structure, all three variables have high values and define it in a statistically significant way. We can make a special note of the significant influence of the crawling with a ball variable.

The relations between motor skills and success in the performance of dance structures have been studied by Srhoj, Katić, & Kaliterna (2006). The canonical correlational analysis between their groups yielded two canonical roots (0.94 and 0.73), which are significant at the $p=0.001$ level. In the basis of the first canonical correlation we find a pronounced relationship of a determinant nature between coordination and the folk dance, and in the basis of the second one we find a relationship of a determinant nature between

explosive strength of the running type and the following dances: the Cha-cha-cha, Rock'n'roll and the Paševijen.

On the basis of the results of a canonical correlational analysis (Nožinović, Ibrahimbegović-Gafić, & Nožinović, 2006), it was determined that a significant number of variables of the predictor group (motor skills) affect the variability of the success of the criterion variable (the variable for the evaluation of success of dance structure performance), which was confirmed by a significant canonical factor (Can.R = 73).

Irrespective of the fact that the aforementioned research was realized on samples consisting of schoolchildren or students, the results of our research support these findings in terms of the skills which contribute to the statistically significant relations in the space of motor skills and the space of the quality (success) of the performance of the dance structures.

On the basis of the results for the trust interval, we can determine that the girls who got worse results for crawling with a ball were good at performing the Waltz, Polka and Moravac steps.

Several authors obtained similar results in their research, results which support the claim that predictions of success of the performance of dance structures can be made with the help of motor skills. Some of these studies will be compared to this one.

The relations between motor skills and success in dancing were studied by Oreb (1984). The sample of predictor variables consisted of motor skills: coordination, the performance of rhythmic structures, balance, movement frequency, movement speed, precision, flexibility, force, explosive strength, strength and endurance. The sample of criterion variables was made up of the grades given for the performance of the following dances: the Gorenjski waltz (Slovenia), the Slavonsko kolo (Croatia) and the Moravac (Serbia). The author was able to conclude, on the basis of his results, that the performance of the Slavonsko kolo and the Moravac can be predicted by means of the system of motor skills. The criterion variables can be predicted the most by means of coordination, the performance of rhythmic structures, the frequency of alternative movements and balance, and finally explosive strength.

Motor skills as the predictor variable were used by Srhoj (2002) in order to predict the success of the Croatian Ciclon dance. A significant multiple correlation was obtained, and the variables for flexibility and frequency speed showed the greatest effect.

Coordination in rhythm, frequency arm and leg speed, explosive strength, coordination and balance are motor skills which are important for the performance of dance structures such as the Waltz and the Polka, a claim which has been confirmed by the research of Miletić, Maleš & Sekulić in 2000.

The study carried out by Jocić, Uzunović, & Kostić (2004) has shown that motor skills are significant factors in prediction of the success of the performance of the Moravac dance. The study was carried out on a sample consisting of subjects of both sexes. The influence of frequency speed, coordination, strength and flexibility was especially noted.

The set of predictor motor variables which consisted of coordination, explosive strength and frequency speed have given a statistically significant explanation of the results for the criterion variables which consisted of the grades for the performance of the Ciclon, Paševijan, Rock'n'roll and the Cha-cha-cha (Srhoj, Katić, & Kaliterna, 2006). The overall dance success in this research primarily depended on motor coordination skills, followed by explosive strength, and finally frequency speed.

Motor coordination skills are a significant motor skill, which is manifested in a great many aspects of physical education and sport and recreational activities, which in turn are used in the curriculums in preschools. The performance of various physical activities is influenced by various degrees of motor coordination skills.

The results obtained during the course of this research are the basis on which we can further orient preschool children to further practice the basic steps of traditional and folk dances. Children that achieve better results in motor coordination tests will stand a greater chance of successfully completing dance programs and might even be further motivated to take a more active part in dancing.

CONCLUSION

The results and the discussion sections of this study into the relations between the quality of the performance of dance structures such as the Waltz, the Polka and the Moravac and the motor coordination skills of 80 preschool girls have shown that a statistically significant canonical relation exists between the two aforementioned spaces at this age level. The results have proved the justification of further study of the relations between motor coordination skills and the efficiency in teaching dance structures to children, a point which has also been proven in studies which included older subjects. The methodology of the studies carried out up to now and which has been used on older subjects has proven to be appropriate for preschool children as well.

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ZNAČAJNOST RELACIJA KVALITETA IZVOĐENJA PLESNIH STRUKTURA I SPOSOBNOSTI MOTORIČKE KOORDINACIJE PREDŠKOLSKE DECE

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Cilj istraživanja je da se utvrde relacije kvaliteta izvođenja plesnih struktura i motoričke sposobnosti koordinacije. Uzorak ispitanica činilo je 80 devojčica uzrasta 6 godina ± 6 meseci iz predškolskih ustanova Kruševca u Srbiji, koje su pohađale organizovane plesne aktivnosti. Prosečna telesna visina ispitanica bila je 120,46 (SD±5,35), a prosečna telesna masa 23,81 (SD±4,30). Sposobnost motoričke koordinacije procenjena je pomoću pet mernih instrumenata, a kvalitet izvođenja plesnih koraka Valcera, Polke i Moravca ocenjivala su tri ocenjivača. Dobijeni podaci obrađeni su kanoničkom korelacionom analizom. Analizom i diskusijom dobijenih faktora utvrđen je jedan koren koji je ukazao da postoje statistički značajne relacije između kvaliteta izvođenja plesnih struktura i motoričke sposobnosti koordinacije.

Ključne reči: *koordinacija, ples, kanoničke relacije, predškolski uzrast*