ANDROGYNY IN ADOLESCENT PSYCHIATRIC PATIENTS AND IN DELINQUENTS

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The study reported here forms part of an investigation into the physiological maturity of adolescents with psychiatric illness (Henderson, 1967). The Discriminant Androgyny Score No. 1 (Tanner, 1951, 1962) is a measure of the femininity of males or the masculinity of females and may be regarded as an index of the degree of sexual differentiation which an individual undergoes during adolescence. The score is derived from measurements of shoulder and hip width. In adults, men have a mean score of 93 units and women of 78 units, both with a standard deviation of about five (Tanner, 1962). While this provides a high degree of discrimination between the sexes in adulthood, the score does not have this function in prepubertal children. It was expected on *a priori* grounds that, as boys' shoulders and girls' hips become relatively wide during adolescence, the score would increasingly differentiate between the sexes; and the increase in androgyny score would be greater for boys than for girls. The authors could find no longitudinal studies of changes in androgyny during adolescence to support this assumption. The present study, therefore, required normative data to be found for the teenage years.

A number of studies have indicated that a difference exists between the androgyny scores of normal adults and of psychiatric patients belonging to certain diagnostic categories. These studies referred only to adult material. Coppen (1959) found that when a group of 31 male homosexuals was compared with neurotic and control samples, both the homosexuals and the neurotics had significantly lower scores than the controls; that is, they were more feminine. Rey and Coppen (1959) showed that schizophrenic, neurotic, and depressive patients of both sexes had significantly lower androgyny scores than controls.

Johnson (1965) found that 55 sexually impotent male patients showed a tendency to gynandromorphy when their androgyny scores were compared with healthy males. Kelsey (1965) compared the androgyny scores of schizophrenics with those of their siblings, parents, and controls. For female patients, the mean androgyny score was decreased but for males there was no significant difference. Kelsey has drawn attention to the danger of a possible artefact in work on androgyny: there is an indication that androgyny decreases with age during adulthood in both sexes. In this connexion it should be noted that Rey and Coppen's female controls had a significantly lower mean age (24.1 years; S.D. = 4.1) than the means for the schizophrenic and depressive samples (36.1 years; S.D. = 11.0, and 31.0 years; S.D. = 9.8 respectively).

To date only one study refers to androgyny in childhood and adolescence among psychiatric patients. Dutton (1964) found no differences between 25 psychotic boys and a control group of non-mongol subnormal boys. In the present study, the authors argued that if the Discriminant Androgyny Score is indeed less in certain categories of adult psychiatric patients, it is likely that these individuals will have undergone less sex-specific morphological differentiation during adolescence; that is, that they are *morphologically* immature in addition to being emotionally ill. A comparison has therefore been made of the development of androgyny in normal and psychiatrically disturbed teenagers. It was appreciated that a cohort of such patients would not be strictly comparable with adult psychiatric patients. It was expected that, if the adult findings were indeed valid, the adolescent patients would fail to differentiate at the same rate as healthy teenagers.

METHOD

The Discriminant Androgyny Score No. 1 (Tanner, 1951; 1962) is derived from the biacromial and bi-iliac diameters according to the formula: 3 (biacromial diameter)—1 (bi-iliac diameter)=Androgyny Score. These diameters were measured with the Harpenden Anthropometer according to the method described by Tanner and Whitehouse (1957).

RELIABILITY

One of us (A.S.H.) gained experience in anthropometry in the course of the pilot study. He had in addition the benefit of two training sessions from Mr Reginald Whitehouse at the National Children's Home, Harpenden. Provision was made for tests of reliability to be made at two points in the study: immediately before starting and close to its end. The first exercise allowed one to decide if reliability was high enough for the main study to be started; the second gave an indication of any temporal drift in reliability. For the first measurement, ten boys and ten girls from an approved school were measured twice. The first series of measurements were completed on all persons before repeating the procedure, thus ensuring that the second readings were less open to bias from the author's recall of the first. For the measurement of reliability towards the end of the study, seven boys and eight girls, all psychiatric patients, had duplicate measurements taken as before.

The Pearson correlation coefficients for the two measures were as follows:

Reliability at Start of Study (July, 1966)

Diameter	Boys (10)	Girls (10)
Biacromial	0.973	0.952
Bi-iliac	0.950	0.926

Reliability at End of Study (May, 1967)

Diameter	Boys (7)	Girls (8)
Biacromial	0.980	0.963
Bi-iliac	0.943	0.937

MATERIAL

All subjects fulfilled the following criteria: they were aged 12 to 19 years inclusive at the time of examination; they were resident in the cities of Edinburgh or Aberdeen on the night before the examination; none had had at any time a serious physical illness or disability; the measured I.Q. was over 70. Samples were obtained of psychiatrically ill, delinquent and normal adolescents fulfilling the above criteria.

PATIENT SAMPLE

This was made up of those teenagers attending, as in-, out-, or day-patients, the psychiatric hospitals or clinics in Edinburgh and Aberdeen during the period of the study: from July 1, 1966, until June 30, 1967, in Edinburgh, and from September 1, 1966, until April 30, 1967, in Aberdeen. For all patients fulfilling the general criteria for inclusion, a letter was written to both the patient and the parents. In all, 72 per cent. of the total sample was examined: those lost from the study mainly comprised individuals who did not reply to two invitations to attend, but a small number were considered by their psychiatrist to be too disturbed to participate.

For those individuals who fulfilled the general criteria but were not examined, data were collected on age, social class, and diagnosis. There was a tendency for Social Class I patients to be under-represented and Social Class V to be over-represented in the non-examined group.

The diagnostic composition of the patient sample is shown in Table I.

TABLE I
DIAGNOSTIC CATEGORIES

Diagnosis	Number		Percentage	
	Boys	Girls	Boys	Girls
Psychosis	4	3	4.3	4.2
Neurosis	35	41	37.6	57.7
Behaviour Disorder	39	16	41.9	22.5
Adolescent Crisis	5	5	5.4	7.0
Abnormal Personality	6	2	6.5	2.8
Nil Psychiatric Diagnosis	4	4	4.3	5.6
Total	93	71	100.0	100.0

CONTROL SAMPLE

This would ideally have been drawn from a city register, thereby avoiding the bias inherent in a school population after the age of 15 years. The present sample was prepared by a quota sampling technique from six Edinburgh schools and an Edinburgh general practice. These schools were chosen as likely to provide a sample closely similar in social class to the patient sample. Although school classes or forms were selected, subjects were chosen within these by systematic methods, using alphabetically arranged registers. Thus, by taking every third name in a class of thirty pupils, one obtained a sample of ten subjects in whom ethnic bias was unlikely to have been present. Full co-operation was obtained from the teenage pupils and their parents: only one refused to participate. The contact rate in the general practice was only 48 per cent., yielding 22 subjects. The total sample numbered 262 persons (126 boys and 136

girls). The patient and normal samples are compared for age and social class distribution in Tables II and III. These show that the samples were sufficiently comparable for the present exercise. It should be noted that no control material was obtained from Aberdeen, but there are no known grounds for expecting regional differences in androgyny. Furthermore, it had been demonstrated that *skeletal* maturity was not significantly different at the 5 per cent. level among Edinburgh patients, Edinburgh controls, and Aberdeen patients (Henderson, 1967).

TABLE III
SOCIAL CLASS COMPOSITION OF 165 PATIENTS
AND 262 CONTROLS
(Values expressed as percentages)

Social Class		I	II	III	IV	V	Not known	Total
Boys	Patients	6.5	15.1	41.9	18.3	12.9	5.4	100.1
	Controls	7.1	19.0	55.6	11.9	5.6	0.8	100.0
Girls	Patients	9.7	11.1	43.1	22.2	9.7	4.2	100.0
	Controls	9.6	16.2	54.5	15.4	2.9	1.5	100.1
Total	Patients	7.9	13.3	42.4	20.0	11.5	4.9	100.0
	Controls	8.4	17.6	55.0	13.7	4.2	1.1	100.0

For Patients n = 164 (93 boys; 71 girls),
and for Controls n = 262 (126 boys; 136 girls)

DELINQUENT SAMPLE

Samples of delinquent boys and girls were taken from Dr Guthrie's Schools, Edinburgh. These are Approved Schools catering for delinquent children from the whole of Scotland. In the Approved School for girls, all pupils in the age group 12 to 17 years were asked to participate; there were 27 persons, of whom three declined to take part, which gave an overall contact rate of 89 per cent. among the girls. The 52 boys all agreed to take part. The age and social class distribution of the delinquent sample is shown in Tables IV and V.

TABLE IV
AGE COMPOSITION OF DELINQUENT SAMPLE

Age (yrs)		12-13.9	14-15.9	16-17.9	18-20.0	All Ages
Boys	No.	27	25	—	—	52
	Percentage	51.9	48.1	—	—	100.0
Girls	No.	—	7	17	—	24
	Percentage	—	29.2	70.8	—	100.0
Total	No.	27	32	17	—	76
	Percentage	35.5	42.1	22.4	—	100.0

TABLE II
AGE COMPOSITION OF PATIENT AND CONTROL SAMPLES (PER CENT.)

Age (yrs)		12-13.9 (inclusive)	14-15.9	16-17.9	18-20.0	All Ages	Total Numbers
Boys	Patients	25.8	34.4	17.2	22.6	100.0	93
	Controls	21.4	34.9	30.2	13.5	100.0	126
Girls	Patients	23.6	30.6	29.2	16.7	100.1	71
	Controls	21.3	36.0	36.0	6.6	99.9	136
Total	Patients	24.9	32.7	22.4	20.0	100.0	164
	Controls	21.4	35.5	33.2	9.9	100.1	262

TABLE V
SOCIAL CLASS OF DELINQUENT SAMPLE

Social Class		I	II	III	IV	V	Not known	Total
Boys	No.	—	1	10	17	14	10	52
	Percentage	—	1.9	19.2	32.7	26.9	19.2	99.9
Girls	No.	—	—	5	8	5	6	24
	Percentage	—	—	20.8	33.3	20.8	25.0	99.9
Total	No.	—	1	15	25	19	16	76
	Percentage	—	1.3	19.7	32.9	25.0	21.1	100.0

For Patients n = 164, and for Controls n = 262

FIG. 1.—“Scatter-diagram” of Androgyny in boys.

FIG. 2.—“Scatter-diagram” of Androgyny in girls.

ANALYSIS AND FINDINGS

For patients and normal subjects graphs were prepared for each sex showing the change in androgyny with age (Figs 1 and 2).

Over the age range considered, and this is emphasized, the distribution of androgyny against chronological age was approximately linear, so regression lines were fitted for the diagnostic groups which were large enough (Neurotic and Behaviour Disorder), for the delinquents, and for the controls. It was appreciated at the same time that the androgyny score is likely to approach a fairly constant value at the end of adolescence. The apparent linearity in the graphs was thought to be a function of the limited age range studied. The true regression line, therefore, was almost certain to be curvilinear, but for the purpose of this comparative study it was legitimate to compare the slope of *linear* regression in normal subjects and in patients. To compare the normal subjects with the total patient group, an F-test (Lindley, 1965) was applied to see if the ordinates were different in either sex, and if the slopes were different in either sex (Table VI).

No significant differences were found. The least squares estimate of the regression coefficients (95 per

TABLE VI
COMPARISON OF ANDROGYNY IN PATIENTS
(EXCLUDING DELINQUENTS) AND NORMALS

Sex	Comparison	Sums of Squares	Degrees of Freedom	Mean Squares	F
Boys	Between ordinates	70·547	1	70·547	2·16
	Between slopes	37·232	1	37·232	1·14
	Residual	7020·999	215	32·656	
	Ordinates residual	7058·231	216	32·677	
	Total	7128·784	217		
Girls	Between ordinates	50·026	1	50·026	2·12
	Between slopes	14·357	1	14·357	0·61
	Residual	4798·334	203	23·637	
	Ordinates residual	4812·691	204	23·592	
	Total	4862·717	205		

cent. confidence intervals) for the combined normal and patient group were:

$$\text{Boys: } \hat{\alpha} = 82\cdot273 \pm 0\cdot759$$

$$\hat{\beta} = 2\cdot477 \pm 0\cdot390$$

$$\text{Girls: } \hat{\alpha} = 77\cdot196 \pm 0\cdot663$$

$$\hat{\beta} = 1\cdot106 \pm 0\cdot372$$

(The form $y = \alpha + \beta(x - \bar{x})$ was used)

Separate regression lines were fitted for the diagnostic categories which were large enough (Neurotics and Behaviour Disorder) and for the delinquents and controls. The F-test for difference in ordinates and in slopes was applied for each sex. There were no significant differences (Table VII).

TABLE VII
COMPARISON OF ANDROGYN IN TWO DIAGNOSTIC GROUPS, DELINQUENTS AND CONTROLS

Sex	Comparison	Sums of Squares	Degrees of Freedom	Mean Squares	F
Boys	Between ordinates	149.421	3	49.807	1.55
	Between slopes	33.018	3	11.006	0.34
	Residual	7923.583	244	32.474	
	Ordinates residual	7956.601	247	32.213	
	Total	8106.023	250		
Girls	Between ordinates	100.534	3	33.511	1.48
	Between slopes	83.001	3	27.667	1.22
	Residual	4729.786	209	22.631	
	Ordinates residual	4812.787	212	22.702	
	Total	4913.322	215		

Note: The apparent discrepancy in degrees of freedom is due to a small number of patients in several diagnostic categories not included in this comparison.

From the present material, therefore, the authors have been unable to demonstrate differences in androgyny between psychiatrically ill, delinquent, and normal adolescents.

CONCLUSIONS

The findings of this study are at variance with those of earlier ones referring to adult psychiatric patients. The following interpretations are offered:

- (1) Because of imperfections in the control material, the adult findings are to be held in doubt. There may be no significant differences between the androgyny of adult psychiatric and normal subjects in either sex.
- (2) The present findings may fail to show a difference which does exist.
- (3) Both the earlier and the present findings may be valid: differences in androgyny may become apparent only in adult psychiatric patients.

Until differences in androgyny among adult psychiatric patients are confirmed by other studies, one may conclude for the present that adolescent psychiatric patients, who may be derived from a different population from their mentally-ill elders,

show no abnormality of androgyny. In this area of sexual differentiation, both patients and juvenile delinquents show no differences from behaviourally-normal adolescents. This finding is consistent with other parts of the overall study (Henderson, 1967, 1968) which has demonstrated that physiological maturity, as determined by skeletal age and age at menarche, is the same in mentally-ill, delinquent, and normal adolescents.

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