

## Validation of a Physical Activity and Health Questionnaire for Young People

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### Abstract

*The objective was to design and validate a questionnaire that measures the degree of knowledge of young people about the physical activity and health recommendations of the World Health Organization. Methodology: A quantitative, non-experimental, descriptive and cross-sectional study was carried out, for its elaboration a disciplinary team was formed, a pilot test and validation of the questionnaire were formed. Content validity (CVI and Tristan), construct validity (Kolmogorov-Smirnov) and principal component factor analysis, and reliability of internal consistency (Cronbach's alpha) were determined. Results: the final questionnaire, consisting of 20 items with 2 dimensions physical activity and health, completed the online questionnaire. Factor analysis showed a probable structure of 2 factors, with 41.16% of the total variance, global content validity (CVI=0.79), construct validity, and Cronbach's alpha reliability (0.71). Kaiser-Meyer-Olkin (KMO=0.72) and Bartlett's sphericity test ( $p<0.001$ ) were performed. Conclusions: The questionnaire designed is agile, valid and reliable to measure knowledge about physical activity and health according to the World Health Organization. In this general context, it is especially necessary to know the validity and reliability of the instruments used in the assessment of physical activity, since the existing psychometric instruments and their use for diagnostic purposes offer questionable results. It should be noted that there is no published evidence that records an instrument. Is Cuafys-J a valid tool to measure knowledge about the WHO's physical activity and health recommendations in young people?*

**Keywords:** World Health Organization; knowledge; guidelines; adolescents.

### Introduction

The World Health Organization (WHO) considers "physical inactivity as the fourth leading determinant of global mortality risk, accounting for 6% of deaths worldwide" (World Health Organization [WHO], 2013). A significant fraction of mortality from the most common chronic noncommunicable diseases (NCDs) is attributable to physical inactivity. A 20% reduction in mortality from NCDs would lead to a significant decrease in mortality from NCDs (Olguín, 2009). Physical activity (PA) is a factor that intervenes in the state of health of people, health not only as the absence of disease, but as a physical well-being that

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consists of a personal task that arises from self-discipline, from taking care of our own body, including daily routine activities, such as household chores, and from work or with some degree of effort such as, for example, moving from one place to another, doing a sport and many others that human beings do daily (León & Berenson, 2013). Studies highlight that some PA is better than nothing and the mortality risk reductions associated with moderate to vigorous intensity PA are independent of how the activity accumulates (Saint, 2018), i.e., any PA, regardless of the level of intensity, can reduce the risk of all-cause mortality by up to 17% (Ekelund et al., 2019). Likewise, low levels of PA, sedentary lifestyle or spending a lot of time sitting have a harmful effect on cardiovascular and metabolic risk factors, the recommendations of the WHO should be taken into account in future PA guidelines for the population (Leiva et al., 2017).

Globally, 81% of adolescents do not comply with the 2010 WHO global recommendations on PA, with no significant improvement in compliance in the last 10 years (WHO, 2020), despite many public health efforts to promote PA in Colombia, according to the 2015 National Surveys on the Nutritional Situation (ENSIN) in adolescence. PA was significantly reduced, with adolescents (13-17 years old) complying with the recommendations by only 13.4%, being the population with the lowest figure. With differences also for gender, 26% of schoolgirls have a lower prevalence of PA. There are also significant inequalities: evidence shows that in almost all countries girls and women are less active than boys and men, and that PA levels vary between higher and lower economic groups and across country and region. (WHO Guidelines on Physical Activity and Sedentary Habits: At a Glance, 2020)

PA in children has been studied by researchers. The ways of having fun and spending leisure time have changed drastically in recent years, children spend more time sitting in front of a screen than playing games and/or physical sports activities, which has a negative impact on their health (Cigarroa et al., 2016; Ray & Jat, 2010).

According to WHO report, women are the most affected by this lack of exercise, as they outperform men by eight points in this rate of inactivity. What's worse, this gender gap has widened over the course of the 21st century. In 2001, 25.5 per cent of men were inactive and 31.5 per cent of women were inactive; In 2016, this percentage has fallen to 23.4% in men while remaining almost the same for women, at 31.7% (Salas, 2018). "Cultural norms, traditional roles, or lack of social and community support can lead to reduced participation in PA among girls and women. These barriers need to be understood and addressed in order to plan and deliver culturally sensitive actions to support behaviour change," the WHO report states. Only nine out of 168 countries surveyed do women have a better inactivity rate than men, such as China and Finland (Salas Javier, 2018)

Questionnaires are very useful as they are easy to administer and have a low cost (Roosen et al., 2012). PA questionnaires have been used to estimate the level and measure the amount of PA in adolescents such as: The International Physical Activity Questionnaire for Adolescents (PAQ-A) (Hagströmer et al., 2008), Validation of the PAQ-C and IPAQ-A questionnaires in school-age children (Mart & Casaj, 2020), Minnesota Leisure Time Physical Activity Questionnaire (MLTPAQ), Bielan, according to parents in Brazil, measures the preferences of children aged 4 to 11 years (Bielemann et al., 2011). Camargo, which measures PA and sedentary behavior in children (Camargo et al., 2015). Aedo and Ávila, evaluates the self-efficacy towards PA in 900 children between 7 and 10 years of age in Mexico City, the results allowed the elaboration of a questionnaire of reliability and validity of construct, test-retest reliability and internal consistency, as a good indicator to evaluate the knowledge of this variable in the child population (Aedo & Ávila, 2009). Likewise, Galindo measured the time that adolescents spend on PA in Colombia and determined whether they complied or did not comply with the recommendations for daily time (Galindo F, 2020) indicated that the predictors of inactive behavior are: age, social role, social support, socioeconomic status, place of residence and access to recreation as well as (González & Rivas, 2018).

People's health can be better assessed through the use of tools that assess knowledge of PA recommendations suggested by the WHO (WHO, 2008). Health educators have recognized the need for these tests and have developed instruments to measure knowledge about NCDs and can help evaluate the effectiveness of PA programs proposed by WHO (Of et al., 2007).

There are no instruments that measure knowledge about PA and health for young people. There are different instruments to assess PA in any population. These instruments must have as indispensable characteristics a good validity and reliability (Robles and Rojas, n.d.), the validation of all these instruments is a requirement for them to be applied (Carvajal, et al, 2011). (Galicía et al., 2017) differentiate several types of validation methods when performing this process, such as validity construction, criterion validity, and content validity ratio (CVR). Pedrosa et al. consider that content validity is necessary to interpret test scores (Martínez et al., 2009; Pedrosa et al., 2013).

National guidelines alone do not produce an increase in the level of PA in the population (Martínez et al., 2009), which is why it is necessary to have statistics and questionnaires that indicate how much knowledge they have about PA in a population, this study aims to design and validate a questionnaire to measure knowledge of PA and health according to the recommendations of the WHO in young Colombian women.

## Methods:

This study is a quantitative, non-experimental, descriptive and cross-sectional study (Tristán, 2008), The sample consisted of 426 girls from 11 to 18 years old, from educational institutions in the city of Ibagué-Colombia, they were selected according to the following inclusion criteria: (a) female gender; (b) that the parents sign the informed consent and assent; (c) complete 100% of the PA and Youth Health Questionnaire (CUAFYS-J).

The procedure for the design and validation of the CUAFYS-J questionnaire (Figure 1), literature review, operationalization of variables, instrument design, presentation of the questionnaire to a multidisciplinary group of experts, validation (content, construct and reliability validity) and data processing and statistical analysis are proposed (Morera et al., 2018).

Figure 1

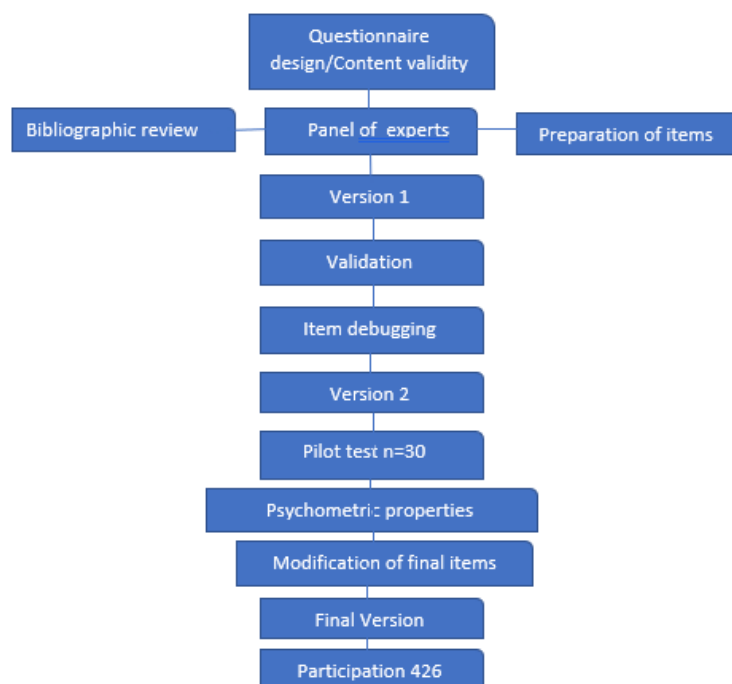


Figure 1. General outline of the study on the design and validation of the CUAFYS-J questionnaire to measure the degree of knowledge of PA and health according to the WHO

First, a review of the literature was carried out, taking into account the proposals of the Parmenter and Wardle diagram (Parmenter & Wardle, 2000). Second, content validity was carried out: it had the collaboration of 7 professionals in different fields of health (4 physical educators, 2 doctor, 1 nurse). It is worth highlighting the role of the moderator of the group, who guided the discussions that were reflected in a written statement by an observer (researcher), with the purpose of generating real questions according to the recommendations given by the WHO. Using the item criterion according to Lawshe (Ong & Blumenthal, 2010), the 7 professional experts commissioned took into account each alternative question to identify whether it was essential, useful but not essential and not necessary; In this way, select in the questionnaire the questions with scores greater than 0.58 to highlight their validity. Through the analysis of the questions, the professionals found writing problems due to the fact that they contradicted each other, which led to a modification in the wording and the way to the option of Likert-type answers. On the other hand, no language comprehension problems were found for any of the items presented by the participants in the pilot test (30 young people). Thirdly, Cronbach's alpha coefficient was taken into account, according to Oviedo & Campo-Arias, n.d., to define the accuracy and stability of the questionnaire that takes the value of 0.71 as a reference to give internal consistency.

In summary, the validation of the questions was carried out in order to verify their quality. For this process, the following were taken into account: -1. Apparent validity, which was responsible for verifying that the CUAFYS-J questionnaire assessed knowledge. -2. The validity of the content was confirmed through the literature review and the participation of a panel of experts (CVR and Tristán). -3. This was responsible for validating the reliability of the instrument used to measure the alpha coefficient, in this case the Cronbach coefficient. -4. Exploratory and confirmatory factor analysis. In this sense, the final questionnaire had 20 questions with multiple choice with a single answer.

It is a two-dimensional questionnaire on the WHO recommendations with the dimensions PA (questions 1,3,6,7,11,12,13,15,16,20) and health (questions 2,4,5,8,9,10,14,17,18,19). consists of 20 Likert-type items with 4 response options (disagree, neither agree nor disagree, agree, strongly agree), with an assessment scale (scale) of 1 to 4 points, 20 correct answers are equivalent to 100%, therefore, the scoring scale is: low level from 20 to 40; medium from 41 to 60 and high from 61 to 80. accessing the study sample through emails, along with some sociodemographic questions and perception questions.

## Results:

After the literature review, no validated questionnaire measuring knowledge was found, and even less so in young people. With the first draft of the questionnaire, a pre-test was carried out with 30 young people that allowed the questions to be reformulated, which gave rise to the final questionnaire. The time needed to complete the questionnaire ranged from 20 min. The demographic variables of the participants are shown in Table 1. where it was observed that girls have an average of: age 15 years, weight 53 kg, height 1.59 m. In addition, 58.9% considered themselves physically active, while 41.1% said they were physically inactive.

According to the Colombian Ministry of Education, the education of the participants was analyzed at three levels of schooling: 55.4% of the sample were in vocational school;

43.7% basic secondary education; 0.9% basic primary. On the other hand, 74.6% of the sample were not affiliated to any club.

Table 1.

## Sample characterization

Sociodemographic and anthropometric variables	Girls n=426 (100%)	
	Stocking	OF
Age (years)	15	2,05
Weight (kg)	53	10,02
Size (m)	1,59	0,73
<b>Educational Level</b>	<b><u>N</u></b>	<b><u>%</u></b>
Basic Primary (1st to 5th)	4	0,9
Elementary Secondary (6th to 9th)	186	43,7
Vocational Medium (10th to 11th)	236	55,4
	<b><u>Yes</u></b>	<b><u>No</u></b>
<b>Do you consider yourself physically active?</b> n (%)	251 (58,9)	175 (41,1)
<b>Are you enrolled in a sports club?</b> n (%)	108 (25,4)	318 (74,6)

Kg: Kilograms; m: meters; n/Quantity; %: percentage; SD: standard deviation

Content validity: according to Lawser's (1995) model modified by Tristán (2008), it demonstrated an instrument Content Validity Index (CVI) of 0.81, which indicates that it has acceptable psychometric properties to be used as an assessment tool as shown in Table 2.

Table 2.

## Reason for Content Validity

Items	Essential	Useful/ N.E.	Not Important	CVR Lawshe	CVR Trista n
1. The PA is	6	1	0	0,71	0,86
2. For the WHO, concepts related to sports, work activities, and home are considered as PA	6	1	0	0,71	0,86
3. The WHO recommends at least intense maximal-effort PA.	5	2	0	0,43	0,71
4. If I am 5 to 17 years old, the World Health Organization recommends doing at least 60 minutes of PA per day.	6	1	0	0,71	0,86
5. Which trip benefits your health the most when you go to school?	6	1	0	0,71	0,86
6. How important do you think it is that the WHO recommendations are applicable to all children and young people regardless of gender, social status and ethnicity?	6	1	0	0,71	0,86
7. Is moderate PA defined as?	6	1	0	0,71	0,86
8. Is regular PA every day good for your health?	5	2	0	0,43	0,71
9. Would not participating in regular PA increase the health risk?	6	1	0	0,71	0,86

10. Which of these diseases are not related to lack of PA?	5	2	0	0,43	0,71
11. Se should engage in vigorous activities at least three times a week	6	1	0	0,71	0,86
12. A child who begins to do PA should start with an activity:	5	2	0	0,43	0,71
13. What activities make bones stronger?	6	1	0	0,71	0,86
14. Young people who perform PA may feel compelled to use cigarettes, alcohol and drugs to be able to have more social behaviors	6	1	0	0,71	0,86
15. Is it recommended to perform recreational PA for more than 5 days?	6	1	0	0,71	0,86
16. Is vigorous PA defined as?	6	1	0	0,71	0,86
17. PA decreases in young people:	6	1	0	0,71	0,86
18. Performing PA helps young people learn to control the neuromuscular system (coordination and movement control)	5	2	0	0,43	0,71
19. Performing PA such as: riding a bike, walking fast, swimming or playing, every day more than 1 hour is bad for health	5	1	1	0,43	0,71
20. Si I am between 5 and 17 years old, I must do at least 1 hour of AF every day of the week	5	2	0	0,43	0,71
				12,29	16,14
Global CVI				0,61	0,81

CVR: content validity ratio, represents the degree of consensus of the expert panel (N = 7) on whether or not the reagent is essential to achieve the objective of the questionnaire.

CVR Lawshe = Lawshe's Content Validity Ratio

CVR ' Tristan = Tristan Content Validity Ratio.

CVI=Global Content Validity Index

N. E = not essential

Exploratory factor analysis of principal components was performed, where the Kaiser-Meyer Olkin coefficient was obtained with (0.72.) and Bartlett's sphericity test with a significance of ( $p < 0.0$ ) showed that the sample met the criteria for factor analysis. With the rotation of the matrix, 3 factors or dimensions were obtained that explain 41.16% of the total variance, as shown in Figure 2 of principal component sedimentation; finally, two dimensions remained: first PA and second health. Finally, a confirmatory factor analysis was performed that allowed the principal component extraction method to determine only two components, being similar to the WHO theoretical model.

Figure 2

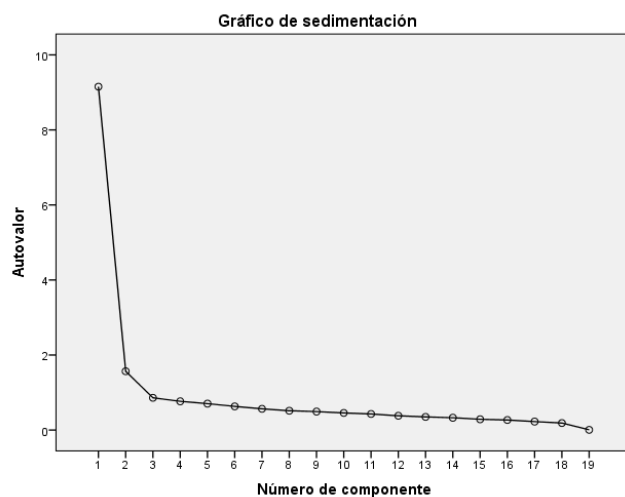


Figure 2. Sedimentation of eigenvalues for each factor or component.

Finally, with respect to reliability, internal consistency was established by Cronbach's alpha, a coefficient  $\alpha = 0.71$  ( $n=426$ ) which was interpreted as good (Meyers et al., 2006).

### Discussion:

Specialists in the field are increasingly interested and concerned about the routine monitoring of PA levels in young people. Consequently, over the past fifteen to twenty years, significant advances in technology and methodology have made it easier to estimate human energy consumption both in the laboratory and in the field. This is because techniques such as self-recall recordings, motion sensors, direct observation, and heart rate monitoring have become popular to assess PA practice. Kemper HCG, Saris WHM, Montoye HJ and Washburn RA (1996).

Validity and reliability were assessed in this study. It was born out of the need for a short, easy-to-use questionnaire to assess knowledge about PA and adolescent health, in line with WHO guidelines. The results of this study offer a useful tool to the scientific community. There is consensus among experts on the need for accurate tools to collect information on children's PA and health knowledge (Ong & Blumenthal, 2010). It is worth mentioning that the research will focus on adolescence, described by the United Nations Children's Fund (UNICEF) as the stage of growth between the ages of 10 and 19 that follows childhood, but precedes adulthood (UNICEF, 2021). Therefore, the aim of the present study was to create a simple self-report tool to determine the level of knowledge at these ages.

The reliability of the designed questionnaire was determined using Cronbach's alpha on a scale of 0.71, which according to Rosenthal and De Vellis can be considered an acceptable value, as it reaches values between 0.70 and 0.80 that have been advocated by other authors. From this perspective, in order to develop a PA questionnaire for adolescents, the study took into consideration the suggestions described by Dishman, Sunhard (Dishman, n.d.; Stubbe et al., 2007), by highlighting the minimum requirements that a measuring instrument must have, such as: validity and reliability. These values are similar in relation to other studies when evaluating motivational strategies in physical education classes. Nunnally JC. (1978), Cervelló E, Moreno JA, del Villar F, Reina R. (2007).

In addition, it was found in the review that authors such as: Prince, Prince, On the other hand, it is common to obtain low coefficients when analyzing the reliability of an instrument, with samples larger than 50, but these tend to be more stable (Morera et al., 2018). The results of the present study are consistent with previous studies, where with a large sample, the correlation tends to be low to moderate but stable.

The sample has a normal weight according to the WHO classification of girls (WHO, 2016) and according to the results of the CUAFYS-J questionnaire, 58.9% are considered physically active. As is also evidenced in other studies: Villar, came to the conclusion that, "in the field of sport, there is a gender gap, only 23.8% of girls between 12 and 17 years old exercise sixty minutes a day, 16% less than men" (Villar, 2019) and Leanne Riley shows that "young women are less active than boys" (WHO, n.d.). As time goes by, schoolchildren, and especially women in Colombia, perform less and less PA, due to laziness, lack of economic resources and youth culture (Varela et al., 2011). Therefore, the need to obtain results in this genre is demonstrated.

Globally, adolescent girls performed less PA than adolescents, and 85% of them versus 78% of them did not meet the WHO recommendations of moderate to intense PA for at least 60 minutes a day (WHO, 2020).

The questionnaire collects, in 20 items, the main aspects necessary to determine the knowledge of PA and health according to the recommendations of the WHO in girls. Likewise, HRQoL, through the judgment of experts, is the key part of these studies (Carvajal, et al. 2011). This type of test seeks to assess knowledge of a subject or course, to argue that a test is valid for a particular testing purpose (Mart, 2004). For all these reasons and with the results obtained in the study, it can be demonstrated that the questionnaire is valid, due to the relationship between each of the items and the test in general.

Based on knowledge of WHO recommendations, they provide specific information on the amount of physical activity needed for good health in different age and population groups. This information will help prevent and manage non-communicable diseases (NCDs), such as diabetes, cancer and cardiovascular disease, as well as decrease symptoms of anxiety and depression, support the healthy development of girls and generally improve the well-being of the population. It will also help to plan new public policies to raise awareness and improve the environment for a healthy life.

Consequently, if girls follow these instructions, their health will improve and they will learn healthy lifestyle habits. It is recommended to add lines such as PA behaviors in future studies.

Finally, there is not much research in our context that uses cross-sectional questionnaires to measure students' PA levels. Research indicates that it is essential to use questionnaires to examine prevalence, trends, and population tracking. This is due to the fact that sedentary lifestyles and other elements – mainly unhealthy eating habits – have played a role in the current change that has been observed in both undeveloped and industrialized nations. As a result, the suggested questionnaire for adolescents satisfies the standards of validity and reliability and has the potential to be generalized.

Therefore, despite the fact that the study did not control for some variables, such as socioeconomic status and non-probabilistic convenience sampling, the proposed questionnaire for adolescents meets the requirements of validity and reliability and could be generalized to populations with similar characteristics. Trost SG, Pierón M (2003), Pate RR (2005), Mciver KL.

### **Conclusion:**

The CUAFYS-J questionnaire is a practical, flexible, valid and reliable instrument to assess young people's PA and health knowledge according to WHO guidelines. The results demonstrate the validity of the instrument and show that it has sufficient psychometric qualities to be used as an assessment tool.

The degree of health improvement among young people is strongly correlated with their understanding of WHO standards.



The survey can be used to evaluate various interventions, PAs, health initiatives, and the follow-up associated with them. Therefore, the questionnaire is essential to determine the general public's awareness of these recommendations, which can influence public policies aimed at bringing about lasting behavioural changes that can improve the health of young people.

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