

Characteristics of the Health-Related Physical Fitness Questionnaire: Serbian version

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Abstract

Modern directions in the development of physical education in the world emphasize the importance of health-related physical fitness (HRPF), with special attention to the development and monitoring of knowledge about HRPF through the application of a targeted questionnaire. The main goal of this research was to analyze the characteristics of the HRPF questionnaire adapted to the Serbian language. After adjustment to Serbian language and terminology, questionnaire was administered to a sample of 270 children, 175 children of the fifth grade (11 to 12 years) and 95 children of the eighth grade (14 to 15 years). In both subsamples, the questionnaire has shown good internal consistency (Cronbach's α was 0.73 for fifth grade and 0.67 for eighth grade) and good features of most questions. The results also suggested problems with three questions which needed adjustment for further use: Question Q2 - Jana wants to do something after school what would help her to become successful in the football team she plays in, she should; Question Q11 - Volleyball is good; Question Q25 - If you want to be stronger, you should. After that kind of implementation, the questionnaire can be recommended for evaluation of HRPF of older primary-school children.

Keywords: physical fitness · health · questionnaire · characteristics

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Introduction

Modern lifestyle has contributed to the fact that children spend ever less time outside their homes playing, and ever more so turn to the use of modern multimedia devices. The consequence of this is that children move very little and use their energy ever less, because their free time has been occupied by their sedentary lifestyle, which consequently has the growth of health problems such as obesity, diabetes, depression, posture disorders etc. (Gea-García et al., 2020).

Children avoid Physical education (PE) classes because they are not “eligible” in the game of sport and are often exposed to criticism by their nimble peers, too. Therefore, not wanting to show their incompetence, they find “justifiable” reasons for passive participation (sitting on the bench, in the locker rooms) or skipping classes (Buisic, 2015). The intensity of exercising in the PE classes is low, probably because of the contents primarily directed to the elementary acquisition of motor skills (Djokic, 2014).

Modern directions of PE development in the world emphasize the important role of health fitness which is often defined in foreign countries as Physical fitness related to health (Britton et al., 2020). There are three important domains that PE should cover in health-related physical fitness: cognitive, psychomotor and affective. Excellent example can be found in the USA (SHAPE America, 2013), where outcomes have been defined for every grade and for all three areas (Cvejic, 2016). It is necessary that the community recognizes the great importance of knowledge about health fitness and at the same time the importance of that segment in the Physical and health education classes. If the children have cognitive knowledge about the benefits of health fitness, it is assumed that they will be more active and motivated for work.

Much research testifies significant health effects of physical activities on health (Ruiz et al., 2006a; Mesa et al., 2006a; Ruiz et al., 2006b; Chen, Hammond-Bennett, Hypnar & Mason, 2018). Regular physical activity habits and healthy physical fitness established in childhood continue in adolescence and mature age (Stodden et al., 2008). It is necessary to provide children with the possibility to gain cognitive knowledge about health fitness, as early as possible. That will help them to understand why engaging in physical activity is important, what the benefits of this are, how to program exercises on their own to preserve or advance their level of fitness.

The fact that studying about health fitness has positive changes on the health fitness knowledge level and on the physical activity level is testified by research of Hodges et al. (2016) who implemented their own knowledge of health fitness test. Results also indicate that the level of professor’s knowledge about health fitness and their art to transfer that knowledge is directly connected to the level of children knowledge (Yılmaz & Hunuk, 2022).

Palmer, Graham and Elliot (2005) assessed the influence of online module Healthy hearts 4 kids (HHK) studying on knowledge about physical activity and health. The program led to the improvement of knowledge and attitudes about physical activity of children and show that the Internet can be one of the alternatives to provide more, maybe even better, instructions about the health of children in primary school.

Hodges et al. (2015b) conducted the study to check the efficiency of newly designed fitness segments which can be used for providing health fitness knowledge. The most significant result of this study is that children who participated in the experimental program have significantly improved the results of health fitness knowledge.

Research conveyed by Longmuir et al. (2018) had the goal to check the questionnaire of the PLKQ (Physical Literacy Knowledge Questionnaire) validity and feasibility. It was conducted on the sample of 678 children of fourth, fifth and sixth grade in Canada. Research showed that knowledge rate has increased over the years, but it is not related to gender. Feasibility, reliability and validity of the PLKQ questionnaire about physical literacy knowledge and understanding among Canadian children was confirmed.

In the study by Hodges et al. (2015a), the weight and discrimination of questions in the newly created HRPF questionnaire was demonstrated through the evaluation of their metric characteristics. On a sample of 5th grade children, good reliability of the questionnaire (0.69) was obtained.

Research in other countries has also been directed to the creation of standardized tests about health fitness which were applicable to their area (Hunuk & Ince, 2010; Thompson & Hannon, 2012; Keating, Harrison, Dauenhauer, Chen, & Guan, 2013; Hodges et al., 2015a; Serbes, Cengiz, Sivri, & Filiz, 2017; Volk et al., 2022). These studies often included professors who teach, given the importance of teachers having certain knowledge about HROF to transfer it to children (Hunuk et al.,

2012; Santiago, & Morrow Jr, 2018; Yilmaz & Hunuk, 2022).

Considering the importance of knowledge about children fitness related to health conditions, knowledge assessment should be carried out using a questionnaire that includes terminology familiar to our children and using familiar sports and physical activities. There is no HRPF knowledge questionnaire available in our country that is adapted to our language. In such a situation, we decided to adapt one of the existing HRPF knowledge questionnaires, taking care to ensure that the content of the questionnaire is as much as possible oriented towards the Serbian PE curriculum. Therefore, we have started selecting an HRPF knowledge questionnaire that could be adapted and used in our country.

The main goal of this research was to adapt the selected HRPF questionnaire (Hoges, 2015a) to the Serbian language and terminology and to examine the basic metric characteristics of the questionnaire on a sample of children in our elementary schools.

Method

Participants

The sample of the participants has been formed out of the population of children who attend the fifth and eighth grade in primary schools on the territory of the municipalities of Vrbas and Kula. The total number of children sampled is 270, out of which 175 are from the fifth grades (87 boys and 88 girls; 11 to 12 years) and 95 from the eighth grades (46 boys and 49 girls; 14 to 15 years). All the children were healthy, attended physical education regularly and accepted participation in the research voluntarily. The children from primary schools in the municipalities attend PE under quite similar conditions.

Measurement instrument

The questionnaire used in this study was taken from Hodges et al. (2015a), translated into Serbian and adapted for use (Appendix A). The questionnaire consists of 28 multiple-choice questions with only one correct answer. Some questions and terminological guidelines from the questionnaire taken have been adapted to our backgrounds and our children. In that way, sports and activities like kickball, softball, inline skating, have been replaced with volleyball, bowling, dodge ball and roller skating. Term 'weight-bearing activity' has been translated as "weight training".

The test includes the knowledge of the children about the following guidelines: chooses to be physically active outside their school, describes personal reactions on physical activity, explains the features of physical activities which improve their health, identify physical strengths and weaknesses related to health, describes how to improve personal fitness, identifies principles (guidelines) related to fitness improvement and identifies specific advantages related to every fitness related to health (The questionnaire is available at: <https://sciendo.com/article/10.1515/bhk-2015-0017>).

Research design and procedure

This research has been designed as a cross-sectional one with the aim of checking the measuring features of the adopted HRPF questionnaire. The survey was conducted in April and May 2023, with the children from the fifth and eighth grade of primary schools in the two municipalities. The survey was conducted by a single examiner, using the same spatial and temporal conditions, given instructions, and a standardized questionnaire. All the children got the same thorough guidelines before filling out the questionnaire: that questionnaire is anonymous, that it is used for the purpose of the survey, that the questionnaire is not evaluated, that it is required to circle only one correct answer from the answers offered and that it is necessary that they provide answers for all the questions in the questionnaire. The questionnaire also includes collection of the basic demographic data: gender, age and grade of the children. The questionnaire was conveyed during the PE classes and the children answered the questions without being helped by other children or professors.

Statistical analysis

Data collected in the survey have been evaluated due to the correct answers from the test key and formation of the starting matrix for statistical analysis. Test scores have been determined by summing up the correct answers and calculating standard deviation of test scores. The differences in the children' gender and age have been tested by application of the independent t test.

The content of the test was analyzed using mixRasch R package (Seol, 2022). Difficulty and discrimination coefficients have been determined for all the questions. Preferable values of the difficulty coefficient range from 0.25-0.80 (Mohammad et al., 2015). Values under 0.25 indicate great difficulty with questions, and values above 0.80 too easy questions. Discrimination

coefficients of the questions compare 27% of the best results with 27% of the lowest, whereby the examinees with the best performance are more likely to answer correctly to the question. The limit value of this coefficient ranges from -1 to 1 , and the desirable value should be higher than 0.4 (Fisher Jr., 2007). Assessment of the question qualification into the set of all the questions has been determined based on Outfit coefficients. For the acceptable values of the Outfit coefficient have been considered those ranging from 0.6 – 1.4 (Mohammad et al., 2015). Negative point biserial coefficient indicated to the question which does not belong to the range of all the other questions.

Coefficients of Cronbach's α and McDonald's ω have been determined as the measures of the internal consistency and stability of the questions, and the coefficients higher than 0.70 have been considered as good reliability (Pallant, 2009). Additional analysis of the reliability of the questionnaire was carried out using the Split-Half

method. The interclass correlation and Guttman Split-Half Coefficient were determined.

All the analysis conveyed in Jamovi software package (Jamovi project, 2022) with application of the certain R packages. In testing the differences in gender and age of the examinees, statistical importance has been evaluated on the level of $p \leq 0.05$.

Results

Average values of the results of boys and girls in the HRPF test are almost identical with satisfying values of the standard deviation (Table 1). Testing of the differences in results of the t test in the children's gender hasn't shown statistical importance. When comparing results in the children's testing of 5th and 8th grade, there are noticeably higher values in the results of the eighth-student grades, what has been confirmed by the statistically important test values.

Table 34. Basic descriptive statistics and t test by gender and age

Variable	Boys (N = 134)	Girls (N = 137)	t	p
	Mean \pm SD	Mean \pm SD		
	14.8 \pm 4.63	15.0 \pm 4.34	-0.275	0.783
HRPF	V grade (N = 175)	VIII grade (N = 96)		
	Mean \pm SD	Mean \pm SD		
	14.1 \pm 4.08	16.4 \pm 4.76	-4.31	0.001**

Note: ** Significantly at $p \leq 0.01$

Content analysis of the survey for the 8th grade children

On the sample of the 8th grade children (N=95) analysis of the questions showed that applied questions in whole have good internal consistency and stability. Both reliability coefficients have a value above 0.70 (Cronbach's $\alpha=0.73$; McDonald's $\omega=0.73$), what is good reliability (Pallant, 2009). The results obtained were confirmed by the interclass correlation (0.74) and the Guttman Split-Half Coefficient (0.74). Average correlation has been of a medium size (0.53 ± 0.16) with satisfying variation coefficient of 30.1% .

Analysis results of the individual questions (Table 2) have shown that there are problems with a certain number of questions. Indexes of Item difficulty and discrimination in questions Q11, Q2 and Q25 are outside optimal values of difficulty index (0.25 - 0.80) and discrimination index (≤ 0.20). Questions Q11, Q2 and Q25 have low value of discrimination index and questions Q2 and Q3 high

level of difficulty index. Rasch model also identified high value of outfit index at question Q11 and negative value of biserial correlation, what implies that this question does not have common object of measurement with the rest questions from the questionnaire and that it can be removed. Removal of question Q11 led to the increase of Cronbach's alpha coefficient to 0.737 and McDonald's coefficient to 0.741 , and removal of question Q25 further increased Cronbach's alpha coefficient to 0.741 and McDonald's coefficient to 0.744 . Removal of question Q2 from scale analysis hasn't led to more significant changes in value of reliability coefficient.

On the map of questions and persons (Figure 1) it can be noticed that question Q11 completely varies from the distribution of the result, what is also visible in question Q2 on the other side of the distribution (circled points in the figure).

Table 35. Item statistics for 8th grade children.

Question	Item difficulty	Item discrimination	Point biserial r	Outfit index
Q1	0.465	0.458	0.397	0.967
Q2	0.937	0.045	0.222	0.819
Q3	0.819	0.364	0.356	0.860
Q4	0.402	0.364	0.431	0.917
Q5	0.745	0.386	0.356	0.901
Q6	0.247	0.227	0.432	0.945
Q7	0.815	0.341	0.465	0.712
Q8	0.679	0.364	0.288	1.066
Q9	0.332	0.205	0.317	1.076
Q10	0.579	0.409	0.359	0.997
Q11	0.129	0.045	-0.004	1.835
Q12	0.572	0.568	0.479	0.869
Q13	0.616	0.295	0.323	1.045
Q14	0.605	0.432	0.343	1.023
Q15	0.365	0.341	0.304	1.104
Q16	0.498	0.205	0.276	1.134
Q17	0.494	0.455	0.453	0.888
Q18	0.376	0.386	0.413	0.948
Q19	0.742	0.409	0.436	0.896
Q20	0.601	0.409	0.379	0.957
Q21	0.321	0.227	0.232	1.262
Q22	0.683	0.500	0.418	0.881
Q23	0.535	0.432	0.429	0.943
Q24	0.435	0.364	0.312	1.043
Q25	0.376	0.114	0.202	1.200
Q26	0.664	0.318	0.316	1.056
Q27	0.613	0.432	0.354	0.996
Q28	0.255	0.318	0.293	1.041

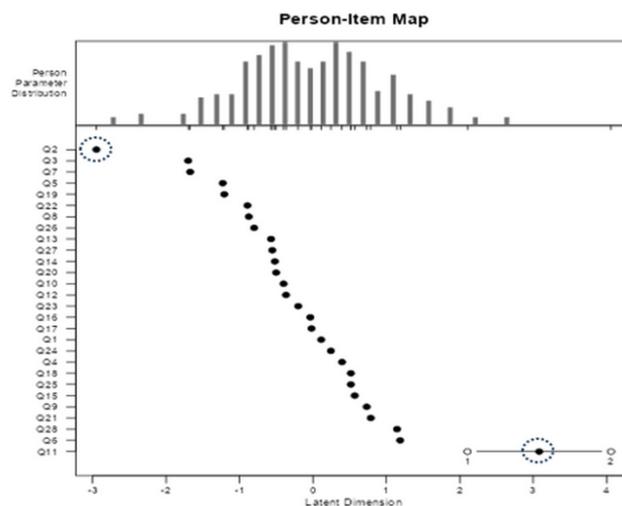


Figure 11. Person-item map for 8th grade children

Content analysis of the questionnaire for the 5th grade

On the sample of children of the 5th grade (N=175) analysis of the questionnaire content indicated that applied questions completely have satisfying internal consistency (Cronbach's $\alpha=0.66$; McDonald's $\omega=0.67$), which is lower in comparison to the sample of the children of the 8th grade. Also, in the sample of 5th grade children, lower values of Interclass correlation (0.62) and Guttman's Split-Half Coefficient (0.61) were obtained. Average correlation and standard deviation have also been lower ($r=0.50\pm 0.15$) with the variation coefficient of 29.1%.

Analysis of the individual questions (Table 3) indicated that the problems exist with the same questions as with the samples of the 8th grade

children. Questions Q11, Q2 and Q25 have low discrimination index values, especially the question Q11 which has a negative discrimination coefficient. With the question Q2 you can also notice high difficulty index value. At question Q11, Rasch model has also identified high outfit index value and very low point biserial correlation, what confirms that with this sample this question also does not have the common object of measurement with the other questions in the questionnaire. Removal of question Q11 led to the increase of Cronbach's alpha coefficient 0.671 and McDonald's coefficient to 0.677, and after removal of question Q25 further increase of Cronbach's alpha coefficient to 0.6791 and McDonald's coefficients to 0.683.

Table 36. Item statistics for 5th grade children

Item	Difficulty	Discrimination	Point biserial r	Outfit index
Q1	0.457	0.458	0.410	0.930
Q2	0.937	0.167	0.190	0.899
Q3	0.783	0.208	0.389	0.816
Q4	0.354	0.667	0.355	0.950
Q5	0.697	0.250	0.374	0.898
Q6	0.217	0.792	0.329	1.059
Q7	0.811	0.583	0.429	0.774
Q8	0.669	0.250	0.331	0.944
Q9	0.240	0.375	0.230	1.116
Q10	0.531	0.458	0.308	1.017
Q11	0.149	-0.042	0.065	1.469
Q12	0.543	0.542	0.485	0.844
Q13	0.577	0.500	0.238	1.129
Q14	0.537	0.208	0.395	0.930
Q15	0.343	0.375	0.310	1.010
Q16	0.469	0.542	0.178	1.202
Q17	0.451	0.833	0.332	0.976
Q18	0.314	0.542	0.356	0.972
Q19	0.691	0.500	0.388	0.917
Q20	0.600	0.625	0.328	0.963
Q21	0.320	0.292	0.231	1.183
Q22	0.674	0.542	0.368	0.933
Q23	0.486	0.708	0.318	1.038
Q24	0.423	0.333	0.341	0.974
Q25	0.314	0.208	0.151	1.236
Q26	0.611	0.337	0.284	1.068
Q27	0.594	0.542	0.291	1.027
Q28	0.263	0.250	0.313	1.004

Overview of question map and persons for the 5th grade (Figure 2) confirms the previous finding that question Q11 completely deviates from the distribution of results. That is also noticeable with

question Q2 on the other side of the distribution, where the extremely high heaviness index has been noticeable, that is, extremely high number of the correct answers.

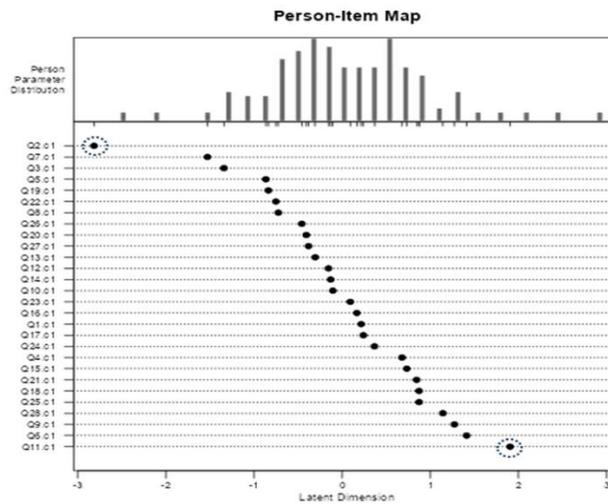


Figure 12. Person-item map for 5th grade children

Discussion

The adapted Health-Related Physical Fitness Questionnaire (Appendix A) showed good internal consistency and reliability in both analyzed grades. On the sample of the 5th grade children, we obtained similar results that were acquired by Hodges et al. (2015a). Higher reliability coefficient values have been obtained with the children of the 8th grade. This was expected given the greater understanding of the role and application of physical activity in improving health in older children. Volk et al. (2022) found, in a sample of 9th grade German children, that the reliability of the 27 items was 0.65, and the test-retest reliability reached 0.70.

The average success of question resolving in the questionnaire with the children of the 5th grade is 47% and with the children of the 8th grade 50%. The obtained level of HRPF knowledge is lower than the level obtained in the study by Hoges et al. (2016) on a sample of the 5th grade children (55.2%). Also, Serbs et al. (2017) and Çimen et al. (2024), using Turkish the 36-question HRPF test, found a success rate of 52.6% for 5th grade children and 63.5% for children 12 to 14 year.

The lower level of HRPF knowledge among our children is expected, given that the PE curriculum in our schools does not specifically include content oriented towards knowledge related to HRPF. It is necessary for the new PE curriculum to focus more on different topics of HRPF knowledge, so that

children gain an in-depth understanding of all HRPF topics.

There are confirmations that practice of the application of the special content in the PE classes directed towards the knowledge improvement of HRPF advances that knowledge (Demetriou et al., 2015; Hoges et al. 2016; Serbs et al. 2017). It is significant to emphasize that it is necessary that professors of PE have enough knowledge about health-oriented fitness to create an adequate environment and satisfy interests and needs of the children (Haerens et al., 2011; Santiago, & Morrow, 2020).

Question analysis by application of the mixRush method to this research confirmed the results of Hodges et al. (2015a) about problems with questions Q11, Q2 and Q25, which have shown low value of the discrimination index. These are questions based on which one could not differ children by their knowledge level about health fitness. This kind of results suggests that listed questions should be adapted to correspond to the primary school children terminologically. Children heard some of the expressions for the first time, or they heard them more times, but they were not conscious of their meaning. Some of these terms are overload, aerobic activity, flexibility, cardiovascular endurance. We think that it affected their answers in this questionnaire. Replacing these terms: overload - with additional muscle load, Flexibility - with joint mobility, Aerobic activities - with outdoor, would

probably lead to a better understanding of the question and more realistic answers.

The adapted Health-Related Physical Fitness Questionnaire (HRPF) extends the possibilities of research in Serbia on health-related fitness knowledge in physical education. In the next period, it would be necessary to perform checking the questionnaire features with the other ages of primary school children, as well as the children from secondary school.

Conclusion

After adaptation being done and Serbian language translate of the questionnaire, presented results of the content analysis of the questionnaire and removal of the noted deficiencies with three extracted questions, we can recommend analyzed questionnaire as a solid instrument for knowledge evaluation of health-related fitness of the primary-school children.

Limiting factor in the analysis of this questionnaire was certainly the necessity of the adequate terminology translation and concepts from the English language which are specific for the field of the health-oriented fitness. Therefore, the key task was to maintain the basic sense and question directionality towards the original components of the health-oriented fitness which was covered by the original questionnaire.

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