PARTIAL STRUCTURE OF PHYSICAL FITNESS IN PARAMEDICS

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- Paramedics,
- Partial structure,
- Physical fitness.

Abstract:

The conducted analysis partially reveals what may be referred to as test redundancy, which may negatively affect its information value. The primary problem of such interpretation is whether using the conducted hierarchic cluster analysis it is possible to regard the cluster order as final and determine the contribution of respective variables on their participation. We may assume that such order interprets their status in the actual motor area.

INTRODUCTION

Requirements related to the preparation of students – paramedics in some parameters overlap with the requirements that determine the preparation of physical education students. During the university studies, students undergo a physically demanding training for two hours per week every semester together with facultative classes and outdoor courses of mountain and water rescue. [3] reported that the curve of professional, theoretical and practical knowledge of the applicants and their fitness level reveal a marked dichotomy. At the beginning of their professional careers, applicants are at their so-called nadir of his or her professional skills and experience.

Work tasks that involve prolonged and repetitive pulling, pushing, holding, carrying and lifting can lead to cumulative trauma disorders, lower back pain, sprains, strains, neck pain, etc. Therefore, a systematic and targeted physical training can be used as a preventive and rehabilitative tool in occupational settings increasing worker productivity and effectiveness in physically demanding occupations. Designing exercise programs requires knowledge about basic facts related to motor behavior. These are the base of actual motor fitness in a particular occupation or profession. Work tasks need to be analyzed in terms of the load that has to be lifted, carried, etc., task frequency, distance covered, time intervals necessary for the execution of the tasks involved. At the same time, tasks should be analyzed to determine the energy systems involved, muscle groups employed, requirements for strength and endurance and environmental conditions during work [3]. The definition of general motor fitness is to be based on the premise of inter-relationships between terms physical fitness, motor fitness and motor ability.

Repeated attempts to define the term physical fitness have produced definitions representing the concept of health-related fitness as a complex of five components (Table 1) morphological, muscular, motor, cardiorespiratory and metabolic.

Table 1. Components of health-related fitness (Bouchard et al., 2007)

Morphological component	
Body mass for height Body composition Subcutaneous fat distribution Bone density	**Cardiorespiratory component** Submaximal exercise capacity Maximal aerobic power Heart functions Lung functions Blood pressure
Motor component	
Agility Balance Coordination Speed of movement	
Muscular component	**Metabolic component**
Power Strength Endurance	Glucose tolerance Insulin sensitivity Blood lipids and lipoproteins Substrate oxidation characteristics

MATERIAL AND METHODS

The research project was carried out in cooperation with the Faculty of Sports, the Faculty of Sports' diagnostic center and The Faculty of Health Care of the University of Prešov in Prešov. This cooperation was time-consuming and demanding in terms of coordination, organization as well as ex post facto redundancy of the administration of particular test items, which were continuously administered but have not been included in the final analysis. The reference samples consisted of 1st year full-time and part-time undergraduate students in the study program Rescue health care. The first reference sample comprised 1st year full-time undergraduate students of the study program "Paramedic." The total number of students was 35, 22 men and 17 women. Average age of men and women was 21.6 years and 20.3 years, respectively. The second reference sample comprised part-time undergraduate students of the same study program. The total sample size was 34, 18 men and 16 women with varying practical experience in the field of paramedical services. The average age of men and women was 32.5 and 28.8 years, respectively.

The selection and administration of test items related to target domains "covered" by acceptable degree of error, were conducted taking into account the degree of standardization and were analyzed in terms of their applicability. The research objective was conducted in the field, where no comparable findings are available except some exceptions. The selection of tests was the combination of standardized systems used to test general motor fitness using the EUROFIT test battery according to Adam et al. (1988), which includes 9 motor parameters, three somatic parameters and Body Mass Index as an additional parameter.

The analysis of the partial structure included both field-based and laboratory-based evaluated using linear correlation analysis. Drawing on the analysis, a map of both significant and highly significant correlates was devised. An important part of the analysis is the possibility of comparing the partial structure within the hierarchy of significant correlates. The partial structure allows for the description of the role of particular parameters in the complex motor domain [4].

RESULTS AND DISCUSSION

The analysis in the sample of full-time students (Table 2) showed that the motor base of this reference sample includes endurance and strength, complemented by balance and somatic

parameters. In the sample of part-time male students (Table 3), of somatic parameters Body mass index and skinfold thickness are of importance and unlike sample 1 also variable no. 11 – body height. There is a supposition of the effect of age. With respect to general motor fitness, the partial structure is determined by strength and endurance alongside balance and rhythmic ability.

Generally, we may conclude that the comparison of full-time and part-time male students showed higher level of motor fitness to a varying degree determined by an approximate 10-year age difference and partially by the effect of becoming "overweight". Of significance is also the continuous effect of regular physical training undergone by full-time students. This is most probably an important factor affecting the actual state of physical fitness and consequently a factor determining the fitness level when comparing and analyzing researched samples.

Table 2. Correlation matrix men – full-time study (n = 22)

Parameter	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**	**12.**	**13.**
1. Flamingo test													
2. Plate tapping													
3. Sit-and-reach test													
4.Standing long jump													
5. Grip dynamometry													
6. Sit-ups 30 seconds													
7. Bent-arm hang													
8. Shuttle run 10x5 m													
9. Endurance shuttle run													
10. Body weight													
11. Body height													
12. Sum of skinfolds													
13. Body mass index													

Level of significance $p \geq .05$
$p \geq .01$

The analysis of the partial structure included both field-based and laboratory-based measurements evaluated using linear correlation analysis. The next step in interpreting correlation coefficients was to "devise a map" of significant and highly significant correlates. The analysis of higher number of variables may lack transparency. The numerical values and the evaluation of their common variance are then difficult to interpret. It is therefore necessary to make the numerical data transparent without the loss of their information value. Similar analyses may be "affected" by paradoxical correlate values with problematic option of clarifying such situation. This situation is present only sporadically and does not prevent the researcher from interpreting and analyzing the status and organization of particular correlates or groups of correlates with high degree of plausibility. Both reference samples are to certain extent unique as they represent "a population sample", which in the past was not enrolled using a stratified sampling. On the other hand, this population undergoes testing that cannot solve the validity of administered testing procedures in terms of their applicability or inapplicability.

Generally, we may conclude that the comparison of men and women studying full-time and part-time showed higher level of motor fitness to a varying extent determined by 10-year age difference and partially by the effect of overweight. Of significance is also the continuous effect of regular physical training undergone by full-time students. This is most probably an important factor affecting the actual state of physical fitness and consequently a factor determining the fitness level when comparing and analyzing researched samples.

Table 3. Correlation matrix men – part-time study (n = 18)

Parameter	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**	**12.**	**13.**
1. Flamingo test													
2. Plate tapping													
3. Sit-and-reach test													
4. Standing long jump													
5. Grip dynamometry													
6. Sit-ups 30 seconds													
7. Bent-arm hang													
8. Shuttle run 10x5 m													
9. Endurance shuttle run													
10. Body weight													
11. Body height													
12. Sum of skinfolds													
13. Body mass index													

Level of significance $p \geq .05$

$p \geq .01$

CONCLUSIONS

The present analysis was a so-called "test probe" into the motor domain of paramedical students who within their full-time study undergo 3 years of preparation and practice in the part-time study. Differences in findings showed the so-called "shift" in both motor fitness and somatic parameters. This may be caused by "motor patterns" formed by practical experience, which compensate for the decline in physical fitness and increase in body weight. The findings have shown that the base of the performance-related requirements and physical fitness determined by motor fitness includes the alternative of strength-speed capabilities. The issue is the age range associated with decline in job-related fitness. This may be viewed as a recommendation for the field of work medicine. When drafting the research project, the most discussed issue was which test items were to be selected in terms of empirical reality of the profession itself and its content reality, which is expressed as professional competence.

The confrontation of bibliographic sources in the whole range of demands related to profiling has specified the criteria, which the paramedical profession requires in terms of its complex structure from the medical standpoint and the standpoint of physical fitness. The argumentation of views on the profession was based especially on the knowledge of American provenience supported by long-time experience based on relatively extensive research presented in concrete findings. The introductory part dealt with issues that limit the transfer of actual knowledge into the environment of Slovakia. It may be hypothesized that this state is a "long-distance running event." However, one thing has been confirmed. The requirements related to the physical fitness of paramedics as a supportive element include in their base a universal character, which is to be necessarily accepted for their working life.

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