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Some Differences Between Published Norms and Data from Matched Controls as a Basis for Comparison with Psychiatrically-Disturbed Groups

By J. CRAWFORD LITTLE and T. A. KERR

Over the years 1959 to 1962 a study was made of a series of 72 male neurotic patients referred to general hospital and private psychiatric practice in Leeds, the results of which were submitted for an M.D. Thesis (Little, 1966). It emerged clearly that the neurotic group was divisible into two major sub-groups differing significantly in a wide range of personality and other premorbid variables. Various objective tests and measurements were used; in the present context we wish to concentrate attention on five: (1 and 2) The N and E Scales of Eysenck's Maudsley Personality Inventory, (3) Tanner's Discriminant Androgyny Scale, (4) Parnell's Ponderal Index, and (5) The Rees-Eysenck Body Index.

Having determined the mean scores and standard deviations for these five measures in the two neurotic sub-groups the significance of the differences observed were calculated. However, one was curious to know further whether the scores for these two groups, taken independently, would differ from those of a comparable normal male population. The innovators of the procedures all publish "norms" for English males, so with some reservations these were accepted as the best available for comparative purposes. Tests of statistical significance were applied to the differences which emerged in various areas of comparison, and appropriate conclusions were drawn which formed the basis for the general theoretical discussion of factors underlying the aetiology of neurotic states in males.

In February, 1965, conditions were favourable for the authors to commence the accumulation of a randomly selected control group of males living in the city, and as the criteria for selection of this control group are critical we describe the procedure in some detail.

Several years ago an attempt was made by the Department of Public Health in Leeds to allocate health visitors to individual general practices. The plan was rejected after a survey revealed that, presumably owing to population moves consequent on housing developments, the patients from any given practice tended to be widely scattered over the 75 square miles of the city. Nevertheless, we evolved a plan to approach in turn seventeen of the general practitioners, with surgeries widely distributed over the city, who had referred the original neurotic male patients. From each practice we asked for two male controls, only stipulating the year of birth in order to effect a control group of the same mean age and variation about the mean as the neurotic patients. The procedure was to start at some random point in the filing cabinets of the practitioners' alphabetically-stacked case records and proceed consecutively until we had extracted the first two case records of males of the appropriate birth year. Once these names and addresses were in our hands, none was rejected. The practitioner introduced us to the subject personally and left us to proceed with our investigations (which were much more extensive than the five items reported here). The project was extremely time-consuming, for most male subjects are only at home in the evenings and at weekends; frequently more than one call would be made to a house before arrangements for the interview were completed. Eventually case records were pulled out for 35 male subjects, only two (5·5 per cent.) of whom proved unwilling to co-operate. The social class distribution emerged as a mirror of that of males

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in the city of Leeds (Fig. 1) and we felt we had probably come as close as was reasonably possible to achieving a representative sample of males distributed about the mean age of 37·6 years living in this northern industrial city.

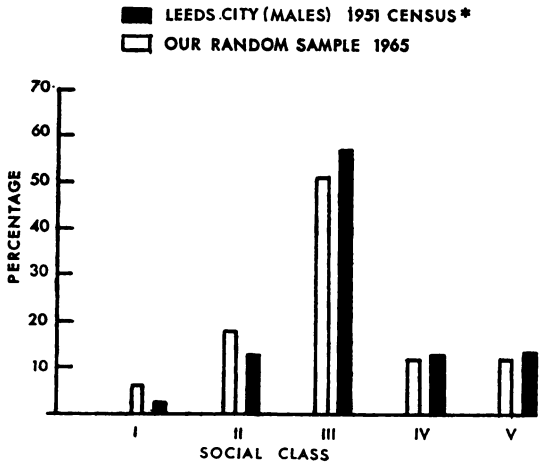


FIG. 1.

* Comparable social class data from the 1961 census are not available.

THE SAMPLE POPULATION

Age

The age range of the 33 male subjects extended from 19 to 61 years, with a mean age of 37·58 years, an approximately normal distribution and a standard deviation of 10·3 years. In order to study the possible effect of ageing on mean scores and measures the group was divided into those below and above the mean age of 37·58 years as shown in Table I.

TABLE I
Age Distribution of Sample

		N	Mean Age in Years	S.D.
Total Group	.. ..	33	37·6	10·30
Age	under 37·6 years ..	17	29·2	5·35
	over 37·6 years ..	16	46·5	5·80

Social Class

The sample was divided into three social class groups, namely Social Classes (I and II), (III), (IV and V). Social class and age are shown to be independent of each other in the sample, the mean age of the three social class groupings being 37·1, 37·8, and 37·7 years respectively.

THE MAUDSLEY PERSONALITY INVENTORY

The original sample from which the norms of the MPI were derived (Eysenck, 1956) consisted of 200 men and 200 women, of whom nearly one-half had had some University education and with the majority in the 20- to 35-year range. Subsequently the sample was augmented by groups of industrial apprentices, nurses and a "quota sample of the whole population" (Eysenck, 1959). Age and class differences were found, but were considered too slight to warrant the preparation of separate norms. The precise distributions within this larger sample in respect of age and class are not given. However, a comparison of Jensen's figures for industrial apprentices with those for Eysenck's entire group of males, half of whom were highly educated, suggests the possibility that social class may be relevant to the different values.

Despite Jensen's (1958) conclusion that age is correlated with N and E scores to a negligible extent, Shaw and Hare (1965), using the shortened version of the MPI on a large random sample of subjects in Croydon found that *neuroticism* scores in males were inversely related to age to a degree significant at the five per cent. level of probability, and that the mean N score for the whole sample was considerably lower than that given in the Handbook of the MPI. Coppen and Kessel (1963), in a study of *women* in the general population, stated "Neuroticism and extraversion were found to be negatively correlated with age, and there was a significant correlation between neuroticism and extraversion".

RESULTS

(See Table II)

Neuroticism Scale

In our small sample no significant differences emerged with respect to age and social class but the mean N score of 13·55, S.D. 9·58 for the 33 subjects was significantly lower ($p < \cdot 01$) than that of 19·89, S.D. 11·02 for Eysenck's quota sample of the whole population. It is also significantly lower ($p < \cdot 05$) than the mean N

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TABLE II

Maudsley Personality Inventory

	N Scale			E Scale	
	N	Mean	S.D.	Mean	S.D.
1. Manual of the MPI. Quota sample of the Whole Population (Eysenck, 1959)	1800	19·89	11·02	24·91	9·71
2. Normal Adult Males (Eysenck, 1956)	200	17·81	11·32	24·62	10·04
3. Industrial (Male) Apprentices (Jensen, 1958)	100	21·20	10·26	29·34	9·00
Present (Male) Sample:					
4. Total Group	33	13·55	9·58	27·06	9·13
5. Age—under 37·6 years	17	11·47	9·11	28·41	9·30
6. Age—over 37·6 years	16	15·75	9·27	25·63	8·40
7. Social Class—S.C. I and II ..	8	11·75	10·60	22·50	4·90
8. Social Class—S.C. III	17	14·77	7·73	26·06	8·57
9. Social Class—S.C. IV and V ..	8	12·75	10·54	33·75	9·18

Neuroticism Scale:
Difference between our total group (4) and Eysenck's quota sample of the whole population (1) significant at $p < \cdot 01$ (difference=6·34, t 3·28, d.f. 1831).
Difference between our total group (4) and Eysenck's 200 adult males (2) significant at $p < \cdot 05$ (difference=4·26, t 2·04, d.f. 231).
Difference between our younger group (5) and Eysenck's adult males (2) significant at $p < \cdot 05$ (difference=6·52, t 2·30 d.f. 215).

Extraversion Scale:
Analysis of Variance (Social Class) $F = 3 \cdot 911$ $p < \cdot 05$.

score of 17·81, S.D. 11·32 for Eysenck's original sample of 200 males (Eysenck, 1956). The mean N score of 11·47 for our *younger* group, of mean age 29·2 years, is significantly lower ($p < \cdot 05$) than that of Eysenck's 200 males.

Extraversion Scale

The mean E score corresponded closely to that found in the Manual for normal adult males. There was no appreciable ageing effect, but an analysis of variance in terms of social class trichotomy showed a significant difference at the five per cent. level, E scores increasing with lower social class. It should be noted that age, which Shaw and Hare found to have a significant negative relation to E scores, was essentially similar in the three social class groups in our study.

COMMENT

Bearing in mind the findings of other workers, the differences we have demonstrated between the mean N score of our sample and the published norms, and the social class influence on E scores, indicate that in selecting a group of controls careful *social* matching with the patient group should be made so that the norms obtained may be more precisely related to the studied sample of patients. The small Leeds control sample is of men predominantly in Social Class III living and working in a northern industrial English city in the 1960s; consequently the MPI findings were judged to be more relevant for comparison with those of male neurotics from the same society than those provided by Eysenck's large sample, the composition of which is not precisely revealed.

N SCORES, NEUROTIC SYMPTOMS AND NEUROTIC VULNERABILITY

Although the control sample turned out to be "normal" for our purposes, in the sense that no subject had ever had treatment by a psychiatrist, it was no surprise to find that 6 (18 per cent.)

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were regarded by themselves or the family doctor as having had an illness of psychological origin at some time. Nine (27 per cent.) responded in the affirmative to a general question as to whether they considered themselves to have been in any way "nervy" or "highly strung" in adult life.

Some subjects complained of symptoms of possibly psychological origin, and each subject was asked specifically about the presence of the following: (1) nervousness, (2) depression, (3) irritability, (4) sleeplessness, (5) unaccountable tiredness or feeling "run-down", and (6) headaches. The presence of each item was awarded a score of one (or ·5 if present in slight degree) contributing to a "sub-clinical neurotic symptom score" (c.f. Taylor and Chave, 1964) with a maximum score of six.

Likewise a score of one for the presence of each of a number of items in the personal life history regarded by us as of emotionally undesirable import contributed to a total "unfavourable markers" score with a possible maximum of 11. These items were: (1) Health in childhood seriously impaired, (2) Health of one or both parents seriously impaired during subject's childhood, (3) Subject reluctant to state clearly that childhood recalled as "happy", (4) "highly-strung" or "nervous" as a child, (5) Relationship to mother impaired during childhood, (6) Relationship to father impaired during childhood, (7) Absence of parental harmony during childhood, (8) Tendency to be "highly-strung" or "nervous" in adult life, (9) Work record poor or doubtful, (10) Subject admits to having had a "nervous" or psychological illness in the past, and (11) Family history of psychiatric illness.

The scores on these two measures were independently compared with the N scores. As the distribution of the measures was non-parametric each scale was divided at an arbitrary point and χ^2 tests applied. With respect to N scores the subjects were divided into those with scores of 15 and under and those with scores of 16 and over. For sub-clinical neurotic symptom scores the subjects were divided into those totally symptom-free (a score of 0) and those with any symptoms (a score of 0·5 and over). For unfavourable markers' scores the subjects were divided into those with a score of 0 or 1 against those with a score of 2 and over.

Result

Of the 14 subjects free of all symptoms, 13 had N scores below 15. Of the 19 with some symptoms, 11 had N scores of above 15. Statistical analysis shows that the N score is significantly and positively correlated with sub-clinical symptom score (ϕ=0·45, $p<·01$), but not with the number of "unfavourable markers" in the personal history (ϕ=0·20, N.S.). "Unfavourable markers" and sub-clinical symptom scores were not correlated (ϕ=0·19, N.S.). It should be noted that no attempt was made to determine in these subjects whether the sub-clinical symptoms were likely to be of psychological or physical origin.

Comment

Knowles (1960) concluded that there was some evidence that fluctuations in clinical status influenced the stability of neuroticism scores. Hare and Shaw (1965) found that, whereas the mean neuroticism score of the persons reporting *current* "nervous disturbance" was significantly higher than that of the general population, there was no such significant difference on comparing the mean neuroticism score of persons reporting only *past* "nervous disturbance" with the general population. Coppen and Metcalfe (1965) demonstrated that the mean N and E scores of depressed patients, abnormal during the illness, were within normal limits following recovery; Ingham (1966) found a substantially similar pattern in neurotics.

The present findings support the view that the neuroticism score of the MPI may well be more related to the presence of symptoms than to the presence of neurotic vulnerability as indicated by traditionally recognized neurotic markers in the personal history.

Tanner's Discriminant Androgyny Scale

In this context androgyny refers to the degree of femininity/masculinity of body-build in men and women. The ratio of bi-acromial (BAD) to bi-iliac diameter (BID) was taken a stage further when Tanner (1951), on incorporating

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leg length (as the subischial length), devised Discriminant Androgyny Scale 2 (DAS2) and thereby further improved the discriminant function, so that the measure misclassified only 4 per cent. of males and 13 per cent. of females. The formula is as follows: 2 bi-acromial +0·53 subischial −1·25 bi-iliac −81 =0.

Tanner's mean DAS2 scores (ignoring the constant 81) were 87·9 S.D. 4·07 for men, and 76·8 S.D. 3·95 for women.

Being based on bone measurement this scale allows less opportunity for the play of subjective bias than the anthroposcopic methods used in the Harvard Grant Study by Seltzer and Brouha (1943) and at Oxford by Parnell (1954). Using these methods, higher levels of athletic achievement in undergraduates at Harvard and Oxford were found to be exclusively associated with higher scores.

Coppen (1959) found the scores of male homosexuals to be significantly lower than those of a control group, but a similar deviation was revealed in a group of heterosexual neurotics, a finding which emphasizes O'Connor's (1964) observation in his study of homosexuals in the R.A.F. that these cases only represent that proportion, probably a minority, of all homosexuals who are seen by a psychiatrist: "I was struck by the high incidence of neurotic symptoms in them."

As Tanner's male subjects were Oxford undergraduates and Sandhurst cadets, it was felt that analysis of the present group might reveal ageing and social class trends, particularly as data published by the Board of Trade (1957) indicate the influence of age and social class *in women* on the bi-acromial and bi-iliac measurements.

Using a pelvimeter, the various measurements were obtained, employing the technique recommended by Parnell (1958).

Result

Discriminant Androgyny Scale 2 (DAS2).

The following account of DAS scores ignores the constant 81 (see Table III).

(*A*) *DAS2 and Age*

(1) The mean DAS2 score of 82·59, S.D. 4·44 for our group of 33 control male subjects of mean age 37·6 years is significantly lower (i.e. more "feminine") than the figure of 87·9, S.D. 4·07 for Tanner's Oxford male undergraduates ($p < \cdot001$). The age of the latter group is not stated, but the subjects presumably fall within the age range 17 to 24 years.

Table III

Tanner's Discriminant Androgyny Scale 2

	N	Mean	S.D.
1. Male Undergraduates (Tanner, 1951)	273	87·9	4·07
2. Female Undergraduates (Tanner, 1951)	172	76·8	3·95
Present Sample (Males):			
3. Total Group (mean age 37·6 years)	33	82·59	4·44
4. Age—under 37·6 years (mean age 29·2 years) ..	17	84·98	3·96
5. Age—over 37·6 years (mean age 46·5 years) ..	16	80·05	3·38
6. Social Class—S.C. I and II	8	83·32	4·40
7. Social Class—S.C. III	17	82·89	3·48
8. Social Class—S.C. IV and V	8	81·24	5·80

Difference between Tanner's Male undergraduates (1) and our total group (3) significant at $p < \cdot001$ (difference=5·311, t 6·549, d.f. 304).
Difference between Tanner's Male undergraduates (1) and our younger group (4) significant at $p < \cdot005$ (difference 2·92, t 2·944, d.f. 288).
Difference between our younger (4) and older (5) groups significant at $p < \cdot001$ (difference 4·928, t 3·91, d.f. 31).
An analysis of variance reveals no significant relationship of androgyny with social class.

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(2) The mean DAS2 of 84·98, S.D. 3·96 for our *younger* group (17 subjects, mean age 29·2 years, S.D. 5·35) is also significantly lower than that of Tanner's male undergraduates ($p < \cdot 005$).

(3) The comparison of the 17 younger (mean age 29·2 years) with the 16 older (mean age 46·5 years) control subjects reveals a significant difference ($p < \cdot 001$) towards a lower (more "feminine") androgyny score (AS) in the older subjects.

(4) Thus there is evidence in normal male subjects of an increasing trend towards "femininity" of body build in subjects of increasing age as shown in Table IV.

(B) The DAS2 did not appear to be influenced by social class.

Comment

The physical basis for this significant change with age in the direction of increasing femininity of body-build is not clear. The finding corroborates the trend found by Kelsey (1965) who additionally showed that the decline in AS with age was associated with lower BAD and higher BID in the older subjects, and further demonstrated that this was not a measurement artefact associated with differences in body fat. In our group the body weight was greater in the younger group, but not to a significant degree, and no significant difference in Ponderal Index between the two age groups was revealed. We also found, as Kelsey showed, that the mean BAD was less and the mean BID greater in the older group than in the younger group. The mean subischial length was less in the older group. None of these differences reached statistical significance. There was no significant difference in height between the younger and older groups to account for any of these trends.

Parnell's Ponderal Index (PI)

The use of this index of height in relation to weight ($PI = \frac{\text{Height in inches}}{\sqrt[3]{\text{weight in pounds}}}$) is described in detail by Parnell (1958) and Parnell and Skottowe (1962). The Linearity Score, closely correlated with Sheldon's Ectomorphy, is determined from age-corrected scales for the Ponderal Index. Scores are interpreted in terms of a 7-point scale for Ectomorphy. The mean Ponderal Index for males given by Parnell is 13·2 with a range of 10·5 to 15·1, this mean figure giving an Ectomorphy estimate at ages 18–23 years of 4, and at age 33 years of $4\frac{1}{2}$.

Result

(See Table V)

1. The mean value for PI reported by Parnell is almost a standard deviation higher than the figure of 12·58, S.D. 0·66 found in our 33 male control subjects. The statistical significance of this is uncertain, as the number of subjects in Parnell's series is not quoted.

2. No significant differences for PI relating to age or social class were evident.

3. The younger group (mean age 29·2 years) had a mean weight of 161·8 lbs., whereas that of the older group (mean age 46·5 years) was 148·7 lbs.—this difference is not significant.

Comment

Weight variation with age is an uncertain relationship particularly as the history may be unreliable. The data of Sheldon *et al.* (1954) show that in healthy men aged 30 to 49 years only 9·5 per cent. reported weight loss over this period of time. However, a cross-sectional survey of men in Birmingham suggested little weight variation with age (Lowe and Gibson,

Table IV

Age Influence on DAS2 Scores in Males

	Tanner (1951) Undergraduates (? Age 17–24 years)	Little and Kerr Male Controls	
		Mean Age 29·2 years	Mean Age 46·5 years
Mean DAS2	87·9	84·98	80·05
Significant of difference		$p < \cdot 005$	$p < \cdot 001$

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TABLE V

Ponderal Index (PI)

	N	Mean Ht. (in.)	Mean Wt. (lb.)	Mean PI Score	S.D.	Mean Age in years	Ectomorphy Score
Present Sample (Males):							
Total Group	33	67·4	155·4	12·58	0·66	37·58	3½
Age { under 37·6 years	17	67·9	161·8	12·50	0·58	29·2	3
Age { over 37·6 years	16	66·7	148·7	12·65	0·74	46·5	3½
Social Class { I and II	8	66·2	148·5	12·78	0·69	37·12	4
Social Class { III	17	67·8	161·7	12·50	0·62	37·85	3½
Social Class { IV and V	8	66·0	148·1	12·50	0·66	37·75	3½

1955). Further, the report by Kemsley (1950) for the Ministry of Food indicated only slight weight gain after 30 years of age in men.

REES EYSENCK BODY INDEX (IB)

This measure is defined by the formula $\frac{\text{stature} \times 100}{\text{transverse chest diameter} \times 6}$ (Rees and Eysenck, 1945).

TABLE VI

Body Index (IB)

	N	Mean IB Score	S.D.
Rees and Eysenck (Eysenck, 1947) ..	100	100·1	7·6
Rees and Eysenck Neurotics (Eysenck, 1947) ..	1000	104·4	7·9
Present Sample (Males):			
Total Group	33	99·28	8·22
Age { under 37·6 years ..	17	98·06	6·75
Age { over 37·6 years ..	16	100·53	9·29
Social Class { I and II ..	8	98·13	8·99
Social Class { III ..	17	99·99	8·17
Social Class { IV and V..	8	97·43	7·51

The mean for the 33 male control subjects in our study lies close to that found by Rees and Eysenck (Eysenck, 1947) for their normals. Age and social class have no obvious influence that can be detected in this small sample. All the means lie well within the mesomorphic range, i.e. within one S.D. of Rees and Eysenck's mean.

CONCLUSION AND SUMMARY

Five well-established psychological and anthropometric measures were determined in a small group of male subjects matched for age, social class, and general practitioner, carefully constructed to offer a control group for comparison with a series of neurotic male patients, living in the same Northern industrial city.

In two of these five measures offering "hard data"—the N scale of the Maudsley Personality Inventory and Tanner's Discriminant Androgyny Scale 2—the mean scores for this control group differed significantly from those published by the innovators. In a third measure, the Ponderal Index, Parnell's mean figure is almost one standard deviation higher than that of our group.

Further, it was found that the E scale scores of the MPI were significantly related to social class ($p < \cdot 05$) in the direction of increasing score with lower social class, and the Androgyny score (DAS2) decreased (i.e. became more "feminine") with increasing age ($p < \cdot 001$). We do not feel that the small size of the sample detracts from the validity or importance of the positive findings; it does, in a sense, make them more striking.

Highly misleading conclusions might be drawn from ill-considered comparisons between findings in patient groups and "norms" derived from subjects drawn from a different psychological and socio-cultural milieu. We are not suggesting that our norms are "better" but simply that they are more appropriate to our particular purpose.

There is perhaps a tendency for some workers, on attempting to establish new biometric techniques, to set values based on experience of subjects drawn from populations of limited social and age range. Easily available young and

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intelligent volunteers offer too ready a control group to the investigator working in the academic field; the ensuing temptation for others to generalize from this experience is not strictly his concern, but he must bear some responsibility for the implication of general validity, particularly if he has been vague about the precise composition of his sample.

One suspects that, through his close professional contacts with family doctors, with whom upwards of 95 per cent. of the population are registered for general medical services under the National Health Service, the clinical investigator who is also in consultant practice in the United Kingdom might well be in a special position of privileged advantage in seeking out and readily gaining the confidence of control subjects in the community.

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