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The Ilha de Maré study: a survey of child mental health problems in a predominantly African-Brazilian rural community

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Abstract *Background* There have been very few Brazilian epidemiological surveys of child mental health problems. The only recent survey to have used internationally recognised measures and diagnostic criteria was carried out in Southeast Brazil in a relatively prosperous setting where the population was predominantly urban and white. *Methods* The setting was an island community in Northeast Brazil that is rural, relatively poor and has a strong African heritage. In an initial phase, a simple random sample of 519 children aged 5–14 was assessed by screening questionnaires completed by parents, teachers and older children. In a second phase, a sub-sample of 100 children was selected for more detailed diagnostic assessments. *Results* Conduct and hyperactivity problems were commoner in boys; emotional symptoms were commoner in girls; and hyperactivity declined with age. By contrast with previously collected data from Southeast Brazil, there were more reported symptoms, but less resultant impact. Using a variety of indices, the rate of disorder on Ilha de Maré was around half that previously found in Southeast Brazil. *Conclusion* The measures and diagnostic criteria that were employed appeared valid for use in Northeast Brazil, though there was evidence for consis-

tent over-reporting of symptoms on the screening questionnaire. Rates of child mental health problems appear to differ substantially between sites, confirming the need for a multi-site Brazilian study of the prevalence of child psychiatric disorders.

Key words epidemiology – child and adolescent – mental health problems – psychiatric disorder – transcultural – Latin America

Introduction

Brazil is the largest and most populous country in Latin America, with a total population of around 170 million, of whom approximately 61 million are aged under 18. There have been very few Brazilian epidemiological surveys to determine the overall prevalence of child mental health problems. Over 20 years ago, a study in the city of Salvador in Northeast Brazil assessed 828 children aged between 5 and 14 years; 10% had a psychiatric disorder in need of treatment (Almeida Filho 1982). More recently, a study in Taubaté in Southeast Brazil assessed 1251 children aged between 7 and 14 years using current diagnostic criteria and international measures that had been translated into Portuguese and revalidated in Brazil; 13% of the sample had DSM-IV psychiatric disorders that resulted in substantial distress or social impairment (Fleitlich-Bilyk and Goodman 2004). In a country as large and diverse as Brazil, it would be surprising if findings from one municipality in the Southeast were typical of the country as a whole. There would be many advantages to carrying out similar prevalence studies in a variety of different settings in Brazil, using the same measures of psychopathology to facilitate comparisons between sites. The present study represents a first step in this direction and deliberately focuses on a very different setting. Whereas Taubaté is predominantly urban, relatively prosperous and has a strong European heritage, Ilha de Maré is rural, relatively poor and has a strong African heritage. The study

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had two main aims: firstly, to establish whether the measures of psychopathology used in Taubaté functioned satisfactorily in a very different Brazilian setting; and, secondly, to compare the prevalence of mental health problems in Ilha de Maré and Taubaté in order to provide a first indication of how variable prevalence rates might be across the country.

Subjects and methods

■ Setting

Ilha de Maré (Tide Island) is one of 36 islands in All Saints Bay in the Brazilian State of Bahia in Northeast Brazil. Ilha de Maré is part of the municipality of Salvador, which is the largest city in the Northeast, and which was formerly the main point of disembarkation for the millions of African slaves transported to Brazil. The area is a centre for African-Brazilian culture, and most of the population identify themselves as black or of mixed heritage. Ilha de Maré itself is officially listed as a Quilombo (Fundação Cultural Palmares 2000) – a term previously applied to communities founded by escaped slaves, but nowadays applied more broadly to communities with a particularly strong African-Brazilian heritage. Ilha de Maré has an area of 14 square kilometres and is home to around 4000 inhabitants, most of whom live in nine villages. The island is rugged, there are no roads, and nearly all adults are employed in fishing or small-scale farming. Elementary schooling is available on the island, but intermediate and advanced schooling is only available on the mainland. Though administratively part of the municipality of Salvador, the island is relatively isolated from the city. For example, a visitor from Salvador needs to travel to the outskirts of the city, take a 20-min journey by motor launch, transfer to a canoe to get closer to a beach, and then wade ashore.

■ Procedure

Ethical permission was obtained from the Federal University of Bahia and from the Institutes of Psychiatry in London and São Paulo. The study was a two-phase cross-sectional survey. In the first phase, a simple random sample of 5- to 14-year-olds was assessed using questionnaire measures of psychopathology administered to parents, teachers and the older children (11–14 years). Parents also provided demographic details. The second phase was restricted to 7- to 14-year-olds: these are the compulsory school years in Brazil and were the ages studied in the Taubaté survey. The second phase involved a more detailed assessment of psychopathology that was applied to all children who were screen positive in the first phase, plus a random sample of screen negative children.

■ Ilha de Maré sample

We identified 848 children aged from 5 to 14 years in a comprehensive survey of all households on Ilha de Maré between October and December 2001; this included children who attended intermediate and advanced schools on the mainland. Since the island is small and the census was carried out with the aid of local residents including teachers and health workers, we are confident that this list was comprehensive. Resources did not permit a survey of all 848 children; 519 were chosen at random for further study, of whom 430 were aged 7–14. The parents of all 519 children agreed to provide information and also consented to questionnaires being sent to teachers (from island or mainland schools as appropriate) and older children (11–14 years). Teachers provided information on 494 children (95%), and the participation rate among the 11- to 14-year-olds was 94% (188/199). The sample was 50% male, with an average age of 10.0 years (standard deviation 2.8 years). By parent report, 36% (189) of the sample was black, 55% (287) was of mixed heritage, 5% (27) was white, and 3%

(16) was of another race. Of the 430 children who were aged 7–14, 100 were selected for the second phase involving more detailed interviews: 42 children who were screen positive and 58 randomly chosen children who were screen negative. All 100 parents who were approached to take part in the second phase agreed to participate, as did 98 of the teachers and 97% of the 11- to 14-year-olds (56/58).

■ Taubaté comparison sample

For comparative purposes, some of the results from Ilha de Maré are compared with the corresponding results from the earlier prevalence study of 7- to 14-year-olds in Taubaté in Southeast Brazil. The sample of 1251 children is fully described in Fleitlich-Bilyk and Goodman (2004). In summary, random sampling of schools (stratified into public urban schools, public rural schools and private schools) was followed by random sampling of students within schools. The assessment was carried out in a single phase (unlike the two-phase design used in Ilha de Maré), with all participants being assessed using the questionnaires and detailed interview measures of psychopathology described below. By parent report, 6% of the sample was black, 23% was of mixed heritage, 71% was white, and under 1% was of another race. Comparing the Taubaté sample with the 7- to 14-year-old Ilha de Maré sample, there were no significant differences in gender ratio or mean age, but the ethnic composition differed markedly ($\chi^2 = 621.3, 3df, p < 0.001$).

■ Measures

The Strengths and Difficulties Questionnaire (SDQ) asks about 25 attributes, some positive and some negative. The items, which were selected on the basis of contemporary diagnostic criteria as well as factor analyses, are divided between five scales of five items each, generating scores for emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial behaviours. All items contributing to the first four subscales are summed to generate a total difficulties score. The informant version of the SDQ can be completed in about 5 min by parents or teachers of children aged 4–16 (Goodman 1997). There is also a self-report version (Goodman et al. 1998) for those aged 11 and above. An extended version assesses the impact of any psychiatric symptoms in terms of resultant distress, social impairment or burden for others (Goodman 1999). The SDQ has been shown to be of acceptable reliability and validity, performing at least as well as lengthier and longer-established alternatives (Goodman 2001). The website at www.sdqinfo.com provides more information on the SDQ plus downloadable versions of the questionnaires in many languages. The versions of the SDQ used in this study were the informant and self-report versions including impact supplements, all being scored in the standard manner (Goodman 1997; Goodman et al. 1998, Goodman 1999). Parent and teacher SDQs were administered on all subjects, whereas self-report SDQs were only administered to 11- to 14-year-olds. All teachers completed paper versions of the questionnaires, whereas parents and older children were all seen by interviewers who gave respondents the choice of completing paper versions of the questionnaires or having them administered as structured interviews – the latter is an important option in a society with high levels of illiteracy. Children were taken to be screen positive in the first phase of the study if they were classified as probable psychiatric cases by a computer algorithm based on the information from all available SDQs; this algorithm has been shown to be discriminating and cross-culturally valid (Goodman et al. 2000b, 2000c). The Portuguese version of the SDQ functions well in Brazil (Fleitlich and Goodman 2001).

The Development and Well-Being Assessment (DAWBA) (Goodman et al. 2000a) uses a mixture of closed and open questions about child psychiatric symptoms and their *impact* (i.e. resultant distress and social impairment). It is administered as an interview to parents and older children (aged 11 or more), and as an abbreviated questionnaire to teachers. The interviews can be administered by lay interviewers who also record verbatim accounts of any reported problems, but do not rate them. Experienced clinicians subsequently review both the verbatim accounts and the answers to structured

questions before assigning diagnoses according to DSM-IV criteria (American Psychiatric Association 1994). Previous studies have provided evidence for the validity of the DAWBA in English (Goodman et al. 2000a; Ford et al. 2003) and Portuguese (Fleitlich-Bilyk and Goodman 2004). Further background information on the DAWBA is available from www.dawba.com – including online and downloadable versions of the measures in English and Portuguese and demonstrations of the clinical rating process.

As previously described (Fleitlich-Bilyk and Goodman 2004), the Portuguese version of the DAWBA had been validated by applying it in a child mental health clinic in São Paulo to 87 subjects who had a DSM-IV clinical diagnosis, with the DAWBA rating being done blind to the clinical diagnosis. There was at least one DAWBA diagnosis made on 94% of this group, with agreement on the primary clinical diagnosis in 78%. For the present study, all DAWBA interviews and clinical ratings were carried out by one of the authors (APRN) supervised by the author (RG) who had also supervised clinical ratings for the Taubaté study (Fleitlich-Bilyk and Goodman 2004). APRN is an experienced child psychiatrist from Salvador and had carried out some of the interviews and clinical ratings for the Taubaté study. As previously reported, 255 subjects from the Taubaté study were independently rated by two clinicians (APRN and BFB); the kappa statistic for chance-corrected agreement between them was 0.93 for any disorder (SE 0.03), 0.91 for internalising disorders (SE 0.05), and 1.0 for externalising disorders (Fleitlich-Bilyk and Goodman 2004).

■ Statistical analysis

Whereas the first phase was a simple random sample and did not require weighting, the second phase of the Ilha de Maré study did require weighting to adjust for the disproportionate sampling of screen positive children, using the Statistics/Data Analysis Program (STATA 6) survey program in the calculation of test statistics and standard errors. When comparing the Ilha de Maré data with data from the Taubaté study, allowance was also made for the complex clustering, stratification and weighting of the Taubaté survey (Fleitlich-Bilyk and Goodman 2004), using Taylor series linearisation methods to adjust for sampling weights and clustering within strata and primary sampling units (schools) in the calculation of test statistics and standard errors (Stata Corporation 1997).

Table 1 Mean symptom scores in 5- to 14-year-olds from Ilha de Maré by respondent, gender and age band

	Mean symptom score (SD)			
	Total difficulties	Emotional	Conduct	Hyperactivity
Aged 5–10				
Parent report				
Male (N = 163)	15.9 (6.7) ^a	4.3 (2.8)	3.9 (2.4)	5.5 (2.7) ^{* c}
Female (N = 157)	15.7 (6.4)	4.9 (2.6) [*]	3.9 (2.5) ^a	4.9 (2.7) ^c
Teacher report				
Male (N = 157)	12.0 (6.0) ^{** a}	2.5 (1.8)	2.9 (2.3) ^{*** a}	4.9 (2.9) ^{** a}
Female (N = 148)	9.9 (5.5) ^a	2.7 (2.0)	1.6 (1.8) ^a	4.0 (2.4) ^b
Aged 11–14				
Parent report				
Male (N = 97)	14.0 (7.5)	4.3 (3.0)	3.3 (2.5)	4.2 (2.8)
Female (N = 102)	14.3 (7.4)	5.2 (3.0) [*]	3.2 (2.2)	3.5 (2.6)
Teacher report				
Male (N = 93)	10.2 (5.9) [*]	2.2 (1.6)	2.3 (2.1) ^{**}	4.0 (2.6) ^{**}
Female (N = 88)	8.2 (5.6)	2.4 (1.8)	1.5 (1.9)	2.9 (2.4)
Self-report				
Male (N = 88)	12.0 (6.3)	4.0 (2.8)	2.4 (1.9)	3.4 (2.2)
Female (N = 99)	14.1 (6.0) [*]	5.3 (2.7) ^{**}	2.8 (2.1)	3.5 (2.3)

Gender difference within that age band: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, t-test
Higher in younger children (same gender): ^a $p < 0.05$; ^b $p < 0.01$; ^c $p < 0.001$, t-test

Results

Table 1 presents symptoms scores from the SDQ for the entire sample of 519 children aged 5–14, focusing on the scores that are of greatest psychiatric interest, namely emotional symptoms, conduct problems and hyperactivity, along with the total difficulties score. Across the age range, boys had higher levels of hyperactivity and conduct problems, primarily by teacher report, whereas girls had higher rates of emotional symptoms, both by parent and self-report. Judging from parent and teacher reports, the level of hyperactivity (and, to a lesser extent, conduct problems) declined with age in both boys and girls.

For the remaining analyses that involve a comparison between Ilha de Maré and the comparison site of Taubaté in Southeast Brazil, the data from Ilha de Maré are restricted to 7- to 14-year-olds since 5- and 6-year-olds were not included in the Taubaté survey. Table 2 presents SDQ scores from both sites, demonstrating that average symptom scores were higher in Ilha de Maré, but the average impact score (reflecting the distress and social disability caused by any symptoms) was higher in Taubaté; this pattern was consistent across all three categories of respondent, namely parents, teachers and 11- to 14-year-olds.

Moving from dimensional measures to categorical ones, Table 3 presents the rate of mental health problems in 7- to 14-year-olds from Ilha de Maré and Taubaté, along with confidence intervals and odds ratios. The presence or absence of mental health problems was defined in eight different ways. The first four rates were derived from the SDQ: How often did parents think their children had definite or severe problems with emotions,

Table 2 Mean symptom and impact scores in 7- to 14-year-olds from Ilha de Maré and a comparison site in Southeast Brazil (Taubaté)

	Mean score (SD)	
	Ilha de Maré N = 430	Taubaté N = 1251
Parent report		
Total difficulties	15.1 (7.1)***	11.3 (6.9)
Emotional symptoms	4.7 (2.9)***	3.7 (2.7)
Conduct problems	3.6 (2.5)***	2.0 (2.1)
Hyperactivity	4.6 (2.8)***	3.7 (3.1)
Peer problems	2.2 (1.9)*	1.9 (1.8)
Prosocial behaviour	8.6 (1.8)	8.6 (1.8)
Impact of symptoms	0.3 (1.0)	0.8 (1.7)***
Teacher report		
	N = 406	N = 1181
Total difficulties	10.3 (5.9)***	8.2 (6.7)
Emotional symptoms	2.5 (1.8)**	2.0 (2.0)
Conduct problems	2.1 (2.1)***	1.4 (2.0)
Hyperactivity	4.1 (2.7)***	3.0 (2.7)
Peer problems	1.7 (1.6)	1.7 (1.8)
Prosocial behaviour	7.3 (2.3)	7.4 (2.6)
Impact of symptoms	0.2 (0.7)	0.3 (0.9) (p = 0.054)
Self-report		
	N = 187	N = 634
Total difficulties	13.1 (6.2)***	11.4 (6.0)
Emotional symptoms	4.7 (2.8)***	3.7 (2.5)
Conduct problems	2.6 (2.0)	2.4 (1.8)
Hyperactivity	3.4 (2.2)	3.3 (2.3)
Peer problems	2.4 (1.9)	2.1 (1.7)
Prosocial behaviour	8.9 (1.5)*	8.6 (1.5)
Impact of symptoms	0.2 (0.8)	0.4 (1.1)*

Significantly higher than other site: * p < 0.05; ** p < 0.01; *** p < 0.001, t-test

behaviour, concentration or social relationships? How often did teachers think the same of their students? How often did 11- to 14-year-olds think that of themselves? How often did the SDQ computer algorithm predict probable 'caseness' based on all sources of information? The remaining four rates of mental health problems were derived from the DAWBA: rates of any DSM-IV

psychiatric disorder, any emotional disorder, any behavioural disorder (including oppositional-defiant and conduct disorder), and any attention-deficit/hyperactivity disorder (ADHD). For all eight ways of defining psychiatric problems, the rate of these problems in Ilha de Maré was about half or less of the comparable rate in Taubaté – differences that were all highly significant (p < 0.001) for the SDQ-based comparisons, but were not significant for any of the DAWBA-based comparisons, perhaps due to lack of statistical power (since, whereas 430 seven- to 14-year-olds were assessed with the SDQ in the first phase of the Ilha de Maré study, only 100 of these children were subsequently assessed with the DAWBA in the second phase). Conceptually, the most comparable SDQ and DAWBA ratings are the SDQ 'caseness' rating and the DAWBA estimate of any psychiatric disorder – both are estimates of the overall rate of mental health problems based on multi-informant data on symptoms and impact; the odds ratio for Ilha de Maré relative to Taubaté was 0.49 (95% CI 0.33–0.72) for the SDQ measure and 0.52 (95% CI 0.24–1.18) for the DAWBA measure.

There was significant agreement between the SDQ and DAWBA ratings for the Ilha de Maré sample, with at least one DSM-IV psychiatric diagnosis being made in 40% (17/42) of the SDQ cases as compared with 3% (2/58) of the SDQ non-cases (continuity-adjusted chi-square = 19.4, 1df, p < 0.001). These rates of agreement were similar to those found in Taubaté, where at least one DSM-IV psychiatric diagnosis was made in 44% (96/217) of the SDQ cases as compared with 5% (53/1034) of the SDQ non-cases (continuity-adjusted chi-square = 257.8, 1df, p < 0.001). In a logistic regression analysis on the combined sample, the presence or absence of at least one DSM-IV diagnosis was predicted by SDQ caseness (p < 0.001), but not by whether the child was from Ilha de Maré or Taubaté (p = 0.4).

Of the Ilha de Maré children given at least one DSM-IV diagnosis by the clinical rater, 32% (6/19) were assigned 'not otherwise specified' anxiety or disruptive behaviour disorders; these children had emotional or

Table 3 Prevalence of child mental health problems in 7- to 14-year-olds from Ilha de Maré and a comparison site in Southeast Brazil (Taubaté)

Measure of child mental health problem	Proportion positive (95% CI)		Odds ratio (95% CI)
	Ilha de Maré	Taubaté	
Based on questionnaires:			
Parent thinks there is a problem (N = 430 vs. 1251)*	5.3% (3.2%, 7.5%)	32.7% (30.1%, 35.3%)	0.12 (0.08, 0.18)
Teacher thinks there is a problem (N = 414 vs. 1164)*	4.8% (2.8%, 6.9%)	11.8% (9.1%, 14.6%)	0.38 (0.22, 0.64)
Adolescent thinks there is a problem (N = 188 vs. 617)*	6.4% (2.9%, 9.9%)	18.0% (14.7%, 21.3%)	0.31 (0.16, 0.58)
Multi-informant questionnaire 'caseness' (N = 430 vs. 1251)*	9.8% (7.0%, 12.6%)	18.1% (14.8%, 21.4%)	0.49 (0.33, 0.72)
Based on psychiatric assessment:			
Any DSM-IV psychiatric diagnosis (N = 100 vs. 1251)*	7.0% (2.3%, 11.8%)	12.7% (9.8%, 15.5%)	0.52 (0.24, 1.18)
Any DSM-IV emotional disorder (N = 100 vs. 1251)*	3.6% (0.2%, 7.0%)	5.9% (4.0%, 7.8%)	0.60 (0.22, 1.67)
Any DSM-IV behavioural disorder (N = 100 vs. 1251)*	3.4% (0.1%, 6.8%)	7.0% (5.1%, 8.9%)	0.47 (0.16, 1.34)
DSM-IV attention-deficit/hyperactivity disorder (N = 100 vs. 1251)*	0.9% (0%, 1.9%)	1.8% (0.7%, 2.8%)	0.53 (0.16, 1.68)

* Number of subjects from Ilha de Maré and Taubaté, respectively

behavioural symptoms that did not meet current DSM-IV operationalised criteria, but that did result in significant impairment or distress. The corresponding proportion for the Taubaté children was 28% (41/149) – a non-significant difference between sites (continuity-adjusted chi-square = 0.01, 1df, $p = 0.9$).

Discussion

Ilha de Maré in Northeast Brazil differs markedly from the comparison site of Taubaté in Southeast Brazil: Ilha de Maré is rural and the population is almost entirely black or of mixed heritage (only 5% white), whereas Taubaté is mostly urban and over 70% white. Despite these demographic and cultural differences, our findings suggest that the measures of psychopathology functioned well in the Northeast just as they have previously been shown to function well in the Southeast (Fleitlich and Goodman 2001; Fleitlich-Bilyk and Goodman 2004). Thus, the questionnaire measure (SDQ) demonstrated that variations in psychopathology with age and gender are comparable to those present elsewhere in the world (see www.sdqinfo.com), with a male excess of externalising problems, a female excess of internalising problems, and an age-related decline in hyperactivity symptoms. Judging the ‘caseness’ prediction from multi-informant SDQs against psychiatric diagnoses based on detailed interviews, broadly similar screening properties were evident in Northeast and Southeast Brazil as have previously been described in Britain (Goodman et al. 2000b), namely high negative predictive values (97% Northeast Brazil, 95% Southeast Brazil, 96% Britain) and moderate positive predictive values (40% Northeast Brazil, 44% Southeast Brazil, 53% Britain). Thus, the rate of false negatives is kept low at the expense of an increased rate of false positives, as is often appropriate for screening measures.

The detailed diagnostic measure (DAWBA) demonstrated that the mixture of DSM-IV disorders on Ilha de Maré was comparable to that reported elsewhere, with emotional and conduct disorders predominating, followed by hyperactivity disorders (Ford et al. 2003; Fleitlich-Bilyk and Goodman 2004). Were these diagnoses being imposed in a culturally inappropriate way? There are several reasons for doubting this. The diagnostic ratings were made by an experienced child psychiatrist from Northeast Brazil who had access not only to the respondents’ answers to structured questions related to DSM-IV criteria, but also to detailed transcripts of their answers to open-ended questions. Respondents were encouraged to describe any concerns that had not previously been covered by the structured questions. This process did not identify any ‘culture bound’ syndromes, and the verbatim descriptions generally matched the DSM-IV criteria for operationalised diagnoses. Examining the rate of ‘not otherwise specified’ diagnoses provided another indication of the local applicability of DSM-IV categories. It is well recognised that a

substantial minority of children with service-relevant psychiatric disorders do ‘slip between the cracks’ of our current set of operationalised diagnoses (Goodman et al. 1996; Angold et al. 1999). The proportion of children assigned ‘not otherwise specified’ diagnoses was almost the same in Ilha de Maré as in Taubaté (32% v. 28%) and only slightly higher than in Britain (21%) (Fleitlich-Bilyk and Goodman 2004), providing further evidence for the relevance of DSM-IV diagnostic categories to Ilha de Maré, while also confirming that epidemiological surveys are liable to underestimate prevalence if they rely on assessment techniques that can only detect operationalised diagnoses (Ford et al. 2003).

Our findings suggest that contemporary measures and diagnostic concepts apply equally well to Brazilians of African and European heritage, and can be used with success in relatively isolated rural settings as well as in more evidently westernised urban settings. These findings support the future use of the same measures and diagnostic concepts in multi-site comparative studies throughout Brazil. One important caveat, though, is that we have not examined the applicability of these measures or diagnoses to the indigenous peoples of Brazil, e.g. tribal peoples in Amazonia; this is an important task for the future.

Given measures that appear to be equally applicable in Northeast and Southeast Brazil, it is appropriate to use these measures to compare child mental health across the two sites. The differences between Ilha de Maré and Taubaté are consistent but complex. Compared with children from Taubaté, the children from Ilha de Maré were reported to have more symptoms, but less impact from those symptoms. This same pattern was evident from the reports of all three categories of informants: parents, teachers and 11- to 14-year-olds. The surprising discrepancy between symptoms and impact is particularly important since the DSM-IV criteria for most child psychiatric diagnoses insist on a combination of symptoms and impact. The reason for this insistence is that previous studies have shown that many children have psychiatric symptoms that do not result in significant distress and social impairment (Bird et al. 1990; Simonoff et al. 1997); the classification of such children as psychiatrically disordered results in misleadingly high prevalence rates.

What could explain the combination of high symptoms scores and low impact scores on Ilha de Maré? Although previous studies have mostly suggested that rural children have fewer mental health problems than urban children (Quinton 1988), and that the urbanisation of previously rural areas can lead to increased mental health problems despite improvements in living conditions, education and physical health (Rahim and Cederblad 1986), there is one Chinese study that has reported higher rates of mental health problems in rural as opposed to urban children (Shen et al. 1985). If the children on Ilha de Maré did genuinely have a high rate of symptoms, is there any plausible explanation for these symptoms having an unusually low impact? One possible explanation is that

rural settings are better suited for children with mental health problems. For example, hyperactive children may be allowed much more freedom to play outside in rural areas than in poor urban areas with dangerous traffic and no safe playgrounds. Though plausible, the evidence from teachers suggests that this is unlikely to be the main reason for the low reported impact. Whether schools are in rural and urban areas, teachers observe their pupils in very similar classrooms. There is no reason to suppose that hyperactive, disruptive or anxious pupils experience less distress or social impairment in a rural classroom than an urban classroom. Consequently, it remains puzzling that teachers report that their pupils have more symptoms, but less impact, on Ilha de Maré than in Taubaté – a paradoxical combination that cannot readily be attributed to the greater freedom of rural life.

If it is true that genuinely high levels of symptoms are unlikely to coexist with genuinely low levels of impact, there are two remaining explanations for the differences between Ilha de Maré and Taubaté: either Ilha de Maré respondents have a lower threshold for reporting symptoms ('over-reporting symptoms'); or Ilha de Maré respondents have a higher threshold for reporting impact ('under-reporting impact'). An example of over-reporting symptoms would be rating minor worries as definite anxieties, while correctly recognising that these resulted in little or no distress or social impairment. An example of under-reporting impact would be correctly rating major worries as definite anxieties, while failing to recognise that these resulted in significant distress or social impairment. In a relatively isolated society such as Ilha de Maré where adults and children have very little experience of completing questionnaires, the first possibility seems more likely. Respondents may well have found it hard to know what level of worries (or other symptoms) the investigators wanted to know about, while finding it easier to decide whether the child experienced overall distress and impairment on the basis of 'common sense' and everyday experience.

Whereas our questionnaire measures of mental health were necessarily affected by respondents' reporting thresholds, our DSM-IV diagnoses were derived from measures of mental health that were investigator-based rather than respondent-based. Diagnoses were assigned by an experienced local child psychiatrist on the basis of detailed open-ended descriptions of symptoms and impact elicited by interview – a procedure that allowed the psychiatrist rather than the respondents to judge the significance of symptoms and impact. The estimated prevalence of DSM-IV diagnoses on Ilha de Maré was about half of that in Taubaté, though the confidence interval was wide. On balance, the diagnostic findings suggest that respondents from Ilha de Maré were more likely to be over-rating symptoms than under-rating impact. A substantially lower rate of child mental health problems in rural as opposed to urban areas has been reported by one previous Brazilian study (Fleitlich and Goodman 2001), perhaps reflecting area differences in social capital.

In summary, when contrasting sites in Brazil are assessed using measures and diagnostic criteria that are equally applicable to each site, the rates of child mental health problems differ substantially between sites. These findings establish the need for a multi-site study of the prevalence of child psychiatric disorders in Brazil, and also provide a methodological basis for such a study. Such a study should also investigate the role of a wide range of risk and protective factors, some of which might explain differences in prevalence between sites.

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