A Questionnaire for Assessment of Healthy Living Aspect of Physical Education for Secondary School Children: Initial Development and Validation

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ABSTRACT

Physical education provides a scientific base of knowledge to the children which combines biological, physical, environmental and social studies. The shortage of efficient steps to show the value of physical education in learner growth is a grave problem for the future of the discipline in this era of enhanced transparency (Lund & Kirk, 2010). Based on the curriculum guidelines for assessment in Physical education, there are four aspects, viz., physical fitness, sports skill, healthy living and neuromuscular co-ordination, to assess the efficacy of physical education programs. This paper establishes and validates an instrument for assessing the healthy living aspect. Following the goals of the National Curriculum System Physical Education Policy, the first edition of the statements was prepared. The instrument components were objectively evaluated through professional judgment (n=10) to ensure the high consistency, validity and understandability of the claims and proper association of characteristics. The exceptional findings of the pilot test (n = 600) strengthened the curricular framework and confirmed the quality and efficacy of the questionnaire. Exploratory factor analysis revealed a number of statements that were in accordance with the initial methodology and a connection between the factors and the assertion was sufficient for the confirmatory factor analysis. Fitting indices show that the conclusions coincided well with the questionnaire and also Pearson correlated test corroborated positive, important correlations by the suggested variables. The questionnaire has also demonstrated strong outcomes and has the ability to determine the knowledge of healthy living aspect learnt through physical education in secondary school childrens.

KEY WORDS: HEALTHY LIVING, PHYSICAL EDUCATION ASSESSMENT, QUESTIONNAIRE VALIDATION AND DEVELOPMENT.

INTRODUCTION

For physical education programmes to be successful, the curriculum plays an important role. Focus on the curriculum for physical education is vital because a major problem is that students do not understand and appreciate

the impact of physical education on other faculties not just during the learning phase but all through the life. Hennessy (1996) cites an example of the fact that the knowledge of algebra which a student acquired in the school might not be used later in day to day life, however, there exists endless use of the hand-eye coordination and the slightly bigger lung capacity which resulted from the participation in physical education programmes.

One of the aims of physical education is to educate students to be involved physically. Physical education helps prevent sedentary lifestyle in students by teaching skills, values, and common knowledge about physical exercises. Students are taught the healthy ways of life. They are also taught how to take care of their personal

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health. Physical education also has preventive health benefits for the students. Majority of the health problems can be prevented by physical exercises and the discipline which is imparted by physical education. Obesity, which is now considered a global endemic, can be controlled and surmounted through proper physical education programmes. Another goal of physical education is to help make learning fun.

Using sports to involve the students in the learning process accelerates their development. Use of sports to help in the personal growth of students is a very effective mechanism. For example, improvements in the emotional and communication skills of a student can be very effective through sports. Physical education also instils the values of teamwork and coordination. Yet another goal of physical education is to ensure the inclusion of those students who are typically excluded from the society based on social class, gender and disability. Kidd and Donnelly (2000) demonstrated the need for a physical education programme which ensure girls achieve the parity of esteem. Donnelly (2008) highlights the fact that “poverty is the single greatest barrier to participation” in the context of sports. Physical activities help enhance health, self-efficacy, and community inclusion of persons with disabilities (Moss, Landon & Fleming, 2017)

Ensuring a holistic curriculum for physical education requires an effective assessment of the same. Evaluation is a learning method for pupils, instructors, parents and policy-makers in physical education. The aim of Veal (1995) was to offer guidance to both learners and teachers while evaluation is part of the teaching and learning stage of practice; the key goal of the appraisal.” Anderson & Goode (1997) describe assessment as a “three-way connection between teaching, testing, and learning.”

Healthy Living Aspect in Physical Education: We are living through an era in which overweight and obesity have become a major global health problem, particularly among children and young adults (International Obesity Task Force, 2009; World Health Organization, 2010). It is well known that the habits in adult life are greatly influenced by the patterns developed during childhood. (Freedman et al., 2007). The growing epidemic of obesity among children and young people is also becoming an issue for potential adults. The problem is complex and needs to involve a systematic, multidisciplinary strategy. Worldwide professionals of health, leisure and physical education play an important role in applying responses to this issue. Innovative methods of pedagogy must be included, health and physical education systems must be more efficiently integrated, balance active lifestyle patterns should be promoted, technologies used to teach physical education should be studied, and school activities should be connected with informal community programs with help of physical education teachers. (Edginton et al., 2011).

The national health curriculum standards should encourage the preparation of curriculum for a

comprehensive professional education curriculum for school health. The guidelines are designed to enhance realistic health knowledge and to identify core skills for all forms of healthy living. These techniques include analysis of the value of the actions of family, colleagues, community, media and technologies; studying how to access and use adequate health information; using communication, decision making, metrics and advocacy skills to promote health behaviour. Furthermore the efficiency and effectiveness of health education programs was correlated to an appropriate amount of time spent in health education classrooms.

There is a strong connection between school health curriculum and health literacy. Health literacy is the willingness of citizens to gain important information and services about health, to understand and to develop them. Students must develop their wellness literacy and boost their quality of life in order to accept and maintain healthy behaviour. A research study from the Institute of Medicine on health literacy states that the most effective approach to improve health literacy is to ensure that health education is a part of all educational curriculum. “The research has shown that successful school-level wellness initiatives are intense and begin before risky behaviour, according to the World Health Office (WHO) It is essential for students to obtain adequate time to obtain vital data and health education skills that are gained and improved year on year.

MATERIAL AND METHODS

Main goal: As we are aware that research work in assessment of the physical education is very limited, thus the specific aim of this work was to develop and validate a Healthy Living aspect assessment instrument, which is one of the three aspects of the physical education program: physical fitness, sports skill and neuromuscular coordination.

Procedure: According to earlier works of Alfrey, O'Connor, Phillipson, Penney, Jeanes & Phillipson, 2017; Cumming, Woodcock, Cooley, Holland, & Burns, 2015, Denson & Bowman, 2015; Perry, Nicholls, Clough, & Crust, 2015; Richards, Gaudreault & Woodland, 2017; Rossato, Uphill, Swain & Coleman, 2016; Wang, Shen, Luo, Hu & Garn, 2018 the process of construction and validation of the tool were performed which included: theoretical foundation, initial statement preparation, expert judgement(logical review), pilot study data collection, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Thus the SPSS program used both mathematical methods and the PCA (version 16.0). The Jamovi program was used to execute the CFA.

Participants: Ten experts took part in logical review from field of Physical education and sports sciences with minimum of five years' experience in government or private institution. The empirical review was conducted on 600 secondary school students from government and private schools in Noida, Uttar Pradesh.

Figure 1

Theoretical Foundation and Selection of variables
As per the National curriculum framework, the objective of Physical education is to

Table 1. Rotated component matrix from EFA

	Component 1	2	3
VAR00039	0.89		
VAR00001	0.884	.	
VAR00040	0.878		
VAR00002	0.877		
VAR00011	0.874	.	
VAR00006	0.872		
VAR00058	0.863		
VAR00046	0.861		
VAR00028	0.854		
VAR00009	0.853		
VAR00015	0.847		
VAR00050	0.831		
VAR00018	0.826	.	
VAR00029	0.814		
VAR00007	0.809		.
VAR00041	0.809		
VAR00031	0.806		
VAR00008	0.797		
VAR00032	0.725		
VAR00025	0.669		
VAR00035	0.653		
VAR00037	0.623		.
VAR00052	0.605		
VAR00044		0.863	
VAR00005		0.861	
VAR00024		0.853	
VAR00036		0.85	
VAR00056		0.846	
VAR00016		0.845	
VAR00049		0.831	

- Encourage children to know and embrace the obligation for safe home, school and community life, both personally and collectively,
- Allow them to consider their health condition, recognize health conditions and be told of steps to correct them.
- Sensitizing children to protective laws in appropriate dangerous conditions to minimize collisions and injury.
- Familiarization with first aid procedures on customary disease, injury and accidents.

Table 1. Rotated component matrix from EFA

	Component 1	2	3
VAR00017		0.811	
VAR00060		0.721	
VAR00010		0.704	
VAR00038		0.7	
VAR00033		0.698	
VAR00019		0.694	
VAR00048	.	0.692	
VAR00026		0.691	
VAR00021		0.688	
VAR00053		0.683	
VAR00013		0.681	
VAR00051		0.657	
VAR00003		0.643	
VAR00047		0.57	
VAR00055			0.802
VAR00022			0.74
VAR00004			0.733
VAR00043			0.722
VAR00014			0.721
VAR00030			0.717
VAR00034			0.697
VAR00023		.	0.685
VAR00059			0.68
VAR00054			0.654
VAR00045			0.649
VAR00057			0.635
VAR00020			0.63
VAR00027			0.628
VAR00042			0.627
VAR00012			0.614

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 6 iterations.

Thus, the variables selected for Healthy living were Personal Health, Environmental health and Family health. As per these variables list of 90 statements were proposed involving 10 statement from each sub variables

for assessing healthy living aspect in secondary school students.

Expert Judgement: We underwent a rational analysis to test the validation of the structure. An professional assessment was used to improve the method. To do this the ten experts from field of Physical education and sports sciences with minimum of five years' experience in government or private institution validated the statements and their belonging categories by filling the document where they had to select the categories for each statement as per their expertise provided in the form of questionnaire online at <https://study.pankajapandey.com/>. The statements which were selected by at least 5 experts for that particular category were select for the second version of the questionnaire and thus 90 statements were reduced to 60 statements for the further validation and pilot test.

Pilot test data collection: Throughout the pilot study, an empirical review of the statements was performed before applying the EFA (Exploratory Factor Analysis) and the CFA (Confirmatory Factor analysis). During the process, the questionnaire including 60 statements finalized after expert review was filled by N=600 secondary school children which is a significant no of samples for pilot study. A five-point Likert scale from one to five cumulative disagreements to consider the knowledge of secondary students with each argument was used. If the claims were closely connected to perform a factor study was checked by the KMO Sampling Calculation Adequacy and the sphericity test by Bartlett. The nearest the KMO value to 1, the more comparable the variations in the declarations are. The high value of 0.981, which is acceptable, was obtained from the KMO examination. The test results of the Bartlett revealed a valuable common ground between the statements (Significance level $p < .05$), it was obtained a result of $\chi^2 (1770) = 9.98, p=.000$. Based on these results, the data obtained from the questionnaire satisfied all the conditions for the factor analysis.

Exploratory Factor analysis: An EFA was done to categorize the statements in order to explain the internal structure of the questionnaire. The EFA was carried out using the principal component analysis process of extraction. The rotation approach used standardisation of Varimax and Kaiser, which converged into six iterations and displayed 4 major categories describing 77.67 percent of total variance. With regard to the extraction of claims, the declarations were divided into three classes or variables shown in Table 1.

To investigate the position of the item/statement, a part plot was derived from the collected data in a rotated space graph. The findings revealed the exact position of the object after rotation during the EFA, which showed that the items were strongly connected in figure 2.

Since the current questionnaire has the same number of categories as the original category proposed (three) the layout of the categories after the EFA was different from

the initial proposal. Although the number of statement selected for the final questionnaire were on the basis of the factor loading values of each statement in each category. Statement with factor loading values 0.6 or more were selected from all the three categories. For the feasibility of students and the time limitation for assessing the students in the subject only 25 statements were finalized for the questionnaire. 9 statement from component one with highest factor loading and 8 statements each from component two and three with highest factor loading were selected for the study as shown in figure 3.

Figure 2: Component plot in a rotated space graphic from the EFA

Confirmatory Factor Analysis: This method tests if the data suit into a hypothesized model of measurement. The purpose of this experiment was to prove the accuracy of the planned new distribution. In the new questionnaire, the route diagram indicated an appropriate connection between the variables (categories) and the objects investigated. (Figure 4).

The relative health indexes displayed outstanding, decent and reasonable results respectively, and results similar to the reference ranges were obtained in the IFI, TLI and CFI indices. The details then fit properly into the default delivery model.

Test for Exact Fit: χ^2 df p
4107 272 < .001

Fit Measures:

RMSEA 90% CI				
CFI	TLI	RMSEA	Lower	Upper
0.893	0.882	0.153	0.149	0.157

Reliability test: Finally Pearson Correlation test was conducted for reliability of the questionnaire for which the 25 statements were then converted in Multiple Choice questions (MCQ) to assess the knowledge of secondary school students about healthy living. The test retest method was then administered for the reliability of questionnaire on 60 secondary school going students. The scores from Time 1 and Time 2 were then tested for correlation by using Pearson Correlation test in order to

evaluate the test for stability over time (Colin and Julie, 2006).The result was found to be acceptable as shown in figure 5

Figure 3

Item No.	Question	FACTOR LOADING VALUES		
		Component 1	Component 2	Component 3
1	Body Mass Index is an important metric to measure one's health	0.884		0
2	One should visit the doctor for regular check-ups	0.877		0
3	Health related TV programs are useful and should be seen	0.840		0
4	One must know their own and their family members' blood groups		0.731	0
5	It is important to take care of one's personal hygiene	0.861		0
6	Increased body weight is harmful and one must work on controlling it	0.871		0
7	It is advised to sleep for 7-8 hours a day for a healthy lifestyle	0.889		0
8	One can usually watch or play video games on computer, table or mobile phones for more than 2 hours a day	0.797		0
9	Performing physical activities or exercises make one feel refreshed and recharged	0.853		0
10	Before and after performing any physical activity, one must warm up and cool down by stretching	0.704		0
11	One should prefer using stairs instead of escalators or elevators wherever possible	0.674		0
12	One should understand the difference between aerobic and anaerobic exercises		0.614	0
13	One must appreciate and participate in learning new sports and exercises while in school or academy		0.681	0
14	One must make bread, cereals and grains at least three a day		0.721	0
15	Being careful about the quality of drinking water is important	0.847		0
16	One must be aware of the benefits of cleanliness and the disadvantages of uncleanliness especially their health hazards	0.845		0
17	Plastic wastes are harmful to the environment	0.811		0
18	The quantity of plastic (drinking water resources available in the world) are finite and are diminishing with time	0.835		0
19	Being able to adapt to changes at school or home easily is a sign of good mental health		0.694	0
20	Physically hurting oneself, such as cutting or bruising oneself, is a sign of inner stress and must be checked		0.630	0
21	One must be aware of and vigilant about various kinds of diseases such as physical, emotional or sexual	0.689		0
22	Daily products such as milk, yogurt and cheese should be consumed daily		0.740	0
23	It is important to be aware of HIV, infection and AIDS and how to avoid them		0.665	0
24	One must be taught the meaning of recycling and the need of reuse	0.863		0
25	Being happy about ourselves is important	0.689		0
26	It is important to segregate garbage	0.695		0
27	One must continue to learn the area where they live or spend time at school or home	0.629		0
28	One must spend at least an hour a day in physical activities such as swimming, cycling, exercising or playing games	0.864		0
29	Drinking plenty of fluids at regular intervals during the day is important	0.854		0
30	One must organize or participate regularly in group activities for some social cause		0.717	0
31	Schools must have a clean and safe toilet	0.885		0
32	One must turn the tap and wash their hands before and after using	0.775		0
33	Respectful and judicious use of natural resources is vital for our survival as a species	0.698		0
34	One should strive to support or help the underprivileged children		0.697	0
35	Documentary movies/books should be taken in the school and print media helps in creating and reading awareness with regards to the pollution	0.693		0
36	The main cause of air and water pollution is the effluent from industries	0.850		0
37	Eating sugar coated breakfast cereals or adding sugar to breakfast cereals makes the breakfast less healthy	0.623		0
38	The importance of Balanced Diet must be taught and practiced	0.700		0
39	Getting angry frequently and easily is a sign of a healthy mind	0.686		0
40	Expressing your feelings is an equally important part of your well-being	0.659		0
41	One must discharge their duty to protect the environment provided for in the Constitution of India	0.889		0
42	Being choosy about clothes, sweaters and shoes regularly is a part of a balanced diet		0.627	0
43	One must make 5 portions of fruits and vegetables a day		0.720	0
44	One must be aware of and actively participate in the Swachh Bharat Mission program launched by the Government of India	0.863		0
45	Regular consumption of water (tap or bottled) is good for your health		0.648	0
46	One must teach their parents or teachers when they have a problem in their lives	0.861		0
47	One must be aware of the various authorities before filing a complaint or else filed in case any individual/group/industry/state pollutes the environment	0.670		0
48	Diseases caused due to deficiencies of vitamins and minerals are preventable and one must be aware of them	0.692		0
49	Excessive noise can be extremely harmful, may even lead to death	0.811		0
50	The awareness of the causes of homelessness is low in India	0.881		0
51	There are risks associated with common pests and one must be aware of the ways to control their infestation	0.657		0
52	Knowing about the nearest hospital to your home and school is a must	0.885		0
53	Visiting an Old age home or an orphanage is an important practice	0.683		0
54	One must be aware of the difference between Empathy and Sympathy		0.654	0
55	One must be aware of the history of any chronic hereditary diseases that run in their family	0.846		0
56	One should not interact with the Sanitary workers at school or home		0.635	0
57	India has suffered from colonization of people due to their profession and violation of their rights have happened	0.863		0
58	One must be aware of the concept and benefits of Swachh Bharat		0.680	0
59	Students must be taught the first aid procedures and use of first aid kit		0.680	0
60	Knowledge of any allergies that you or your family members may suffer from is a vital in times of emergencies	0.701		0

Figure 4: Path diagram from the CFA

Figure 5: Correlation

	Score1	Score2
Pearson Correlation	1	.987**
Sig. (2-tailed)		.000
N	60	60
Pearson Correlation	.987**	1
Sig. (2-tailed)	.000	
N	60	60

DISCUSSION AND CONCLUSION

It is important to link the benefits and results of physical education to the core learner areas of the 21st Century such as critical learning, problem solving, endurance and acceptance capability, the ability to understand and express information and the ability to act innovatively in order to continue to be valued as part of the basic school curriculum (Bailey, 2006). In the last 40 years major changes and improvements were introduced in physical education including a shift from traditional game playing for recreation to a greater focus on healthy living, wellness and lifelong physical activity (Bocarro et al., 2008; Jago et al., 2009; McKenzie & Kahan, 2008). The importance of physical education programs are constantly being measured worldwide. Physical education initiatives need to produce evidence that will allow the profession to render curriculum interventions even more accountable. The lack of

transparency in physical education assessment programs prohibits physical education subject from being part of any community's wellness infrastructure. Quality expectations and methods of assessing the effect of physical education and its effect are the need of the present scenario in physical education.

In an increasingly structured field of schooling, the requirement for physical education program for children to show their fundamental skills is imperative. The teacher in physical education are constantly called upon to show student abilities to improve the skills to maintain an active lifestyle for wellbeing. The current study for the latest questionnaire creation on healthy living will lead to increase the standard and quality of physical education assessment. All the criteria for development of standardized questionnaire of were followed to establish a structured questionnaire that improves the importance of the questionnaire and makes sure a broad variety of implementations are included. In order to ensure good accuracy, validity and interpretation of the variables in the questionnaire and the right association of

characteristics, the filtering method was performed using expert evaluations. The suitability of the questionnaire, and the apt feature selection to determine the healthy living aspect of Physical Education, is reaffirmed considering the decrease in the number of items and the modifications did not alter the import of the original proposal.

The excellent results from the pilot test statistically strengthened the theoretical foundation for the questionnaire and provided excellent reliability values for the Cronbach alpha test, without substantial changes in deletion of the statements. The KMO and Bartlett resulted in excellent results and significant results, which revealed that the statements were strongly related and was suitable for factor analysis. The EFA of the questionnaire structure established the grouping of the items into three classes aligned to the initial (curricular) approach, which led to little distinction from the original proposal. Without some significant changes from the first edition, the latest delivery was easy to understand and validated the structure of the questionnaire. In comparison, the reliability requirements were high for the new groups. The CFA has further analysed the composition of the questionnaire and the results proved sufficient relations between statements and variables. The absolute, incremental and relative fit indices were excellent, efficient and sufficient results for both the χ^2/df , RMSEA and RMR tests; hence the data were considered to be in accordance with the distribution questionnaire. Finally, the Pearson correlation test has demonstrated that there was a strong correlation between the statements of questionnaire.

To conclude, a precious questionnaire was developed and tested to evaluate the healthy living aspect of physical education in secondary school students and to serve the original intent of this work. This developed tool is valuable for assessment of physical education and contribute in assessing the knowledge of healthy living among children studying in secondary schools.

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