Adjustment of Adopted Children and Prognosis from Maternal and Natal Risk Factors

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Introduction

The medical examination of the newborn infant for adoption should reduce the risk of the prospective parents adopting a child with a potentially serious disease or abnormality, and ensure that the infant being adopted is healthy (Betheras, 1976). Genetic and clinically obvious conditions apart, an early detection of brain damage was said to be of highest importance in such an examination, because adopting parents ". . . find it insupportable if a child cannot respond adequately to their love and affection" (Tizard, 1969, p. 44). However, because even gross brain damage may be undetectable in the early weeks of life, and the prediction of future development of the neonate is seldom possible from a paediatric examination (Tizard, 1969; Karelitz, 1956), there appear to be only very limited prospects to reduce ". . . the magnitude of the risk that adoptive parents must taken when they adopt newborn infants" (Karelitz, 1956, p. 94). It has been argued that adoptive parents should take the same risks associated with child bearing as are taken by biological parents, but this argument disregards the primary consideration of adoption practice, which is the welfare of the child to be adopted. The welfare of children at risk requires a particularly careful selection of suitable adoptive parents (Advisory Council on Child Care, 1970), because of the special importance which environmental factors play in the adjustment of such children (Werner *et alii*, 1967l Rutter *et alii*, 1970; Davie *et alii*, 1972). Selection should aim to minimize what Rutter (1977) called **"transactional"** effect, of a brain damaged child experiencing psychosocial stress within the family because of his personal characteristics, which could increase the risk of further more serious maladjustment. The identification of infants for adoption at risk is therefore more important for the future welfare of the child than for the satisfaction of expectations of adoptive parents.

It appears from the literature that there is scope for a vast improvement of the existing methods of identification of children at risk (in spite of the earlier quoted pessimistic view of paediatrics), by supplementing the clinical examination of the neonate with a statistical prediction. This is so, because there is a well established and generally recognized relationship between factors of pregnancy and birth and the child's subsequent vulnerability to developmental and behaviour problems (Richmond, 1956; Drillien, 1964; Ucko, 1965; Nelson, 1969; Kenny *et elii*, 1967; Herzberg *et al.*, 1977; Stott, 1969; Grunseit, 1976; Betheras, 1976). Moreover, certain social characteristics of the biological mother also show this relationship (Witmer *et alii*, 1963; Kenny *et alii*, 1967; Egan, 1969; Bohman, 1970). Additionally, while clinical prediction tends to make only gross differentiations, statistical prediction is likely to be sensitive to the recognized "continuum of reproductive casuality" (Pasamanick *et alii*, 1955, 1956, 1960) in the lower end of its spectrum encompassing relatively minor behavioural and learning difficulties, and to the diagnostically important ". . . kind of risk" (Kellmer Pringle, 1967, p. 28) that can be expected in the presence of given pregnancy and birth factors.

Although ". . . only rarely does one encounter such consistent findings in any area of human behaviour" (Sines, 1970; p. 142) as those indicating the superiority of statistical to clinical prediction in

psychopathology, few attempts appear to have been made to develop statistical methods of prognostication for the neonate. For adoption, the notable attempt was an infant rating scale developed for the Child Welfare League of America (Hoopes, 1967) which, however, has the limited aim of predicting only the infant's intellectual potential. In so far as it was possible to ascertain, there appear to be no formalized scales aimed at the identification of specific risks in the infant's future personal and social adjustment. The purpose of the present study is to meet the existing need for such an instrument, so that the welfare of infants at risk could be catered for allotting them to specially selected adoptive parents.

METHOD

Sample

344 couples were mailed a questionnaire concerning the health and behaviour of a child they had adopted between 7 and 7½ years earlier. All were adoptions by non-relatives where the child was placed within 4 weeks of birth, and were consecutive entries taken from an adoption register. The post-office returned 81 letters marked 'not at this address'. The completed questionnaires were returned by 210 couples. A statistical comparison of the latter group with the remainder of the sample, showed no significant or near significant differences between the groups in respect of the 11 maternal and natal 'risk' characteristics, of the adopted child, which were subject of the present study.

The data on the characteristics and natal factors of biological mothers and their infants surrendered for adoption were obtained from the records of the New South Wales Department of Youth and Community Services. The data on adjustment of the adopted children when aged 7 to 7½ years, were obtained from their adoptive parents by means of a postal questionnaire.

Procedure

A questionnaire constructed for the collection of data from the adoptive parents comprised 51 items, describing childhood behaviour problems, followed by 'Yes' and 'No' answers, the appropriate one to be marked with a circle by the respondent. The items were selected from, or based on, parental questionnaires which have been used in studies of childhood adjustment (Cattell *et al.*, 1957; Mech, 1963; Kellmer Pringle *et al.*, 1966; Lawder *et al.*, 1969; Bohman, 1970; Richman *et al.*, 1971, 1975) and on psychiatric descriptions classified as "problems of behaviour" (Kanner, 1960). Space was provided on the questionnaire to list 'any other aspects of the child's behaviour' which cause the parents concern. A covering letter was attached to the questionnaire, and an addressed and stamped envelope was provided for its return to the Department of Youth and Community Services. The items used in the questionnaire are shown in Appendix I, but they were used without the headings (type of manifestations) and in a random and not a grouped order.

It should be noted here that the questionnaire method is regarded by experts as having advantages over the personal interview in the collection of structured data (Young, 1966), and that its superiority (validity, reliability) over the interview has been well demonstrated by empirical studies (Maccoby, 1959; Fanshel, 1962). The reliability of responses of adoptive parents to the present questionnaire has been demonstrated in an earlier study of the same population as used here (Kraus, 1975).

Which independent variables could be used in the present study was determined by the data available from the existing adoption records. In respect of the biological mother, the variables were; occupation, age, height, parity, gestation period, birth complications. In respect of the infant, the variables were; sex, weight, head circumference, body length, Apgar score (Apgar, 1957). Unfortunately, there was no systematic record of some prognostically relevant medical data, such as antenatal history of pregnancy, duration of labour, drugs administered to mother, and foetal status during labour (Betheras, 1976), so that these variables could not be investigated. Certain of the unavailable variables would have been particularly important in the light of the evidence about the inadequacy of antenatal care among unmarried mothers (Egan, 1969).

ANALYSIS AND FINDINGS

For the purpose of analysis, on each of the independent variables a medically recognized 'risk' group was contrasted with the remainder of the sample. For variables for which population norms were available (e.g., Nelson, 1969), the risk group was operationally defined in terms of the parameters of the lowest (or highest) 10 per cent of the population. Whichever definition of risk was used, if the group so defined was found to be too small for analysis the parameters were relaxed until a group of suitable size was obtained. For example, a shortened gestation period was defined as 37 weeks or under rather than in terms of the more stringent parameters used by many obstetricians.

The analysis of childhood behaviour problems (dependent variables) was done in terms of nine 'types' (Appendix I) quantified as indicated in Table 1. The quantification categories were determined by frequency distribution of manifestations within each 'type'. For example, 'Habit distrubance' type comprises 7 manifestations, but only in 5 cases was there a report of 2 manifestations, and the maximum number of 3 manifestations was reported in 4 cases; consequently, the only practicable quantification was 'one or more' manifestations.

The (one-tail) hypothesis tested was that there is a greater proportion of children with manifestations of distrubed functioning in the 'risk' group than in the remainder of the sample.

The test of significance of difference between proportions in two samples (Chou, 1970) was used with Bessel's correction for small numbers. The testing of differences between individual proportions is equivalent to, and has the same purpose as, the partitioning of the degrees of freedom in a chi-square (Maxwell, 1961). Conservatively, because of the relatively small size of the samples t rather than z distribution was used to assess the significance (Cochran, 1953).

The statistically significant findings are shown in Table 1. (next page).

Findings

Mother's age. More children born to mothers aged 16 or less, than to older ones, show distrubance of habits and sleep, and manifestations of distrubance generally. Referring to Appendix I (AI), it can be seen that most likely manifestations are fingernail biting and restlessness in sleep, with the probability of the clinically more serious manifestations (e.g., stammer, encopresis, etc.) being quite low, excepting perhaps nocturnal enuresis. It is also worth noting that since over 20% of the children show 'eleven or more' undifferentiated manifestations, this number can not be considered as indicating serious behaviour pathology.

Mothers' occupation. More children to mothers from unskilled (factory, domestic, waitress, wardsmaid, packer, kitchenmaid, etc.) than skilled or semi-skilled occupations show disturbance of eating, peer relations, and behaviour, and manifestations of disturbance generally. The most likely manifestations (viz AI) are faddy eating, quarreling and fighting with other children and isolation from peers, and disobedience, restlessness and attention seeking. The significance of 'eleven or more' undifferentiated manifestations has been mentioned above.

Mothers' height. More children born to mothers of short stature (155cm and less) than to taller mothers show somatic manifestations such as headaches, eczemas, asthma or squint, and more have disturbed relations with their peers reflected in quarreling, fighting and isolation.

Birth weight. More children whose birth weight exceeded 4000g than less weighing children show somatic manifestations (headaches, eczema, asthma, squint) and distrubance of mood most likely to be reflected in irritability, poor emotional control, and changeability.

Head circumference. Both a large and a small head circumference at birth were found to be associated with disturbance of functioning. More children whose head measurement was 362mm or more manifested disturbance of mood (as above) and 'sixteen or more' undifferentiated manifestations. Also children whose heads measured 334mm or less show more disturbance of sleep and mood, the most likely manifestations of which have already been mentioned. It must be noted that there is a significant correlation between large head and birth weight over 4000g (r 0.332 p .0001), and consequently the findings relating to these two variables are not independent. On the other hand small head and low birth weight (2800g and less) are also significantly correlated (r 0.325 p .0002), however no relationship was found between low birth weight and any of the dependent variables.

Length at birth. More children whose body length at birth was 48cm or less than children with longer bodies show manifestations of sleep disturbance as mentioned above. It was also ascertained that body length is not correlated with either head circumference or birth weight.

When analysing 'Mothers' occupation' it was necessary to control for the occupational status of adoptive parents, because more than twice as many babies born to unskilled mothers (48.2%) than to mothers in other occupations (20.9%) were placed in adoptive homes with an unskilled manual background. The association between the occupational statuses of the biological mothers and adoptive parents (r 0.262 p .001) results, of course, from the use of social characteristics in matching babies with adopters. The control was necessary because of the existing relationsip between childhood adjustment and parental occupational status (Kellmer Pringle *et alii*, 1966).

In addition to 'risk' factors, six of the children was also analysed as an independent variable. More boys than girls were found to show at least one manifestation of disturbed peer relations (44.7% vs. 29.0%; t 2.368 df 206 p .02 two tails) and at least four manifestations in the area of behaviour problems (35.9% vs. 22.4%; t 2.170 df 206 p .05 two tails). Regarding specific manifestations, more boys tend to be worried, destructive, disobedient, and to steal and wander from

TABLE 1

Selected characteristics of biological mothers and natal factors differentiating adopted children who manifest disturbance of functioning. The table shows proportions of children with given types of manifestations, and the statistical significance of differences.

Type and number of manifestations	Characteristics of mothers and natal factors		t*	p=
	Mothers' age			
	16 and under (N=28)	**17 and over (N=182)**		
Habit disturbance				
one or more manifestations	.500	.352	1.290	.10
Sleep disturbance				
two or more manifestations	.286	.110	2.479	.01
Total manifestations				
eleven or more	.368	.190	2.312	.0125
	Mothers' occupation			
	unskilled (N=38)	**other (N=158)**		
Eating problems				
one or more manifestations	.553	.278	3.274	.0025
Peer relations				
one or more	.473	.336	1.539	.10
Behaviour problems				
one or more	.895	.737	2.052	.025
Total manifestations				
eleven or more	.368	.190	2.312	0.125
	Mothers' height			
	155cm and under (N=24)	**156cm and over (N=186)**		
Other somatic manifestations				
one or more	.375	.210	1.854	.05
Peer relations				
one or more	.541	.344	1.876	.05
	Birth weight			
	over 4000g (N=11)	**4000g and less (N=199)**		
Other somatic manifestations				
one or more	.545	.211	2.651	.005
Mood disturbance				
three or more	.182	.055	1.688	.05
	Head circumference			
	362mm and over (N=30)	**361mm and under (N=180)**		
Mood disturbance				
three or more	.167	.044	2.733	.005
Total manifestations				
sixteen or more	.167	.061	1.927	.05
	334mm and under (N=27)	**335mm and over (N=183)**		
Sleep disturbance				
two or more	.296	.109	2.634	.005
Mood disturbance				
one or two	.593	.366	2.270	0.125
	Length of birth			
	48cm and under (N=20)	**49cm and over (N=190)**		
Sleep disturbance				
two or more	.250	.121	1.675	.05

* $df = n_1 + n_2 - 2$

home, while more girls tend to be fearful of animals (Appendix I).

Although no relationship was found between 'risk' and adjustment in respect of the other independent variables, it seems relevant to show here the prevalence of the risk factors as defined in the present study. Low birth weight (range 2800-2130g) was found in 16.7% of the sample, in 5.2* being 2500g or less. Delivery following an estimated short gestation period (range 37-32 weeks) occured in 6.2% of cases. In 9.5% of cases the first Apgar score after delivery was low (range 6-3). There were complications in 18.6% of the births: 2.9% cord round neck, 2.4% breech delivery, 1.9% ceasarian section, and 11.4% instrumental delivery. Among the latter ⅓ had foetal distress and about 1 5 cord round neck.

PREDICTION OF DYSFUNCTION

Among statistical decision models suited to the prediction of categorical criteria from categorical predictor variables is Bayes's formula. "The merit of the Bayesian decision rule is that it maximizes the terminal expected payoffs for a given set of prior probabilities and a particular sample size. Thus while there exist other decision rules under the same conditions . . . none of these can yield a higher expected payoff than the Bayesian rule" (Chou, 1970, p. 690). It is based on the concept of revised probabilities, which ". . . is an excellent statistical tool for evaluating new information and revising our estimates of reality. This method helps reduce the large amount of information needed to make decisions based upon probabilities" (Thierauf, 1970, p.76). Unfortunately, ". . . this most import theorem has not yet penetrated into the thinking of social (and behavioural) scientists" (Edwards, 1971, p. 19), so that examples of its use in psychopathology are few (Overall *et al.*, 1963; Maxwel, 1961; Kraus, 1972).

For the present purposes Bayes's formula can be expressed generic terms as follows:

d: childhood dysfunction
d : absence of childhood dysfunction d
r: 'risk' factor
p(r/d): *conditional probability* that a child drawn randomly from the population of children showing d will have r (Table 3)
p(r/d): *conditional probability* that a child drawn randomly from the population of children *not* showing d will have r (Table 3)
g : *prior probability* that a child drawn randomly from the given population of children will show d
1-g : *prior probability* that a child drawn randomly from the given population of children will not show d
p(d/r): *posterior probability* that a child having r will show d

$$p(d/r) = \frac{g \cdot p(r/d)}{(g \cdot p(r/d)) + (1-g) \cdot p(r/d\ )}$$

The *prior probabilities* of childhood dysfunctions (in terms of the classification used in analysis) are shown in Table 2. The relevant *conditional probabilities* are shown in Table 3.

TABLE 2

Prior probabilities of manifestations of childhood dysfunction, of adopted children when 7 years of age.

Type of manifestation (N)*	Number of manifestations	Prior p
Gastrointestinal (4)	one or more	0.2667
Other somatic (4)	one or more	0.2286
Habit disturbance (7)	one or more	0.3714
Sleep disturbance (4)	one	0.2810
	two or more	0.1333
Fears and phobias (5)	one	0.2857
	two or more	0.2000
Eating problems (3)	one	0.1952
	two or more	0.1286
Peer relations (6)	one	0.1619
	two or more	0.2048
Behaviour problems (12)	one to three	0.4429
	four or more	0.2905
Mood disturbance (6)	one or two	0.3952
	three or more	0.0619
Other manifestations	one or more	0.1905
Total manifestations (51)	none	0.0762
	one to five	0.4286
	six to ten	0.2714
	eleven to fifteen	0.1476
	sixteen or more	0.0762

* Total number of manifestations rated for the given type

TABLE 3

Conditional probabilities of 'risk' characteristics of biological mothers and natal factors, when the given manifestations of childhood dysfunction are present (underlined) and when they are absent (lower row).

Characteristics of biological mothers and natal factors associated with 'risk'	Habit disturbance	Sleep disturbance	Eating problems	Peer relations	Behaviour problems	Other somatic manifest.	Mood disturbance	Total manifestations
Mother's occupation 'unskilled'			.3231	.2535	.2361			.3182
			.1298	.1760	.0769			.1579
Mother 16 years or younger	.1795	.2857						.2128
	.1061	.1099						.1104
Mother's height 155cm or less				.1688		.1875		
				.0827		.0926		
Birth weight 4000g or more						.1250	.1539	
						.0309	.0457	
Head circumference 362mm or more							.3846	.3125
							.1269	.1289
Head circumference 334mm or less		.2857					.1928	
		.1044					.0866	
Length at birth 48cm or less		.1786						
		.0824						
Male baby				.5974	.6066			
				.4286	.4430			

The SE of *posterior* p is calculated by the unsual formula:

SE p(1-p)/N

N of the subsample is estimated by mulitplying the *joint probability* of 'risk' factors, used in calculating the *posterior p*, by N (210) of the total sample. In the present context the size of the subsamples will be small, consequently t rather than z distribution should be used to derive the confidence probability.

Example

What is the probability that a *male* baby, born to a *16-year-old* who is a housemaid (*unskillled*), will show a total of 11 or more manifestations of childhood dysfunction?

The *prior* p of a child showing 11 to 15 manifestations is 0.1476 (Table 2), and of it not showing this number 1 - 0.1476. The baby being *male* is not a risk factor here (Table 3). The *conditional* p of the mother being 16 given 11 manifestations is 0.2128, and given less than 11 manifestations it is 0.1104 (Table 3). The *posterior* p, therefore, that a baby of a 16-year-old mother will show 11 to 15 manifestations of childhood dysfunction is:

0.1476 x 0.2128
p
(0.1476 x 0.2128) + (1 -p 0.1476)
0.1104
0.2480

The *posterior* p 0.248 is used as *prior* p when the second 'risk' factor of the mother's unskilled occupation is considered, using again the

relevant *conditional probabilities* from Table 3. The *posterior* p so revised 0.407.

What confidence can one have in this result? The observed probabilities of the two risk factors are (Table 1): 16-year-old mother 0.133 (28/210), and unskilled occupation 0.181 (38/210); their *joined probability* is 0.133 x 0.181 0.024. The estimated N for the calculation of the SE is 0.024 x 210 5.04, and the SE is:

SE
0.407 x (1 - 0.407)
0.219
5

Using the t distribution (with df 4), one can have about 70% confidence that the true probability of the child showing 11 to 15 manifestations lies between 0.188 and 0.626 (i.e., - 1SE).

It must be noted that, since only independent factors can be used in the Bayes's formula, a baby's large head circumference and heavy birth weight cannot be used together; this limitation, however, does not apply to any of the other risk factors, because their intercorrelations are well within the limits of pure chance (Appendix II).

With the *posterior* p of a given type of manifestations known, the *posterior probabilities* of the specific manifestations comprised by that type can be calculated. For example, assuming that the *posterior* p of a child showing one or more eating problems is 0.3241, what are the individual probabilities of the three manifestations comprised by this type? For a boy, we add the percentages of the three manifestations (Appendix I), to a total of 44.7, and then convert each percentage to a percentage of that total (poor appetite 23.9%; faddy 63.1%; overeats 13.0%). This percentage, of the *posterior* p of the type, is the *posterior* p of the individual manifestation (poor appetite 0.0775; faddy 0.2045; overeats 0.0421). The example is, of course, entirely hypothetical because the observed probability of a child showing one or more eating problems is in fact greater than that assumed here.

DISCUSSION

The findings relating to types of manifestation of dysfunction could be quantified only in a categorical form, which indicates differences in the prevalence but not in the intensity of dysfunction. The total number of manifestations, however, was quantified as a continuous variable which can be interpreted in terms of intensity. What then, on statistical grounds, constitutes a serious dysfunction? If for the sake of comparability of research we accept the paradigm of other studies, that approximately 7% of children in all age groups have moderate to severe behaviour problems and further 15% have mild behaviour problems (Richman *et alii,* 1975; Rutter *et alii,* 1970; Graham *et al,* 1973; Kellmer Pringle *et alii,* 1966), we can operationally define serious dysfunction as 16 or more manifestations, and mild dysfunction as 11 to 15 manifestations (Appendix I). In terms of these definitions, the present findings indicate that a large head at birth (362mm+ circumference) constitutes 'risk' factor in relation to serious dysfunction in childhood, while mother's youth (16 or less) and 'unskilled' occupation do so in relation to mild dysfunction. Also, that manifestations of dysfunction related to a large head are mostly likely to be characterised by irritability and changeable moods. The mild dysfunction associated with mother's youth and with her 'unskilled' occupation is statistically (Appendix I) most likely to involve the more frequent manifestations of habit and sleep disturbance, and of eating problems, difficulties with peer relations and behaviour problems, respectively.

Although the mother's age and size of neonate's head are paediatrically recognized parameters of 'risk' (Betheras, 1976), the significance of mother's occupation is not obvious in this context. The association of 'risk' with 'unskilled' mothers is consistent, however, with findings that adjustment of adopted children is related to education levels of biological mothers (Witmer *et alli,* 1963; Bohman, 1970) and their socio-economic status (Kenny *et alli,* 1972; Kellmer-Pringle *et alli,* 1966), these findings could possibly be accounted for by selective adoption placements, except that this variable was controlled for in the present study. Another possibility seems that selective mating of 'unskilled' mothers results in offsprings who are at 'risk' because of their developmental limitations (De LaCruz, 1969), which would be consistent with their showing the greatest variety of problems (Table 1).

Four risk factors

The remaining four 'risk' factors, which are also medically recognized as such, are associated with an increased prevalence but not necessarily intensity of certain manifestations of dysfunction. The relationship of increased birth weight and small head circumference to the prevalence of mood disturbance (mainly irritability and lability) could be a function of post and pre-term foetal maturity respectively, and the disturbance a primary symptom. It is difficult to see, however, how a short stature of the mother relates to later somatic manifestations and disturbed peer relations, or how the length of the

neonate is related to sleep disturbance. The explanatory hypothesis suggested by the literature is that between relationships, and some of the other found here relationships, between 'risk' characteristics and manifestations of dysfunction reflect secondary symptomatology or *transactional* effects (Rutter, 1977), rooted in the primary symptoms of "reproductive casuality" (Pasamanick *et al,* 1955) by which adopted children are particularly affected (Silver, 1970; Kenny *et alii,* 1967; De LaCruz, 1969).

Present funding

The present finding, that more boys than girls show manifestations of disturbed peer relations and behaviour problems at home, is consistent with the findings of other studies concerned with adopted (Bohman, 1970) as well as natural children (McFarlane *et alii,* 1954; Kellmer-Pringle *et alii,* 1966; Richman *et alii,* 1975). Also in the overall pattern of behaviour problems, the prominent manifestations (Appendix I) are those which often lead parents of children aged from 5 to 10 years to consult a child guidance centre (Buckle *et al.,* 1960). It is worth noting, that the consistencies could be said to validate indirectly these facets of the present findings which did not replicate the findings of other relevant studies.

Not replicated

Among findings not replicated here is the relationship of birth complications, low birth weight, and prematurity, to subsequent behaviour disturbances in the child, but there are also other studies which failed to find this relationship (Wolff, 1967; Minde *et alii,* 1968; Hoopes, 1967). With regard to low birth weight and prematurity (which some authorities consider as being synonymous), the lack of replication could possibly be accounted for by the clinically liberal parameters used here in their operational definitions; this could not, however, apply to complications of birth. Of interest is also the finding that a low Apgar score has no predictive value; this could possibly be accounted for again by the parameter of its operational definition, and by the fact that only one score (60 sec. after birth) was available for analysis, while the prescribed procedure requires repeated evaluations at intervals thereafter (Apgar, 1957).

Presumed risk

It must be pointed out that the presumed 'risk' of some of the factors analysed in the present study might have been unconfirmed, because it was not practicable to measure all the relevant possible dysfunctions. Birth complications of adopted children, for example, were found to have a significant association with reading and writing difficulties but not with the children's adjustment (Bohman, 1970). This incompleteness of measurements imposes, of course, special limitations on the extent of 'risk' prediction which the statistical method presented here can offer. In spite of its limitations, however, the method offers objective prediction in a clinically gray area, in which ". . . the developmental paediatrician (who) delves back into the prenatal and perinatal history for factors which might compromise the infant's later development" (Rendle-Short, 1977, p. 99) would be likely to find little upon which to make a comparable clinical prognosis, or to recommend a special selection of adoptive parents.

SUMMARY

The study was concerned with the significance of maternal and natal 'risk' factors for the prediction of childhood adjustment of babies surrendered for adoption. Using a sample of 210 adopted children aged 7 to 7½ years, the relationship was analysed of 11 'risk' factors to 9 types of childhood dysfunction (comprising 51 manifestations of disturbance). Of these factors, 7 were found to have a significant relationship to dysfunction: age of biological mother 16 or under; mother's occupation 'unskilled'; mother's height 155cm or under; the baby's birth weight over 400g; head circumference at birth 362mm or more, or 334mm or less; length at birth 48cm or less; baby's sex male. A statistical prediction method was demonstrated, based on the significant 'risk' factors and using Bayesian rules. The findings were discussed critically and conclusions drawn.

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APPENDIX I

Types and contents of manifestations of childhood dysfunction and percentages of adopted children showing these manifestations, when 7 years of age.

Type and content of manifestations	Boys (N=103)	Girls (N=107)	Total (N=210)
Gastrointestinal			
complains of tummy aches	13.6	20.6	17.2
has often diarrhoea	1.9	0.9	1.4
is often constipated	6.8	8.4	7.6
has periodic vomiting or bilious attacks	4.9	5.6	5.2
Other somatic			
complains of headaches	10.7	11.2	11.0
has attacks of asthma	4.9	3.7	4.3
gets eczema or skin eruptions	9.7	9.3	9.5
has a squint or suspected squint	2.9	5.6	4.3
Habit disturbance			
has twitches or mannerisms of the face, eyes or body	1.0	2.8	1.9
has a stammer	1.0	0.0	0.5
bites nails	28.2	23.4	25.7
sucks thumb or finger during day	5.8	3.7	4.8
wets self during day time	0.0	1.9	1.0
wets bed at night time	7.8	8.4	8.1
poor bowel control, soils pants by day	1.0	3.7	2.4
Sleep disturbance			
has difficulty in getting off to sleep	15.5	11.2	13.3
has bad dreams or night terrors	14.6	13.1	13.8
restless in sleep, tosses and turns	25.2	20.6	22.9
has sleepwalked on a few occasions	9.7	6.5	8.1
Fears and phobias			
is afraid of the dark when in bed at night	22.3	15.0	18.6
generally fearful of unfamiliar people	4.9	10.3	7.6
very much afraid of one or more animals	2.9	8.4*	5.7
easily upset by new situations or things happening for the first time	18.4	18.7	18.6
worries about many things	32.0***	16.8	24.3
Eating problems			
has a poor appetite	10.7	15.9	13.3
is faddy, refuses to eat or dislikes many foods	28.2	24.3	26.2
overeats for more than the occasional meal	5.8	5.6	5.7
Peer relations			
quarrels a lot with other children	17.5	12.2	14.8
prefers doing things (playing, etc.) alone, rather than with others	14.6	8.4	11.4
is bullied by other children	12.6	6.5	9.5
dislikes going to school	9.7	5.6	7.6
fights with other children	20.4	12.2	16.2
is timid, shy or fearful of other children	7.8	3.7	5.7
Behaviour problems			
has difficulty in settling to anything for longer than a few minutes	23.3	19.6	21.4
purposely destroys or breaks things	11.7**	3.7	7.6
has stolen things on several occasions	9.7**	2.8	6.2
quite often tells deliberate untruth	20.4	17.8	19.1
is disobedient at home	34.0@	15.0	24.3
tends to be very jealous	23.3	24.3	23.8
wanders off from home without permission	12.6@	3.7	8.1
misbehaves to attract attention of adults	24.3	15.9	20.0
often resists when asked or told to do something	58.3	45.8	51.9
complains and whines a lot	18.4	20.6	19.5
has temper and screaming tantrums	12.6	11.2	11.9
is squirmy or fidgety, cannot sit still	36.9	25.2	31.0
Mood disturbance			
is often miserable or tearful	6.8	13.1	10.0
is irritable, quick to fly off the handle	22.3	19.6	21.0
is very quiet and daydreams a lot	13.6	7.5	10.5
has very changeable moods	20.4	17.8	19.1
sulks for hours on end	1.0	3.7	2.4
is very placid, shows virtually no emotions	7.8	6.5	7.2
Total manifestations			
1–5	37.9	47.7	42.8
6–10	33.0	21.5	27.3
11–15	16.5	13.1	14.8
16+	7.8	7.5	7.7

* p = .10
** p = .05
*** p = .01

APPENDIX II

r_φ correlations between 'risk' characteristics of biological mothers and natal factors

'risk' characteristics	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Mother's occupation 'unskilled'	–	–.128	.037	.014	–.014	–.023	.002	–.077
(2) Mother 16 years or younger		–	–.123	.034	.040	–.067	.016	.007
(3) Mother's height 155cm or less			–	–.017	.024	–.004	–.015	–.083
(4) Birth weight over 4000g				–	.332*	–.090	–.003	.026
(5) Head circumference 362mm and over					–	n.a.	–.040	.062
(6) Head circumference 334mm and under						–	.118	–.092
(7) Length at birth 48cm and under							–	.039
(8) Baby of male sex								–

* $p < .0005$

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