

# Measuring Health-Related Quality of Life in Adolescents by Subgroups of Students and Outpatient Mental Health Clients

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## Abstract

This study aims to compare generic measures of HRQoL obtained with the KIDSCREEN-27 into subgroups of adolescents from different contexts including subgroup of outpatient treatment for mental disorders and subgroups of students from regions with low and high human development index in the direction of analyzing the discriminant properties of the instrument and its utility to monitor health outcomes in adolescents. Descriptive statistics are presented by group and gender. The statistical analyses aimed to check the reliability, convergent validity between self-report and proxy versions and discriminant validity between clinical and students contexts using KIDSCREEN-27 questionnaires. Most assumptions about the reliability, convergent and discriminant validity of the instrument KIDSCREEN-27 were established. This research highlighted lower scores of HRQOL in adolescents with mental illness in four of five dimensions, with an effect size ranging from 0.25 for Physical Well-Being to 0.46 for Autonomy & Parents. The results were acceptable, but the findings in this study were more modest than those obtained in the original validation of the instrument.

## Keywords

Quality of Life, Adolescence, Validity, Mental Health, KIDSCREEN-27

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## 1. Introduction

In common sense, the term “quality of life” is often used interchangeably with well-being, life satisfaction, happiness, personal fulfillment, health status, functional status. Researchers point out that the term moves in a polysemic semantic field and encompasses many meanings which reflect the culture of a particular society at a particular historical moment and feature a social construction with the mark of cultural relativity. This term includes ideas that relate to the life conditions and lifestyles, sustainable development and human ecology, development and human rights and social standards of comfort and tolerance, established by the society (Minayo, Hartz, & Buss, 2000).

Of the five conceptual approaches identified as most relevant to the use of the term quality of life—philosophical, economic, sociological, psychological and medical, it was highlighted the medical approach, that emerged in response to advances in medical treatments and allowed to value not only the survival time in the face of incurable diseases, but also how the patient feels during that time (Eiser & Morse, 2001). The emergence of the term “Health-Related Quality of Life” (HRQoL) was based on ideas of all traditions to refer specifically to the impact of health and disease on quality of life of the individual and thereby differentiate them from the meanings most popular relating to term quality of life (Eiser & Morse, 2001).

Despite the lack of a consensus on the concept of quality of life, some aspects inherent in its construct have been achieving consensus among research groups, namely, subjectivity, multidimensionality and the presence of positive and negative domains (Fleck et al., 1999).

Researches about HRQoL on adults have shown rapid progress in recent decades, with the development of many generic instruments and other specific for diseases, mainly in the areas of oncology, cardiology, neurology, psychiatry, diabetes, pain syndromes among others (Bullinger, 2002; Kuenstner et al., 2002; Seidl & Zannon, 2004).

Similar advancement is also occurring in the development of instruments to assess HRQoL in children and adolescents and several are currently available for use in these groups (Erhart & Ravens-Sieberer, 2006; Gaspar, Matos, Ribeiro, & Leal, 2006; Rajmil et al., 2012; Solans et al., 2008). Generic HRQoL measures may be useful for identifying subgroups of children and adolescents who are at risk of health problems and can help determine the weight of a particular disease or disability, identifying health inequalities in resource allocation and in epidemiological studies (Gaspar et al., 2006; Ravens-Sieberer et al., 2008; Solans et al., 2008).

The first generic instrument that comprehensively fulfill guidelines released by WHO (WHO, 1994) in order to obtain adequate measurements of HRQoL for children/adolescents, came from the KIDSCREEN European project (Ravens-Sieberer et al., 2006). Similar projects conducted by other research groups, also originated measurement instruments with international validation as DISABKIDS (Baars, Atherton, Koopman, Bullinger, & Power, 2005), Euro-QoL-5D Youths (EQ-5D-Y) (Wille et al., 2010) and Haemo-QoL (specific to people with hemophilia) (Bullinger et al., 2002).

The KIDSCREEN project resulted in three versions of questionnaires for children/adolescents and similar for parents/caregivers (proxy) with 52, 27 and 10 items. A reduced version from KIDSCREEN-52 had 27 items that were grouped into the following dimensions—Physical Well-Being, Psychological Well-Being, Autonomy and Parent Relations, Social Support and Peer Relations, and School Environment—with a minimal loss of information compared to version of 52 items and with similar psychometric quality. The instrument has been translated and validated in several languages, including Portuguese (Gaspar & Matos, 2008; The KIDSCREEN Group Europe, 2006).

With regard to reliability, the KIDSCREEN-27 showed satisfactory results: its internal consistency values ranged from 0.79 (Physical Well-Being) to 0.84 (Psychological Well-Being); the test-retest reliability with an interval of two weeks, ranged from 0.61 to 0.74 and intraclass correlation between the scores of self-reports of children and adolescents compared with proxy versions answered by parents ranged from 0.44 (Social Support and Peer Relations) to 0.61 (Physical Well-Being) (The KIDSCREEN Group Europe, 2006).

Similarly, its convergent and discriminant validation showed satisfactory results (The KIDSCREEN Group Europe, 2006) when compared with previously validated screening tools for physical problems, the Children with Special Health Care Needs Screener for Parents—CSHCN (Bethell, Read, Neff et al., 2002; Bethell, Read, Stein et al., 2002) and of mental health, the Strength and Difficulties Questionnaire-SDQ (Goodman, 1997; The KIDSCREEN Group Europe, 2006).

The KIDSCREEN validation studies reported that children/adolescents with special health care needs showed lower scores for HRQoL in the dimensions of physical and psychological well-being compared with healthy child-

ren (The KIDSCREEN Group Europe, 2006). These findings were confirmed by other researchers in Europe (Bisegger & Cloetta, 2005) and one in particular, highlighted more pronounced differences when the gender was considered, showing that girls with special needs showed the lowest HRQoL scores (Mohler-Kuo & Dey, 2011).

In the process of validation of KIDSCREEN there was a theoretical expectation that children/adolescents with mental health problems could display low HRQoL scores especially in dimensions of Psychological Well-being and Mood & Emotions. Actually, the findings confirmed such expectation in most dimensions of the instrument. Particularly, the version of 27 items highlighted lower scores of HRQoL in patients with mental illness in all of its dimensions, with an effect size ranging from 0.42 to the Physical Well Being 0.68 to Psychological Well-being (The KIDSCREEN Group Europe, 2006). Other studies have also sought to demonstrate empirically the relationship between mental health and HRQoL in children/adolescents (Karatzias, Chouliara, Power, & Swanson, 2006; Sawatzky, Ratner, Johnson, Kopec, & Zumbo, 2010) but it is still an area that needs expansion aiming to routinely include such indices as an indicator of health (Huebner et al., 2004; The KIDSCREEN Group Europe, 2006).

In Brazil a multicenter project developed in four state capitals investigated the understanding of the concept of health and disease, health-related quality of life as well as issues related to evaluation of mental health care services offered to children and adolescents, particularly in the public sector (Amparo et al., 2010). The public health system in Brazil-called Unified Health System (SUS, acronym in Portuguese), follows the principles of regionalization and hierarchy of services and therefore includes a set of organized units in an articulated way, responsible for the full provision of health services in a given geopolitical structure, understood as the territorial and populational base that has self-sufficiency to the level of complexity previously defined (Jesus & Assis, 2010). Regarding the mental health of children and adolescents, customers who have disorders from moderate to severe complexity and are in need of specialized mental health care are oriented toward specialized services that offer different psychotherapeutic techniques, biological therapy and occupational therapy carried out by specialized teams of psychologists, psychiatrists, social workers, nurses, occupational therapists and pharmacists and in some, a physical education teacher. These services are called Psychosocial Care Centers of Children and Youth (CAPSi, acronym in Portuguese) and are the main strategy of the Brazilian Psychiatric Reform in contrast to the hospital-centered model, hegemonic until a few years ago (Brasil, 2004). Nowadays the establishment of these centers in some Brazilian geopolitical regions is still incipient to meet the demands of the population (Morais, Amparo, Fukuda, & Brasil, 2012) and because of that it is considered necessary to examine the customer base that frequents those services.

This study, linked to the Brazilian multicenter study (Amparo et al., 2010) aims to compare generic measures of HRQoL obtained with the KIDSCREEN-27 into subgroups of adolescents from different contexts including a subgroup of outpatient treatment for mental disorders and subgroups of students from regions with low and high human development index in the direction of analyzing the discriminant properties of the instrument and its utility to monitor health outcomes in adolescents.

## 2. Methods

### 2.1. Study Type and Local

It is an exploratory and cross sectional study which aims to present part of the results of the second phase of a multicenter Brazilian project research, which investigated the perspectives of adolescents and caregivers about mental health and health services in four Brazilian state capitals: Brasilia, Porto Alegre, Fortaleza and Belém. These cities are included in four of five major geopolitical regions of the country: Midwest, South, Northeast and North, respectively. The data were integrated into a national database for analysis.

### 2.2. Participants

1082 adolescents, aged between 12 - 18 years old, of both sexes participated in this study. The sample was selected in a multistage sampling from three groups (clusters): a clinical group (CG), a group of public schools students (PG) and a group of private schools students (PrG).

To constitute the clinical group (CG), in the first phase, the public and private services considered reference in outpatient mental health care for children and youth in each of the target cities in the survey were identified (particularly, Psychosocial Care Centers of Children and Youth). Then, the institutional adherence to research

was asked to their managers. In a second step, in the centers that joined the research, the samples were composed from invitations to all adolescents and their caregivers who were attending in the waiting rooms of services in the period for data collection stipulated for each city. So, for those adolescents who accepted the invitation was requested to the caregiver the authorization for the teenager to participate, as well as its own adherence to answer voluntarily the proxy version of questionnaire. Only after these procedures the instrument was administered in private rooms for adolescents and caregivers separately.

To constitute the students groups (PG and PrG), in the first stage were selected two types of schools-public (with low Human Development Index-HDI) and private (with high HDI), both located geographically close to selected health services when forming the clinical group (CG) considering the principle of regionalization of health services mentioned above. Again, was requested for school principals, adherence to research. In schools that have joined to the research, invitations were performed in the classroom for all students in the age group under study. Those who volunteered to participate in the study took a letter to their caregivers to give them consent for participation beyond their own adhesion to answer Proxy instrument. For students—who brought the consent signed by themselves and by their caregivers—was applied the research instrument, individually or in small groups, depending on the class schedule. For caregivers who agreed to respond to the proxy instrument, meetings were scheduled to apply the instrument, at school or in some cases, at the caregiver's home.

It was obtained approval from the Ethics Committee in Human Beings Research of the Catholic University of Brasília (CEP/UCB No. 86/2006) and participants and the participating institutions were asked to signing the term of free and informed consent stating their knowledge and acceptance of research.

### 2.3. Instruments

In the first phase of this multicenter study, self-report and proxy versions of KIDSCREEN-27 in Lusitanian Portuguese (Gaspar & Matos, 2008), were adapted for the Brazilian study through a semantics validation process that resulted in minor changes related to the use of the treatment pronoun of the second singular person, to a more usual form in colloquial language in much of the Brazilian territory. Due to the idiomatic similarity, back translation was not performed. Other details of semantic validation can be found in the work of Morais (Morais, 2008).

The answers to the 27 items were given on a five-point scale ranging from poor/never/not at all to excellent/always/extremely. The instruments were administered in the researcher presence. The reference period of time was the week prior to the study (Erhart, Ottova et al., 2009).

The KIDSCREEN-27 instrument measures five dimensions of Health-Related Quality of Life (HRQoL) (The KIDSCREEN Group Europe, 2006):

- 1) Physical Well-Being (PHY) (four items): explores the level of physical activity or performance and energy, as well as the intensity at which a child or teenager feels ill and complains of poor health.
- 2) Psychological Well-Being (PWB) (seven items): explores positive emotions and life satisfaction, as well as the presence of feelings of loneliness and sadness.
- 3) Autonomy and Relationships with Parents (PAR) (seven items): explores the quality of interactions between children/adolescents and their parents (or caregivers), as if the young feels loved and supported by family. It also examines the level of autonomy as well as the quality of financial resources perceived by the young.
- 4) Social Support and Peer Relations (SOC) (four items): examines social relationships with friends and peers, as well as the support received.
- 5) School Environment (SE) (four items): explores the perception of the youth about their cognitive ability, learning and concentration and their feelings about school. Moreover, explores the vision of the young about their relationship with their teachers.

### 2.4. Statistical Analysis

Statistical analyzes were designed to check the reliability and convergent validity between self-report and proxy versions and the discriminant validity between clinical contexts and students using KIDCREEN-27 questionnaires. The internal consistency reliability was determined by computing Cronbach's alpha for all dimensions and for general scale (Cronbach, 1951). To check the convergent validity was performed a Multitrait Multimethods Matrix (MTMM) (Campbell & Fiske, 1959; Raykov, 2011).

To check the discriminant validity it is important to emphasize that KIDSCREEN items in original validation

studies proved to satisfy the assumptions of the Rasch model (Bond & Fox, 2013). So, the answers on five-point scales were computed as scores of Rasch scales using IBM®SPSS® syntax provided by KIDSCREEN Handbook (The KIDSCREEN Group Europe, 2006). The resulting values were converted into T-scores to perform the calculation of means and standard deviations by gender and group (students and clinical). Toward discriminant validity of the instrument, the averages obtained were analyzed to compare sexes by *t* test for independent samples and to compare groups by one-way multivariate analysis of variance (MANOVA), using the Cohen *d* to estimate the effect size (Cohen, 1988). The MANOVA was followed up with discriminant analysis to investigate the nature of relationships between the KIDSCREEN-27 scores and groups of adolescents from different backgrounds. A conservative approach to statistical significance testing was applied. An alpha level of 0.001 with Bonferroni correction was specified for a new MANOVA performed with canonical functions derived from self-report KIDSCREEN-27 after the discriminant analysis. Descriptive statistics are presented by group, and gender. The decision level adopted for all other analyzes was an alpha of 0.05.

### 3. Results

In the overall sample, consisting of 1082 adolescents, 53.88% were female, mean age 15.3 (*SD* = 1.6) years old. There were no differences in age, between the sexes  $t(1080) = -1.436, p = 0.151$ . The means age by group were  $M = 15.4$  (*SD* = 1.47) years old,  $M = 15.53$  (*SD* = 1.61) years old and  $M = 14.49$  (*SD* = 1.68) years old, respectively, for PG, PrG and CG and the differences were significant [ $F(2, 141.753) = 29.242, p < 0.001$ ]. ANOVA multiple comparisons performed with the post hoc Hochberg Test revealed that adolescents from clinical group (CG) had means ages significantly lower than PG (mean difference  $-0.908, p < 0.001$ ) and that of PrG (mean difference  $-1.036, p < 0.001$ ). There was no difference between the ages for groups of students (PG and PrG). The distribution of adolescent and caregivers sample are in **Table 1**.

#### 3.1. Internal Consistency

It was obtained a Cronbach's alpha for the general scale of 27 items of 0.91 for self-report version and 0.93 for proxy version. In self-report version internal consistency values ranged from 0.77 (School Environment) to 0.86 (Social Support and Peer Relations) while the proxy version internal consistency values ranged from 0.82 (Autonomy and Relationships with Parents) to 0.87 (Physical Well-Being). Values for each of the five dimensions are specified in **Table 2**. In self-report version, the median of item-total correlations was 0.52, classified as moderate, and three items had values below 0.40, which means weak indices (Hair Jr., Black, Babin, Anderson, & Tatham, 2009). They are: item 1 (In general, how would you say your health is?), item 16 (Have your parent(s) treated you fairly?) and item 25 (Have you got on well at school?). In proxy version, the median item-total correlations was 0.54 and all items were above 0.40.

#### 3.2. Convergent Validity

The MTMM matrix (**Table 3**) showed positive correlations between the scores of proxy version and the scores of self-report version. Convergent validity was achieved. All coefficients representing the monotrait-heteromethod were significantly different and higher than zero for all of the five dimensions ( $r$  ranged from 0.25 to 0.40,  $p < 0.01$ ) (Campbell & Fiske, 1959). Four of five coefficients (Physical Well-Being, Psychological Well-Being, Autonomy & Parents and the School Environment) representing a monotrait-heteromethod were higher than other correlations inside this trait with other coefficients measured by other methods (heterotrait-heteromethod). The only dimension which showed weak discrepancies inside its trait was Support & Peers, with Psychological Well-Being. All heterotrait triangles showed approximately the same pattern. The average correlation between adolescents and proxy scores for corresponding domains (average  $r = 0.35$ ) were higher than that for divergent domains (average  $r = 0.21$ ).

#### 3.3. Discriminant Validity

Means and standard deviations obtained from T-scores, by gender and groups (students and clinical), are shown in **Table 3** and **Table 4**. T tests were performed for independent samples by gender (**Table 3**).

The male participants showed higher scores in dimensions Physical Well-Being, Psychological Well-Being and Autonomy & Parents than females, with effect size *d* of  $-0.47, -0.43$  and  $0.28$ , respectively. Only in Support

**Table 1.** Adolescents sample distribution.

Variables	Categories	PG		PrG		CG		Total	
		n	%	n	%	n	%	N	%
<b>City</b>									
	Brasília	320	29.57	137	12.66	68	6.28	525	48.52
	Porto Alegre	95	8.78	185	17.10	59	5.45	339	31.33
	Fortaleza	71	6.56	51	4.71	3	0.28	125	11.55
	Belém	24	2.22	21	1.94	48	4.44	93	8.60
<b>Sex</b>									
	Female	276	25.51	215	19.87	92	8.50	583	53.88
	Male	234	21.63	179	16.54	86	7.95	499	46.12
<b>Age range</b>									
	12 - 13 years old	62	5.73	56	5.18	59	5.45	177	16.36
	14 - 15 years old	170	15.71	119	11.00	69	6.38	358	33.09
	16 - 18 years old	278	25.69	219	20.24	50	4.62	547	50.55
<b>Schooling years</b>									
	4 - 6 years	12	1.11	5	0.46	44	4.07	61	5.64
	7 - 9 years	348	32.16	227	20.98	80	7.39	655	60.54
	10 - 11 years	100	9.24	157	14.51	33	3.05	290	26.80
	Total valid	460	42.51	389	35.95	157	14.51	1006	92.98
	Missing	50	4.62	5	0.46	21	1.94	76	7.02
<b>Socioeconomic status*</b>									
	Low FAS	219	20.24	24	2.22	76	7.02	319	29.48
	Medium FAS	241	22.27	144	13.31	66	6.10	451	41.68
	High FAS	49	4.53	226	20.89	36	3.33	311	28.74
	Missing	1	0.09						0.09
<b>Caregivers</b>									
	Maternal figure	106	9.80	117	10.81	127	11.74	350	32.35
	Paternal figure	31	2.87	82	7.58	16	1.48	129	11.92
	Total valid	137	12.66	199	18.39	143	13.22	479	44.27
	Without participation	373	34.47	195	18.02	35	3.23	603	55.73
<b>Total general</b>		510	47.13	394	36.41	178	16.45	1082	100.00

Note: PG = Public School Group, PrG = Private School Group, CG = Clinical Group, \*FAS = Family Affluence Scale (0 - 2 = low; 3 - 5 = medium; 6 - 9 = high).

& Peers dimension, the female participants showed higher scores than males, with an effect size  $d$  of 0.12. In School Environment dimension differences were not observed.

Prior to conducting the MANOVA, a series of Pearson correlations were performed between KIDSCREEN-27 in order to test the MANOVA assumption that the dependent variables would be correlated with each other in the moderate range (Meyer, Gampst, & Guarino, 2006). As can be seen in Table 2, a meaningful pattern of

**Table 2.** Multitrait-multimethod matrix (MTMM) for Pearson correlations between adolescents and parents (proxy) reports for KIDSCREEN-27 version.

		Adolescents					Proxy				
		PHY	PWB	PAR	SOC	SE	PHY	PWB	PAR	SOC	SE
Adolescents	PHY	(0.81)									
	PWB	0.57*	(0.83)								
	PAR	0.45*	0.50*	(0.80)							
	SOC	0.36*	0.38*	0.41*	(0.86)						
	SE	0.43*	0.42*	0.43*	0.32*	(0.77)					
Proxy	PHY	0.40*	0.27*	0.24*	0.20*	0.14*	(0.87)				
	PWB	0.33*	0.33*	0.29*	0.29*	0.26*	0.65*	(0.84)			
	PAR	0.18*	0.22*	0.29*	0.17*	0.18*	0.37*	0.45*	(0.82)		
	SOC	0.13*	0.13*	0.15*	0.25*	0.09	0.42*	0.41*	0.31	(0.86)	
	SE	0.22*	0.23*	0.22*	0.22*	0.40*	0.40*	0.50*	0.37*	0.33*	(0.84)

Note: Range of N = 479 to 1082; PHY = Physical Well-Being, PWB = Psychological Well-Being, PAR = Autonomy & Parents, SOC = Social Support & Peers, SE = School Environment; \*significant correlation at the 0.01 level. The diagonal validity (convergent) is the set of values in italics (monotrait-heteromethod). The diagonals of reliability are the two sets of values in parentheses (values of Cronbach's alpha). The two triangles heterotrait monomethod are delimited by a solid line. The triangles heterotrait heteromethod are delimited by a broken line.

**Table 3.** Means, standards deviations and T-tests by gender for self-report KIDSCREEN-27.

Dimensions KIDSCREEN-27	Female (n=583)	Male (n=499)	T test			
	M (SD)	M (SD)	T	df	p	d
PHY	45.51 (11.54)	50.98 (11.47)	-7.791	1080	<0.01	-0.47
PWB	44.71 (10.38)	49.41 (11.48)	-7.060	1080	<0.01	-0.43
PAR	43.63 (10.77)	46.56 (10.00)	-4.614	1080	<0.01	-0.28
SOC	49.41 (12.64)	47.92 (12.02)	1.987	1080	<0.05	0.12
SE	49.57 (9.77)	49.42 (10.41)	0.235	1080	0.81	0.01

Note: PHY = Physical Well-Being, PWB = Psychological Well-Being, PAR = Autonomy & Parents, SOC = Social Support & Peers, SE = School Environment.

**Table 4.** Means, standards deviations and F-tests by groups for self-report KIDSCREEN-27.

KIDSCREEN-27	PG (n=510)	PrG (n=394)	CG (n=178)	ANOVAS		
	M (SD)	M (SD)	M (SD)	F (2,1079)	p	η <sup>2</sup>
PHY	47.94 (12.46)	49.57 (10.40)	44.88 (12.31)	9.839	<0.01	0.02
PWB	46.74 (11.91)	48.27 (9.70)	44.19 (11.39)	8.385	<0.01	0.02
PAR	43.39 (11.28)	48.40 (8.82)	41.95 (9.69)	36.283	<0.01	0.06
SOC	47.10 (13.28)	52.38 (10.11)	45.27 (12.31)	29.976	<0.01	0.05
SE	48.66 (10.63)	50.83 (8.85)	48.99 (10.68)	5.478	<0.05	0.01

Note: PHY = Physical Well-Being, PWB = Psychological Well-Being, PAR = Autonomy & Parents, SOC = Social Support & Peers, SE = School Environment.

correlations was observed amongst most of the dependent variables, suggesting the appropriateness of a MANOVA. Additionally, the Box's M value of 112.92 was associated with a  $p < 0.001$  but matrices were equal thus, the covariance matrices between the groups were assumed to be equal for the purposes of the MANOVA (Field, 2013).

A one-way multivariate analysis of variance (MANOVA) was conducted to test the hypothesis that there would be one or more mean differences between adolescents groups (PG, PrG and CG) and KIDSCREEN-27 scores. A statistically significant MANOVA effect was obtained, Pillais's Trace = 0.097,  $F(4, 2152) = 11.019$ ,  $p < 0.001$ . The multivariate effect size was estimated at 0.049, which implies that 4.9% of the variance in the canonically derived dependent variable was accounted for by groups.

Prior to conducting a series of follow-up ANOVAs, the homogeneity of variance assumption was tested for all five KIDSCREEN-27 dimensions. Based on a series of Levene's F tests, the homogeneity of variance assumption was considered satisfied. A series of one-way ANOVA's on each of the five dependent variables was conducted as a follow-up tests to the MANOVA. As can be seen in **Table 2**, all of the ANOVA's were statistically significant, with effect sizes (partial  $\eta^2$ ) ranging from 0.01 (SE) to 0.06 (PAR).

After that, a series of post-hoc analyses (Hochberg) were performed to examine individual mean difference comparisons across all three adolescents groups and all five KIDSCREEN-27 dimensions. The results revealed that ten of fifteen post-hoc mean comparisons were statistically significant ( $p < 0.05$ ). In all cases, the trend of the effect was linear. That is, on average, PrG adolescents showed better HRQoL scores than CG adolescents for all dimensions and that PG adolescents for three dimensions (PAR, SOC and SE). PG adolescents showed, on average, better HRQoL scores than CG adolescents for two dimensions (PHY and PWB). The effect sizes as estimated by Cohen's d are reported in **Table 5**. It can be observed that the largest effects tended to be associated with the dimensions SOC and PAR with mean Cohen's d values equal to 0.46 and 0.42, respectively, which are small effect according to Cohen's (1988) guidelines.

The MANOVA was followed up with discriminant analysis. As the independent variable was associated with three levels (PG, PrG and CG), two eigenvalues and canonical correlations were extracted by the MANOVA. The first eigenvalue was equal to 0.09 and accounted for nearly all (88.42%) of the model variance. The canonical correlation associated with the first eigenvalue was equal to 0.292, which implies that 29.2% of the variance in the discriminant function derived scores which was accounted for groups. By contrast, the second eigenvalue was equal to 0.012 and a corresponding canonical correlation of 0.011, both of them was found to be statistically significant, (Wilks  $\Lambda = 0.90$ ,  $F(10, 11.18)$ ,  $p < 0.001$ ) and (Wilks  $\Lambda = 0.99$ ,  $F(4, 3.29)$ ,  $p < 0.05$ ), respectively.

As can be seen in **Table 6**, the standardized discriminant function coefficients suggested that the three groups of adolescents (PG, PrG and CG) were maximally differentiated by canonical variate first function with greater weightings from the PAR (0.77) and SOC (0.58) dimensions and by canonical variate second function with greater weightings from the PHY (0.76), SE (-0.70) and PWB (0.59) dimensions.

The estimates at group centroids performed to the first function showed that the PrG group was associated with the largest group centroid ( $M = 0.40$ ,  $SD = 0.85$ ), the PG group was associated with the next largest group centroid ( $M = -0.19$ ,  $SD = 1.11$ ) and, finally, the CG was associated with the smallest group centroid ( $M = -0.34$ ,  $SD = 0.98$ ). By contrast, the estimates performed to the second function showed that the PG group was associated with the largest group centroid ( $M = 0.10$ ,  $SD = 1.07$ ), the PrG group was associated with the next largest group centroid ( $M = -0.03$ ,  $SD = 0.87$ ) and, finally, the CG was associated with the smallest group

**Table 5.** Mean differences in KIDSCREEN-27 between groups of adolescents.

KIDSCREEN-27	PrG vs. PG		PrG vs. CG		PG vs. CG		Mean Cohen's d
	Mean difference	d	Mean difference	d	Mean difference	d	
PHY	1.63	0.14	4.69*	0.41	3.06*	0.25	0.27
PWB	1.53	0.14	4.08*	0.38	2.55*	0.22	0.25
PAR	5.01*	0.49	6.45*	0.70	1.44	0.19	0.46
SOC	5.27*	0.48	7.10*	0.63	1.83	0.14	0.42
SE	2.17*	0.22	1.83*	0.19	-0.34	-0.03	0.13

Note: \*The mean difference is significant at the 0.05 level.



centroid ( $M = -0.22, SD = 1.05$ ) (Figure 1).

A conservative approach to statistical significance testing was applied. Specifically, an alpha level of 0.001 was specified to the MANOVA. A statistically significant MANOVA effect was obtained, Pillais’s Trace = 0.10,  $F(4, 2158) = 27.625, p < 0.001$  with three adolescents groups (PG, PrG and CG) that was performed on the canonically derived KIDSCREEN-27 (Table 7). The first function, yielded  $F(2, 1079) = 50.344, p < 0.001$ , and  $\eta^2 = 0.085$ , which implies that 8.5% of the variance in the canonically derived associated with the first eigenvalue reported above. By contrast, second function, yielded  $F(2, 1079) = 6.591, p = 0.001$ , and  $\eta^2 = 0.012$ , which implies that 1.2% of the variance in the canonically derived associated with the second eigenvalue reported above.

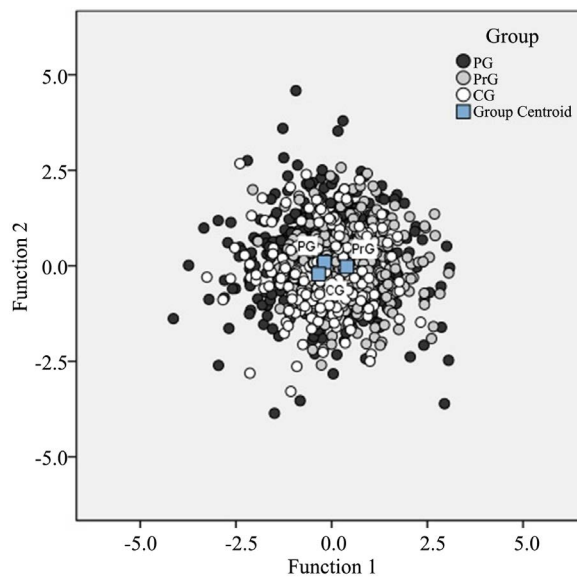
Bonferroni adjusted post-hoc tests were performed to specifically contrast the adolescents groups variable on the canonically derived KIDSCREEN-27 dimensions (Table 8). Contrasts were found to be statistically significant ( $p < 0.00025$ ) to both variates. The mean Cohen’s d values were as follows: Function 1 = 0.51 and Function 2 = 0.12. The first value is suggestive of a moderate effect size, according to Cohen (1992).

**Table 6.** Discriminant functions coefficients associated with the MANOVA.

KIDSCREEN-27 dimensions	Canonical discriminant function coefficients				Structure matrix	
	Raw		Standardized		Function 1	Function 2
	Function 1	Function 2	Function 1	Function 2		
PHY	0.00	0.07	-0.03	0.76	0.85	0.04
PWB	-0.02	0.05	-0.19	0.59	0.77	0.11
PAR	0.08	-0.03	0.77	-0.28	0.32	-0.26
SOC	0.05	0.00	0.58	-0.05	0.37	0.66
SE	-0.01	-0.07	-0.10	-0.70	0.35	0.57

**Table 7.** Means, standards deviations and F-tests by groups for Canonical variates derived from self-report KIDSCREEN-27.

Canonical variate	Groups			ANOVAS		
	PG (n = 510)	PrG (n=394)	CG (n = 178)	$F(2,1079)$	$p$	$\eta^2$
	$M(SD)$	$M(SD)$	$M(SD)$			
Function 1	-0.19 (1.11)	0.40 (0.85)	-0.34 (0.98)	50.344	< 0.001	0.085
Function 2	0.10 (1.07)	-0.03 (0.87)	-0.22 (1.05)	6.591	0.001	0.012



**Figure 1.** Canonical discriminant functions derived from self-report KIDSCREEN-27.

**Table 8.** Mean differences on Canonical variates derived from self-report KIDSCREEN-27 between groups of adolescents.

Canonical variate	PrG vs PG		PrG vs CG		PG vs CG		Mean Choen's d
	Mean differences <sup>a</sup>	d	Mean differences <sup>a</sup>	D	Mean differences <sup>a</sup>	d	
Function 1	0.58*	0.59	0.74*	0.80	0.15	0.15	0.51
Function 2	-0.12	-0.12	0.19	0.20	0.31	0.29	0.12

Note: \*The mean difference is significant at the 0.001 level. <sup>a</sup>Adjustment for multiple comparisons: Bonferroni.

## 4. Discussion

This exploratory study, inserted in a second phase of a multicenter research project performed in four Brazilian capital cities, aimed to compare generic HRQoL measures for subgroups of adolescents from schools and from outpatient mental health services to analyze discriminant properties of the KIDSCREEN-27 questionnaire.

Beforehand, the results indicated that both KIDSCREEN-27 versions enable a reliable assessment of general HRQoL in adolescents with and without mental health problems.

Both self-report and proxy versions presented Cronbach's alphas suitable for screening tools and resembles the results obtained in the European validation whose coefficients ranged from 0.78 to 0.84 for the individual dimensions (Robitail et al., 2007).

Regarding the convergence/discrepancy between the answers given by participants and those provided by their caregivers (proxy) in the same dimensions, the findings showed moderate to weak convergence for the different areas. These findings are similar to those found in literature which indicate that, in general, there is good agreement in areas that reflect observable functioning and poor agreement for the areas that reflect non-observable functioning (Davis et al., 2007; Robitail, Siméoni, Ravens-Sieberer, Bruil, & Auquier, 2007; Upton, Lawford, & Eiser, 2008).

As regards the discriminant validity, the instrument was able to discriminate between gender and between students and clinical groups. Those findings were also reported in studies on similar populations (Erhart, Ottova et al., 2009; Erhart, Ravens-Sieberer, Dickinson, & Colver, 2009; Mohler-Kuo & Dey, 2011).

In general, scores on the subscales which compared children and adolescents considered healthy belonging to the students group with those with acute or chronic mental illnesses in the clinical group, rated the quality of life of the first group as better in almost all areas, both for the gender as to the age range adolescent, consistent with findings in other studies (Mohler-Kuo & Dey, 2011; Ravens-Sieberer et al., 2008).

In summary, we can say that most of the assumptions about the reliability, convergent and discriminant validity of the instrument KIDSCREEN-27 were established. The results were acceptable, and are similar to those obtained in its original validation. The instrument was well accepted by the respondents, reliable for use in adolescents, and useful for its multidimensional characteristic synthesized in a relatively small number of items. KIDSCREEN-27 allows the assessment of quality of life in several areas, translating into an important tool in national and international multicenter studies that might contribute with indicators in the search for improvements in policies aimed at health care of children and adolescents.

This study, although covering a community-based sample related to the Psychosocial Care Centers of Children and Youth, which imply a population base of 100,000 people, in each surveyed city, the number of centers was below the actual demand. This fact generated several problems in accessibility of researchers to participants such as concerns of the participants with the necessary time to respond to the instrument and the time required to attend scheduled appointments in centers. Thus, despite the apparently easy access of researchers to the participants previously stratified the evidence of structural problems, limited the sample universe beyond the spontaneous demand and voluntary participation. This means that, as the study is not population-based, our findings cannot be generalized to the population of Brazilian adolescents. Furthermore, due to their cross-sectional design cannot be inferred causal factors.

## 5. Conclusion

In conclusion, the study provides pertinent and valuable information about measuring HRQoL in adolescents, a field that has been the subject of little research. In addition, we can say that most of the assumptions about the reliability, convergent and discriminant validity of the instrument KIDSCREEN-27 were established. The results

were acceptable, and are similar to those obtained in the original validation. The instrument was well accepted by the respondents, reliable for use in adolescents, and useful for its multidimensional characteristic synthesized in a relatively small number of items. KIDSCREEN-27 allows the assessment of quality of life in several areas, translating into an important tool in national and international multicenter studies that might contribute with indicators in the search for improvements in policies aimed at health care of children and adolescents.

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