Factor analysis of the Children's Behaviour Questionnaire

in a Nigerian paediatric primary care population

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Objective. This paper examines the factor structure of the Yoruba translation of the Children's Behaviour Questionnaire for Completion by Parents (CBQ) administered in a Nigerian paediatric primary care population.

Design. A cross-sectional questionnaire survey.

Subjects. Four hundred and seventy-eight children aged 7 - 14 years who attended a primary care clinic in Ibadan, Nigeria, over a 3-month period.

Methods. Parents' ratings of the children were obtained using the Yoruba translation of the CBQ. The factor structure of this instrument was examined using principal component analysis with varimax rotation. Only factors with eigenvalues of greater than 1 were examined further.

Results. The first seven dimensions were readily conceptualised. These factors are conduct problem, hyperactivity, emotional problem, irritability, problems with elimination, a somatic complaint and a school problem dimension.

Conclusion. These factors are similar to what has been observed in other studies involving populations of children with psychopathology, with the exception of the somatic complaint and school problem dimension. The emergence of these two factors, which are quite different from what has been observed in other studies, may demonstrate differences that reflect the influence of language, culture and the peculiar-

ities of a primary care setting. On the other hand the similarity of most of the factors to those found in previous studies confirms the broad similarities in the behaviour of children across different cultures.

The Rutter scales are two short screening instruments used to collect information from parents and teachers about the behaviour of children in their care. A number of studies looking at the factor structure of these scales have been reported.[1-3] The results have varied, depending in part on the site at which data samples were obtained. When used on an entirely normal population of children, two dimensions emerged after principal factor analysis with varimax rotation.[2] The first factor extracted was characterised by symptoms relating to aggressiveness, distractibility and hyperactivity, and the second factor was characterised by symptoms of anxiety and fearfulness. When these scales were used on a mixed group of normal and disturbed preschool children, Behar and Stringfield[1] obtained three factors that accounted for 37.7% of the total variance of the scale. Factor 1 consisted of symptoms signifying a hostile-aggressive dimension, factor 2 an anxious-fearful dimension, and factor 3 emerged as a hyperactive-distractible dimension. Interestingly, Fowler and Park's factor 1 combined the features of Behar and Stringfield's factors 1 and 3.[1,2]

Factor analysis of data obtained in a primary school population in a developing country produced two factors that accounted for 56.7% and 19.5% of the total variance respectively.[3] These two factors are similar to the factors reported by Fowler and Park in their normal population sample.[2] Venables *et al.*[3] proceeded to investigate the nature of the factor structure that would emerge in a sample of disturbed children by extracting the data of 76 children said to be at risk for psychiatric breakdown. The analysis of

these data yielded five factors described as follows: anxious-fearful factor (factor 1), somatic complaint factor (factor 2), 'whining child' factor (factor 3), conduct disorder factor (factor 4) and a mixture of aggressiveness, distractibility and hyperactivity symptoms (factor 5).

Factors 4 and 5 contained different aspects of factor 1 in the overall analysis. Lest it be suggested that the reason for five factors was due to the small number of the group, a further analysis was conducted on a similar sized group of normal children and this yielded just three factors accounting for 71% of the variance. More recently, the two Rutter questionnaires were used in a sample of 3 069 7-year-old Chinese school-boys and three factors of hyperactivity, antisocial and neurotic dimensions were evident.[4]

Similar factors have been obtained when other behaviour questionnaires have been studied. For example, analysis of the Pre-School Behaviour Questionnaire in a sample of 304 African-American, Euro-American, Asian and Hispanic children in a Head Start programme,[5] yielded two clearly interpretable factors: aggressive-hyperactive-distractible and anxious-fearful, factors with striking similarity to those obtained by Fowler and Park.[2]

None of these studies has reported the dimensions found in the factor structure of children presenting in a primary care setting. It is generally reported that children seen in primary care have higher rates of mental health problems than children in the general population. Also, what effect will a translated version of the Rutter Scale have on the factor structure? According to Elander and Rutter[6] it is important to consider how well individual items translate and to ensure that meanings do not change. Therefore the main objective of this investigation was to examine the factor structure of the Yoruba translation of the Children Behaviour Questionnaire for Completion by Parents (CBQ), administered in a primary care setting. This was with a view to identifying the dimensions along which children in this setting and culture would group.

Methods

Parents' ratings of 478 children aged 7 - 14 years who attended the general outpatient clinic (GOPC) of the University College Hospital, Ibadan, over a 3-month period were obtained using the CBQ.[7] Although situated within a teaching hospital, the GOPC offers a primary health care service in that it operates a 'walk-in' policy where no referrals are needed. Patients who were very ill and needed urgent attention and those not accom-

panied by their mothers were excluded.

The scale consists of 31 brief statements concerning the child's behaviour. The parent indicates the frequency of occurrence or the degree of severity of the behaviour. Each item is then scored 0, 1, or 2, thereby producing a score of 0 - 62. According to Rutter,[7] children with disorder could have either a neurotic or an antisocial disorder. Selecting these children involves a two-step procedure whereby at the first step children with a total score of 13 or more are designated as showing disorder. In the second step, children with a neurotic score exceeding the antisocial score are described as 'neurotic', and those with an antisocial score exceeding the neurotic score are designated 'antisocial'. Items which are summed up to arrive at the neurotic score are 'has stomach ache or vomiting', 'has tears on arrival at school or refuses to go into the building', 'does he/she have any sleeping difficulty?', 'often worried, worries about many things', and 'tends to be fearful or afraid of new things or new situations'. Items that make up the antisocial subscore are 'does he/she ever steal things?', 'often destroys own or others' belongings', is often disobedient', 'often tells lies', and 'bullies other children'. However, when this scale was validated for use in a Nigerian primary care setting, a cut-off score of seven had an optimised sensitivity and specificity.[8]

The CBQ was administered in its Yoruba version derived by the iterative back-translation method. Because of the high rate of illiteracy in the population, the questions were read aloud by medical students who had received prior training in the screening process.

The internal structure of the CBQ was examined by principal-component analysis with varimax rotation. Only factors with eigenvalues greater than 1 were examined further. Analyses were performed using the Statistical Package for the Social Sciences (SPSS).

Results

Twelve factors with eigenvalues greater than 1 were derived. These 12 factors accounted for 60.2% of the total variance. The first seven of these factors, which accounted for 41.7% of the total variance, could be conceptualised readily. Table I shows the factor loadings for the 18 items that had loadings > 0.30 on the seven interpretable factors.

The first and largest factor is a conduct problem factor, which consists of loadings on items relating to destructive behaviour,

Table I. The Rutter Scale A2 — results of principal factor analysis followed by Varimax rotation*

Item	Factors						
	1	2	3	4	5	6	7
Headaches							0.78
Stomach ache/vomiting							0.74
Asthma/attacks of wheezing							
Wets bed/pants						0.71	
Soils						0.68	
Temper tantrums					0.68		
Tears on arrival at school			0.83				
Truants from school			0.80				
Stammers/stutters							
Other difficulty with speech							
Has stolen things							
Eating difficulty				0.40			
Sleeping difficulty							
Very restless		0.63					
Squirmy, fidgety child		0.74					
Often destroys property	0.55						
Frequently fights	0.74						
Not liked by other children	0.47						
Often worried							
Solitary				0.76			
Irritable					0.62		
Miserable/unhappy/tearful				0.63			
Twitches/mannerisms/tics							
Sucks thumb/finger							
Bites nails							
Often disobedient	0.64						
Cannot settle to anything		0.69					
Fearful/afraid of things							
Fussy/over-particular							0.33
Often tells lies							
Bullies other children	0.61						

* Rotated loadings < 0.30 not included in this table.

fighting, not being liked by other children, disobedience and bullying. Factor 2 is a hyperactivity factor with item loadings on restlessness, squirmy and fidgety behaviour and not settling to anything. Factor 3 can be described as a school factor with items relating to school phobia and truancy. Factor 4 is an emotional/depression factor that loads highly on being solitary, miserable, unhappy, and tearful and having eating difficulties. Factor 5 is an irritability factor with loadings on temper tantrums and irritability. Factor 6 includes elimination disorders with problems of enuresis and encopresis. Factor 7 is a somatic complaint factor with loadings on headaches, stomach aches, and being fussy and over-particular. These 7 factors, their eigenvalues and the variance they accounted for are given in Table II.

Discussion

Interesting findings have emerged from the factor analysis of the Yoruba translation of the Rutter Scale used on children presenting in a primary care setting. These findings can be summarised in the following two observations: (*i*) a large number of factors have emerged; and (*ii*) some of the dimensions that have emerged are quite different from what has been observed in other factor analytic studies of the Rutter Scale. Several reasons may account for these findings but it is important to examine the possible influence of site, language and culture on the findings.

According to the observation by Venables *et al.*[3] the number of factors extracted increases as the prevalence of disturbed children increases in the sample under study and separation of factors depends on the nature of the group under study and not on its size. Based on their findings, Venables *et al.*[3] were able to conclude that when factor analysis of data from pathological groups is used, the tidiness of large overall factors breaks down and more narrowly defined groups of behavioural abnormalities emerge. This may account for the breakdown that has been observed in these data, derived as they were from a child prima-

Table II. Eigenvalues and variance for seven interpretable factors

Name and number of factor	Eigenvalue	Variance accounted for (%)
1. Conduct problem factor	3.8	12.5
2. Hyperactivity factor	1.7	5.8
3. School problem factor	1.6	5.2
4. Emotional problem factor	1.5	4.7
5. Irritability factor	1.4	4.7
6. Elimination problem factor	1.4	4.6
7. Somatic problem factor	1.3	4.3

ry care population. The prevalence of specific *Diagnostic and Statistical Manual* (DSM-III-R) disorders in this group of children was about 20%.[9] This high occurrence of psychopathology could also account for some of the separation of factors observed. This is further supported by the findings that the items that occurred significantly more often in children with conduct disorders and emotional disorders[8] are the items that were extracted in the factor analysis as conduct and emotional factors.

A factor analytic study of this scale among Japanese schoolchildren also yielded eight factors, although only five were interpreted.[10] Four of the factors relating to conduct problems, hyperactivity, school problems and emotional problems are similar to those obtained in this study. The Japanese study involved interviewing children judged as having deviant behaviour by a school nurse, thus indicating a high level of psychopathology in the sample.

It is plausible to assume that the mode of clinical presentation will have a bearing on the constituent factors. In this sample a somatic complaint factor was extracted. Even though Venables *et al.*[3] described a somatic complaint factor in their sample, the items making up the factor are quite different from those in this study. The factor reported here may be peculiar to the primary care setting where the somatisation of emotional or conduct problems may be common.[9] It is interesting to note that factor analytic studies of the General Health Questionnaire among adults seen in primary care have yielded a similar factor.[11]

The 'school problem' factor obtained by us is also of interest. The two constituent items of interest, namely 'truancy' and 'tears on arrival at school', respectively, have often been part of a larger factor of conduct problems and anxiety problems in other studies.[3,10] Their emergence as a distinct factor in our sample may reflect the nuance of the translated version of the CBQ. For example, the item for truancy when translated to Yoruba read: 'Does your child run away from school?'. While this question may actually have identified children with truancy problems, it may also have identified children who ran away from school but

then went home to be with their parents. This latter group of children may also be the ones who would have had tears on arrival at school. Therefore differences in the experiences of parents and semantic differences may have influenced the way questions were answered. It may be worthwhile altering the item on truancy and giving more detail in future studies to see if the school factor will emerge differently.

Conclusion

In conclusion, this study has confirmed the broad similarity in the range of behavioural problems seen in this sample with those reported in other cultural and clinical samples. It has also highlighted differences that may reflect a cultural distance from the British origin of the CBQ and the peculiarities of a primary care setting. The findings may aid our understanding of behavioural problems in children in different cultures.

References

1. Behar L, Stringfield S. A behaviour rating scale for the pre-school child. *Dev Psychol* 1974; **10:** 601-610.
2. Fowler PC, Park RM. Factor structure of the pre-school behaviour questionnaire in a normal population. *Psychol Rep* 1979; **45:** 599-606.
3. Venables PH, Fletcher RP, Dalais JC, Mitchell DA, Schulsinger F, Mednick SA. Factor structure of the Rutter 'Children's Behaviour Questionnaire' in a primary school population in a developing country. *J Child Psychol Psychiatry* 1983; **24:** 213-222.
4. Ho TP, Leung PW, Luk ES, Taylor E, Bacon-Shone J, Mak FL. Establishing the constructs of childhood behavioural disturbances in a Chinese population: a questionnaire study. *J Abnorm Child Psychol* 1996; **24:** 417-431.
5. Johnson R, Gomez FC jun., Sanders-Phillips K. Factor structure and subtest differences on the Pre-school Behaviour Questionnaire in a Latino, African-American, Euro-American, and Asian pre-school population. *Psychol Rep* 1999; **84:** 936-942.
6. Elander J, Rutter M. An update on the status of the Rutter parents' and teachers' scales. *Child Psychol Psychiatr Rev* 1996; **1:** 31-35.
7. Rutter M. A children's behaviour questionnaire. *J Child Psychol Psychiatry* 1967; **8:** 1-11.
8. Omigbodun O, Gureje O, Gater R, Ikuesan B, Adebayo E. Psychiatric morbidity in a Nigerian paediatric primary care service: a comparison of two screening instruments. *Soc Psychiatry Psychiatr Epidemiol* 1996; **31:** 186-193.
9. Gureje O, Omigbodun OO, Gater R, Acha RA, Ikuesan BA, Morris J. Psychiatric disorders in a paediatric primary care clinic. *Br J Psychiatry* 1994; **165:** 527-530.
10. Morita H, Suzuki M, Kamoshita S. Screening measures for detecting psychiatric disorders in Japanese secondary school children. *J Child Psychol Psychiatry* 1990; **31:** 603-617.
11. Goldberg DP, Hillier VF. 'A scaled version of the General Health Questionnaire'. *Psychol Med* 1979: **9:** 139-145.