

Health-related quality of life of adolescent students

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Abstract *This study aimed to evaluate the perception of health related quality of life (HRQoL) of adolescent students. This is a cross-sectional study with 807 adolescents aged 10 to 17 years from two public schools of Niterói and four private schools of Rio de Janeiro and São Gonçalo. Information on HRQoL was obtained by a reduced version of the Kidscreen questionnaire with 27 items. Student t tests were used to assess the perception of HRQoL stratified by type of school, gender, age and ownership of assets. We used linear regression models to evaluate HRQoL settings. In general, the evaluated adolescents evidenced a good HRQoL. However, results show significant differences in the perception of each HRQoL realm between subgroups. Private school adolescents had better HRQoL compared to public schools in all Kidscreen-27 realms. Older adolescents, those from public school and those with lower ownership of assets had lower HRQoL values in most realms, particularly in the 'Autonomy and Relationship with Parents' realm. Disclosure of the differentiated profile of HRQoL among adolescents is the first step towards developing action strategies in the school environment that prioritize the most vulnerable groups.*

Key words *Quality of life, Adolescent, School health*

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Introduction

The concept of health proposed by the World Health Organization (WHO) in 1947 as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” introduced discussions about the importance of subjective aspects of health¹. In addition to somatic indicators, health also began to cover how individuals feel vis-à-vis the different realms of their lives.

‘Health-related quality of life’ (HRQoL) has been defined as a multidimensional and subjective construct²⁻⁴. Covering physical, social, psychological and functional aspects of individual well-being, it implies a comprehensive model of subjective health. In this perspective, its study is instrumental to understanding the impact of diseases, assessing health interventions for the chronically ill, recognizing vulnerable subgroups and prioritizing resource allocation in health².

The determinants of health and disease traverse the social and psychological fields, particularly in adolescence, since individual experiences experiments and transformations. Because it involves an identity-building phase, such experiences can lead to risky behaviors, shaping their attributes and attitudes in adulthood and old age. A deeper understanding of how adolescents perceive their lives allows a greater understanding of their health. As discussed in some international studies that investigated the HRQoL of school adolescents^{5,6}, this further analysis can be a management tool, aiming at guiding the organization of resources and decision-making processes to improve the quality of life of schoolchildren^{4,7}.

In adolescence, studies investigating the perception of HRQoL in chronic patients, developed mainly in hospital or outpatient settings are predominant. On the other hand, a recent interest in the study of healthy groups has emerged and are, therefore, performed in other contexts^{4,8}. Of great relevance, one of these environments is school because it allows the recognition and monitoring of adolescents vulnerable to a poor health-related quality of life.

Thus, by accepting that school can provide a mediating environment and even be a promoter of actions aimed at improving the HRQoL of its students, it is necessary to expand knowledge about the subject. This study aims to evaluate the HRQoL of adolescent students in Rio de Janeiro and Metropolitan Region by type of school (public or private) and their demographic and economic characteristics. The dissemination of

results of this study is expected to foster a debate on health inequities and strategies to reduce the problem.

Method

Study design and population

This is a cross-sectional study with 807 adolescent elementary school sixth-graders at four private schools in Rio de Janeiro and São Gonçalo, and two schools in the public network of Niterói.

The current study concerns the baseline of one of the follow-up cohorts of the Longitudinal Study of Adolescent Nutrition Assessment - ELANA (2010-2014). All the adolescents enrolled and effectively attending said period were eligible for the background study, except for those with any physical or mental condition that precluded the proposed evaluations, namely, being pregnant or breastfeeding and/or under medication for obesity. Of the 943 eligible students, 21 were not authorized by parents to participate in the study, 35 refused to participate in the study, 2 were excluded because they did not belong to the age group of interest and 78 were not found, and the final sample was thus set at 807 individuals.

Variables of interest and measurement tool

The information about the perception of HRQoL of adolescents was obtained from the Kidscreen⁹ tool. It is a generic tool used for the evaluation and monitoring of HRQoL of children and adolescents between 8 and 18 years, both healthy and chronic diseases carriers. The items identify the frequency and intensity of specific behaviors/feelings or attitudes in a one-week application period. In this study, the reduced version was used, with 27 items underpinning five realms, *viz.*, ‘Health and Physical Activity’, ‘Psychological Well-Being’, ‘Autonomy and Relationship with Parents’, ‘Friends and Social Support’ and ‘School Environment’. The answers to the items have five ordinal qualification levels (from ‘very bad’ to ‘excellent’, from ‘nothing’ to ‘totally’ or ‘never’ to ‘always’). The items and respective categories of the version used are available in Gaspar and Matos⁴.

Since the Kidscreen items comply with the assumptions of the Rasch⁹ Measurement Model, we followed the tool proponents’ recommendations of using the scales in this metric interval¹⁰. Thus,

the total crude scores of each realm were replaced by equivalent Rasch values, estimated in the European Kidscreen study in thirteen countries (aggregate) and provided in a reference syntax¹⁰. The Rasch values were then replaced by T-Scores, making the interpretation of realms more intelligible. As recommended in the Kidscreen Manual¹⁰, T-scores were specified by realms to contain means 50 and standard deviations 10, that is, values between 45 and 55 ($50 \pm 0.5 \cdot 10$) would indicate a perception of 'normal' or 'common' HRQoL, whereas values below 45 would indicate a negative/bad HRQoL perception and values above 55 would indicate a positive/good HRQoL perception. The three steps were implemented in an ad hoc routine programmed in Stata software 13^{10,11}.

Schools were categorized into public and private. Demographic characteristics were represented by gender and age group. For descriptive purposes and in tune with the European Kidscreen study, 10- and 11-year-old adolescents were separated from 12- to 17-year-old adolescents.

The economic characteristics of the families of adolescents were represented by an indicator built from information on the ownership of durable goods at home, according to the methodology used by Szwarcwald et al.¹². Denominated 'Indicator of Assets (IB)', the index is calculated by $IB = \sum_i (1 - f_i) b_i$, where i ranges from 1 to 8 assets and $b_i = 1$ or 0 in the presence or lack of a color TV set; VCR or DVD player; radio; WC; car; washing machine; refrigerator and freezer (independent appliance or part of duplex refrigerator). Weight attributed to the presence of each item is given by the complement of its frequency in the study population (f_i).

The rarer the asset, the greater its weight in the total score¹². The indicator was further refined by adding a weighting factor that considers the quantity of the asset i found in the household (and not only whether it exists or not at home). This variant is calculated by $IB_w = \sum_i (1 - f_i) b_{iw}$, where $w=0$ to k , and k indicates the number of i assets in the household.

The IB variables and their IBw variant required more investigation. In the scrutiny of several forms of centilified clustering; the most promising as a risk marker was IBw in quintiles. Implemented in the *fracpoly* program of the Stata¹¹ software, the fractional polynomial smoothing showed a clear difference between the first and the other quintiles for the T-score of all five Kidscreen realms.

There was a clear upward slope from the first to the second quintile, followed by a plateau. Thus, we used the dichotomized form of the variable initially in quintiles to separate the subgroup of lesser ownership of assets – presumably the 'economically less favored' – of the other aggregated groups.

Data review

In addition to simple univariate analyzes, variance analyses and regression models were implemented via polynomial fractions were implemented to examine the relationships between subgroups specification variables (gender, age, school type, and economic status) and the central interest variables (HRQoL realms in T-scores) for possible inflection points.

The Student's t-Test was used with a level of statistical significance of 5% to evaluate the different perception of stratified HRQoL by type of school, gender, age group and ownership of assets.

A predictive modeling was also implemented to evaluate different HRQoL settings according to combinations of the selected variables. Thus, linear regression models were adjusted since the five dependent variables of the Kidscreen realms metrics in T-Scores have an almost Gaussian distribution. Regarding projected mean T-scores by subgroups (settings), we used Stata software's post-margins command¹¹.

Initially, all combinations were designed by gender, ages set at 10, 13 and 16 years; two school types (public and private); and by IBw dichotomous variable, identifying the economic status. Subsequently, new projected settings were evaluated for each Kidscreen realm, considering only variables that were statistically significant (p-value < 0.05) to the preliminary analyses.

The Research Ethics Committee of the Institute of Social Medicine (IMS) of the State University of Rio de Janeiro (UERJ) approved the study.

Results

Table 1 shows the profile of the adolescents studied. Of the 807 adolescents in the sample, slightly more than half are male and study in the private education network. While the majority is in the 10-11 years age group as would be expected for the sixth-graders of elementary school, at least 30% were above 12 years of age.

Table 2 shows differences in the perception of HRQoL by age, gender, school type and economic status. While evidencing some difference relevant to the stratification in subgroups, most adolescents have a positive perception of HRQoL in all its realms. It can be observed that adolescents aged 10-11 years showed higher values than the others in all realms.

Differences by gender, however, are not so marked. Girls showed higher values than boys in almost all realms of the tool, except in 'Health and Physical Activity'. We also highlight subgroups "school type" and "economic status", where the mean values of T-scores of students from private schools and greater ownership of assets are higher than those of public schools and lesser ownership of assets in all realms. It is also observed that older adolescents, those from public schools and/or those with less ownership of assets were the only ones with T-score values below 45, and even then, only in the realm "Autonomy and Relationship with Parents".

Table 3 shows the mean T-scores and their confidence intervals, estimated according to the different combinations of the subgroups specification variables that evidenced statistical significance in the preliminary analysis. Increasing vul-

nerability settings are perceptible in each realm of the HRQoL. The gray shading scheme seeks to evidence this gradient. In general, the projected settings according to realms suggest a worse perception of HRQoL (1) among girls from public schools and with less ownership of assets ('Health and Physical Activity'); (2) among those in public schools and closer to adulthood ('Psychological well-being'); (3) among public school students with less ownership of assets ('Autonomy and Relationship with Parents'); (4) among public school children ('Friends and Social Support'); and (5) boys aged in the second stage of adolescence ('School Environment').

Discussion

The perceptions of quality of life were satisfactory in the sample as a whole, with values below the lower limit only in the 'Autonomy and Relationship with Parents' realm. When compared to the results of the different countries of the European Kidscreen study¹⁰, it is generally observed that adolescents studied perceive their HRQoL more positively, although their living conditions are lower than those of European adolescents.

Corroborating what was observed in part of the results of the European study of Kidscreen¹³ and in other countries, such as Argentina and Portugal^{4,6,14}, adolescents aged 10-11 years tend to perceive their HRQoL more positively in comparison to adolescents close to adulthood. According to Borges *et al.*¹⁵, the specific biopsychosocial changes of this phase raise cognitive and emotional issues that translate into a decreased positive health perception as adolescents get older. Confirming this first impression, the predictive modeling revealed that perceptions of adolescents become more negative with age, both in the realm that addresses the psychological aspects of well-being and the realm dealing with the very school environment of the student. Considering that the 'Psychological Well-Being' contains items that explore positive emotions, such as satisfaction with life and feelings of sadness and loneliness, these findings translate a greater vulnerability to the perceptions of unhappiness and helplessness as adolescents approach adulthood.

Other studies^{7,16} have also shown that older adolescents tend to have more depressive and stressful emotions, as well as feelings of loneliness that are very characteristic of the transition phase between adolescence and adulthood. Regarding the 'School Environment', which deals

Table 1. Characteristics of the study population regarding demographic and economic aspects.

Variables	N	%*
Gender		
Male	435	54.0 (50.4 - 57.3)
Female	372	
Age		
From 10 to 11 years	568	70.7 (67.5 - 73.8)
From 12 to 17 years	235	
Education Network		
Private	507	63.0 (59.5 - 66.2)
Public	299	
Weighted assets indicator		
Group with greater ownership of assets (2 nd to 4 th quintiles)	622	80.3 (77.3 - 82.9)
Group with lower ownership of assets (1 st quintile)	153	

Note: * Between brackets: confidence limits of 95%.

Source: ELANA. Rio de Janeiro. 2010.

Table 2. Differential perception of HRQoL by age, gender, type of school and ownership of assets of adolescents studied.

Realm ^a	Age Group			Gender		
	10-11	12-17		Male	Female	
Health and Physical Activity	49.5 (48.7-50.3)	48.1 (46.7-49.4)		50.3 (49.4-51.1)	47.6 (46.5-48.6)	***
Psychological Well-Being	50.1 (49.3-50.9)	47.1 (45.8-48.4)	***	49.0 (48.1-49.9)	49.4 (48.4-50.5)	
Autonomy and Relationship with Parents	47.8 (46.9-48.6)	44.2 (42.6-45.9)	***	46.7 (45.7-47.7)	46.8 (45.6-48.0)	
Friends and Social Support	51.8 (51.0-52.6)	49.5 (48.1-51.0)	**	49.4 (48.4-50.4)	53.1 (52.1-54.1)	***
School Environment	55.0 (54.3-55.7)	51.0 (49.6-52.3)	***	52.6 (51.6-53.5)	55.1 (54.2-56.0)	***

Realm ^a	Type of school			Assets		
	Public	Private		Less	More	
Health and Physical Activity	47.0 (45.9-48.2)	50.2 (49.4-51)	***	46.5 (44.8-48.1)	49.6 (48.9-50.4)	***
Psychological Well-Being	46.9 (45.7-48.2)	50.5 (49.7-51.3)	***	47.2 (45.3-49.0)	49.7 (49.0-50.5)	**
Autonomy and Relationship with Parents	43.6 (42.2-45.0)	48.5 (47.6-49.3)	***	43.2 (41.2-45-2)	47.8 (46.9-48.6)	***
Friends and Social Support	48.5 (47.2-49.8)	52.6 (51.8-53.3)	***	49.9 (48.2-51.6)	51.6 (50.8-52.3)	
School Environment	51.9 (50.7-53.1)	54.8 (54.1-55.6)	***	52.5 (50.9-54.0)	54.2 (53.5-54.9)	**

^aAverage T-scores for the Kidscreen-27 tool. * p-value 0.05-0.01 ** p-value 0.01-0.001 *** p-value < 0.001.

with adolescents' perception of their cognitive, learning and concentration abilities, as well as their feelings about school and teachers, these findings may be related to the characteristics of some students who were no longer an adequate age group for the 6th grade of elementary school, whether due to school failure, late school enrollment or curricular adaptation.

In addition, adolescents aged 12-17 years had negative/poor HRQoL values (below 45) for the realm 'Autonomy and Relationship with Parents', which addresses issues associated with managing leisure time with autonomy, financial resources and interaction with parents. According to the UNICEF report on the situation of Brazilian adolescents, the negative perception of this HRQoL realm may be linked to the evolutionary stage of these adolescents, characterized by new responsibilities and less leisure time, impatience with situations of dependence and financial constraint, as well as constant warnings from own parents¹⁷. It would be interesting to take actions that seek to

bring schools closer to and dialogue with adolescents for a better understanding of the relationship between them and their families. Of course, health-promoting strategies based on support, reception, developing autonomy and youth leading role, including adolescents and their families would also contribute.

The perception of HRQoL according to the gender of adolescents agrees with the results of the European Kidscreen study, in which boys had higher values only in the realm related to the physical aspects¹³. Such findings in the 'Health and Physical Activity' realm for boys may be due to the existing different gender roles in Brazilian society. According to Oliveira et al.¹⁸, boys' participation in intense physical activities and sports is more valued at a very early age, while social stimulus is lower among girls for this practice, with a greater focus on household chores and games that involve taking care of their home, manual activities, among others. Salles-Costa et al.¹⁹ also identified the presence of gender patterns in sports

Table 3. Projected T-scores, according to population subgroups, concerning the HRQoL realms of Kidscreen.

Realm 'Health and Physical Activity'				
Gender	Type of school	Ownership of assets	T-scores	CI (95%)
Boy	Private	More assets	51.6	50.1 - 53.1
Boy	Private	Less assets	49.6	47.0 - 52.3
Boy	Public	More assets	49.1	47.2 - 51.1
Girl	Private	More assets	48.8	47.3 - 50.4
Boy	Public	Less assets	47.1	44.7 - 49.5
Girl	Private	Less assets	46.8	44.0 - 49.6
Girl	Public	More assets	46.3	44.1 - 48.5
Girl	Public	Less assets	44.3	41.7 - 47.0 ←

Adjusted model (p-value of coefficients between brackets): $\beta_{\text{GENDER}} = -2.79$ (< 0.001); $\beta_{\text{SCHOOL}} = -2.48$ (0.001); $\beta_{\text{BASSETS}} = -2.02$ (0.030).

Realm 'Psychological Well-Being'				
Age	Type of school	T-scores	CI (95%)	
10 years	Private	51.7	49.8 - 53.5	
10 years	Public	49.2	46.1 - 52.4	
13 years	Private	49.2	47.2 - 51.2	
13 years	Public	46.8	45.1 - 48.5	
16 years	Private	46.8	41.7 - 51.8	
16 years	Public	44.3	40.4 - 48.3 ←	

Adjusted model (p-value of coefficients between brackets): $\beta_{\text{AGE}} = -0.82$ (0.042); $\beta_{\text{SCHOOL}} = -2.43$ (0.006).

Realm 'Autonomy and Relationship with Parents'				
Type of school	Ownership of assets	T-scores	CI (95%)	
Private	More assets	48.7	47.6 - 49.9	
Private	Less assets	45.7	42.9 - 48.5	
Public	More assets	45.1	43.1 - 47.2	
Public	Less assets	44.3	39.5 - 44.7 ←	

Adjusted model (p-value of coefficients between brackets): $\beta_{\text{SCHOOL}} = -3.59$ (< 0.001); $\beta_{\text{ASSETS}} = -3.03$ (0.007).

Realm 'Friends and Social Support'				
Gender	Type of school	T-scores	CI (95%)	
Girl	Private	54.6	53.3 - 55.8	
Boy	Private	50.9	49.5 - 52.2	
Girl	Public	50.5	48.6 - 52.4	
Boy	Public	46.8	45.0 - 48.7	

Adjusted model (p-value of coefficients between brackets): $\beta_{\text{GENDER}} = 3.67$ (< 0.001); $\beta_{\text{SCHOOL}} = -4.05$ (< 0.001).

Realm 'School Environment'				
Gender	Age	T-scores	CI (95%)	
Girl	10 years	58.6	56.7 - 60.5 ←	
Boy	10 years	56.7	54.7 - 58.7	
Girl	13 years	52.4	50.7 - 54.2	
Boy	13 years	50.6	48.9 - 52.2	
Girl	16 years	46.3	42.1 - 50.5	
Boy	16 years	44.4	40.3 - 48.5 ←	

Adjusted model (p-value of coefficients between brackets): $\beta_{\text{GENDER}} = 1.88$ (0.003); $\beta_{\text{AGE}} = -2.05$ (< 0.001).

Obs 1: The marker ← indicates the most vulnerable setting with a value below the preset lower limit (45) and the marker ← indicates the setting with a value above the preset upper limit (55). Obs 2: In prediction modeling, the number of individuals corresponds to 775. Assuming randomness of the missing data, the 'listwise deletion' feature was used for the regression.

practice by administrative staff of a public university located in the city of Rio de Janeiro, noting the greater male participation in collective physi-

cal activities such as soccer, volleyball and tennis, and females more involved in individual activities (gymnastics, dances, walks). Thus, the results ob-

tained may also be related to the type of activity/sports commonly adopted in school physical education classes, in general, practiced collectively.

The most vulnerable setting in this realm consists of girls from public schools with less affluent families. As already discussed, this setting agrees with literature on gender, but differs from other studies regarding the role of school type and economic condition. In a study with 5,249 schoolchildren, Hallal et al.²⁰ found that physical inactivity was positively associated with females, higher socioeconomic strata and studying in private schools. Similarly, in a study with 592 schoolchildren, Oliveira et al.¹⁸ observed that students enrolled in the public network had higher levels of physical activity than those in the private network. Authors contend that these results relate to leisure activities at no cost, such as street games and sports, as well as the more active walk to school due to the relative lack of financial resources for transportation. In contrast, private school students would have more access to technological resources and, thus, more time spent on sedentary activities, such as videogames and computer use.

Findings regarding the 'school type' and 'economic status' subgroups suggest that adolescents in public schools and with less affluent families perceive all HRQoL realms more negatively. In the realm exploring social support and the relationship with friends, public school children underpinned the most vulnerable setting in predictive modeling, which may indicate a perception of exclusion and lack of acceptance by peers in these schools. These results call our attention to the possible more positive impact of schools on the subjective well-being of adolescents, either due to the activities developed in their space or the linkage between school community and students. These findings are difficult to contrast with the literature due to the lack of studies that considered these variables, as structured in the current study.

An important issue to consider is also the possibility of students' school type revealing the socioeconomic aspects of their family. In this case, the results found point to the same direction as those related to home assets ownership, suggesting that a better economic condition would positively influence the subjective health of adolescents studied. This reflection is consistent with the HRQoL values found for the realm 'Autonomy and Relationship with Parents', where adolescents showed a negative perception of the component items²¹.

The results of this study should be seen in light of its strengths and limitations. Among main strengths are the methodological rigor used while processing and analyzing the variables of main interest, as recommended by the Kidscreen Group Europe, which allowed a tuned external comparability. Although the reduced versions of Kidscreen require a further psychometric study in Brazil, the tool has a history of more than thirty transcultural adaptations and widespread use in different countries and contexts. A gap filled by the research refers to the proposed study on the perceived HRQoL of a priori healthy Brazilian adolescents in the school environment, considering that most studies on HRQoL are geared to children and adolescents with chronic diseases or disabilities^{22,23}.

The casuistry restricted to some schools could be seen as a limitation of the study and, thus, it would be important to develop new studies of similar methodology in broader populations. Another shortcoming of the study is that some potentially descriptive characteristics of interest in the composition of projected settings, such as family structure, school performance, morbidities, among others could not be studied because they were not of interest to the background study (ELANA).

Findings of this study provide a clear idea that the dynamics involved in adolescent socializing contexts (family, school, peers and community) can influence the various facets of HRQoL. Faced with an age group with such varied issues, ranging from risks and vulnerabilities to individual and environmental needs, the predictive modeling sought to shed some light on the confluence of its characteristics, showing settings of vulnerability by HRQoL realm. According to Burt²⁴, adolescent care programs often focus on solving specific problems and such focal interventions have proven to be ineffective. Thus, it seems necessary to invest in articulated actions for comprehensive health due to the lack of efficiency of isolated practices and intervention strategies appropriate to the adolescent profile²⁵. Therefore, one of the most auspicious contexts in the adolescent development process is school, because it could possibly be a complex of integration of the family, community and social environment, observing the student in a holistic way. To do so, its actions must exceed those focused on school performance, providing a review of school programs and educational projects in order to guide health promotion strategies in this environment¹⁵.

Interventions that aim at comprehensive health in schools require dynamic pedagogical actions that transform schools into singularization settings, where its students can develop in a conscious, critical and creative way²⁶. The conduction of this process is expressed in the use of pedagogical tools and strategies that promote changes in school organization, such as curricular innovations and permanent teacher training to use participatory methodologies.

The results of this study indicate, in general, that there is an important internal gradient that particularizes and weakens some subgroups.

These findings corroborate with those of other studies that have signaled the importance of studying HRQoL in school settings, with a view to identifying subgroups of students that deserve special attention in their socialization environments. Since school is the most important social space in the life of adolescents, it must be a privileged place for projects that foster and strengthen these adolescents in relation not only to their own health care, but also to encourage them to be major players in understanding and reducing their vulnerabilities²⁷.

Collaborators

BT Agathão, ME Reichenheim and CL Moraes participated in all the steps for the production of the paper and are in agreement with its expressed content.

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