S 9 Reliability and reliability and motor testsat

I. Reliability

THEORY

In addition to validity, reliability is a basic feature of the test. By reliability we mean the accuracy with which the test affects the measured motor character. Expresses the degree of agreement in repeated measurements. We express it mostly using the correlation coefficient, using a parallel form of the test, which can take different forms, see. further. Each measurement and testing is burdened with a certain error rate. It is therefore necessary to verify the reliability of the tests with suitable diagnostic tools and critically assess their suitability for the given purpose.

Different authors view a sufficient degree of reliability differently, let's mention the conclusions of the author Zaciorský (1980) who state the indicative limits for assessing reliability in the field of kinanthropology:

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0.99 - 0.95 high reliability 0.94
- 0.90 good reliability
0.89 - 0.80 acceptable reliability (sufficient for individual
measurements) 0.79 - 0.70 very low reliability (sufficient for group
measurements) 0.69 - 0.60 insufficient

Individual aspects of reliability:

1. test stability
2. internal consistency of the test
3. test equivalence

1. Stability

We use the test-retest method to determine the stability of the test over time. We consider the second, repeated measurement (under standardized conditions, performed on the same probands, by the same examiner) as a parallel form of the test and we calculate the stability coefficient as the coefficient of product correlation between the two tests. We choose the time interval between the two tests according to the nature and difficulty of the test (cf. 12 min. Running and tapping of the hand)

Coefficient of stability

r_{xy} = correlation coefficient (calculation see seminar 5) x =

and results of the 1st measurement

$y_{\overline{and}}$ results of the 2nd measurement

2. Internal consistency

This method can be used where it is possible to divide the test into two halves, eg even and odd results. It is assumed that the two halves are parallel to each other. The correlation coefficient calculated from both halves of the test indicates the reliability of only one half. Therefore, it is necessary to further correct the result for the whole test using the Spearman-Brown formula.

$x_{\overline{and}}$ 1st half measurement results

$y_{\overline{and}}$ 2nd half measurement results

3. Equivalence

The parallel form of the test necessary for the calculation of the correlation coefficient here consists of a test of the same type measuring the same construct. E.g. the anaerobic threshold can be detected by various tests equivalent to each other (spiroergometry, lactate dynamics monitoring, Conconi test, etc.). The assumption is a minimum time interval from both measurements. We will again use the product correlation coefficient for the calculation.

$x_{\overline{and}}$ results of the 1st measurement (original test)

$y_{\overline{and}}$ results of the 2nd measurement (parallel test)

Objectivity

Evaluates the influence of the examiner person on the test result. The correlation coefficient between the results reported by the various assessors will give us a rough estimate of this particular form of test reliability.

$x_{\overline{and}}$ measurement results of the 1st assessor

$y_{\overline{and}}$ measurement results of the 2nd assessor

EXAMPLES

1. Find out the stability of the test in running at 50 m in boys of the 5th class - measured after 1 week, the times are given in the table:

Order no.	test x_{and}	retest y_{and}
1	10.5	10.0
2	9.1	9.3
3	8.1	8.5
4	9.9	10.4
5	7.6	7.5
6	9.3	9.2
7	10.6	10.6
8	10.2	10.1
9	9.4	9.9
10	9.3	9.5
Σ	94.0	95.0

$r_{xy} = 0.945$

This is good test stability.

2. Find the equivalence of vertical jump tests - long jump from a place. are these tests strictly equivalent?

52	242
58	260
62	264
64	268
63	261
47	222
58	256
55	250
50	240
52	244
48	230
50	241
52	244
54	248
56	252
58	258
60	264
62	266
40	268
66	272
66	271
52	242
58	258
62	264
63	266
64	268
63	261
67	274
48	230
58	259

TASKS

1. Calculate the stability of the manual dynamometry test for the first and second attempts of the dominant arm. Use the data measured within the subject Development of motor skills from the 1st year

2. Calculate the equivalence of endurance tests, 12 minute run and progressive shuttle run. Use data from the 1st year (temporarily unavailable)

II. Validity

THEORY

Validity means the degree to which a test actually measures, affects, or describes what the purpose of the detection is. The validity of a motor test is always ascertained for some quantity that the test indirectly measures, the so-called criterion. We can define it as the probability of a match between the test result and the status of the criterion.

We distinguish concurrent validity, eg verification of the relationship of two tests to explosive power, or the validity of different swimming tests to the criterion of 800 m swimming, etc. In the second case we distinguish non-concurrency - eg racing) period.

The most commonly used measure of validity is the validity coefficient, which is most often the absolute value of the correlation between test X on the one hand and criterion Y on the other. Sometimes we use labels r_{tk}(test, criterion).

Theory (Blahuš, 1988), lists several types. b

Predictive validity - the estimate has the character of a prediction of future results

Diagram:

training

Test ——— time lag ———→ Criterion

Throwing forward can be an entrance test for students in the gymnastics class. The equation for estimating the criterion Y using a single test X has the form: ´ = +

= — =?̄? -̄??

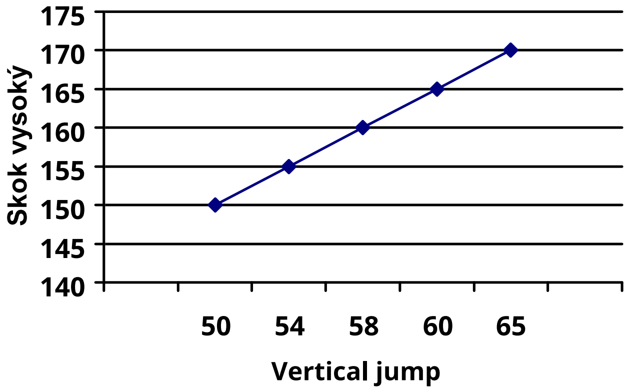
where *a, b* are the coefficients for estimating the performance in the criterion (assumption that the conditions of linear regression are met)

EXAMPLE

Calculation of height jump prediction based on the vertical jump test (T.15) The following performances were found in five children:

Pore. C.	Vertical jump X_{and}	High jump y_{and}
1	50	150
2	54	155
3	58	160
4	60	165
5	65	170
Σ	287	800

r_{xy}= = 0.994



The graph expresses a two-dimensional distribution of frequencies and allows rough estimates.

Based on the knowledge of the test validity coefficient and the individual's score, we can try to estimate sports performance. This is made possible by the regression line ′ (see picture). Its equation has the form ′ = +

´ .... predicted criterion score

=?̄? - ?̄? .... constant

.... regression coefficient

The regression coefficient is the direction of the regression line, we calculate it from the equation:

= —

Our example shows:

n = 5 ?̄? = 57.4 = 5.73 = 5.73

?̄? = 160 = 7.91

= — = 0.994 $\frac{7.91}{5.73}$ = 1,372

=?̄? - ?̄? = 160 - 57.4. 1,372 = 81,247

´ = + ´ = 81.247 + 1.372

Pupil M, who jumped with a vertical jump mě in the specific period = 62 , probably jumps ´

y´ = 81, 247 +1, 37. 62 = 166, 311

Pupil M jumps approximately 166 cm. We have to take into account a certain estimation error. This means that it is necessary to take into account the occurrence of performance in a certain confidence interval.

We calculate the confidence interval ("performances") for linear regression according to the formula:

´ ± μ1 - $\frac{}{2}$ √ √$\frac{}{- 2}$

- (+)

where = ∑= 1[- (+)]^2 and μ1 = $\frac{}{2}$ are critical values of the standardized normal distribution. We choose the reliability of the prediction of the normal distribution.

If we choose the reliability of the prediction 1− = 95% is = 5% and 1 - $\frac{}{2}$ = 0.975; therefore μ1 - $\frac{}{2}$ = at

0.9751 = ˙ 1.959

In our case, we calculate the values of the following table

Pore. C.	Vertical jump x_{and}	High jump y_{and}	Prediction value $y' = 81,247 + 1,372xy'$	Deviation $\Delta_{and} = y_{and} - y_{and}'$	Square Δ^2
1	50	150	149, 847	0.153	0.023
2	54	155	155,335 th most common	- 0.335	0.112
3	58	160	160,823 th most common	- 0.823	0.667
4	60	165	163,567 th most common	1,433 th most common	2,053 th most common
5	65	170	170,427 th most common	- 0.427	0.182
Σ	287	800			3,047 th most common

Sum in last column (Δ^2) is a value of *with*$_r$. Substituting into the above formula we get

$' \pm \mu_1 - \sqrt{\sqrt{2}} \frac{}{--2}$ $' \pm 1.96$ feet3,047 th most common $\frac{}{3}$ $' = 1,974$

the information contained in Table 24 allows us to determine the performance prediction ′according to formula ′ = + with an accuracy of less than 2 or 4 cm.

TASK *(Temporarily unavailable)*

Calculate the predictive validity of swimming at 100 m (time and method you achieved during the entrance exams) and achieved in swimming lessons - link. Construct a prediction graph.