

Prevalence of psychiatric disorders in a Brazilian birth cohort of 11-year-olds

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Abstract

Objective To estimate the prevalence of psychiatric disorders in preadolescents aged 11–12 years from a birth cohort in a southern Brazilian city.

Methods This is a cross-sectional investigation nested in a cohort study with a two-phase design: screening and diagnosis. In the screening phase, 4,452 preadolescents and their mothers were interviewed with the Strengths and Difficulties Questionnaire (SDQ). In the diagnostic phase, all preadolescents with a positive SDQ ($n = 122$) and their mothers answered the Development and Well-Being Assessment for Children and Adolescents (DAWBA). A sample randomly selected among the cohort participants with a negative SDQ served as a control group (158 subjects and their mothers) and was also assessed using the DAWBA.

Results After adjustment for the performance of the screening instrument, 10.8% (95% CI 7.1–14.5) of the preadolescents showed at least one psychiatric disorder

according to either the DSM-IV or the ICD-10. The most prevalent disorders were disruptive behavior (prevalence rates were 8.5% according to the DSM-IV and 7.1% according to the ICD-10) and anxiety disorders (prevalence rates were 6.0% according to the DSM-IV and 6.2% according to the ICD-10).

Conclusion Both overall and individual prevalence rates of psychiatric disorders found in this study are in the same range of other international studies, although slightly higher than findings from developed countries. The results corroborate previous findings from other epidemiological studies in children and adolescents suggesting the universality of psychiatric disorders across cultures.

Keywords Prevalence · Child and adolescent · Mental health problems · Epidemiology · Psychiatric disorders

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Introduction

Epidemiological studies have shown that the estimated prevalence of psychiatric disorders in preadolescents is around 12%, reaching 15% during adolescence [23]. Although the prevalence of psychiatric disorders in children and adolescents is quite homogeneous among different cultures [5, 22], there are differences between developed and developing countries [4]. Therefore, it is important to carry out studies in different cultures.

Children and adolescents who live in developing countries usually have higher prevalence rates of psychiatric disorders when compared to their peers from developed countries, probably due to their poor socioeconomic conditions [4]. Although these differences in prevalence rates are significant, they are moderate in magnitude [16]. A

recent review of epidemiological studies including representative samples of the population and using internationally accepted diagnostic criteria has found an estimated prevalence rate of psychiatric disorders in children and adolescents from developing countries between 5 and 18% [21].

Brazil is the largest and most populous country in Latin America. Moreover, 29.6% of its population is younger than 14 years and 54 million people live below the poverty line [30]. It is important to note that not more than three epidemiological studies have investigated the total prevalence of mental health problems (not just specific disorders) in children and adolescents in Brazil. The pioneer study conducted in the Northeast region of the country found that 10.0% of 828 children and adolescents aged 5–14 years had severe or moderate mental disorders [1]. In the Southeast region, a total prevalence rate of 12.7% was found for psychiatric disorders using the DSM-IV criteria in 1,251 Brazilian schoolchildren aged 7–14 years [10]. In Ilha da Maré, in Northeast Brazil, 7.0% of 430 children, representing all 7–14-year-old children living in the island, had at least one mental disorder [15].

To the best of our knowledge, there is no study on the prevalence of mental health problems in children and adolescents with nationally representative samples of Brazil or any other country in South America [4]. Therefore, it is important to perform studies using similar methods in different countries of the region in order to obtain appropriate estimates taking into consideration ethnical, cultural and social differences. The pattern of occurrence of psychiatric disorders in this age range must be recognized, allowing for the identification of both age of onset of these disorders and the most appropriate age for preventive interventions.

The objective of this study was to estimate the prevalence of psychiatric disorders in preadolescents from a birth cohort conducted in the city of Pelotas, located in the South region of Brazil.

Methods

This is a cross-sectional study nested in a longitudinal study with a two-phase sampling strategy: screening and diagnosis.

The population comprised 4,452 preadolescents (49.7% boys and 50.3% girls) and their mothers who belonged to the 1993 Brazilian Birth Cohort Study [29]. During 1993, interviewers visited the five maternity hospitals of the city of Pelotas. There is almost no incidence of home deliveries in the city and all mothers who lived in the urban area were recruited to participate in the study. Pelotas currently has 320,000 urban inhabitants. It is located in the southernmost

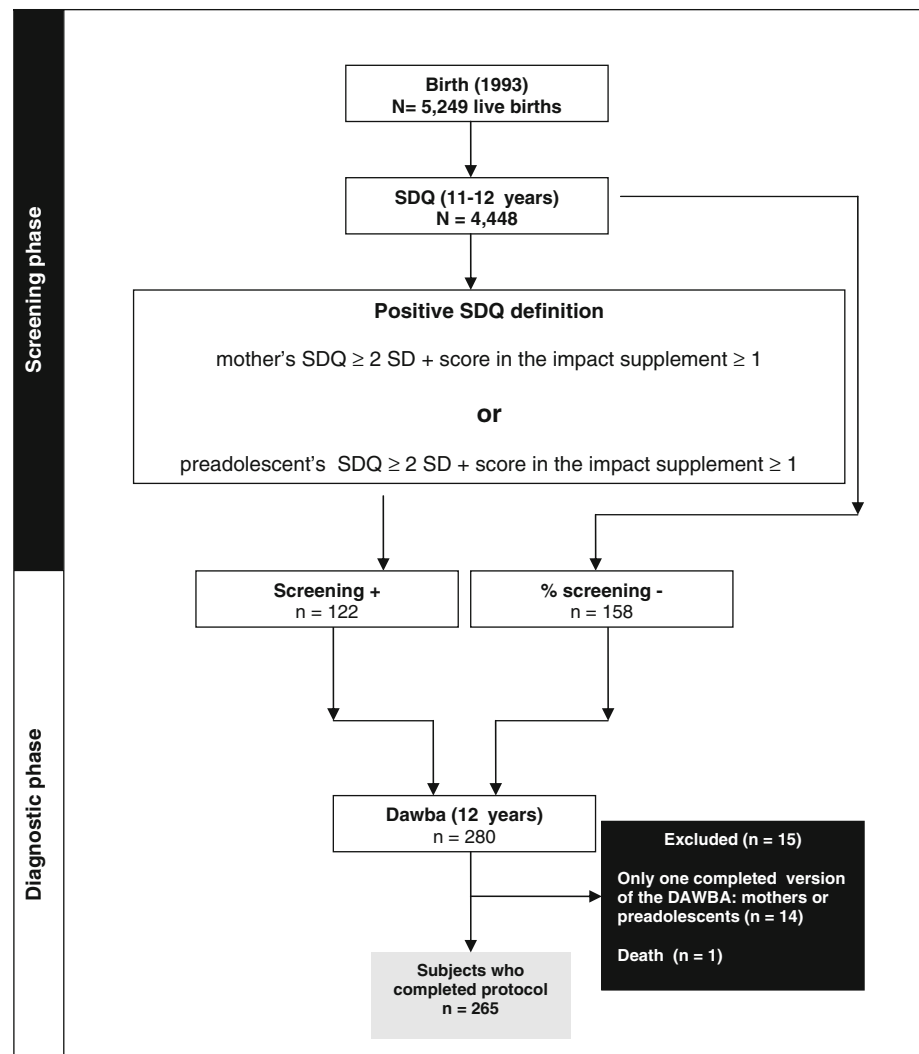
region of Brazil, close to the border with Uruguay. The mothers of 5,249 live newborns and 55 stillborns were interviewed. Several follow-ups of samples were carried out [29]. The last follow-up was conducted in 2004/2005 when the mean age of the subjects of the cohort was 11.3 years (SD 0.3). All subjects were searched for and 87.5% ($N = 4,452$) of the preadolescents and their mothers were interviewed during home visits. Attrition was studied in relation to baseline characteristics and subjects from lower socioeconomic level—according to either family income or maternal schooling—were more likely to be traced, although the differences were not substantial. At least 79.9% of all children in each five income subgroups and at least 82.1% of all children in each five maternal schooling subgroups were traced in the 11-year visit [29]. Self-referred skin color by subjects included in the cohort was as follows: white (66.8%), black or mixed (28.5%) and Asians or Native Individuals (4.7%). During the screening phase, almost all mothers and guardians ($N = 4,423$) were interviewed using the Strengths and Difficulties Questionnaire (SDQ), which is a screening instrument to assess mental health problems in children and adolescents. A confidential questionnaire was applied to preadolescents, including a self-administered version of SDQ. A total of 4,285 preadolescents completed it, resulting in 4,448 completed SDQs either by mothers or preadolescents (four SDQs could not be used in the study). The first phase was performed from July 2004 to March 2005. During the diagnostic phase, when the participants' mean age was 12.4 years (SD 0.5), new home visits occurred, and 280 preadolescents and their mothers were interviewed using the SDQ again and a diagnostic instrument for mental disorders—the Development and Well-Being Assessment of Children and Adolescents (DAWBA). This phase was performed from October 2005 to March 2006 (Fig. 1).

The sample of the diagnostic phase comprised all preadolescents with positive SDQs and a similar proportion with negative SDQs.

Positive SDQs were defined a priori according to the following criteria: all subjects who had mother's scores on the SDQ ≥ 2 standard deviations + score in the impact supplement of SDQ ≥ 1 , or preadolescent's scores on the SDQ ≥ 2 standard deviations + score in the impact supplement ≥ 1 . This group was composed by 122 subjects. A similar number of subjects ($n = 158$) was randomly selected among the other participants of the cohort with the purpose of forming a control group (negative SDQ). There were no exclusion criteria to initially compose both groups.

Among the 280 preadolescents who composed the sample for the diagnostic phase, there was one death between screening and diagnostic phase and 14 diagnostic interviews were excluded because they had only one completed version of the DAWBA (mothers or preadolescents). The reasons

Fig. 1 Flowchart showing inclusion criteria for the samples of adolescents in this two-phase design study



for having just one completed version were as follow: one mother had health problems, one refusal, one needed to interrupt the interview, one mother had scheduling problems, two preadolescents had difficulty to understand the interview, and eight preadolescents lived in other cities. Among these 14 excluded interviews, nine were cases and five were included in the control group. Thus, the final sample included 265 preadolescents.

The screening phase team was comprised of lay interviewers. The diagnostic phase team consisted of eight psychologists whose training included: (1) extensive theoretical course taught by the child psychiatrist in charge of the validation of the SDQ and the DAWBA in Brazil (BFB) and by another experienced child psychiatrist (LAR); (2) training on the instrument using DVDs showing DAWBA application; (3) joint administration and score of the DAWBA in six interviews with community adolescents or patients from mental health services (possible cases and controls) and in two interviews with parents in order to

check interrater reliability. The only discrepancies found were as follows—(a) major depression: for one patient, one interviewer scored a positive diagnosis while all others indicated a negative diagnosis; (b) oppositional defiant disorder: for one patient, one interviewer scored a negative diagnosis while all others indicated a positive diagnosis. Field work was supervised by the psychologist who coordinated the study (LA) and by a child psychiatrist (LAR). An experienced child psychiatrist (BFB) performed the clinical judgment of diagnoses established by the trained psychologists using the DAWBA. She was already in charge of deciding clinical diagnoses in a previous study using the DAWBA to assess child psychiatric diagnoses in a different Brazilian sample [10]. Her task consisted of (a) confirming the diagnoses obtained using a specific DAWBA software; (b) choosing the final diagnosis when the mother's version showed a different diagnosis from the adolescent's version; (c) establishing the diagnosis without any other specification in situations where the number of

symptoms was not enough to meet the diagnostic criteria but there was enough impact on the preadolescent's life to establish the diagnosis.

During both phases of the study, data were entered twice. The following software were used: Epi-Info (CDC, 2001) and DAWBA [14]. A brief version of the diagnostic instrument was applied again in a subsample of 5% randomly selected subjects in order to control the quality of the information. The research project was approved by the Research Ethics Committee of the School of Medicine at the Universidade Federal de Pelotas (UFPeL). Mothers and adolescents signed a written informed consent at each phase of the study, and those who requested psychological care for their children were referred to the Outpatient Clinic in the Adolescent Mental Health Clinic of the UFPeL.

Instruments

Strengths and Difficulties Questionnaire

This is a screening questionnaire for mental health problems consisting of 25 items. The items are divided into five subscales with five items each, resulting in scores of emotional symptoms, conduct problems, hyperactive behavior, peer relationships, and prosocial behavior. All items of the first four scales generate the total difficulties score. An extended version of the questionnaire was used. It contained six extra items assessing the impact of symptoms in terms of suffering, social impairment and burden for relatives, although only five are considered for impact scoring. The versions for parents and child and adolescent were used. The SDQ was designed by Goodman [13] and validated in Brazil by Fleitlich-Bilyk [10].

Development and Well-Being Assessment for Children and Adolescents parental version

The ICD-10 [31] and DSM-IV [3] diagnoses were operationally established using the DAWBA, an interview designed by Goodman [14] and validated in Brazil by Fleitlich-Bilyk [10]. The DAWBA is an instrument containing a structured psychiatric interview for parents with additional open questions in which parents may report the problems using their own words, while it is possible for a clinical judge to assess the diagnosis obtained using the software. The DAWBA is appropriate for epidemiological studies and it was developed based on the following premises: (1) need of measuring the symptoms and their impact using questions on suffering or interference in family life, peer relationships, leisure and learning activities caused by the difficulties; (2) need of multiple

informants; (3) instruments based on the respondent are easier to manage than semi-structured interviews based on clinical or highly trained interviewers; (4) information provided by a clinical judge increases the validity of the study; (5) focus on the recent present and past since information from the remote past tends to have less reliability; (6) estimation of the prevalence of rare disorders requires a different approach.

DAWBA—child and adolescent versions—is almost the same as the parental version. The sections of attention-deficit/hyperactivity disorder (ADHD) and oppositional defiant disorder are shorter because self-report of these domains usually have limited validity [14]. On the other hand, this version has more questions about panic disorder than the parental version due to the subjective nature of the symptoms [14].

Statistical analysis

Prevalence was estimated according to the formula described below, where Pe is the estimated prevalence, cd is the cases during the diagnostic phase, nns is the number of negative screenings that were not assessed in the diagnostic phase, npv is the negative predictive value of SDQ and n is the sample size [26]:

$$Pe = cd + nns(1 - npv)/n$$

Standard errors and confidence intervals were calculated [2, 9]. Sensitivity, specificity, positive and negative predictive values were calculated with a 2×2 table. In order to check accuracy of the SDQ as a screening instrument, a receiver operating characteristic (ROC) curve was also performed with the DSM-IV (DAWBA) as a diagnosis parameter using the SPSS 13.0.

Results

The findings indicate that 479 preadolescents out of the 4,448 participants of the 1993 birth cohort would present at least one psychiatric disorder according to either the ICD-10 or the DSM-IV, meaning a prevalence rate of 10.8% (95% CI 7.1–14.5), after adjusting the results for the performance of the screening instrument (SDQ) (Table 1).

Among the diagnostic groups, the most prevalent disorders were anxiety disorders, followed by oppositional defiant disorder and conduct disorder, and finally ADHD and depressive disorder. Considering externalizing disorders all together (ADHD, oppositional and conduct disorders), as has been done by others [7, 14], this is the group of disorders with the highest prevalence, presenting a prevalence rate of 8.5% according to the DSM-IV and 7.1% according to the ICD-10.

Table 1 Prevalence and confidence intervals for psychiatric disorders according to DSM-IV and ICD-10 diagnosis: 1993 cohort sample, follow-up 2004–2005

Disorders	Prevalence (95% CI)	
	DSM-IV	ICD-10
Any diagnosis	10.8 (7.1–14.5)	10.8 (7.1–14.5)
Any anxiety disorder	6.0 (3.2–8.8)	6.2 (3.2–8.8)
Separation anxiety disorder	0.7 (0.3–1.7)	0.8 (0.3–1.9)
Specific phobia	1.4 (0.2–2.2)	1.4 (0.2–2.2)
Social phobia	0.1 (0.3–0.5)	0.1 (0.3–0.5)
Obsessive-compulsive disorder	0.1 (0.3–0.5)	0.1 (0.3–0.5)
Generalized anxiety disorder	1.4 (0.2–2.2)	1.4 (0.2–2.2)
Posttraumatic stress disorder	0.1 (0.3–0.5)	–
Agoraphobia	–	0.1 (0.3–0.5)
Other anxiety disorder	2.2 (0.3–3.7)	2.3 (0.3–3.7)
Any depressive disorders	1.6 (0.4–3.6)	1.6 (0.4–3.6)
Major depression	1.6 (0.4–3.6)	0.9 (0.2–2.0)
Other depressive disorder	0.1 (0.3–0.5)	0.7 (0.3–1.7)
Any ADHD/hyperkinetic disorder	4.1 (1.6–6.4)	2.7 (0.9–5.0)
Any oppositional–conduct disorder	4.4 (1.6–6.4)	4.4 (1.6–6.4)
Oppositional defiant disorder	2.1 (0.3–3.7)	2.1 (0.3–3.7)
Conduct disorder	2.2 (0.3–3.7)	2.2 (0.6–3.4)
Other disruptive disorder	0.1 (0.3–0.5)	0.1 (0.3–0.5)
Less common disorders	1.4 (0.2–2.2)	1.4 (0.2–2.2)
Eating disorders	0.1 (0.3–0.5)	0.1 (0.3–0.5)
Tic disorders and Tourette syndrome	1.3 (0.2–2.2)	1.3 (0.2–2.2)

There were no cases of panic attacks, autistic spectrum disorders, bipolar disorder, attachment disorders, selective mutism, psychotic disorders

Only 2.4% of the subjects fulfilled subthreshold diagnostic criteria according to the DSM-IV and 3.1% according to the ICD-10. However, this constellation of psychiatric symptoms caused enough impairment and suffering in the preadolescents to cause them to be classified as “diagnosis without other specification” (e.g., other anxiety disorder, other depressive disorder, other disruptive disorder).

Table 2 shows psychometric properties for the proposed SDQ cut-off point as a screening criterion. The area under the curve in ROC analyses was 74% (95% CI 0.68–0.81),

Table 2 SDQ’s cut-off point performance as a screening criterion

Parameter	Values (95% CI) (%)
Sensitivity	78.2 (73.3–83.2)
Specificity	70.4 (64.9–75.9)
Positive predictive value	48.2 (42.2–54.2)
Negative predictive value	90.2 (86.6–93.8)
Area under the curve	74.0 (0.68–0.81)

documenting a moderate performance of the SDQ as a screening instrument in this sample. More relevant for its purpose in this study, the instrument showed an adequate negative predictive value: 90.2% (95% CI 86.6–93.8).

Discussion

The findings suggest that 10.8% of preadolescents from a medium-sized city in the South region of Brazil had at least one psychiatric disorder according to both the DSM-IV and the ICD-10. It is important to note that there was a great similarity between the prevalence rates of disorders according to the DSM-IV and the ICD-10.

This total prevalence of 10.8% was quite similar to the rates found in other Brazilian studies carried out in the Southeast (12.7%) [10] and in the Northeast (10.0 and 7.0%) [1, 15]. Our prevalence rate was higher than the prevalence of the study conducted at Ilha da Maré [15] (10.8 vs. 7.0%), but there was overlap of the relevant 95% confidence intervals (7.1–14.5% for this study as compared with 2.3–11.8% for Ilha da Maré), showing that is unlikely that there would be a statistically significant difference between rates.

The prevalence of 10.8% found in the present study was also similar to the rates found in recent international studies, being slightly higher than the prevalence rates found in studies conducted in developed countries and lower than those found in studies carried out in other developing countries and in Russia. Other studies that also used DAWBA in community samples found the following prevalence rates: 9.7% in 10,438 British children aged 5–15 years [11]; 8.2% in Italian schoolchildren aged 10–14 years [12]; 7.0% in 9,155 Norwegian children aged 8–10 years [20]; 15.0% in 922 children aged 5–10 years from Bangladesh [21] and in 448 children aged 7–14 years from Russia [17]. Other studies that have also used the DSM-IV or the ICD-10 criteria, but different diagnostic instruments, showed the same pattern of results, i.e., higher prevalence in poorer countries. In the 12-year follow-up of the Great Smoky Mountain Study, 8.3% of the 854 North American preadolescents had at least one mental disorder [7]. On the other hand, in Puerto Rico, the prevalence was 16.4% in 1,886 children aged 4–17 years [6] and prevalence rates of 12.5 and 9.4% were found, respectively, in 2,064 children from 0 to 16 years [28] and in 1,403 children aged 8–12 years from India [19]. These differences in prevalence rates might be caused by the poorer socioeconomic conditions and the higher environmental difficulties faced by the children and adolescents who live in less developed countries [27].

Although some differences were detected in prevalence rates among the several studies mentioned above, estimates

obtained from the ICD-10 and the DSM-IV (including that presented in this study) showed more conservative prevalence rates than those found in studies using the DSM III-R and the ICD-9 diagnostic criteria [8]. It is important to stress that the inclusion of a consideration of impairment in the epidemiological interviews provides more reasonable and realistic prevalence rates for the planning of public policies, even considering the recent debate on how adequate impairment from symptoms might be to determine cut-off points for diagnostic criteria [25]. Knowing the level of impairment is fundamental to determine the burden of symptoms and/or the significance of any disorder, even more considering that the correlation of symptoms and impairment are not always high [18].

In the present study, there were very slight differences between the diagnoses obtained using the DAWBA according to the ICD-10 or to the DSM-IV (Table 1), showing that the current versions of both classification systems are more aligned than previous versions [16]. The highest difference was found for ADHD, which had a higher prevalence according to the DSM-IV criteria than according to the ICD-10 criteria. This difference was expected because the ICD-10 criteria for hyperkinetic disorder are more restrictive. In order to receive a diagnosis, children must present with symptoms in the three dimensions (lack of attention, impulsivity and hyperactivity) in at least two different contexts (e.g., home and school), and they must not have any comorbidity with development, mood and anxiety disorders [22]. In a recent meta-regression analysis including epidemiological studies of ADHD in children and adolescents, diagnostic classification was one of the most important reasons explaining the heterogeneity of ADHD rates among studies worldwide. More important, the highest differences were detected between DSM-IV and ICD-10 [22].

The psychopathology pattern found in this study was the same as that found worldwide for this age group, i.e., the most prevalent disorders were disruptive and anxiety disorders [10, 11]. When compared to other Brazilian studies that used the DAWBA [10, 15], the present study presented a higher prevalence rate of ADHD, but the relatively wide 95% confidence intervals in this study (1.6% to 6.4%) seems to overlap the confidence intervals for ADHD reported by the others Brazilians studies [10, 15].

The SDQ performance as a screening instrument was similar to that detected in other Brazilian studies [10, 15] that also used SDQ during the screening phase combined with the DAWBA in the diagnostic phase for mental disorders. The SDQ had a high negative predictive value (90.2% in Pelotas, 97% in Ilha da Maré, and 95% in the Southeast) and a moderate positive predictive value (48.2% in Pelotas, 40% in Ilha da Maré, and 44% in the Southeast). A great similarity of the SDQ performance among the

studies was found in spite of the following methodological differences: (1) the version for teachers of both instruments (SDQ and DAWBA) was not used in our study; (2) we used a different cut-off point for the SDQ in our definition of case; and (3) our sample was larger. It is important to emphasize that all preadolescents who were classified as possible cases by SDQ were included in the sample of 265 subjects (42% cases vs. 58% group control), artificially increasing the prevalence of psychiatric disorders in the diagnostic phase of the study. This strategy might have changed the diagnostic accuracy of the SDQ. Nevertheless, the same sampling strategy was used in the second phase of the study of Ilha da Maré (42% cases vs. 58% control group), which provides a comparison of SDQ performance between both studies.

Limitations

We only used parental and self-report screening and diagnostic instruments (SDQ and DAWBA). The versions for teachers were not used in this study since a strategy of performing home visits was chosen. The mothers and preadolescents were not assessed by different interviewers due to logistic reasons. This strategy might have increased the agreement between these two information sources, decreasing prevalence rates [24]. The gap between the screening and the psychiatric assessment in the second phase might have reduced the accuracy of the screening measure, since some positive cases found during screening might have become normal afterwards and some subjects who were negative for mental disorder during screening might have become positive cases afterwards. However, the high correlation between diagnosis and screening phases' SDQs (parent's SDQ Pearson's correlation = 0.75; preadolescent's SDQ Pearson's correlation = 0.68) assures accuracy of the results. The SDQ performance as a screening instrument might have been influenced by the artificially increased prevalence of mental disorders in the diagnostic phase of the study.

Conclusion

The agreement between our results and those from the other studies performed from different regions of the country—Southeast and Northeast—showed a homogeneous prevalence of psychiatric disorders in Brazilian children and adolescents (7.0–12.7%). These findings can contribute to the planning of national public mental health policies.

The prevalence of 10.8% was also comparable to that found in several international studies that used a similar

methodology, presenting an intermediate value: higher than that found in developed countries and lower than that found in countries poorer than Brazil.

The psychopathology pattern found in this study—disruptive disorders and anxiety disorders were the most prevalent—was the same as the pattern found in Brazilian and international studies. The similarity between the prevalence rates and the types of psychopathologies found in several studies suggests that there is universality of mental disorders in early adolescence across different cultures.

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