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Type A behaviour and ischaemic heart disease in middle aged British men

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Abstract

The Bortner questionnaire, which measures aspects of type A (coronary prone) behaviour, was completed by 5936 men aged 40-59 selected at random from one general practice in each of 19 British towns. The presence of ischaemic heart disease was determined at initial examination and the men were followed up for an average of 6·2 years for morbidity and mortality from myocardial infarction and for sudden cardiac death.

Non-manual workers had significantly higher scores (more type A) than manual workers and the score decreased (less type A) with increasing age. After adjustment for social class and age men with higher scores had higher prevalences of ischaemic heart disease less marked for electrocardiographic evidence and more marked for response to a chest pain questionnaire (angina or possible myocardial infarction). A man's recall of a doctor's diagnosis of ischaemic heart disease, however, did not relate to his Bortner score. There was no significant relation between the Bortner score and the attack rate or incidence of major ischaemic heart disease events.

In this study type A behaviour, as measured by the Bortner questionnaire, did not predict major ischaemic heart disease events in British middle aged men.

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Introduction

Type A or coronary prone behaviour is characterised by intense competitiveness, a sense of being under time pressure, and easily provoked hostility. Type A behaviour has been shown to relate to the prevalence and incidence of ischaemic heart disease independently of the traditional risk factors of hypertension, hypercholesterolaemia, and cigarette smoking in several countries, but it has not been examined extensively in the United Kingdom.[1-3]

We describe the relation between type A behaviour and the prevalence and attack rate of ischaemic heart disease in roughly 6000 middle aged British men selected at random from one general practice in each of 19 British towns as part of the British regional heart study. Type A behaviour was assessed by using the Bortner questionnaire, a 14 item questionnaire which is used extensively in Great Britain and western Europe.[4] We find that it has adequate reliability and that it relates well to the Jenkins activity survey, the questionnaire more widely used in North America.[5]

Subjects and methods

The British regional heart study is a prospective study of men aged 40-59 randomly selected from the age-sex registers of one group general practice in each of 24 towns in England, Wales, and Scotland. The 24 towns were primarily selected from those with populations of 50 000-100 000 (1971 census). They were chosen to represent the full range of cardiovascular disease mortality and included towns in all the main regions. Each general practice was selected to have a social class distribution which was more or less representative of the men of that town. From each age-sex register some 420 men aged 40-59 were randomly selected and in a letter signed by their general practitioner invited to take part. On average 78% of those invited attended for examination and 7735 men were screened. The Bortner questionnaire was given to the 6177 men in the last 19 towns to complete while they waited to be examined. This paper is concerned with the 5936 men who satisfactorily completed the Bortner questionnaire.

Pre-existing ischaemic heart disease—The presence of ischaemic heart disease at the initial examination was assessed (*a*) by means of a questionnaire asking about chest pain (definite or possible angina or possible myocardial infarction), (*b*) by taking a resting electrocardiogram, and (*c*) by asking the men if a doctor had ever told them that they had ischaemic heart disease (angina, heart attack, myocardial infarction).[6][7] Electrocardiographic evidence of ischaemic heart disease included definite or possible myocardial infarction and definite myocardial ischaemia. In this paper possible ischaemia is not included as evidence of ischaemic heart disease.

TABLE I—*Bortner scores of men stratified by social class (four men not classed)*

Social class	No of men	Bortner score	
		Mean	SD
I (Professional)	483	100·09	18·21
II (Managerial)	1260	101·90	18·84
III (Clerical)	534	93·01	19·21
III (Skilled manual)	2615	91·60	19·40
IV (Semiskilled manual	616	88·54	18·26
V (Unskilled manual)	258	84·27	20·12
Armed services	166	95·15	18·95

TABLE II—*Bortner scores stratified by smoking category (six men not classified for smoking)*

Smoking category	No of men	Bortner score		
		Mean	SD	Adjusted mean*
Never smoked	1234	96·54	19·44	94·98
Non-smoker (ex-cigarette smoker)	1611	96·41	19·45	96·35
Pipe or cigar smoker only	128	94·52	19·62	92·51
Pipe or cigar smoker (ex-cigarette smoker)	472	94·33	19·77	93·98
Cigarette smoker	2485	91·22	19·75	92·24

*Adjusted for age and social class.
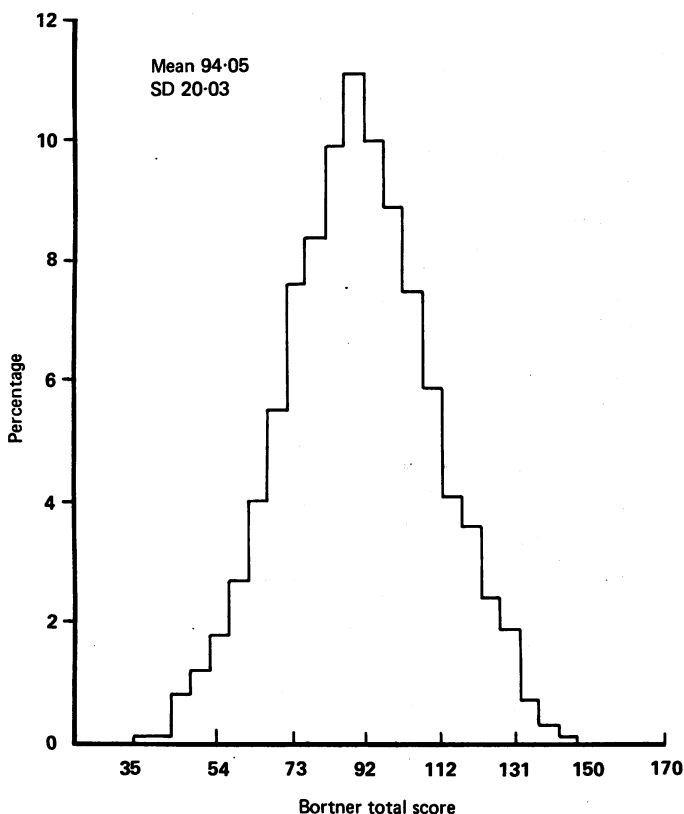
Distribution of Bortner scores in sample of 5936 men.

Follow up and major new cardiovascular events—All the men who participated in the initial examination were being followed up for both cardiovascular morbidity and all causes of mortality.[8] In this report a fatal case is any subject for whom the death certificate recorded ischaemic heart disease (International Classification of Diseases (9th revision) codes 410-414) and a non-fatal case any subject with a reported myocardial infarction supported by at least two of the following: infarction preceded by severe prolonged chest pain; electrocardiographic evidence of myocardial infarction; and cardiac enzyme changes.[9] Up to July 1985 all men had been followed up for between 5·0 and 7·5 years (average 6·2 years).

Bortner questionnaire—Each of the 14 questions in the Bortner questionnaire was scored 1-12, type A behaviour scoring 12, and the total summed to produce an overall score between 14 and 168. Other workers have scored the questions 1-24 and hence report higher values. For the 343 questionnaires with one item missing and the 45 with two items missing the total was calculated on the scored items and scaled up proportionately. The 241 questionnaires not satisfactorily completed were excluded from the analysis.

Blood pressure and blood cholesterol values—The London School of Hygiene sphygmomanometer was used to measure the blood pressure twice in succession with the subject seated. Diastolic pressure was recorded at the point of disappearance of sounds (phase V). The mean of these two readings adjusted for observer variation was used for the analysis. Serum total cholesterol concentration was measured by a modified Liebermann-Burchard method.[10]

Social class was determined from each man's longest held occupation by using the six classes of the Registrar General's 1970 classification.[11] Men who had spent most of their working life in one of the armed services formed a separate group.

Smoking—The men were grouped as follows according to their current smoking state: non-smokers, ex-cigarette smokers, pipe or cigar smokers, ex-cigarette smokers who had changed to pipe or cigar, and current cigarette smokers.

Statistical methods—In tables I and II the distribution of Bortner scores stratified by social class and smoking category is presented as means and standard deviations (SD). In table II the adjusted means for smoking categories are based on analysis of covariance. The prevalence and attack rates of ischaemic heart disease are presented by quintiles of the Bortner score. Rates adjusted for age and social class were obtained by fitting logistic regressions in which the ischaemic heart disease measure treated as a 0, 1 variable was regressed on the Bortner score (fitted as four dummy variables), age (fitted as a continuous variable), and social class (fitted as six dummy variables). Statistical significance of any trend in prevalence or attack rates was assessed by fitting the Bortner score as a continuous variable rather than as four dummy variables in the appropriate logistic regression.

Results

The distribution of Bortner scores for the total sample (figure) showed a normal distribution with a mean of 94. There appeared to be little relation between the Bortner score and the major risk factors for ischaemic heart disease; the correlation coefficient was −0·07 with systolic blood pressure, 0·02 with diastolic blood pressure, and 0·03 with serum total cholesterol concentration. These small correlations were statistically significant because of the large numbers studied. The correlation of −0·09 with age was of slightly greater relevance as the prevalence and attack rate of ischaemic heart disease are so much higher in older men.

Table I shows the relation between the Bortner score and social class. There was a strong association, non-manual workers having significantly higher scores than manual workers. The relation with smoking (table II) showed somewhat higher scores in men who had never smoked and in men who had given up cigarette smoking completely. Pipe and cigar smokers had slightly lower scores, and those currently smoking cigarettes at screening had the lowest scores of all. The relation between smoking and the Bortner score was confounded by the effects of social class and age, as current cigarette smoking is more common among manual workers and ex-smokers tend to be older. Bortner scores adjusted for social class and age in table II show a reduced mean difference between cigarette smokers and men who had never smoked.

Prevalence of ischaemic heart disease—Table III shows the percentage prevalence of ischaemic heart disease at entry into the study stratified by quintiles of the Bortner score. With the rates unadjusted the prevalence of both electrocardiographic and questionnaire evidence of ischaemic heart disease was positively related to the Bortner score, though the relation for electrocardiographic prevalence was weak and not significant at the 5% level. Because of the possible confounding effects of other factors we carried out preliminary analyses in which the prevalence rates were adjusted for blood pressure, age, serum total cholesterol value, smoking, and social class. As only social class and age had any effect, table III presents the rates adjusted for these two factors. After adjustment the trends were significant for both

the electrocardiographic and the questionnaire evidence. A man's recall of a diagnosis of ischaemic heart disease made by a doctor did not relate to the Bortner score before or after adjustment.

New major ischaemic heart disease events—Table IV shows the attack rates of new major ischaemic heart disease events, non-fatal and fatal, stratified by quintiles of the Bortner score. Overall the attack rate was higher among men with lower Bortner scores—that is, type B men. This negative trend, however, was not significant at the 5% level. Adjustment for age and social class had the expected outcome of reducing the trend. The significant negative trend in the fatal event rate with increasing Bortner score was also

The structured interview showed type A behaviour to be a risk factor for ischaemic heart disease in two out of three studies,[16-18] the Jenkins activity scale in two out of five,[17 19 20] the Bortner score in two out of four,[12 17] and the Framingham questionnaire on the one occasion on which it was used.[21] There was no striking difference among the methods used in the positive and negative studies. It does not appear that any one method of measuring type A behaviour is more successful, though many argue that the structured interview is the most satisfactory. In studies in which type A behaviour was

TABLE III—*Percentage prevalence of ischaemic heart disease at screening stratified by quintiles of Bortner score. (SE in parentheses)*

Bortner range	No of men	Electrocardiogram		Chest pain (questionnaire)		Recall	
		Crude	Adjusted*	Crude	Adjusted*	Crude	Adjusted*
26-77	1158	7·0 (0·7)	6·4	14·4 (1·0)	12·8	6·6 (0·7)	5·8
78-89	1264	7·7 (0·7)	7·5	11·8 (0·9)	11·2	4·0 (0·6)	3·8
90-98	1136	7·6 (0·8)	7·6	14·7 (1·1)	14·5	5·7 (0·7)	5·6
99-110	1206	7·9 (0·8)	8·0	14·9 (1·0)	15·3	6·1 (0·7)	6·3
111-163	1172	8·7 (0·8)	9·3	17·3 (1·1)	19·0	5·8 (0·7)	6·6
p Value		0·22	0·03	0·04	0·00001	0·98	0·12

*Adjusted for age and social class.

TABLE IV—*Percentage attack rates of major new ischaemic heart disease stratified by quintiles of Bortner score. (SE in parentheses)*

Bortner range	No of men	Crude attack rate			Adjusted attack rate*
		Non-fatal	Fatal	Both	
26-77	1158	2·9	2·3	5·3 (0·7)	4·7
78-89	1264	1·8	2·8	4·7 (0·6)	4·5
90-98	1136	1·6	1·7	3·3 (0·5)	3·3
99-110	1206	2·4	1·9	4·3 (0·6)	4·5
111-163	1172	2·5	1·3	3·8 (0·6)	4·2
p Value		0·86	0·01	0·10	0·64

*Adjusted for age and social class.

reduced to non-significance (p=0·23) when social class and age were adjusted for. The results were unchanged when the data were reanalysed excluding all respondents with evidence of pre-existing ischaemic heart disease at screening.

Discussion

In this study of middle aged British men the Bortner score for type A behaviour was significantly higher in men who had electrocardiographic or questionnaire evidence of ischaemic heart disease at screening. This did not hold for men recalling a doctor's diagnosis of angina or myocardial infarction. Type A behaviour did not relate to the occurrence of major new ischaemic heart disease events during an average of 6·2 years of follow up.

Our findings with respect to type A behaviour and the prevalence of ischaemic heart disease are in general agreement with published findings. In most such studies type A behaviour related to the prevalence of ischaemic heart disease[12-14] and appeared to do so most clearly from measures derived from symptoms such as chest pain. One interpretation is that in men with pre-existing ischaemic heart disease and a tendency to symptomatic ischaemia pain may be precipitated by type A behaviour.[15]

The lack of relation between the Bortner scores and subsequent myocardial infarction or sudden death in this study should be seen against the background of other prospective studies. We have identified eight studies including the present report. Four methods of measuring type A behaviour have been used in these studies: the structured interview (the original measure), the Jenkins activity scale, the Bortner score, and the Framingham questionnaire.

found to be a significant risk factor it was of comparable power to other risk factors such as systolic blood pressure or total serum cholesterol concentration, which suggests that type A behaviour is not simply a weak risk factor that achieves marginal significance in some studies. It may be relevant that it has recently been claimed that hostility, which was not specifically addressed in any of these studies, may be the aspect of type A behaviour that correlates best with coronary artery disease.[22 23] It is quite likely that the relation between type A behaviour and hostility varies among different cultures and subcultures and hence measures of type A behaviour may not always include this relevant behaviour.

We have not found type A behaviour, as measured by the Bortner questionnaire, to relate to new major ischaemic heart disease events in a British middle aged male population. Though it is possible that some aspects of type A behaviour predispose subjects in some populations to ischaemic heart disease, it is not at present clear which aspects these are or in whom they are most important.

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Lethal malformations and perinatal mortality: a 10 year review with comparison of ethnic differences

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Abstract

During 1976 to 1985 perinatal mortality in Leicestershire decreased from 21 to 9·5 per 1000 births. Throughout this period the incidence of lethal malformations, excluding neural tube defects, remained relatively constant at around 1·8 per 1000 births. Analysis of the malformations present in 201 lethally malformed babies showed that 147 (73%) had a disorder carrying a recurrence risk of 1% or greater. Only 7% of these malformations might have been predicted from the family history or advanced maternal age. The incidence of lethal malformations was significantly increased in the Asian population, largely because of an excess of autosomal recessive disorders.

The contribution of lethal malformations to perinatal mortality has almost doubled over the past 10 years and is likely to increase despite prenatal diagnosis and improvements in obstetric and paediatric services.

Introduction

Malformations account for a substantial proportion of perinatal mortality in the United Kingdom, with figures of 26% and 34% having been observed in recent studies.[1,2] Given the decline in other causes of perinatal death and the recent unexplained reduction in the incidence of neural tube defects,[3] attention will probably focus increasingly on babies with malformations other than neural tube defects, whose relative contribution to perinatal mortality is likely to increase despite existing or planned improvements in obstetric and paediatric services.

In 1976 a comprehensive survey of perinatal mortality was launched in Leicestershire (population 833 000), a county which readily lends itself to epidemiological study as obstetric and paediatric services are based in two centrally located teaching hospitals, thus facilitating the collection of relevant information. Using data from the first 10 years of this survey we reviewed the records of babies dying as a result of malformations, excluding neural tube defects. The objectives of this study were (a) to ascertain whether there had been any change in the overall incidence of lethal malformations over 10 years; (b) to establish the aetiological range and its genetic component; (c) to estimate the possible impact of genetic counselling and prenatal diagnostic surveillance; and (d) to identify possible ethnic differences.

Methods

Babies were ascertained through the records of the Leicestershire perinatal mortality survey, full details of which have been recorded elsewhere.[4,5] Strenuous efforts were made to review the records of all babies along with necropsy reports, radiographs, and clinical photographs. Babies were included in the study only if death was due primarily to a malformation, so that babies who had a relatively minor abnormality, which was coincidental rather than causally related to their death, were not included. When appropriate recourse was made to expert opinion and the London dysmorphology database to help establish the diagnosis.[6]

The results presented below refer to lethal malformations other than isolated non-syndromic neural tube defects.

Results

INCIDENCE OF LETHAL MALFORMATIONS

Table I gives the birth statistics for Leicestershire for 1976-85. During this period 208 babies died in the perinatal period primarily as the direct result of a malformation or malformations: an overall incidence of 1·80 per

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TABLE I—*Birth statistics for Leicestershire 1976-85*

	Deaths due to malformations			Total perinatal deaths	Total births		
	White	Asian	Total		White	Asian	Total
1976	15	3	18	230	9752	1123	10875
1977	20	4	24	190	9549	1286	10835
1978	19	4	23	196	9784	1276	11060
1979	19	4	23	172	10388	1366	11754
1980	18	4	22	151	10822	1524	12346
1981	16	5	21	118	10273	1518	11791
1982	12	4	16	130	10061	1496	11557
1983	16	7	23	122	9979	1565	11544
1984	11	4	15	101	10161	1625	11786
1985	18	5	23	114	10375	1582	11957
Total	164	44	208	1524	101144	14361	115505