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COMPETITIVE SUCCESS OF JUNIOR FEMALE ALPINE SKIERS IN LIGHT OF CERTAIN CHOSEN TESTS OF CO-ORDINATION

Maja Dolenec
Milan Žvan

POVEZANOST IZBRANIH RAZSEŽNOSTI PROSTORA KOORDINACIJE S TEKMOVALNO USPEŠNOSTJO MLAJŠIH DEKLIC V ALPSKEM SMUČANJU

Abstract

The objective of this investigation was to determine the mutual correlations between the three variables of co-ordination (ability for efficient resolution of space-related problems, ability for realising rhythmic structures and agility) and their individual correlations with the competitive success of junior female alpine skiers.

The sample consisted of twenty-four junior female competitors in alpine skiing. To evaluate their co-ordination three tests were selected (polygon backwards, side-stepping, drumming). The criterion variable (competitive success) was the sum of points achieved in the competitions of the Radenska Cup. In the first phase of analysis, the Pearson correlation coefficients between the individual independent variables and their individual correlations with the criterion were computed. The relations between the co-ordination space variables and success in alpine skiing were studied by multiple regression analysis.

The mutual correlations between the co-ordination variables were statistically non-significant. The Pearson correlation coefficients with the criterion were statistically significant for sidestepping (r = -0.50) and polygon backwards (r = -0.43). Multiple regression analysis showed a statistically significant association (Multiple R = 0.56, Sig F = 0.05) between the predictors and the criterion, the independent variables explaining about 31% of the criterion variance.

Keywords: co-ordination, competitive success, junior females, alpine skiing

Izvleček

Namen raziskave je bil ugotoviti medsebojne korelacije treh spremenljivk koordinacije (sposobnost kinetičnega reševanja prostorskih problemov, sposobnost realizacije ritmičnih struktur in agilnost) ter njihove individualne korelacije s tekmovalno uspešnostjo mlajših deklic v alpskem smučanju.

Vzorec merjenk je zajemal štiriindvajset tekmovalk v kategoriji mlajših deklic v alpskem smučanju. Za ugotavljanje razvitosti koordinacije so bili izbrani trije testi (poligon nazaj, koraki v stran, bobnanje). Kriterijska spremenljivka (tekmovalna uspešnost) je bila vsota doseženih točk na tekmovanjih Pokala Radenske. V prvi fazi obdelave podatkov so bile izračunane vrednosti Pearsonovega korelacijskega koeficenta med posameznimi neodvisnimi spremenljivkami in njihove individualne povezave s kriterijem. Za ugotavljanje povezanosti prostora koordinacije s tekmovalno uspešnostjo mlajših deklic v alpskem smučanju je bila uporabljena metoda regresijske analize.

Medsebojne povezave spremenljivk prostora koordinacije niso bile statistično značilne. S kriterijsko spremenljivko sta bili značilno povezani spremenljivki koraki v stran (r = -0,50) in poligon nazaj (r = -0,43). Z multiplo regresijsko analizo je bila ugotovljena statistično značilna povezava prediktorskih spremenljivk s kriterijsko, s čemer spremenljivke prostora koordinacije pojasnjujejo enaintrideset odstotkov variance kriterijske spremenljivke.

Ključne besede: koordinacija, tekmovalna uspešnost, mlajše deklice, alpsko smučanje

Contact address
Maja Dolenec
University of Ljubljana – Faculty of Sport
Gortanova 22
SI-1000 Ljubljana
Slovenia
Phone: +386 1 540-10-77
Fax: +386 1 540-22-33
E-mail: Maja.Dolenec@sp.uni-lj.si

INTRODUCTION

The purpose of the study was to find the mutual correlations between the independent variables of co-ordination and their individual correlations with competitive success of junior female alpine skiers and to assess the association of the complete co-ordination space with the criterion variable (competitive success). On the basis of the computed parameters it is possible to find the usefulness of using all or just some of the predictor variables of co-ordination, in order to explain the largest possible proportion of the criterion's variance. The results of the study would show if co-ordination space is a factor which would enable prediction of good placements at competitions, as has already been established by previous authors (Agrež, 1976; Žvan, Lešnik, & Dolenec, 1995). The importance of co-ordination for success in alpine skiing was assessed in this study from the viewpoint of three factors – ability for efficient resolution of space-related problems, ability for realising rhythmic structures and agility.

METHODS

The subject sample consisted of twenty-four junior female competitors in alpine skiing (body height 155.1±7.9 cm, body mass 46.2±7.0 kg, age 12.2±0.7 years). Each subject participated in the training process in one of the Slovene skiing clubs and gathered at least 100 points in the Radenska Cup competition in the season 1995/96.

The sample of independent variables consisted of the tests polygon backwards (POLYGON BACKWARDS), sidestepping (SIDE-STEPPING) and rhythmic drumming with the arms and the legs (DRUMMING). The variable polygon backwards represents the ability for efficient resolution of space-related problems (Pistotnik, 1999). The subject must cover a distance of 10 m as fast as possible on all fours backwards, the first obstacle should be climbed over and the second crawled through (Šturm, 1977). The variable sidestepping measures the ability for fast and efficient change of direction of movement (Pistotnik, 1999). The subject covers a distance of 4 m between two lines (each time crossing the line) with sidesteps left and right six times (Šturm, 1977). The third variable measures the ability for co-ordinated movement in rhythm (Pistotnik, 1999). In the arm and leg drumming test the subject sits in a corner of a room and performs as many correct sequences of the prescribed rhythmic motor cycle (left foot on left wall, right palm on right wall, left palm on left wall and finally right foot on right wall) as possible in the allotted time (Šturm, 1977).

The criterion variable (competitive success) was the sum of the points (POINTS) achieved in the competitions of the Radenska Cup. The sum consisted of two best slalom placements, three giant slalom placements and the best placement in super-giant slalom (points awarded for placements according to the bulletin of the Slovene Skiing Association – Bilten II. SZS, 1996). The basic statistical parameters of all the variables were computed in the first phase of the data analysis. In the second, the Pearson correlation coefficients (r) between the individual independent variables and their individual correlations with the criterion were computed. Statistical significance was tested two-sidedly, 5% error level was used. In the third part, classic multiple regression analysis was used to assess the correlation of the co-ordination space variables with success in alpine skiing. Here too, 5% statistical significance was observed.

RESULTS

The mutual correlations between the co-ordination variables shown in Table 2 are low and statistically non-significant. The two tests with the highest corre-

Table 1: Basic statistical parameters of the used variables

	Mean	Std. Dev.	Minimum	Maximum	Sig. K-S
POLYGON BACKWARDS	10.09	1.13	7.86	12.50	0.95
SIDE-STEPPING	10.56	0.57	9.55	11.88	0.96
DRUMMING	15.13	3.07	10	24	0.75
POINTS	311.25	226.44	105	885	-----

Legend: K-S Kolmogorov-Smirnov test of distribution normality

Table 2: Pearson correlation coefficients between the used variables

	POLYGON BACKWARDS	DRUMMING	SIDE-STEPPING
POLYGON BACKWARDS			
DRUMMING	-0.17		
SIDE-STEPPING	0.39	-0.23	
POINTS	-0.43	0.12	-0.50

Legend: statistically significant correlations (p<0.05) are shown in bold

Table 3: Multiple regression of the co-ordination variables on the criterion

	Multiple R	R2	St. Err.	Sig. F	Beta	Sig. T
POINTS	**0.56**	0.31	201.06	**0.05**		
POLYGON BACKWARDS					-0.28	0.17
DRUMMING					-0.38	0.07
SIDE-STEPPING					-0.02	0.92

Legend: statistically significant correlations (p<0.05) are shown in bold

lation with competitive success are precisely those two that also have the highest mutual correlation. The Pearson correlation coefficient with the criterion is somewhat higher for the variable sidestepping (r = –0.50), a little lower, but still statistically significant, is the correlation of the test polygon backwards (r = –0.43). The correlation of the third predictor variable (drumming) with competitive success proved to be low and statistically non-significant.

Multiple regression analysis showed a statistically significant association between the predictors and the criterion, the independent variables explaining about 31% of the criterion variance. Of the predictor variables, the sidestepping test has the largest partial projection, but the beta coefficient is statistically non-significant. The projections of the other two predictor variables are also statistically non-significant.

DISCUSSION

The correlations of all the chosen variables shown in Table 2 are low and not statistically significant. Such results therefore prove that the tests representing the individual factors of co-ordination were well chosen. The reason for this might also be the onset of differentiatedness of the motorics of junior female alpine skiers. This could happen as a consequence of the training or the selection process – the girls involved in the regular transformation process could start to react differently to different tests of co-ordination.

It is also possible to conclude that in the background of both correlated variables (polygon backwards and sidestepping) lie motor tasks that demand the activation of the entire body, and are a combination of complex motor structures performed with maximal speed and where a certain order and mode of overcoming an obstacle - or distance - is needed, but are not automated. These characteristics are also typical for motor structures in alpine skiing (Lešnik, 1999). In skiing, immediately after the start, the competitor must solve the gate-placement problems at high velocity on a course, which demands movement on a pre-determined path (different gate placements).

The projections of the two tests with the highest mutual correlation on the criterion are statistically significant. Since the value of the correlation with compe-

titive success is greater for the sidestepping variable, this can point to the possibility that the ability for rapid and efficient change of direction of body movement plays an important role for achieving better results in this sample. The motor structures, which appear in this test, are similar to the nature of movement in alpine skiing (Žvan, & Knez, 1989). Agility, which we measure indirectly with the sidestepping test, can appear in skiing in the form of different corrections of movement. It is either a matter of correcting the errors during skiing, whose consequence is a too large deviation from the ideal turn path; or a quick adjustment to the appearance of unforeseen factors on the course, such as bad visibility, damaged course… It is possible that those girls that are capable of realising well such motor structures »on dry land«, are also capable of superior and rapid realisation of them on snow in competitive conditions. The correlation of the above-mentioned test with success could possibly also be high because both alpine skiing and this test require speed and explosive power.

The statistically significant correlation of the test polygon backwards with the criterion variable additionally confirms the importance of a rapid and efficient realisation of complex motor tasks for success in junior female alpine skiing. This test indirectly measures the ability, which is important especially in overcoming different obstacles between the placed gates that appear during competition as a consequence of the terrain configuration and atypical gate placements. The run of the course represents a pre-set path with obstacles, which have to be overcome as economically and quickly as possible. As in this test, in skiing also whole-body co-ordination and rapid solving of unusual motor tasks is important, therefore the high correlation is expected.

The value of the Pearson correlation coefficient of the variable arm and leg drumming with the criterion variable is low and statistically non-significant. This test shows the ability to organise movement into a rhythmic cycle. The sense of rhythm is especially required in the technical disciplines of alpine skiing (Mlodzikowska, & Tukiendorf, 1991), but it obviously does not correspond also with the chosen sample of competitors. The results of this study therefore show that success inside the chosen sample, alongside a multi-

tude of other (unexplained) factors, was not connected to the ability for realising rhythmic motor structures. It is possible, due to the influence of the onset of puberty, that certain young subjects experienced a degradation of some of their already established motor programmes. Morphological changes (rapid body growth) could have caused degradation of their control over co-ordinated movements of the arms and legs required by the drumming test.

The multiple correlation coefficient obtained with multiple regression analysis is statistically significant. The co-ordination space variables explained 31% of the criterion's variance. The motor structure of the variable sidestepping is the most similar to the structure of movement in alpine skiing of all the used independent variables (velocity of movement, explosive actions, similarity of motor structures…); therefore it would be logical – because of these parallels - to expect the highest projection of this variable on the criterion. The results of the study support this hypothesis.

It is important to realise that the importance of the co-ordination space for success in junior female alpine skiing was, in our case, only tested with three factors. It is possible that the objectivity of the results would increase if all the factors of co-ordination were used and also their interactions taken into account. The values that define the criterion variable are collected during the entire competitive season while the predictor values show the level of motor status at a given moment. It might be that because of this time difference between the measurements of motor variables and competitive success, the measured results do not show the real status of the competitors (in the competitive season). The obtained results can therefore also be the result of factors not controlled for in the study, so a certain level of restraint in the interpretation of the results is warranted.

It is also possible that the athletes in the obtained sample achieved better results at competitions due to factors that were encompassed by this study. Even if the standardised regression coefficients were not statistically significant, this does not by any means mean that they can be neglected in explaining competitive suc-

cess. From the viewpoint of a long-term development of the dimensions of co-ordination that define the success of junior female alpine skiers, such a deficiency in the preparedness of athletes could fatally affect their possibility of achieving top results in alpine skiing.

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