U.S. DEPARTMENT OF JUSTICE
LAW ENFORCEMENT ASSISTANCE ADMINISTRATION
NATIONAL CRIMINAL JUSTICE REFERENCE SERVICE
WASHINGTON, D.C. 20531

NEW ZEALAND VALIDITY DATA FOR THE BRISTOL SOCIAL ADJUSTMENT GUIDE

D. M. FERGUSSON
S. W. SLATER
J. A. V. BOWELL

Research Report No. 1

Research Unit,
Joint Committee on Young Offenders,
New Zealand
January, 1976

THE JOINT COMMITTEE ON YOUNG OFFENDERS

The Joint Committee on Young Offenders is an inter-departmental committee comprising the Permanent Heads and senior representatives of the Departments of Social Welfare, Education, Police, Maori Affairs, Justice and Internal Affairs. The functions of the Committee are :

GENERALLY

To co-ordinate the activities of the Departments represented in planning, implementing and evaluating programmes to minimise delinquent behaviour by children and young persons, and to promote programmes by Government and other agencies which will minimise such behaviour.

PARTICULARLY

1. To study and propose ways of preventing juvenile offending or reducing its incidence.
2. To participate, where necessary, in Government planning relating to the Committee's general functions.
3. To review legislation and procedures relating to delinquency and young offenders and to study the practical implications arising from such legislation.
4. To co-ordinate the work of the Departments in the prevention of delinquency and in identifying and treating young offenders.
5. To direct the work of the Joint Committee on Young Offenders Research Unit and to propose policy changes in the light of research findings and action by other agencies.

NEW ZEALAND VALIDITY DATA FOR THE BRISTOL SOCIAL ADJUSTMENT GUIDE

D. M. FERGUSSON - (Senior Research Officer, J.C.Y.O.)

JUNE FIFIELD - (Assistant Research Officer, J.C.Y.O.)

S. W. SLATER - (Senior Lecturer in Psychology, Victoria University of Wellington)

ANNE DONNELL - (Research Officer, J.C.Y.O.)

Research Report No. 4

Research Unit,
Joint Committee on Young Offenders,
New Zealand.
January, 1976.

CONTENTS

NEW ZEALAND VALIDITY DATA FOR THE BRISTOL SOCIAL ADJUSTMENT GUIDE

Section 1 Introduction

A previous paper (Fergusson et al 1975a) presented detailed information on the structure and content of the Bristol Social Adjustment Guide (BSAG), as applied to a sample of 5,472 ten year old New Zealand boys. The results of this analysis suggested the following conclusions:

(1) The original method of scoring the test, proposed by the author D. H. Stott, did not produce measures which had a high degree of internal consistency: the Kuder Richardson 20 reliability coefficients for the scoring system ranged from .28 to .80 (Fergusson et al 1975a, p. 21).

(2) A factor analysis of the BSAG indicated that the test content could be represented by seven more or less orthogonal measures of maladjustment. These measures had a generally higher level of internal consistency than the original set of 16 score dimensions. The groupings produced by the factor analytic procedure were similar in content to those suggested by Stott but appeared to measure more general dimensions of maladjustment which subsumed some of the original dimensions.

On the basis of these findings we concluded that the structure and scaling of the BSAG could stand further scrutiny. This paper presents a further analysis of the test by providing validity data for both methods of scaling. The paper covers the following:

(1) A discussion of the similarities and differences between Stott's method of scaling the BSAG and the factor analytic approach described in our earlier paper.

(2) An analysis of the relationship of BSAG scores derived by the two scaling methods to a number of external criterion variables: school performance, personality ratings, juvenile delinquency, health, race, socio-economic status and school attendance.

The BSAG data used in this paper were collected using the 1963 version of the test and the results reported here apply only to that version. Since the data for the study were collected, the BSAG has been extensively revised (Stott 1971). However, as has been discussed in a previous paper (see Fergusson et al 1975a, p. 16) there are strong similarities between the 1963 and the 1971 editions of the test. The results presented here may thus be used as a rough guide to the validity of the 1971 version of the test.

Section 2 Comparison of Factor Analytic Results and Stott's Syndromic Model

The BSAG is a test of maladjustment which comprises a series of statements descriptive of a child's behaviour in the classroom. The test is completed by the child's teacher who endorses those statements which best describe the child. The contents of the test can be conceptualised as a set of binary items; each phrase being an item which assumes one of two states: endorsed or not endorsed. Over the last eighteen years, the test author, D. H. Stott, has developed a "syndromic model" to represent the contents of the BSAG. The following techniques were used to produce this model:

(1) The items in the test were grouped into a series of clusters of interrelated items using visual clustering methods and other techniques. Each such cluster was described as a syndrome (Stott 1963a).

(2) This initial configuration was then refined by item analysis procedures which tested the extent to which items belonged to syndrome groups. Stott and his associates describe two techniques: the para-chi square method and the scorer/non-scorer ratio. Both methods resemble procedures based on the point biserial correlation coefficient, a measure often used in item analysis (cf. Magnusson 1967; Nunnally 1967).

(3) For the 1963 version of the test, two methods of scoring are proposed. The first involves deriving syndrome scores: these scores are a simple unweighted sum of the number of items that are endorsed for each syndrome. A total maladjustment score is also derived from a sum of all endorsements on the BSAG.

(4) In 1970 the BSAG underwent extensive revision: new syndromes were added and old syndromes deleted. Two general dimensions of maladjusted behaviour - Unract and Ovract - were also defined. The scores for the Unract dimension were obtained from a sum of scores of syndromes relating to under-reactive behaviour; the Ovract scores were obtained from a sum of scores of syndromes relating to over-reactive behaviour.

The various methods of scoring the BSAG produce a series of test scores of increasing generality: items are grouped into syndromes and syndrome scores derived; syndromes are subsumed under the Unract/Ovract classification and Unract and Ovract scores obtained; and finally a total maladjustment score is created by summing the number of endorsements received by the child.

This method of scoring makes sense if it is viewed as an attempt to reduce the contents of the BSAG to a series of scale measures which tap underlying dimensions of maladjustment of increasing generality. (In fact, the scoring system has an extremely strong resemblance to the test structure which would be implied by a factor analytic technique which extracted first, second and third order factors). However, Stott and his associates appear to deny, by both their method of presentation and by their nomenclature, that the "syndromic model" is an attempt to scale the BSAG to locate underlying, or latent, dimensions of maladjustment measured by the manifest test content. Instead, it is suggested that the syndromic model produces a taxonomy of behaviour disturbance (Stott et al 1975). An inspection of Stott's method of analysis and data reduction does not support this claim.

Normally the term taxonomy is applied to procedures which group objects (subjects or entities) into a series of classes or sets defined systematically on the similarity of the objects with respect to their characteristics or attributes (see Sneath 1962, p. 297 - 299). In the last twenty years there have been many attempts to produce statistical methods for devising taxonomies (see, for example, McQuitty 1955; Williams and Lambert 1959; MacNaughton-Smith 1965; Williams, Lambert and Lance 1966; Cattell and Coulter 1966). Despite quite marked differences in approach and computational algorithms, these methods have one common feature: objects are grouped into classes or sets defined on the similarity of a series of measurements taken across the objects.

Stott's method of data reduction bears little resemblance to these taxonomic methods: it groups variables into clusters defined on the similarity of the variables measured across a group of subjects. As a technique, the syndromic model belongs to a family of data reduction methods which reduce a series of variables to a smaller number of clusters of variables. The best known of these methods is linear factor analysis. Thus, in principle, the syndromic model differs little from conventional factor analytic methods although there are marked differences in the computational

bases of the two methods. The similarity between factor analysis and the syndromic model can be illustrated by consideration of the following points:

(1) The syndromic model represents the content of the BSAG by a series of scores. It is extremely difficult to reconcile the idea of a taxonomy with such a scoring system, while the resemblance of the syndrome scores to factor scores is immediately apparent.

(2) The results obtained from the syndromic model differ little from the results obtained via factor analysis (see Fergusson et al 1975a, p. 40 - 42).

The above arguments lead to the conclusion that Stott's syndromic model and the factor analytic solution presented in our previous paper are similar approaches to scoring the BSAG.

Two criteria can be used for determining which of the two methods of scoring the test is preferable: (a) the properties of the internal structure of the test; and (b) the relationship of the test scores to external validity measures. The properties of the internal structure of the test suggest that factor analysis provides the better means of data representation: the factor analytic results are both more parsimonious and internally consistent (see Fergusson et al 1975a, p. 40). However, the issue of the validity of the two scoring methods is a more general one. This paper examines the extent to which each method of scaling the test relates to a series of external variables expected on a priori grounds to be associated with maladjustment.

Section 3 Description of the Maladjustment Measures and the Validity Criteria

The data for the analysis reported here were obtained from records of a random sample of 5,472 ten year old boys attending New Zealand State schools in 1967. The method of obtaining this sample and the context in which it was collected has been described in previous papers (Fergusson et al 1975 a, b).

A sample record for a child consisted of an extensive teacher-completed questionnaire referred to as a Child Data Booklet (CDB). Each CDB contained information from the child's school record concerning his school performance, attendance, personal characteristics and the occupation of his parent or guardian; a copy of the 1963 version of the BSAG; and a supplementary checklist containing items relating to the child's vision, hearing and general health. From this source information the following variables were selected for analysis:

(1) Measures of maladjustment based on the syndromes defined by Stott (1963a): from the 16 original syndromes, 11 were selected for analysis:

Syndrome 1 - Unforthcomingness - a measure of tendencies to lack confidence with people and fresh things.

Syndrome 2 - Depression - a measure of tendencies to have mood changes, to be apathetic or lethargic.

Syndrome 3 - Withdrawal - a measure of tendencies to set up defences against human contact and being loved.

Syndrome 4 - Anxiety About Adult Interest - a measure of tendencies to seek adult attention excessively.

Syndrome 5 - Hostility to Adults - a measure of tendencies to act in hostile, rejecting or aggressive ways towards adults.

Syndrome 6 - Anxiety for the Approval of Other Children - a measure of tendencies to be anxious for the approval and acceptance of peers.

Syndrome 7 - Unconcern for Adult Approval - a measure of tendencies to be unconcerned about the approval of adults.

Syndrome 8 - Hostility to Other Children - a measure of tendencies to act in hostile or aggressive ways towards other children.

Syndrome 9 - Restlessness - a measure of tendencies to engage in active, restless behaviour.

Syndrome 10 - Emotional Tension - miscellaneous symptoms of emotional tension.

Syndrome 11 - Nervous Symptoms - miscellaneous symptoms of nervous tension.

These syndromes are described more fully by Stott (1963a). For each syndrome, a measure of the extent of maladjustment displayed by each child was obtained by summing the number of items defining the syndrome which were endorsed for that child.

(2) Measures of maladjustment derived from the rescaled version of the BSAG reported in Fergusson et al (1975a): seven factors, or dimensions, of maladjustment are defined in this rescaling of the test:

Factor 1 - Aggression - a measure of tendencies to display generalised hostile or aggressive behaviour.

Factor 2 - Timidity - a measure of tendencies to display timid, lethargic, withdrawing behaviour.

Factor 3 - Attention-seeking - a measure of tendencies to be demanding in seeking the attention of adults.

Factor 4 - Restlessness - a measure of tendencies to display careless, restless behaviour.

Factor 5 - Aloofness - a measure of tendencies to be aloof, unconcerned or unforthcoming.

Factor 6 - Shyness - a measure of tendencies to be shy or nervous.

Factor 7 - Moodiness - a measure of tendencies to display variable behaviour, especially periodic surliness or truculence.

For each factor, a maladjustment score was constructed by summing those items having factor loadings greater than 0.3. These scores can be taken as approximations to factor scores, and hereafter will be referred to as factor scores.

(3) Measures of school performance:- these were standard teacher ratings of the child's level of performance in the following basic school subjects: oral language, written language, reading, spelling, writing and arithmetic. Ratings of performance on these subjects were made on a five-point scale from 1 "outstanding" to 5 "extremely limited". The ratings were obtained from school records completed in 1966.

(4) School Attendance:- this measure was defined as the ratio of the number of half-days the child had been present at school during 1966 to the number of half-days the school had been open.

(5) Personal characteristics:- these were standard teacher ratings of four broad aspects of the child's behaviour in the classroom - stability, co-operation, independence and perseverance - and were made on a five-point scale from 1 "extremely high" to 5 "extremely low". These data were obtained from school records completed in 1966.

(6) Socio-economic status (SES):- this measure was based on the occupation of the child's parent or guardian. The sample children were classified on the basis of this information into the six socio-economic categories devised for New Zealand by Elley and Irving (1972). These categories may be described as follows:

1. Professional Workers
2. Executive, Managerial Workers and Farmers
3. White Collar and Service Workers
4. Skilled Workers
5. Semi-skilled Workers
6. Unskilled Workers

(7) Health:- three measures of the child's health were constructed using the data from the BSAG and the supplementary checklist:

(a) Respiratory Ailment - the total number of respiratory complaints recorded for the boy.

(b) Physical Defect - the total number of physical abnormalities recorded for the boy, including such conditions as squint, bulging eyes, bad co-ordination, bad eyesight and poor hearing.

(c) Healthy/Unhealthy - a dichotomous measure used by Stott et al (1975) and defined on 15 morbid conditions derived from BSAG data. These conditions can be classified into two types: organically-based conditions such as frequent colds, skin troubles and stomach aches; and neurologically-based conditions such as speech defects and poor muscular co-ordination. A child was defined as unhealthy if he suffered three or more of these conditions.

(8) Juvenile Delinquency:- the sample members were followed up to to the end of 1973 and details of any appearances before the Children's Court were recorded (see Fergusson et al 1975b). From these data two criteria of juvenile offending were constructed:

(a) appearance before the Children's Court by the end of 1973: this was a dichotomous measure which assumed the value 1 if the child had appeared before the Children's Court for an offence or complaint of misbehaviour and 0 otherwise.

(b) the number of appearances before the Children's Court by the end of 1973.

(9) Race:- the child's race was recorded as a dichotomous variable: European/Non-European.

To summarise, a total of 18 variables were defined for the purpose of validating the BSAG: 16 variables extracted from the CDB (six school performance variables, school attendance, ratings of four personal characteristics, SES, three health measures and the race of the child) and two measures of future behaviour (appearance before the Children's Court and the number of such appearances).

Section 4 Correlations of Maladjustment Scores with External Variables

Table 4.1. shows the matrix of correlations between the two methods of scaling the BSAG and the 18 external variables defined in the previous section. The general impressions conveyed by an inspection of this matrix may be summarised as follows:

(1) The measures derived from both methods of scoring the test are associated with the external variables: social maladjustment scores have modest but statistically significant associations with the child's school performance; ratings of personal characteristics; health and juvenile offending. There are smaller associations between race, SES, and the social maladjustment scores.

(2) Both scoring methods produce a similar pattern of results: if a particular syndrome score shows some degree of association with a variable it is often possible to locate a corresponding factor score having a similar degree of association with that variable. The results suggest that both methods of scaling the test yield the same information about the relationship of social maladjustment to the external measures.

A detailed commentary on the contents of the correlation matrix is given below.

School Performance and Social Maladjustment

The majority of school performance measures show positive correlations with the maladjustment scores. The results indicate that school performance declines with increasing maladjustment. The size of this tendency varies with the measure of maladjustment used: for the syndrome scores it is most marked for the measures of Restlessness and Depression; whereas for the factor scores, Restlessness, Aggression and Timidity are most closely associated with school performance.

VARIABLES	SYNDROMES 1	2	3	4	5	6	7	8	9	10	11	FACTORS 1	2	3	4	5	6	7
Race	.077	.046	.048	-.058	.074	.022*	.091	.017*	.074	-.029	-.009*	.053	-.078	-.067	.072	.125	.109	.050
SES	.076	.107	.045	.022	.093	.066	.111	.063	.104	.055	.023	.103	.038	.014*	.117	.103	.081	.068
Oral Language	.219	.255	.186	-.015*	.110	.082	.204	.085	.252	.195	.150	.113	.176	-.041	.248	.221	.245	.065
Written Language	.144	.267	.144	.117	.184	.171	.213	.162	.371	.243	.186	.204	.172	.088	.339	.149	.160	.147
Reading	.124	.240	.125	.074	.152	.153	.200	.135	.337	.171	.164	.179	.103	.048	.308	.150	.160	.113
Spelling	.115	.249	.121	.081	.157	.155	.187	.126	.336	.195	.152	.175	.131	.056	.311	.126	.144	.122
Writing	.083	.222	.124	.120	.157	.142	.168	.134	.323	.235	.143	.161	.187	.097	.294	.094	.084	.132
Arithmetic	.158	.289	.180	.108	.179	.159	.229	.135	.342	.250	.184	.181	.210	.080	.332	.163	.177	.131
Stability	.090	.271	.146	.188	.290	.268	.251	.269	.377	.258	.201	.302	.189	.149	.393	.132	.105	.261
Co-operation	.114	.282	.177	.143	.299	.274	.302	.271	.331	.235	.116	.315	.185	.102	.391	.184	.159	.262
Independence	.167	.245	.159	.114	.156	.159	.220	.138	.306	.258	.154	.167	.219	.086	.310	.160	.178	.120
Perseverance	.106	.291	.171	.161	.247	.245	.285	.218	.393	.259	.170	.256	.205	.124	.407	.165	.131	.204
Attendance	.043	.054	.030	.004*	.038	.046	.040	.042	.041	.058	.026	.047	.044	-.002*	.048	.042	.041	.029
Respiratory	.123	.154	.080	.045	.051	.047	.059	.068	.065	.162	.123	.058	.157	.042	.050	.054	.083	.056
Physical Defect	.097	.194	.133	.070	.109	.097	.083	.098	.148	.195	.262	.107	.179	.058	.143	.062	.064	.090
Health	.275	.402	.257	.121	.172	.153	.211	.159	.256	.331	.427	.155	.310	.094	.246	.147	.223	.149
Appearance	.024	.115	.046	.037	.151	.130	.145	.133	.162	.047	.035	.175	-.002*	.025	.179	.079	.062	.118
No. of App.	.017*	.108	.057	.039	.180	.169	.178	.148	.176	.056	.013*	.214	.002*	.024	.200	.081	.049	.140

KEY:

Synd 1: Unforthcomingness
Synd 2: Depression
Synd 3: Withdrawal
Synd 4: Anxiety About Adult Interest
Synd 5: Hostility to Adults
Synd 6: Anxiety for Approval of Other Children
Synd 7: Uncertain for Adult Approval
Synd 8: Hostility in Other Children
Synd 9: Restlessness
Synd 10: Emotional Tension
Synd 11: Nervous Symptoms

(* denotes correlation not significantly different from zero; p>.05)

Factor 1: Aggression
Factor 2: Timidity
Factor 3: Attention-seeking
Factor 4: Restlessness
Factor 5: Aloofness
Factor 6: Shyness
Factor 7: Moodiness

The association between measures of Restlessness and poor school performance is to be expected since these measures are concerned with the extent to which the child is restless, active or careless in the classroom. There are at least two reasons why children who display such behaviours in an extreme form would tend to show poor school achievement. First, careless, restless behaviour may have a direct impact on the child's school performance in that such behaviour could impede learning in the classroom situation. Second, it is likely that at the primary school level there is a premium placed on the neatness and tidiness of school work and thus the careless or restless child tends to receive poor school achievement ratings because of the appearance of his work.

The findings that poor school achievers are prone to be aggressive, depressed or timid are not quite so easy to explain. One explanation of these relationships is that the association between school performance and social adjustment is mediated by the child's level of ability. It is possible that children who fail to achieve in school adopt aggressive, timid or depressive behaviour as a defense against this failure. Thus, failure in school may result in the emergence of one of several types of defensive responses which in their extreme forms can be viewed as maladjusted or at least maladaptive.[1]

Personal Characteristics and Social Maladjustment

Teacher ratings of the child's personal characteristics have some of the highest associations with the maladjustment measures: the syndromes having the highest correlations are Restlessness, Depression and Unconcern for Adult Approval; the factors with the highest correlations are Restlessness, Moodiness and Aggression.

1. It must be borne in mind that the teacher ratings of the child's school performance and the BSAG were not always completed independently: in many cases the teacher who completed the BSAG would have also made the performance ratings for the child. Consequently, the correlations between the social adjustment scores and the school performance measures may be artifactually inflated by "halo effects": teachers may have scored children having superior academic performance more favourably than less able children.

The interpretation of these findings is difficult since the validity and reliability of the teacher ratings are unknown. While it is clear that the teacher ratings and the BSAG data measure similar aspects of the child's behaviour, the unknown properties of the ratings make it almost impossible to interpret the associations between the measures. Perhaps the only conclusion that can be drawn is that the positive correlations between the teacher ratings of personal characteristics and the maladjustment measures provide some evidence for the validity of the BSAG.

Juvenile Delinquency and Social Maladjustment

In a previous paper (Fergusson et al 1975b) we presented an extensive analysis of the relationship between social maladjustment and future juvenile delinquency. The findings of this research showed that BSAG scores collected at age ten years were related to future young offending. However, the degree of association present was not large.

The results presented in the correlation matrix reflect this tendency: both the syndrome scores and the factor scores show modest relationships with future offending by the age of 17 years.

The syndromes which show the highest correlations with future offending are Hostility to Adults, Unconcern for Adult Approval and Restlessness. The factors which are most closely associated with future offending are Aggression and Restlessness.[1]

The syndrome and the factor scores show a similar pattern of association with young offending: measures relating to aggressive or restless behaviour show the highest associations with offending. The results differ in the clarity with which these relationships appear: for the syndrome scores, the pattern of associations is diffuse - most syndromes show some correlation

1. It is worth noting that these findings provide oblique support for Eysenck's (1964) contention that extraverted children tend to be more delinquency - prone than introverted children. It can be seen that for both systems of scoring the BSAG, Restlessness shows one of the highest overall correlations with future delinquency. The measures of Restlessness may be given a similar interpretation to that of the more general construct of Extraversion proposed by Eysenck.

with offending; for the factor scores, offending is associated with only two measures, Aggression and Restlessness, and shows near zero association with the other measures.

Ill-health and Social Maladjustment

Previous research (Stott 1960, 1962, 1966; Stott et al 1975) has indicated that children who are prone to health problems receive higher scores on the BSAG than healthy children. Stott et al (1975) assert that this association reflects the fact that maladjusted behaviour and certain types of health problems have a common neurological base. They argue as follows:

> "The hypothesis of a direct causal relationship (between ill-health and maladjustment) has to be rejected, first, because only a minority of those suffering from multiple morbidity were maladjusted, and only a minority of the maladjusted were multiple-impaired in a physical sense. In the second place, the morbid conditions most closely associated with maladjustment - speech impairment and poor muscular co-ordination as observed by teachers - pointed to common neurological origins rather than a direct causal relationship" (p. 125).

There are several reasons why the above argument does not provide a sufficient basis for the view that the association between ill-health and social maladjustment reflects some common set of congenital factors. First, the fact that ill-health and maladjusted behaviour are not perfectly (or even strongly) related could equally well be used to refute an assertion that they are associated by way of a set of congenital factors. Second, the relationships on which Stott et al base much of their argument are tautologous: some of the syndromes having associations with alleged neurologically-based health problems contain items which measure the same or very similar conditions. Finally, the health defects used by Stott et al to support the existence of a congenital factor (mainly speech defects, poor muscular co-ordination and defects of vision and hearing) are conditions which could impair the child's ability to interact with his peers or with others in his environment. It is reasonable to suppose that such defects could in themselves lead to maladjusted behaviour.

Despite the equivocal interpretation of the relationship between ill-health and social maladjustment, in all cases there are positive correlations between the three health measures and the syndrome and factor scores. For the syndrome scores, the largest associations are with Depression, Unforthcomingness, Withdrawal, Restlessness, Nervous Symptoms and Emotional Tension. For the factor scores, the strongest associations are with Timidity, Restlessness and Shyness.

The correlations between the health measures and the syndrome scores are higher than those between the health measures and the factor scores. This suggests that the syndrome scores are more sensitive to the child's state of health than the factor scores. The reasons for this probably lie with the nature of the health measures: the measures used in the correlation matrix are identical to those used by Stott et al (1975) in their examination of the relationship between ill-health and maladjustment. As was noted earlier, the correlations between the syndrome scores and the health measures are artifactually inflated as both measures have items in common. Thus, the apparent predictive superiority of the syndrome scores probably reflects nothing more than an artifact created by the way in which the health measures were defined.

Race, SES and Social Maladjustment

Stott et al (1975) reported that BSAG scores are subject to only slight cultural and social class differences. This finding is borne out by the results presented in Table 4.1. The syndrome scores show correlations of between - 0.01 and 0.09 with race and between 0.02 and 0.1 with SES. A similar pattern occurs for the factor scores. The results suggest that social maladjustment is only slightly associated with race and SES. However, the relationships that are present indicate that Non-European children are prone to receive higher scores on the syndromes of Hostility to Adults, Unconcern for Adult Approval, Unforthcomingness and Restlessness and on the factors of Shyness and Aloofness. Similarly, children of low SES are prone to receive higher scores on the syndromes of Unconcern for Adult Approval, Depression and Restlessness and on the factors of Restlessness, Aloofness and Aggression.

School Attendance and Social Maladjustment

The correlations between the maladjustment measures and school attendance are uniformly low indicating that at age ten years there is almost no association between social maladjustment and school attendance. This finding is anomalous in view of the association between health and maladjustment and Stott's (1963b) finding that children who truant receive higher scores on the BSAG than children who do not: both of these results imply an association between school attendance and social maladjustment.

The lack of relationship between the school attendance measure and social maladjustment can probably be explained by the fact that most of the variation in school attendance for the present sample is accounted for by the common infectious diseases (colds, influenza, chicken-pox, mumps, etc.) and that these diseases are unrelated to either the health measures discussed in the previous section or to tendencies to truant.

Section 5 Composites of BSAG Scores: Unract and Ovract

In a previous paper (Fergusson *et al* 1975a, p. 25) it was suggested that the Unract and Ovract dimensions defined by Stott (1971) do not withstand critical scrutiny. Three arguments were put forward to support this view:

(1) It is not reasonable to assume that the content of the BSAG can be reduced to two general underlying dimensions: one measuring under-reactivity and the other over-reactivity. Rather, it would be expected that these two scores would be subsumed under one continuous dimension which ranges from extreme under-reactivity to extreme over-reactivity.

(2) It was also pointed out that the Unract and Ovract measures could reflect distributional artifacts created by the method of scoring the BSAG.

(3) Finally, an extensive factor analysis of the BSAG produced little evidence to indicate the presence of second-order factors corresponding to Unract and Ovract.

Recent findings by Stott *et al* (1975) have shown that Unract and Ovract scores are related to a number of measures including the child's health, motor impairment, physical handicap, and juvenile offending. These results could be interpreted as providing support for the validity of the Unract and Ovract scores. However, given that there is little evidence for these scores as measures of maladjusted behaviour, the findings have an alternative interpretation: Unract and Ovract scores are valid because they are additive composites of a series of tests which, individually, are valid. Thus, Unract and Ovract measures may be considered as a means of combining syndrome scores for predictive purposes.

It is possible to examine the predictive efficacy of Unract and Ovract by comparing the correlations between the Unract/Ovract scores and the validity measures with the comparable correlations for the syndrome and factor scores. If Unract and Ovract scores are useful for predictive purposes they should have higher correlations with the validity measures than those for the individual syndrome or factor scores.

Table 5.1. shows the correlations between the Unract and Ovract scores and four representative validity measures; for comparison, the table also shows the highest correlations of the syndrome and factor scores with these measures. The variables in the table are defined as follows:

(1) Four validity measures: (a) overall school performance measured by a sum of normalised values of the teacher ratings of oral language, written language, reading, spelling, writing and arithmetic; (b) the child's personal characteristics measured by the single teacher rating of stability; (c) the Healthy/Unhealthy distinction based on the 15 morbid conditions described by Stott et al (1975); (d) the number of appearances made before the Children's Court by the age of 17 years.

(2) Unract and Ovract Scores: approximations to Unract and Ovract scores were obtained as follows: the Unract score was defined as the sum of scores on the syndromes of Unforthcomingness, Depression and Withdrawal; the Ovract score was defined as the sum of the scores on the syndromes of Anxiety about Adult Interest, Hostility to Adults, Anxiety for the Approval of Other Children, Unconcern about Adult Approval, Hostility to Other Children and Restlessness.

Table 5.1 CORRELATIONS OF VALIDITY MEASURES WITH UNRACT/OVRACT AND SYNDROME AND FACTOR SCORES

			Highest correlation with individual test scores	
	Unract	Ovract	Syndromes	Factors
School Performance	.291	.317	.411 (Restlessness)	.384 (Restlessness)
Stability	.214	.388	.377 (Restlessness)	.393 (Restlessness)
Health	.400	.255	.427 (Nervous Symptoms)	.310 (Timidity)
No. of Appearances	.075	.210	.180 (Hostility to Adults)	.214 (Aggression)

The results in Table 5.1. show that Unract and Ovract are, in fact, poorer predictors of the validity measures than are single syndrome or factor scores. This finding, taken in conjunction with the results of the factor analysis of the BSAG, suggest that there is little justification for this method of scoring the test: Unract and Ovract do not reflect latent dimensions of the BSAG, nor are they any more effective as predictors than the single syndrome scores. However, it must be borne in mind that these results are based on an analysis of the 1963 version of the BSAG; it is possible that Unract and Ovract are an appropriate means of scoring the 1971 version of the test.

It is possible to construct, by multiple regression methods, linear composites of BSAG scores which have greater predictive validity than either the Unract or the Ovract scores. Table 5.2. shows the multiple correlations of the syndrome and factor scores with the four representative validity measures.

Table 5.2 MATRIX OF MULTIPLE CORRELATIONS

	School Performance	Stability	Health	No. of Appearances
Syndromes (1 to 11)	.464	.428	.536	.235
Factors (1 to 7)	.413	.413	.376	.234

The results in Table 5.2. show that the multiple correlations of the syndrome and factor scores with the validity criteria are noticeably larger than the corresponding correlations for both the Unract/Ovract scores and the single BSAG scores. These results have the following implications:

(1) The sizeable multiple correlations between the validity measures and the syndrome and factor scores provide further support for the validity of BSAG scores as measures of maladjustment.

(2) As a means of producing linear composites of BSAG scores for predictive purposes, multiple regression methods are considerably superior to the Unract and Ovract measures.

It will be seen that the multiple correlations of the syndrome scores are slightly larger than those of the factor scores for the measures of school performance and stability. This probably reflects the fact that the regression equations based on the syndrome scores contain eleven variables, while those for the the factor scores contain only seven variables. The greater number of variables in the syndrome regression equations would give these scores a slight advantage as predictors of the criterion measures. The syndrome scores are, however, markedly superior as predictors of the health variable. The reason for this is probably the tautologous relationship between the syndrome scores and some of the items in the health measure.

Taking these factors into account, there is little evidence to suggest that the syndrome method of scoring the BSAG is superior to the factor method in forming linear composites of test scores to predict the criterion variables.

Section 6 Concluding Comments

The results presented in this report lead to the following conclusions:

(1) The individual syndrome and factor scores show predictive validity in a number of areas of childhood functioning and behaviour: a child's school performance, teacher ratings of his personal characteristics, his health and his future offending behaviour are all related to his social adjustment at age 10 years as measured by the BSAG. However, while BSAG scores have some predictive validity, it must also be observed that the level of prediction achieved is not high: most correlations reported ranged between .10 and .30. There are two explanations for the low predictive power of BSAG scores. First, one would not expect high predictive validity given the complexities of the behaviour being predicted: the low correlations reported may therefore reflect the fact that the associations between BSAG scores and the external variables are mediated by a number of variables whose influence was not examined. For example, the examination of the association between school performance and social maladjustment took no account of differential levels of ability.

A second explanation is that the low predictive validity of the BSAG reflects the limited validity of the test in general. This is a difficult issue to examine. While we have shown that the test has some predictive validity, it is quite clear that the results we have reported do not constitute a complete validation of the test as no attention has been paid to the important issue of construct validity. In particular, there is a need for the test to be validated using independent and reliable measures designed to measure the same underlying attributes as those purported to be measured by the test. This would allow for a direct validation of the test's convergent and discriminant validity using the Campbell and Fiske (1959) multitrait - multimethod matrix. Here we have performed the weaker test of demonstrating that the BSAG has limited predictive validity in a number of areas in which it would be expected to show relationships. Perhaps the best that can be concluded on the basis of this evidence is that the findings are consistent with the view

that the BSAG produces valid measures of social maladjustment. However, before this view can be finally accepted there is a need for more direct and searching approaches to the problem of test validation.

(2) A comparison of the predictive validity of Stott's method of syndrome scoring and the results of a factor analytic scaling of the test content suggests that both methods perform in a very similar fashion. It was noted that if a particular syndrome score showed some association with a given validation variable it was possible to locate a corresponding factor score having a similar correlation with the variable. The major differences in predictive validity were that the factor analytic results were slightly superior in the prediction of juvenile offending, whereas the syndrome scores were more closely related to the child's health.

Two conclusions follow from these findings. First, that the two methods of representing the test content have more or less the same degree of validity and, second, that whichever method is chosen the results and information obtained are similar. In our opinion, scaling the test via the factor analytic approach is to be preferred since it yields a more parsimonious and internally consistent description of the test content than does the syndromic model. On the other hand, the syndromic model gives a slightly richer, if less reliable, description of maladjusted behaviour.

(3) An analysis of various methods of combining BSAG results to produce linear composites of scores suggests the following conclusions:

Unract and Ovract scores showed lower predictive validity than the best syndrome or factor scores. This finding, in conjunction with the results of our previous analysis, indicates that there is little justification for this means of scoring the BSAG: Unract and Ovract do not appear to be latent dimensions of the test and they are less effective as predictors of the validity

criteria than the individual syndrome scores. It must be noted, however, that these conclusions are based on the analysis of the 1963 version of the BSAG; it is possible that Unract and Ovract are appropriate for scoring the (revised) 1971 version of the BSAG.

Linear composites of syndrome and factor scores formed by multiple regression showed reasonable correlations with the validation measures. The multiple correlations for the syndrome scores were slightly higher than those for the factor scores for the measures of school performance and stability. The superiority of the syndrome scores can be explained by the fact that the regression equations based on the syndrome scores contain more variables than those for the factor scores. The greater number of terms in the regression equations involving the syndrome scores would give the syndrome scores a slight advantage as a means of predicting the validity measures. The syndrome scores were markedly superior to the factor scores as predictors of the child's health. This difference can be accounted for by the fact that the health measures and the syndrome scores contain identical items and are thus tautologically related.

Taking these factors into account, the analysis produced little evidence to suggest that the syndrome or factor scores showed any marked difference in predictive validity when used to form linear composites of test scores.

Finally, it should be noted that the primary purpose of this paper has been to provide evidence for the validity of the BSAG as a measure of social maladjustment by showing that test scores are related to a variety of external variables. In the course of this analysis we have uncovered a number of interesting associations between the test scores and the variables. Each of these associations deserves deeper and more searching analysis.

REFERENCES

Campbell, D. T. & Fiske, D. W. — "Convergent and Discriminant Validation by the Multitrait - Multimethod Matrix". Psychological Bulletin, 1959, 56, 81-105.

Cattell, R. B. & Coulter, M. A. — "Principles of Behavioural Taxonomy and the Mathematical Basis of the Taxonome Computer Program". The British Journal of Mathematical and Statistical Psychology, 1966, 19, 237-269.

Elley, W. B. & Irving, J. C. — "A Socio-Economic Index for New Zealand Based on Levels of Education and Income from the 1966 Census". New Zealand Journal of Educational Studies, 1972, 7, 153-167.

Eysenck, H. J. — Crime and Personality. London:Routledge, 1964.

Fergusson, D. M., Donnell, A. A. & Slater, S. W. — The Structure of the Bristol Social Adjustment Guide. Wellington: New Zealand Government Printer, 1975a.

Fergusson, D. M., Donnell, A. A., Slater, S. W., & Fifield, J. K. — The Prediction of Juvenile Offending: A New Zealand Study, 1975b. In Press.

MacNaughton-Smith, P. — Some Statistical and Other Numerical Techniques for Classifying Individuals. London: Her Majesty's Stationery Office, 1965.

Magnusson, D. — Test Theory. Reading, Massachusetts: Addison - Wesley, 1967.

McQuitty, L. L. — A Method of Pattern Analysis for Isolating Typological and Dimensional Constructs. Lackland AFB, Texas: Air Force Personnel and Training Centre, Report No. TN - 55-62, 1955.

Nunnally, J. — Psychometric Theory. New York: McGraw-Hill, 1967.

Sneath, P.H.A. — "The Construction of Taxonomic Groups". In Ainsworth, G. C. and Sneath, P.H.A. Microbial Classification. The Twelfth Symposium of the Society for General Microbiology. Cambridge University Press, 1962.

Stott, D. H. — "Evidence for a Congenital Factor in Maladjustment and Delinquency". British Journal of Psychology, 1960, 51, 157-170.

Stott, D. H. — "Third Report of the Glasgow Survey of Boys put on Probation during 1957". Approved Schools Gazette, April 1962, 7-20.

Stott, D. H. — The Social Adjustment of Children. Manual to the Bristol Social Adjustment Guides (2nd edit.), London: University of London Press, 1963a.

Stott, D. H. — "Truancy and Crime". Scottish Educational Journal, March 1963b, 189-190.

Stott, D. H. — Studies of Troublesome Children. London: Tavistock Publications, 1966

Stott, D. H. — The Social Adjustment of Children. Manual to the Bristol Social Adjustment Guides (4th edit.), London: University of London Press, 1971.

Stott, D. H., Marston, N. C. & Neill, S. J. — Taxonomy of Behaviour Disturbance. London: University of London Press, 1975.

Williams, W. T. & Lambert, J. M. — "Multivariate Methods in Plant Ecology. I. Association-Analysis in Plant Communities". Journal of Ecology, 1959, 47, 83-101.

Williams, W. T., Lambert, J. M. & Lance, G. N. — "Multivariate Methods in Plant Ecology. V. Similarity Analyses and Information - Analysis". Journal of Ecology, 1966, 54, 427-445.

RESEARCH REPORTS IN THIS SERIES

1. The Structure of the Bristol Social Adjustment Guide: Fergusson, D. M., Donnell, A. A. and Slater, S. W. Research Report No. 1, 1975.*

2. The Effects of Race & Socio-Economic Status on Juvenile Offending Statistics: Fergusson, D. M., Donnell, A. A. and Slater, S. W. Research Report No. 2, 1975.*

3. The Prediction of Juvenile Offending: A New Zealand Study. Fergusson, D. M., Donnell, A. A., Slater, S. W. and Fifield, J. K. Research Report No. 3, 1976.*

4. New Zealand Validity Data for the Bristol Social Adjustment Guide: Fergusson, D. M., Fifield, J. K., Slater, S. W. and Donnell, A. A. Research Report No. 4, 1976.**

* Available from the Government Printer, Private Bag, Wellington, New Zealand.

** Available free of charge on application to the Secretary, Joint Committee on Young Offenders, C/- Department of Social Welfare, Head Office, Private Bag, Wellington, New Zealand.

END