

3.12

ANKICA HOŠEK

KONSTANTIN MOMIROVIĆ, FRANJO PROT and KSENIJA BOSNAR

Faculty of physical education, University of Zagreb, Yugoslavia

THE INFLUENCE OF SOME HYPOTHETICAL SOCIAL FACTORS ON THE
DEVELOPMENT OF SOME HYPOTHETICAL FACTORS OF MOTOR ABILITIES

International Sport Dialogue, Dubrovnik, 1982

1. PROBLEM

It is well known that the development of motor abilities, for one, is influenced by the structure of social factors describing subject's immediate environment. On the basis of the results of the investigations that have so far been carried out in this country* a hypothesis could be established, namely, that the development of various motor abilities depends on different social factors, in spite of the relatively high coefficient of correlation between the general motor factor and the general factor of the social status. In accordance with this, the hypothesis that different factors of social status have different impacts on the development of motor abilities, is justified.

The aim of this work is to, on a representative sample from a population in the plateau zone of the curve representing the development of motor abilities, establish the influence of the most important factors of social differentiation, belonging to the socialisation subsystem, upon those primary motor factors which are not equally sensitive to variability of

* A.Hošek, 1979; K.Petrović, K.Momirović and A.Hošek, 1982; A.Hošek, K.Momirović and F.Prot, 1981; K.Momirović, A.Hošek, and K.Bosnar, 1981.

social factors which might affect the processes of growth and development*.,

2. METHODS

The investigation was carried out on the sample of 540 men between 19 and 27 years of age. The sample had been derived by a procedure which makes it sufficiently representative for Yugoslav population of healthy men of this age.

Basic information about social characteristics contained the following data**:

1. Education of the father (OBRZO)
2. Education of the mother (OBRZM)
3. Qualification of the father (KVALO)
4. Qualification of the mother (KVALM)
5. Characteristics of the place in which the subject lived until the age of 15 (MJ15)
6. Characteristics of the place in which his mother lived until her age of 15 (MJ15M)
7. Characteristics of the place in which his father lived until his age of 15 (MJ15O)
8. Characteristics of the place in which the subject lives at present (MJSAD)
9. Functions of the mother in Trade Union (SINDM)
10. Functions of the father in Trade Union (SINDO)
11. Functions of the mother in Communist League (SKJM)
12. Functions of the father in Communist League (SKJO)
13. Annual household income (PRIHD)
14. Possession of a refrigerator (FRIGI)
15. Possession of a TV set (TV)
16. Possession of a washing machine (VESM)

* According to the model which, founded on previous investigations, assumes that the influence of exogene factors on the development of motor abilities is greater if these abilities are more complex.

** All variables belong to the class of ordinal categorical variables. Variable designation used in tables is given in parentheses.

These variables have been selected so as to enable the estimation of the most important factors of passive social status, obtained in previous investigations (Momirović, Hošek et al., 1976): (1) educational status, (2) residential status, (3) socio-political status and (4) economic status.

Data on motor abilities were collected by the use of 24 composite measuring instruments*. Four different tests were applied in the estimation of each of the following six abilities:

1. rhythm (KRBUB, KRBNR, KRP3R, KRPLH)
2. force (DSELP, DSFDP, DSEPK, DSETR)
3. speed (BPDRD, BPLRD, BPDRN, BPDNN)
4. power (RABPT, RCZTL, RLDTN, RAVTR)
5. coordination (KLSNR, AGOSS, KAVLR, BKRLP)
6. timing (KAZON, KUPAL, KLPHV, KUPRN).

The analyses have been performed by the algorithm HYPOCRIT ((HYPO)THETICAL (CRIT)ERION ANALYSIS). This algorithm and the associated program of the same name performs regression analysis of hypothetical factors derived from a set of criterion variables in the space defined by hypothetical factors derived from a set of standardized ordinal predictor variables. Hypothetical factors have been, both in the set of predictor and the set of criterion variables, formed on the basis of selector matrices by a two-phase procedure. In the first phase an initial solution is formed by a modification of the multi-group method. In the second phase the initial solution is used to form hypothetical factors by an algorithm based on the general Guttman model of factoring of a covariance matrix. Regression analysis, separately for each individual criterion factor, is performed by an algorithm which, apart from the standard tests of hypotheses about model parameters, generates a set of regression factors as well. The algorithm allows singularity of both the predictor

* The description of these instruments and their metric characteristics can be found in Momirović, Štalec and Wolf, 1975; and their latent structure, defined by a set of 110 motor tests in Gredelj, Metikoš, Hošek and Momirović, 1975.

and the criterion set of variables under the condition that the hypotheses are set so as not to produce linearly dependent latent dimensions*.

3. RESULTS

Table 1. presents the pattern and Table 2. correlation of hypothetical social factors. As it can be seen from the pattern matrix, a very rich and simple structure with excellently defined factors of educational, residential, socio-political and economic status, has been achieved. Correlations of these dimensions suggest a clear, although not too prominent general factor of passive social status in the space of the second order.

Table 3. shows the pattern and Table 4. correlations of hypothetical motor factors. A structure of quite satisfactory simplicity with clearly defined factors of rhythm, force, speed, power and coordination, was obtained. The timing factor was somewhat poorer; the KAZON test is practically equally saturated by coordination and timing. Judging by intercorrelations of latent dimensions a poor factor of general motor ability can be defined in the space of the second order.

A summary of the results of regression analysis of hypothetical motor factors in the space of hypothetical social factors is shown in Table 5. β denotes standardized partial regression coefficients and F denotes the structures of regression factors. Multiple correlations are in the row denoted by ρ and determination coefficients in the row denoted by δ . Two asterisks (**) denote coefficients of multiple correlation and regression coefficients in which the error in rejection of zero-hypothesis is smaller than 0.01. An asterisk (*) denotes the coefficients of multiple correlation as well as regression coefficients significant on the level of error type I of 0.05.

* The algorithm is applied for the first time in this paper. Program HYPOCRIT, written in SS language, is stored in public library SRCE*SS-MACRO.

The obtained results are in obvious agreement with the hypothesis that the influence of sociological actors is greater if motor ability is more complex. The complexity of motor abilities to the greatest extent depends on the part of variance of cognitive processors in the total variance of some motor ability and to a significant extent on the number of basic motor functions integrated in performing of a motor task.

Table 1. - PATTERN OF HYPOTHETICAL SOCIAL FACTORS

	EDUCATIONAL STATUS	RESIDENTIAL STATUS	SOCIO-POLITICAL STATUS	ECONOMIC STATUS
OBRZO	(.83)	-.03	-.06	.08
OBRZM	(.81)	-.05	-.06	.08
KVALO	(.71)	.06	.05	.04
KVALM	(.69)	.03	.07	-.19
MJ 15	-.05	(.80)	-.18	.14
MJ15M	.11	(.66)	.19	-.14
MJ15O	.02	(.76)	.10	-.17
MJSAD	-.08	(.73)	-.11	.17
SINDM	-.15	-.02	(.68)	-.02
SINDO	-.10	.06	(.64)	.01
SKJM	.07	.06	(.68)	-.04
SKJO	.18	-.10	(.56)	.09
PRIHD	.08	.01	.04	(.62)
FRIGI	-.02	-.07	-.04	(.85)
TV	-.01	-.00	-.04	(.80)
VESM	-.05	.07	.08	(.74)

Table 2. - CORRELATIONS OF HYPOTHETICAL SOCIOLOGICAL FACTORS

	EDUCATIONAL STATUS	RESIDENTIAL STATUS	SOCIO-POLITICAL STATUS	ECONOMIC STATUS
EDUCATIONAL STATUS	1.00			
RESIDENTIAL STATUS	.43	1.00		
SOCIO-POLITICAL STATUS	.41	.21	1.00	
ECONOMIC STATUS	.45	.36	.25	1.00

and the criterion set of variables under the condition that the hypotheses are set so as not to produce linearly dependent latent dimensions*.

3. RESULTS

Table 1. presents the pattern and Table 2. correlation of hypothetical social factors. As it can be seen from the pattern matrix, a very rich and simple structure with excellently defined factors of educational, residential, socio-political and economic status, has been achieved. Correlations of these dimensions suggest a clear, although not too prominent general factor of passive social status in the space of the second order.

Table 3. shows the pattern and Table 4. correlations of hypothetical motor factors. A structure of quite satisfactory simplicity with clearly defined factors of rhythm, force, speed, power and coordination, was obtained. The timing factor was somewhat poorer; the KAZON test is practically equally saturated by coordination and timing. Judging by intercorrelations of latent dimensions a poor factor of general motor ability can be defined in the space of the second order.

A summary of the results of regression analysis of hypothetical motor factors in the space of hypothetical social factors is shown in Table 5. β denotes standardized partial regression coefficients and F denotes the structures of regression factors. Multiple correlations are in the row denoted by ρ and determination coefficients in the row denoted by δ . Two asterisks (**) denote coefficients of multiple correlation and regression coefficients in which the error in rejection of zero-hypothesis is smaller than 0.01. An asterisk (*) denotes the coefficients of multiple correlation as well as regression coefficients significant on the level of error type I of 0.05.

* The algorithm is applied for the first time in this paper. Program HYPOCRIT, written in SS language, is stored in public library SRCE*SS-MACRO.

The obtained results are in obvious agreement with the hypothesis that the influence of sociological actors is greater if motor ability is more complex. The complexity of motor abilities to the greatest extent depends on the part of variance of cognitive processors in the total variance of some motor ability and to a significant extent on the number of basic motor functions integrated in performing of a motor task.

Table 1. - PATTERN OF HYPOTHETICAL SOCIAL FACTORS

	EDUCATIONAL STATUS	RESIDENTIAL STATUS	SOCIO-POLITICAL STATUS	ECONOMIC STATUS
OBRZO	(.83)	-.03	-.06	.08
OBRZM	(.81)	-.05	-.06	.08
KVALO	(.71)	.06	.05	.04
KVALM	(.69)	.03	.07	-.19
MJ 15	-.05	(.80)	-.18	.14
MJ15M	.11	(.66)	.19	-.14
MJ15O	.02	(.76)	.10	-.17
MJSAD	-.08	(.73)	-.11	.17
SINDM	-.15	-.02	(.68)	-.02
SINDO	-.10	.06	(.64)	.01
SKJM	.07	.06	(.68)	-.04
SKJO	.18	-.10	(.56)	.09
PRIHD	.08	.01	.04	(.62)
FRIGI	-.02	-.07	-.04	(.85)
TV	-.01	-.00	-.04	(.80)
VESM	-.05	.07	.08	(.74)

Table 2. - CORRELATIONS OF HYPOTHETICAL SOCIOLOGICAL FACTORS

	EDUCATIONAL STATUS	RESIDENTIAL STATUS	SOCIO-POLITICAL STATUS	ECONOMIC STATUS
EDUCATIONAL STATUS	1.00			
RESIDENTIAL STATUS	.43	1.00		
SOCIO-POLITICAL STATUS	.41	.21	1.00	
ECONOMIC STATUS	.45	.36	.25	1.00

Table 3. - PATTERN OF HYPOTHETICAL MOTORIC FACTORS

	RHYTHM	FORCE	SPEED	POWER	COORDINATION	TIMING
KRBUB	(.76)	-.04	-.04	.12	.08	.10
KRBNR	(.73)	-.06	-.08	.11	.21	-.01
KRP3R	(.82)	.11	.03	-.13	-.15	.00
KRPLH	(.86)	-.03	.10	-.08	-.13	-.07
DSELP	.10	(.76)	.12	.03	-.17	-.06
DSFDP	-.07	(.74)	-.21	.02	.11	.07
DSEPK	-.10	(.77)	.01	-.15	.07	.07
DSETR	.04	(.62)	.12	.16	-.01	-.05
BPDRD	-.03	.06	(-.87)	.01	.05	.04
BPLRD	-.02	.03	(-.87)	.01	.04	.04
BPDRN	-.04	-.00	(-.84)	-.02	.01	-.07
BPDNN	.10	-.11	(-.38)	.01	-.19	-.14
RABPT	.11	.32	.08	(.56)	-.06	-.13
RCZTL	-.12	-.29	.06	(.85)	-.01	.08
RLDTN	-.03	.01	-.06	(.79)	.08	-.00
RAVTR	.04	-.00	-.06	(.82)	-.04	.07
KLSNR	-.03	-.01	.03	.10	(-.81)	-.00
AGOSS	.24	.04	-.11	-.07	(-.80)	.04
KAVLR	-.15	.00	-.03	.02	(-.73)	.01
BKRLP	-.08	-.06	.06	-.03	(-.63)	-.11
KAZON	.10	.07	-.20	-.01	.34	.34
KUPAL	-.07	-.06	.11	-.06	-.19	(.87)
KLPHV	-.07	-.08	.06	.12	.13	(.63)
KUPRN	-.01	-.08	.04	-.06	-.23	(.87)

Table 4. - CORRELATIONS OF HYPOTHETICAL MOTOR FACTOR

	RHYTHM	FORCE	SPEED	POWER	COORDINATION	TIMING
RHYTHM	1.00					
FORCE	.20	1.00				
SPEED	.39	.21	1.00			
POWER	.02	.55	.03	1.00		
COORDINATION	.42	.21	.27	.20	1.00	
TIMING	.34	.16	.27	.13	.50	1.00

Table 5
REGRESSION ANALYSIS OF HYPOTHETICAL MOTOR FACTORS IN THE SPACE OF HYPOTHETICAL SOCIAL FACTORS

	RHYTHM		FORCE		SPEED		POWER		COORDINATION		TIMING	
	β	F	β	F	β	F	β	F	β	F	β	F
EDUCATIONAL STATUS	.26**	.90	.00	.35	.13*	.95	-.02	-.38	.19**	.91	.10	.86
RESIDENTIAL STATUS	.09*	.61	-.03	.00	-.02	.37	-.03	-.69	.03	.55	-.03	.28
SOCIO-POLITICAL STATUS	.10*	.59	.12	.97	-.01	.34	.04	.44	.01	.43	.07	.72
ECONOMIC STATUS	.15**	.71	.02	.30	.05	.68	-.01	-.43	.13**	.78	.06	.67
ρ	.45**		.12		.14*		.05		.39**		.16**	
δ	.20		.01		.02		.00		.09		.03	

Although it is not quite certain that due to this the participation of dispositional, hence genetic factors as well, is higher in relatively simple motor abilities, the hypotheses that the possibility of affecting the development of complex, and particularly partly cognitively determined, motor abilities is greater than the possibility of affecting the development of elementary abilities, particularly those significantly dependent on physiological effector characteristics, is therefore highly probable.

The results of some previous investigations (Hošek, 1979) have shown that rhythm and coordination, to a greater extent than other motor abilities, depend on the favourable influence of the social field. It is surprising, however, that the influence of the social field upon force and power, hence abilities which are usually assumed to be under low influence of dispositional factors, is insignificant.

It seems that the basic mechanism through which the social field affects the development of complex motor abilities is a relatively greater number and a relatively more adequate choice of stimuli which induce the participation of cognitive functions in solving motor problems. This is in agreement with the theories of Hebb (Hebb, 1949) and Piaget (Piagetm 1968) about development in general, and therefore, about the development of abilities to solve motor problems as well.

The fact that parents' educational status, which is a predominant determinant of cultural level and status in general, has systematically the highest absolute and partial influence on all, especially cognitively determined, motor abilities, speaks in favour of that. The economic status has a lower, yet significant, influence on the development of rhythm and coordination. The influence of residential and socio-political status, significant only for the ability to perform rhythmic structures, is insignificant in comparison with the economic, and especially educational, status.

Different sensitivity of motor abilities to facilitatory factors originating from a favourable social environment, or to defacilitatory factors which are a consequence of a development under unfavourable social and economic conditions, is certainly of some significance for the estimation of the developmental potential of the persons who have previously been developing in unequal conditions as well as for programming of kinesiological procedures aimed at the development of motor abilities.

REFERENCES

1. Gredelj, M., D.Metikoš, A.Hošek i K.Momirović. Model hijerarhijske strukture motoričkih sposobnosti. I. Rezultati dobijeni primjenom jednog neoklasičnog postupka za procjenu latentnih dimenzija. Kineziologija, 5 (1975), 1-2 : 7-81.
2. Hebb, D.O. The organization of behavior. New York, Wiley, 1949.
3. Hošek, A. Utjecaj socioloških karakteristika na motoričke sposobnosti. Kineziologija, 9 (1979), 1-2 : 107-123.
4. Hošek, A., K.Momirović i F.Prot. Neposredni utjecaj obrazovanja i drugih socijalnih činilaca na razvoj koordinacije pokreta. Kineziologija, 12 (1981), 1-2 : 77-82.
5. Momirović, K., J.Štalec i B.Wolf. Pouzdanost nekih kompozitnih testova primarnih motoričkih sposobnosti. Kineziologija, 5 (1975), 1-2 : 169-191.
6. Momirović, K., A.Hošek i suradnici. Latentna struktura dimenzija socijalne stratifikacije. CKS, Studije i analize, Beograd, 1976.
7. Momirović, K., A.Hošek i K.Bosnar. Utjecaj socijalnog statusa i inteligencije na povezanost obrazovanja i koordinacije pokreta. Kineziologija, 12 (1981), 1-2 : 83-86.
8. Petrović, K., K.Momirović and A.Hošek. Relations between structures determined on the indicators of social and taxonomic structures determined on the measures of motoric abilities. 10th World Congress of Sociology, Mexico City, 1982.
9. Piaget, J. Psihologija ličnosti. Nolit, Beograd, 1968.