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Quality of Life of Adolescents: development and Validation of an Instrument with Students from the Esporte Cidadão Project - Indaiatuba Sports Secretariat (Brazil)

Qualidade de Vida de Adolescentes: desenvolvimento e validação de instrumento, com alunos do Projeto Esporte Cidadão - Secretaria de Esportes de Indaiatuba/São Paulo

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Abstract

Objective

Adolescence is a crucial phase in human development, encompassing biological, psychological, and social aspects, representing a period of change and preparation for adulthood. The objective of this study was to develop and validate an instrument to assess the lifestyle of adolescents, based on biopsychosocial indicators.

Method

After theoretical development, the instrument was administered to 1,289 adolescents aged 12 to 17. Reliability and validity analyses were conducted using Cronbach's alpha coefficient and factor analysis.

Results
The instrument consisted of 51 items across the following dimensions: Eating Habits, Physical Activity, Sleep and Rest, Personal Well-being, Leisure and Entertainment, Stress Management, Preventive Behavior, and Social Relationships. The factor analysis, using loadings above 0.50, suggested the exclusion of 18 items, and the Cronbach's alpha value was 0.802, indicating good internal consistency.

Conclusion
The final instrument comprised eight domains and 33 items, demonstrating satisfactory psychometric properties of reliability and validity, thus serving as an important research tool.

Keywords: Adolescents; Quality of life; Validation study.

Resumo

Objetivo
Adolescência é uma fase importante no desenvolvimento humano nos aspectos biológico, psicológico e social, um período de mudanças e preparação da vida adulta. O objetivo deste estudo foi desenvolver e validar um instrumento para avaliar o estilo de vida de adolescentes, baseado em indicadores biopsicossociais.

Método
Após levantamento teórico, o instrumento foi aplicado em 1.289 adolescentes de 12 a 17 anos incompletos. Para análises de confiabilidade e validade, utilizou-se o Coeficiente Alfa de Cronbach e Análise Fatorial.

Resultados
Instrumento composto por 51 itens nas dimensões: Hábitos Alimentares; Atividade Física; Sono e Repouso; Bem-estar Pessoal; Lazer e Diversão; Controle do Stress; Comportamento Preventivo; Relacionamento Social. Análise Fatorial, utilizando cargas acima de 0.50, sugeriu a exclusão de 18 itens e o valor do Alfa de Cronbach foi de 0.802, demonstrando boa consistência interna.

Conclusão
Conclui-se o instrumento com oito domínios e 33 itens, propriedades psicométricas adequadas de confiabilidade e validade, sendo importante instrumento de investigação.

Palavras-chave: *Adolescentes; Qualidade de vida; Estudo de validação.*

Adolescence is characterized as a stage of human growth marked by a period of development in various aspects such as physical, emotional, psychological, and social, a period in which one prepares for adulthood. During this phase, adolescents are more vulnerable to some of the greatest threats to quality of life. In this context, specific health promotion actions for adolescents are relevant, not only because of the importance of this age group but also because their lifestyle habits are being formed, and their quality of life and/or health condition are factors that may impact well-being in adulthood (Barbosa Filho, 2016; Souza & Kuczynski, 2018; World Health Organization [WHO], 2018).

In Brazil, the *Estatuto da Criança e do Adolescente* (ECA, Statute of the Child and Adolescent)[1], was created in 1990, aiming to ensure the comprehensive protection of children and adolescents, serving as a legal and regulatory landmark for the rights of this group. In this sense, "children and adolescents have all the fundamental rights inherent to the human person, without prejudice to their comprehensive protection," as well as "all opportunities and facilities to enable their physical, mental, moral, spiritual, and social development, in conditions of freedom and dignity" (Ministério da Mulher, da Família e dos Direitos Humanos, 2019, p. 15).

Established in 2006 by the Ministry of Health, the *Política Nacional de Promoção da Saúde* (National Health Promotion Policy) has the overall objective of promoting quality of life, consisting

[1] ECA - Article 3, Law nº. 8,069, of July 13, 1990.

of "Promoting equity and improving living conditions and ways of life, enhancing individual and collective health potential, and reducing vulnerabilities and health risks arising from social, economic, political, cultural, and environmental determinants," thus fostering the promotion of a healthy lifestyle (Ministério da Saúde & Secretaria de Vigilância em Saúde, 2018, p. 11).

A survey conducted by the Brazilian Ministry of Health, addressing the comprehensive health of adolescents, reported difficulties in adopting healthy habits during this stage, such as engaging in physical exercise and maintaining a proper diet (Ministério da Saúde, 2017). On the contrary, behaviors related to smoking, excessive alcohol consumption, illicit drug use, involvement in violence, and risky sexual behaviors were observed, highlighting the need for the creation of prevention programs developed in both the public and private sectors as one of the alternatives to address the crisis in the health sector. This involves expanding preventive care through education programs (Assumpção & Kuczynski, 2010; Buss et al., 2020).

In the present study, the concept of quality of life is understood from a subjective and multidimensional perspective, involving the biological, psychological, and social dimensions, presupposing the possibility of self-assessment (Soares et al., 2011; Souza & Kuczynski, 2018). In this context, quality of life is the result obtained through the guarantee of physical, mental, and social health and safety, as well as the capacity for development and application of skills, with the optimal use of personal energy (Taveira et al., 2015). Highlighting the importance of adopting a healthy lifestyle, Bettine et al. (2019) suggest incorporating certain habits such as engaging in physical activity and maintaining a balanced diet, fostering supportive and citizen-oriented affective relationships, and acquiring a positive attitude towards oneself and one's place in the world.

Thus, the assessment of the perception of quality of life among population groups is a relatively well-established topic in science through specific research instruments. However, there are no instruments specifically designed for this age group. Additionally, most instrument validation studies focusing on this construct are conducted for the English language. The absence of an instrument addressing this issue and catering to this segment of the population justified the undertaking of this research and complemented the interest in understanding and explaining events related to adolescence and their connections to quality of life. The absence of an instrument of this nature, addressing this segment of the population, justified the conduction of this research and complemented the interest in addressing and explaining events related to adolescence and their connections with quality of life.

Method

This research had a cross-sectional design, involving students from the *Esporte Cidadão* (Citizen Sports) Project of the Sports Secretariat of the city of Indaiatuba (SP, Brazil). The entire data collection process, as well as the handling of personal data of the adolescents, followed the principles of compliance with the *Lei Geral de Proteção de Dados Pessoais* (General Data Protection Law), preserving and strictly regulating the manipulation of personal data through consensual consent (Botelho, 2020).

The operationalization was carried out through the invitation and acceptance by parents/legal guardians, who received clarification about the research and signed the Informed Consent Form, ensuring the reliability and confidentiality of the collected information. Subsequently, the parent/guardian completed the socioeconomic and demographic questionnaire. After obtaining their consent, the assessment of quality of life was conducted with the adolescents. The study

complied with ethical requirements and was submitted and approved by the Ethics Committee of the Faculty of Pharmaceutical Sciences at the University of São Paulo, Opinion No. 792945.

Participants

A total of 1,289 students from the aforementioned project were involved, covering 22 sports centers where classes are offered in 20 different modalities[2]. Data collection took place between March and November 2015, with adolescents aged 12 to 17, of both genders.

Procedures

The methodological approach adopted for the search of validity and reliability evidence of the Classical Test Theory followed the recommendations of Hutz et al. (2015), which proposed three procedures for constructing instruments of this nature: the theoretical, empirical, and analytical procedures. The development of the instrument followed a survey methodology, which involves asking individuals about their thoughts and behaviors, ensuring better representativeness and generalizability to the population in terms of their feelings and ideas, in addition to other relevant data (Gunther, 2008).

The theoretical procedure was conducted through a literature review of articles indexed in electronic databases such as the *Literatura Latino-Americana e do Caribe em Ciências da Saúde* (Lilacs), Scientific Electronic Library Online (SciELO), and the International Literature on Health Sciences (Medline/PubMed) on the topic. At the current stage of the research, no validated instruments targeting the lifestyle of adolescents were found in the Portuguese language, corroborating the findings of the literature review presented by Soares et al. (2011).

However, some studies are still being conducted, such as the instrument developed by Nahas (2013) called Individual Lifestyle Profile - Adolescent, which is currently undergoing validation. Other sources applicable to this young population include the generic instrument World Health Organization Quality of Life developed by the World Health Organization (Barros et al., 2008; Soares et al., 2011). Additionally, the instrument validated by Constantino et al. (2012) was also considered for this research, where behaviors related to quality of life were assessed through a questionnaire that focused on self-perceived quality of life in adults, emphasizing biopsychosocial dimensions.

According to Hutz et al. (2015), regarding the theoretical part for instrument development, content validity starts with the conceptual definition, literature review of what each dimension consists of, and subsequent operational definition, in other words, which behaviors (typically called items) individuals should exhibit. Throughout the study, after the conceptual and operational definition of the dimensions that encompass the assessment of Adolescent Quality of Life, the instrument was submitted to 18 judges specialized in the domains for qualitative assessment of this initial stage of content validity. This stage of the task involves judging whether or not the items relate to the trait in question. In the analysis, it is necessary to verify if there is agreement of approximately 80% among the judges. In this case, item agreement was achieved and retained in the inventory (Pasquali, 2010).

The suggestions provided by the experts led to qualitative and quantitative modifications, incorporating theoretical contributions in dimensions such as eating habits, physical activity, sleep and rest, personal well-being, leisure and entertainment, stress management, preventive behavior, and social relationships (Constantino et al., 2012; Hutz et al., 2015; Pasquali, 2010).

[3] In 2015, approximately 4,500 children and adolescents were enrolled in the Project (Prefeitura de Indaiatuba & Secretaria dos Esportes, n.d.)

After the qualitative analysis by the judges, the instrument underwent a Pilot Study, initially administered to a small sample of the target population to perform a semantic analysis and assess the difficulty in understanding the items. The pilot study results were assessed, and a discussion was held with the panel of judges. It was decided to use a Likert scale ranging from 0 to 3 points: "does not relate to your lifestyle at all" (0), "sometimes corresponds to your behavior" (1), "almost always true in your behavior" (2), and "the statement is always true in your daily life, part of your lifestyle" (3).

Regarding the analytical stage, which involves analyzing the measurement properties of an instrument, Tavakol and Dennick (2011) emphasize the need to consider two fundamental characteristics: reliability and validity. For reliability analysis, Pasquali (2010) recommends the use of Cronbach's alpha coefficient, which measures the consistency of the instrument by assessing the extent to which each item correlates with the others and the ability of all test items to measure the same construct (Tavakol & Dennick, 2011). The Cronbach's alpha coefficient is an indicator of internal consistency, ranging from zero to one, with zero indicating no internal consistency and one indicating perfect consistency (Martins, 2006). A higher alpha value indicates higher internal consistency. Pasquali (2010) argues that the researcher should define the acceptable level of the alpha value. However, Pereira (1999/2004) considers 0.40 as an acceptable value, considering the complexity of the phenomenon being measured. In the present study, a value of 0.50 was adopted as an acceptable cutoff for Cronbach's alpha.

As a complementary measure of instrument reliability, the split-half technique by Pasquali (1997) was chosen. This procedure involves assessing the scores obtained from a single administration of the instrument by dividing the test items into two halves. The results are obtained by comparing the total scores of each individual in the first half and the total scores in the second half. If the instrument is reliable, the scores of the two halves should be strongly related. The more similar the scores of the two halves, the higher the correlation and the more reliable the instrument (Martins, 2006).

For the analysis of instrument validity, a test is considered valid if it measures what it intends to measure. Hutz et al. (2015) describe the concept of validity in three classic categories: content validity, criterion validity, and construct validity.

Construct validity refers to the degree to which a measurement instrument consistently relates to other similar measurements derived from the same theory and concepts being assessed (Martins 2006). This validity depends on the appropriateness of the instrument in relation to what is being measured. A measurement instrument is not simply valid; it is valid for a specific purpose. Pasquali (1997) states that the validity of the instrument can be assessed using Factor Analysis, which determines the number of common constructs needed to explain the covariances among the items.

In this study, Factor Analysis was chosen as a measure of validity, and the interpretation of factor loadings with correlations ranging from -1 to +1 was adopted. Eigenvalues greater than one were extracted. This method was used to identify clusters of related variables on a scale (Pasquali, 2010).

Descriptive analysis of the data was obtained for variables classified as qualitative (nominal or ordinal level) and was treated using absolute and relative frequency tables (percentages). The following software programs were used for data analysis and processing: IBM®SPSS® for Windows (version 20.0), MS Excel 2010®, and MS Access 2010® for data tabulation and manipulation. These tools were developed in the United States.

Results

At the beginning of the data collection cycle, the original version of the instrument consisted of 51 items distributed across eight domains. After obtaining the first version, the instrument was administered to 1,289 adolescents, with 7.03% being male and 32.97% female. In terms of age, around 70% of the participants were aged 14 or younger, while the remaining were older.

Regarding socioeconomic questions, the monthly family income was obtained using income brackets based on values divided in terms of minimum wage[3], where it was found that 37.30% of the families had a monthly income of up to two minimum wages, while 5.77% had an income above eight minimum wages. Based on the Economic Classification of Brazil, used by the *Instituto Brasileiro de Geografia e Estatística* (IBGE, Brazilian Institute of Geography and Statistics), in this study, 50.19% of the surveyed families were classified as economically belonging to the Brazilian Class C, while 44.40% were classified as Class B. In terms of the education level of the parents/legal guardians, 22% did not complete elementary school, 45.65% completed high school, and 11.54% had a college degree (IBGE, 2015; Oka, 2016).

Analyzing the responses in descriptive terms for each dimension, the group recorded an mean score of 2.05 points for the overall scale. The most affected dimensions were: Eating Habits (mean score of 1.65), Stress Control (mean score of 1.81), Physical Activity (mean score of 1.81), Sleep and Rest (mean score of 2.08), Leisure and Entertainment (mean score of 2.17), and Preventive Behavior (mean score of 2.17). The dimensions with the highest mean scores were Personal Well-being (mean score of 2.42) and Social Relationships (mean score of 2.26).

In the assessment of the coefficient of variation of the responses, it was observed that the distribution of items was not homogeneous, as the coefficient of variation exceeded 25%, indicating that the results presented a high variability (Rizzo, n.d.). Since it is a scale from 0 to 3, the values were not highly concentrated in one particular value. The most important aspect for the study is the correlation between these items.

Moving on to inferential analyses, the correlations ranged from 0.075 (item 3.3) to 0.474 (item 4.1). When analyzing the Cronbach's alpha achieved in each of the dimensions, satisfactory values were obtained (all domains had values above 0.50), and they were similar to the Total Alpha of the scale (0.833), indicating good internal consistency of the instrument (Pasquali, 2010), as shown in Table 1.

Table 1
Internal consistency coefficients of the instrument, according to Cronbach's alpha analysis

1 of 2

Item	Scale mean if item is excluded	Scale variance if item is excluded	Corrected item-total correlation	Cronbach's alpha if an item is excluded
1.1	100.828	273.405	0.250	0.831
1.2	100.905	0.326	0.197	0.832
1.3	99.943	266.859	0.391	0.827
1.4	99.771	267.250	0.413	0.827
1.5	100.580	276.975	0.081	0.835
1.6	100.336	274.750	0.141	0.833
2.1	100.185	273.001	0.189	0.832
2.2	100.482	273.074	0.191	0.832

[3] Minimum wage in the reference year - 2015 (IBGE): BRL 788.00, approx. USD 162.49 (exchange rate as of 06/19/2023). "Currency Converter: BRL to USD Rate." Western Union. Retrieved from: https://www.westernunion.com/br/en/currency-converter/brl-to-usd-rate.html.

Table 1

Internal consistency coefficients of the instrument, according to Cronbach's alpha analysis

Item	Scale mean if item is excluded	Scale variance if item is excluded	Corrected item-total correlation	Cronbach's alpha if an item is excluded
2.3	99.506	274.856	0.169	0.832
2.4	100.798	273.219	0.181	0.832
2.5	100.476	274.667	0.101	0.836
2.6	100.188	272.799	0.160	0.833
3.1	99.893	275.394	0.140	0.833
3.2	99.902	275.798	0.137	0.833
3.3	100.081	277.838	0.075	0.834
3.4	99.972	275.103	0.152	0.833
3.5	99.944	274.489	0.171	0.832
3.6	100.677	272.961	0.175	0.833
3.7	101.098	273.307	0.198	0.832
3.8	99.631	271.078	0.260	0.830
3.9	99.475	271.000	0.257	0.831
3.10	100.061	268.203	0.352	0.828
4.1	99.482	267.709	0.474	0.827
4.2	99.614	267.753	0.417	0.827
4.3	99.818	268.722	0.327	0.829
4.4	99.452	269.489	0.423	0.828
4.5	99.835	267.491	0.378	0.828
4.6	99.535	268.173	0.445	0.827
5.1	99.676	267.829	0.412	0.827
5.2	99.801	270.793	0.270	0.830
5.3	100.423	272.893	0.213	0.832
5.4	99.351	275.239	0.222	0.831
5.5	100.040	267.686	0.360	0.828
6.1	100.082	267.383	0.335	0.829
6.2	100.666	270.564	0.285	0.830
6.3	100.329	266.435	0.405	0.827
6.4	100.346	268.239	0.321	0.829
6.5	99.778	267.938	0.358	0.828
7.1	100.787	268.609	0.286	0.830
7.2	99.685	269.693	0.325	0.829
7.3	99.785	267.174	0.285	0.830
7.4	99.871	267.111	0.292	0.830
7.5	99.526	269.807	0.270	0.830
7.6	99.556	270.356	0.284	0.830
8.1	100.180	272.457	0.207	0.832
8.2	99.708	269.962	0.334	0.829
8.3	99.926	269.256	0.320	0.829
8.4	99.643	269.756	0.374	0.828
8.5	99.401	269.852	0.425	0.828
8.6	99.877	268.642	0.375	0.828
8.7	99.832	266.319	0.453	0.826
N (total items): 51			Cronbach's alpha (total): 0.833	

Source: Adapted from Constantino (2016).

In addition to assessing internal consistency, the investigation of instrument reliability, using the split-half coefficient, also yielded satisfactory results, with a significant association between the scores of the first and second halves. The Spearman-Brown coefficient had a value of 0.612, and the Guttman split-half coefficient was 0.604, both with an "ideal parameter ≥ 0.50," (Rossetti, 2018, p. 40), as recommended by Martins (2006). Thus, it can be said that the instrument demonstrates both reliability and validity, also supported by the Split-Half Technique.

Regarding the instrument's construct validity analysis, it is worth highlighting, in Table 2, the Explained Total Variance Factorial Analysis, which identified the 15 factors selected through variable correlation. When observing the Initial Eigenvalue column in the Eigenvalue item, values above 1.000 are selected, resulting in the first 15 components meeting this criterion.

Table 2

Factorial Analysis, according to Explained Total Variance

1 of 2

Factor	Initial Eigenvalues			Sums of Extraction of Squared Loadings			Rotated Sums of Squared Loadings		
	Eigenvalue	Variance (%)	Cumulative Variance (%)	Eigenvalue	Variance (%)	Cumulative Variance (%)	Eigenvalue	Variance (%)	Cumulative Variance (%)
1	6.554	12.850	12.850	6.554	12.850	12.850	3.489	6.842	6.842
2	2.808	5.506	18.357	2.808	5.506	18.357	2.896	5.678	12.520
3	2.634	5.165	23.521	2.634	5.165	23.521	2.288	4.486	17.006
4	2.234	4.381	27.902	2.234	4.381	27.902	2.256	4.423	21.430
5	1.945	3.814	31.716	1.945	3.814	31.716	2.248	4.409	25.838
6	1.706	3.345	35.061	1.706	3.345	35.061	2.044	4.009	29.847
7	1.542	3.024	38.086	1.542	3.024	38.086	1.989	3.901	33.748
8	1.513	2.967	41.053	1.513	2.967	41.053	1.986	3.894	37.641
9	1.336	2.620	43.673	1.336	2.620	43.673	1.847	3.621	41.262
10	1.232	2.415	46.089	1.232	2.415	46.089	1.628	3.192	44.454
11	1.198	2.349	48.438	1.198	2.349	48.438	1.396	2.737	47.192
12	1.117	2.191	50.629	1.117	2.191	50.629	1.269	2.488	49.679
13	1.097	2.150	52.779	1.097	2.150	52.779	1.237	2.426	52.105
14	1.035	2.029	54.808	1.035	2.029	54.808	1.232	2.416	54.521
15	1.011	1.983	56.791	1.011	1.983	56.791	1.158	2.271	56.791
16	0.995	1.950	58.742						
17	0.952	1.866	60.608						
18	0.928	1.819	62.427						
19	0.911	1.787	64.214						
20	0.877	1.719	65.933						
21	0.837	1.641	67.574						
22	0.831	1.629	69.202						
23	0.788	1.545	70.747						
24	0.782	1.534	72.281						
25	0.768	1.506	73.787						
26	0.766	1.503	75.290						
27	0.734	1.439	76.729						
28	0.703	1.379	78.108						
29	0.679	1.332	79.440						
30	0.673	1.319	80.759						
31	0.659	1.293	82.051						
32	0.645	1.265	83.316						
33	0.620	1.216	84.531						
34	0.603	1.183	85.714						
35	0.584	1.144	86.859						
36	0.583	1.143	88.002						
37	0.565	1.107	89.109						
38	0.561	1.100	90.209						
39	0.551	1.080	91.289						
40	0.545	1.069	92.358						
41	0.525	1.030	93.388						
42	0.514	1.008	94.396						
43	0.491	0.963	95.358						
44	0.456	0.894	96.253						

Table 2
Factorial Analysis, according to Explained Total Variance

Factor	Initial Eigenvalues			Sums of Extraction of Squared Loadings			Rotated Sums of Squared Loadings		
	Eigenvalue	Variance (%)	Cumulative Variance (%)	Eigenvalue	Variance (%)	Cumulative Variance (%)	Eigenvalue	Variance (%)	Cumulative Variance (%)
45	0.450	0.883	97.136						
46	0.441	0.865	98.001						
47	0.336	0.658	98.659						
48	0.281	0.551	99.210						
49	0.211	0.413	99.623						
50	0.148	0.291	99.913						
51	0.044	0.087	100.000						

Source: Adapted from Constantino (2016).

Considering the Rotated Component Matrix analysis (Table 3), a procedure was developed to determine the questions that define the domains by selecting components with factor loadings above 0.50, suggesting they are unidimensional as they measure the same factor. Thus, following McDonald and Ho's (2002) approach, the questions associated with each domain were identified, and in some cases, components ranging from 0.30 to 0.50 and the maximum values that each question obtained were considered as strength to be included in a factor. Some questions did not reach a value above 0.500, for example, question 3 of dimension 2 (maximum = 0.307). Consequently, the questions strongly associated with each dimension were identified, prioritizing the initial factors that provide the highest correlation explanation.

Table 3
Factor Analysis, according to the Rotated Component Matrix

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Max
1.1	0.039	0.014	0.125	0.168	0.052	0.027	0.046	0.067	-0.063	0.065	0.075	0.59	0.124	0.001	0.039	0.590
1.2	0.037	0.006	0.067	-0.123	0.063	0.024	0.082	0.204	0.007	0.191	0.059	0.156	0.021	0.039	0.584	0.584
1.3	0.09	0.015	-0.005	0.163	0.023	0.095	0.155	0.909	0.054	0.01	0.062	0.027	0.087	0.013	0.02	0.909
1.4	0.093	0.021	0.015	0.122	0.043	0.091	0.131	0.924	0.045	0.047	0.077	0.061	0.061	-0.014	0.142	0.924
1.5	0.026	0.008	0.008	-0.082	0.041	-0.117	-0.002	0.122	0.01	0.016	0.067	0.328	0.184	0,523	-0.044	0.523
1.6	0.036	0.038	-0.008	0.01	-0.073	0.075	0.156	-0.039	0.025	0.111	0.002	0.042	0.739	0.068	-0.042	0.739
2.1	-0.015	0.02	0.011	0.039	0.022	0.008	0.726	0.049	-0.026	0.003	0.029	0.069	0.116	-0.063	-0.014	0.726
2.2	0.048	-0.057	-0.001	0.023	0.035	0.046	0.635	0.029	0.111	-0.057	-0.053	0.031	0.075	0.141	0.117	0.635
2.3	0.045	-0.002	-0.045	-0.122	0.055	0.03	0.307	0.116	0.268	0.018	0.116	0.303	0.105	-0.123	-0.178	0.307
2.4	0.031	0.016	0.034	0.031	-0.026	0.005	0.692	0.106	-0.089	0.054	0.001	-0.079	-0.011	0.141	0.024	0.692
2.5	0.063	-0.002	-0.017	-0.026	-0.04	0.113	0.3	-0.046	0.126	-0.009	-0.028	-0.114	-0.065	0.694	0.05	0.694
2.6	0.038	0.002	0.019	-0.05	-0.027	-0.022	0.483	0.165	0.21	0.044	0.05	0.208	0.054	-0.473	-0.088	0.483
3.1	-0.005	-0.02	-0.031	-0.021	0.033	0.095	0.076	0.216	0.157	-0.081	-0.044	0.096	0.549	-0.03	0.097	0.549
3.2	0.004	0.006	0.024	-0.003	0.005	-0.008	0.048	0.045	0.759	0.054	-0.047	0.006	0.149	-0.035	0.016	0.759
3.3	-0.012	-0.009	-0.005	0.085	-0.041	0.082	0.041	-0.019	0.726	-0.071	-0.029	-0.072	-0.094	-0.086	-0.014	0.726
3.4	0.038	0.032	0.052	0.028	-0.019	-0.061	-0.045	0.052	0.713	0.064	0.041	0.032	0.094	0.223	0.02	0.713
3.5	0.05	0.037	0.764	-0.013	0.025	0.013	0.032	-0.029	0.046	0.014	0.05	-0.075	-0.038	-0.003	0.064	0.764
3.6	0.088	0.041	-0.021	0.03	0.087	0.014	-0.001	0.103	-0.007	-0.018	0.806	-0.009	-0.064	0.009	-0.029	0.806
3.7	0.014	0.042	-0.009	0.046	-0.026	0.17	0.005	0.007	-0.022	0.084	0.757	0.097	0.029	-0.003	0.087	0.757
3.8	0.112	0.055	0.871	0.023	0.011	0.067	0.014	0 .008	0.016	0.009	-0.04	0.086	0.012	0.011	-0.029	0.871
3.9	0.063	0.03	0.886	0.049	0.016	0.113	-0.007	0.037	-0.003	0.014	-0.048	0.086	-0.006	-0.018	0.024	0.886
3.10	0.244	0.048	0.091	0.383	-0.008	0.129	0.045	0.118	-0.006	0.082	0.101	0.052	-0.153	0.007	0.161	0.383
4.1	0.65	0.078	0.037	0.139	0.112	0.211	-0.013	0.009	-0.001	-0.034	0.091	0.015	0.103	0.078	0.192	0.650
4.2	0.722	0.029	0.032	0.042	0.055	0.062	0.001	0.053	0.021	0.165	0.075	0.128	-0.075	0.01	-0.281	0.722
4.3	0.674	-0.042	-0.014	-0.05	0	0.048	0.008	0.112	0.064	0.194	-0.026	0.15	-0.074	-0.039	-0.297	0.674

Table 3

Factor Analysis, according to the Rotated Component Matrix

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Max
4.4	0.670	0.08	0.053	0.117	0.075	0.084	0.065	0.015	-0.008	0.11	-0.057	0.013	0.012	0.002	-0.108	0.670
4.5	0.613	0.045	0.063	0.142	0.051	-0.034	0.056	0.06	0.022	0.075	0.049	-0.15	0.024	0.064	0.32	0.613
4.6	0.671	0.077	0.05	0.189	0.125	0.065	0.057	0.016	-0.031	-0.038	0.093	-0.072	0.019	0.023	0.213	0.671
5.1	0.182	0.072	0.097	0.513	0.059	0.1	-0.054	0.121	0.025	0.312	-0.067	0.179	-0.056	0.054	-0.055	0.513
5.2	0.053	0.016	-0.036	0.61	0.093	0.085	0.026	0.057	0.096	-0.016	0.061	0	-0.053	-0.139	0.052	0.610
5.3	0.122	-0.027	-0.104	0.426	0.156	-0.056	-0.031	-0.085	-0.021	0.015	0.005	0.355	0.075	-0.007	0.157	0.426
5.4	0.105	0.059	-0.008	0.57	0.03	0.087	0.028	0.03	0.064	-0.213	-0.041	-0.1	0.2	-0.026	-0.08	0.570
5.5	0.117	0.035	0.074	0.563	0.276	-0.067	0.037	0.08	-0.039	0.207	0.018	0.122	0.007	0.04	-0.145	0.563
6.1	0.041	0.056	-0.005	0.434	0.12	0.179	-0.002	0.098	-0.031	0.359	0.077	0.033	-0.134	0.173	-0.082	0.434
6.2	0.09	0.036	0.009	0.147	0.076	-0.005	0.082	-0.031	0.025	0.651	0.062	-0.051	0.075	-0.145	0.325	0.651
6.3	0.134	0.025	0.031	0.123	0.093	0.483	0.01	0.099	0.014	0.419	0.064	0.02	-0.007	-0.011	0.01	0.483
6.4	0.272	0.008	0.005	-0.02	0.031	0.195	-0.049	0.007	0.035	0.644	-0.006	0.071	0.03	0.067	-0.012	0.644
6.5	0.361	0.026	0.068	0.139	-0.004	0.371	-0.032	-0.05	0.031	0.128	-0.017	0.053	0.019	-0.029	0.193	0.371
7.1	0.04	0.095	-0.031	0.094	0.014	0.45	0.111	-0.007	0.055	-0.063	-0.053	0.495	-0.29	0.054	0.252	0.495
7.2	0.082	0.155	0.018	0.081	-0.003	0.635	-0.006	0.043	0.029	-0.017	0.104	0.042	0.094	-0.023	-0.054	0.635
7.3	0.035	0.885	0.048	0.049	0.003	-0.02	0.025	0.006	0.028	0.077	0.06	0.019	-0.031	-0.012	0.003	0.885
7.4	0.047	0.88	0.081	0.027	-0.014	0.01	0.026	0	0.025	0.077	0.07	0.016	-0.026	-0.026	-0.004	0.880
7.5	0.034	0.867	0.035	0.071	0.035	0.041	-0.012	0.023	0	-0.016	-0.003	-0.03	0.024	-0.003	-0.035	0.867
7.6	0.115	0.699	-0.036	0.014	0.068	0.225	-0.062	0.005	-0.027	-0.077	-0.035	0.036	0.053	0.052	0.069	0.699
8.1	-0.01	0.004	-0.01	0.076	0.775	-0.008	-0.005	0.054	0.009	-0.048	0.029	0.025	-0.016	-0.03	0.049	0.775
8.2	0.115	0.06	0.079	0.353	0.508	0.021	0.061	0.034	-0.086	0.037	0.004	0.085	-0.006	0.022	-0.109	0.508
8.3	0.091	0.044	-0.048	0.095	0.738	0.096	-0.002	-0.053	0.001	0.123	0.049	0.065	-0.057	0.027	0.138	0.738
8.4	0.233	0.001	0.054	0.076	0.655	0.243	-0.01	0.022	0.003	0.051	-0.02	-0.042	0.028	-0.02	-0.052	0.655
8.5	0.474	0.022	0.166	0.02	0.206	0.41	-0.089	0.03	-0.016	0	-0.06	0.118	0.095	-0.079	0.061	0.474
8.6	0.144	0.031	0.121	-0.032	0.239	0.512	0.092	0.089	0.014	0.186	0.15	-0.184	0.093	0.027	-0.042	0.512
8.7	0.201	-0.003	0.115	0.125	0.302	0.463	0.091	0.119	-0.079	0.146	0.029	0.056	0.048	0.135	0.004	0.463

Source: Adapted from Constantino (2016).

Analyzing the grouping of their respective factor loadings, the dimensions were defined based on the most explanatory questions. Thus, the final selection of questions within the dimensions was obtained from a statistical perspective. It is important to note that seven (7) factors did not specifically align with any dimension and were therefore not included in the final instrument. However, it is worth highlighting that items 2.3, 6.1, and 6.3, despite having low factor loadings (below 0.50), were retained in the final version of the instrument due to their strong Cronbach's alpha in their respective dimensions. On the other hand, items 3.10, 6.5, 8.5, and 8.7 no longer strongly align with any specific factor. Thus, the analysis that determined the factor loadings criteria was decided in conjunction with Cronbach's alpha.

Considering the analysis of the final instrument in conjunction with the results of the Factorial Analysis, the Cronbach's alpha values were recalculated, taking into account some exclusion indications. The results indicate that the dimensions had alpha values above 0.6, and the Cronbach's alpha value for the total scale remained high (0.833), demonstrating good reliability and validity of the final instrument.

The proposal for the development/creation of the new instrument undergoes a new configuration, achieving good fit. The analyses indicated that some variables should be excluded or improved. At this point, it was necessary to discuss whether removing an item would contribute to an increase in the Cronbach's alpha coefficient of its respective factor or if this increase would not justify its removal, considering that all factors exhibit satisfactory internal consistency values (Hongyu et al., 2016; Manly & Alberto, 2019).

The instrument that emerged at the end of this study consisted of eight domains with a total of 33 items (Table 4). Eighteen items were excluded, following the rigor of the methodology chosen to validate the *Instrumento de Avaliação da Qualidade de Vida de Adolescentes* (Instrument for Assessing the Quality of Life of Adolescents) (Constantino, 2018). However, it is important to highlight the need to test the instrument on other groups of adolescents with diverse socioeconomic and demographic backgrounds in order to identify potential new indicators of their quality of life.

Table 4

Instrument – Quality of Life Assessment of Adolescents

LIFESTYLE refers to the set of habitual actions that reflect individuals' attitudes and values. These actions greatly influence overall health and the quality of life of individuals. The items below represent characteristics of the lifestyle related to individual well-being. Please answer all the questions, considering the past 4 (four) weeks as a reference. Express your opinion about each statement, using a scale of 0 to 3, considering that the first response that comes to mind is the best one, for all alternatives.
(0) Does not relate to your lifestyle at all.
(1) Sometimes corresponds to your behavior.
(2) Almost always true in your behavior.
(3) The statement is always true in your daily life; it is part of your lifestyle.

1- Dimension: Eating Habits		0	1	2	3
1	You have at least four meals a day (breakfast, lunch, snack, and dinner) at regular times.				
2	Do you drink plenty of water? (At least eight glasses per day)				
2- Dimension: Physical Activity		0	1	2	3
1	In your daily life, do you usually walk or cycle for transportation?				
2	Do you practice relaxation and stretching exercises?				
3	Do you participate in Physical Education classes at school?				
4	Do you engage in gentle physical activities (such as walking) 2 to 3 times a week, for more than 30 minutes in each session?				
5	Do you engage in vigorous physical activities (such as running, soccer) 2 to 3 times a week, for more than 30 minutes in each session?				
3- Dimension: Sleep and Rest		0	1	2	3
1	Do you wake up in the middle of the night?				
2	Do you experience insomnia?				
3	Do you use medication to sleep?				
4- Dimension: Personal Well-being		0	1	2	3
1	Do you feel that your life has meaning?				
2	Do you accept your physical appearance?				
3	Are you satisfied with your body?				
4	Are you satisfied with your way of being?				
5	Do you have satisfaction in your romantic life?				
6	Do you have positive feelings about your life?				
5- Dimension: Leisure and Entertainment		0	1	2	3
1	Do you set aside time for leisure and entertainment?				
2	Do you engage in a hobby among your activities (sports, music, reading, etc.)?				
3	Do you go to the cinema, theater, shows, outings, etc., on a weekly basis?				
4	Do you usually watch TV, listen to music, radio, etc., during the week?				
5	Does your leisure time include gatherings with friends, group sports activities, participation in associations?				
6- Dimension: Stress Management		0	1	2	3
1	Do you set aside time (at least 5 minutes) every day to relax?				
2	Do you maintain a discussion without getting upset, even when contradicted?				
3	Do you balance the time dedicated to studying with the time dedicated to leisure?				
4	Do you consider yourself calm and stress-free?				
7- Dimension: Preventive Behavior		0	1	2	3
1	Do you smoke?				
2	Do you consume alcoholic beverages?				
3	Are you aware of and avoid the harmful effects of drugs?				
4	Are you informed and take preventive measures against sexually transmitted diseases?				
8- Dimension: Social Relationships		0	1	2	3
1	Do you share your difficulties with close friends?				
2	Do you frequently meet with your group of friends?				
3	When faced with problems, do you reflect and have conversations with people who are good listeners?				
4	Are you satisfied with the support you receive from your friends?				

Note: Instrument not submitted for validation in the English language.

Discussion

The present study focuses on the validation of an instrument that assesses the lifestyle of adolescents and, therefore, was not designed to assess hypotheses or compare subpopulations. Thus, it does not involve comparisons between different population groups. In the current research, care was taken to identify adolescents' behaviors and orientations based on their own patterns, with the aim of providing information and stimuli for qualitative changes in these behaviors and habits (Scheer et al., 2019).

Benincasa et al. (2015) emphasize the importance of analyzing programs that investigate the population's lifestyle as a significant means for future preventive policies. In this direction, Buss et al. (2020) consider and expand on this concept by stating that the health-disease process and its determinants have a connection between scientific and popular knowledge, driven by public and private investments and the population's commitment to quality of life.

In terms of sociodemographic factors, in terms of gender, there was a heterogeneous distribution that does not follow the population trend of adolescents in Brazil – which, according to data from IBGE (2015), represents 18% of the total population, with 50.40% male and 49.60% female. This result is likely due to the choices of sports modalities included in the study, which predominantly appeal to a male audience.

Regarding socioeconomic data, a differentiated profile of the researched population was identified for income- and education-related questions. Referring to the question of the legal guardian's educational level, the mean number of years of study for the age group of 25 years and older reflects the educational status of a society. Basic education in Brazil consists of three cycles (called *Ensino Fundamental I* and *II,* and *Ensino Médio*) – in the USA (Elementary, Middle, and High School) – corresponding to 12 years of study. The IBGE (2015) shows that the mean number of years of study in the country was 7.7 years, indicating that most people did not complete Middle School. In this sense, it can be stated that the sample has a significantly higher mean number of years of study.

About monthly family income, it was found that the population in this study has a standard well above the national scenario as shown in IBGE data (2015), which reported the mean nominal per capita household income in Brazil as BRL 1,052.00 and BRL 1,432.00 in the state of São Paulo, considered the largest industrial hub in the country. This perspective highlights that the families who participated in this study have a high level of education as well as a good classification of family income. However, this poses a limitation, suggesting that further studies should include individuals from different socioeconomic backgrounds. Additionally, due to the study's focus on a specific population, the results are exclusive to this community and cannot be generalized.

Regarding psychometric aspects, Echevarría-Guanilo et al. (2019) recommend the importance of using instruments that assess the population following a rigorous methodology, considering the key psychometric properties, with reliability and validity analysis being relevant in this context. It is also necessary to obtain an assessment regarding the instrument in question, allowing for the identification of whether it measures what it intends to measure, and particularly, when adapted, whether it will continue to measure the same construct.

In the present study, when considering the items used to construct the constructs, separated by domain, the related values were generally high. However, Bettine et al. (2019) emphasize that many students are still not interested in the medium and long-term effects that a satisfactory lifestyle can bring. Supporting this understanding, the findings of Strelhow et al. (2010) indicate that the analysis of the lifestyle of adolescents/students is not considered positive.

Examining the correlations presented among all the items, it was observed that they do not show a consistent pattern in the collected responses. Souza et al. (2017) suggest that high correlations indicate a similar response pattern between constructs, characterizing inconsistency in the instrument. They also recommend the elimination of items with correlations above 0.8 and alpha below 0.30.

The psychometric characteristics of the instrument met the criteria related to reliability and validity analysis, demonstrating good internal consistency of the domains measured by Cronbach's alpha coefficient and the Spearman-Brown and Guttman split-half coefficients, as outlined by Pasquali (2016) and Rosetti (2018). In line with this, Hutz et al. (2015) also corroborate, when considering reliability as a psychometric property that represents the stability of the items comprising the instrument, enabling its replicability and understanding its capacity to differentiate the various levels of performance it aims to assess.

Regarding the analysis of instrument validity, Souza et al. (2017) argue that it cannot be established in a single study but rather through multiple investigations of the theory being measured. They also emphasize the need to thoroughly understand the instrument - its items, domains, assessment methods, and especially measurement properties – before using it.

Echevarría-Guanilo et al. (2019) outline that construct validity refers to the degree to which an instrument is measuring the construct of interest, examining the theoretical relationship between the instrument's items and the concepts contained in the theory, thereby providing evidence for the interpretation of the proposed values.

Based on the results of this validation study, the instrument demonstrated adequate psychometric properties and can be useful in identifying the impact of different changes to the lifestyle of adolescents and assisting in the choice of public health policies (Buss et al., 2020). However, caution should be exercised regarding the results, as the selected sample is limited to urban, metropolitan adolescents involved in a sports project within the school system, representing the specific focus of this research.

In this sense, further investigations will be necessary to understand different social spectrums in terms of health-promoting or risky lifestyles as well as additional analyses of validity and reliability, including examinations of Item Response Theory. However, the analysis conducted here yielded satisfactory indices, demonstrating that the instrument developed to investigate the lifestyle of adolescents through a biopsychosocial perspective showed adequate internal consistency and can be considered validated.

Considering the findings and limitations of the present study, it is suggested that new validity research be conducted with a stratified sample to assess the instrument's performance in different economic and sociocultural contexts, contributing to its stability. Such approaches will allow for a more consistent assessment of the retention or removal of items for use in the Brazilian reality, as demonstrated in studies of validated instruments archived in the Rimas repository (http://rimas.uc.pt/).

Thus, as emphasized by Camaliont and Boccalandro (2017), reflecting on adolescent health means considering the various ways of experiencing adolescence and life, making efforts to build interdisciplinary practices with the aim of providing more comprehensive, concrete, and historically constructed assistance, articulating the various dimensions within the biological, psychological, and social realms.

Conclusion

The instrument analyzed in this paper possesses adequate psychometric properties, demonstrating satisfactory characteristics of internal consistency, validity, and reliability. However, this research represents an initial investigation and is far from answering the numerous questions related to the application of an instrument to assess the quality of life of adolescents in the Brazilian context. Regional cultural variables, sociocultural differences, and peculiarities of specific situations deserve in-depth study to enable the instrument to achieve the breadth it aims for. Nevertheless, the methodology employed in its development indicates that it plays an important role in studying the quality of life of adolescents in Brazil, while also allowing for comparisons with data from other population groups.

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