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FIELD SURVEY

by

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SURVEYS TO ANSWER QUESTIONS :
some methodological considerations

Epidemiology is the study of the distribution of disorders in a population, together with an examination of how the distribution varies with particular environmental circumstances. As a research tool, it has many applications. It may be used, for example, to assess the need for services, to determine whether particular disorders are becoming more or less common, to establish age or sex differences in prevalence and to study causal processes. With each of these, it is necessary before starting the study, to define very clearly the questions or hypotheses to be examined, as the form of the question should determine the strategy and tactics of the research. Unfortunately, all too often, epidemiological studies have consisted of a general counting of heads in the (usually forlorn) hope that something will emerge from the mass of data accumulated. There is no virtue in the mere attachment of numerical values unless the numbers have a point and a purpose.

In this paper, I want to consider some of the procedures to be followed in planning an epidemiological study. In doing this I will use a recent investigation undertaken by myself and my colleagues, as an illustration of the methodological problems involved and some of the solutions which may be employed. The study was planned in order to find out if psychiatric disorder was more common among children living in inner city districts than in those with homes in small towns, or rural areas, and if it was, why this was so. There were several specific hypotheses we wished to test, but broadly speaking, the question was posed in order to obtain information relevant for the planning of services and for the prevention of child psychiatric disorder. Inner London and the Isle of Wight (an area of small towns and countryside just off the south coast of England) were chosen as the two areas to compare. A brief preliminary report (Rutter, 1973) of the study was pre-circulated and fuller details are available in Rutter et al 1975a and b and Berger et al, 1975. Because London included many black immigrants and the Isle of Wight had none at the time of the study, the main comparison between the two areas was restricted to the indigenous white population. However, children from immigrant families were just as much Londoners as the others and were included in all stages of the survey. As a result, it was possible to compare these youngsters with those from indigenous families. No mention will be made here of this aspect of the survey but a full report is given in Rutter et al, 1974 and 1975c and Yule et al, 1975.

Definition of Variables

The first point to be decided in planning the survey was what we meant by psychiatric disorders. These were defined as conditions in which there was an abnormality of behaviour, emotions or relationships which was sufficiently marked and sufficiently prolonged to cause the child to be impaired in his social functioning and/or to lead to distress or disturbance in the family or community. The definition excluded mere oddities of behaviour, variations in personality or life style and minor problems not leading to social impairment; but it covered a considerably wider range of disorders than would ordinarily be subsumed under the heading of mental illness or disease. We defined psychiatric disorder in this way because we were concerned with problems of sufficient severity to be likely to require treatment, but of a kind which might properly be dealt with by community services rather than by hospital in-patient units.

The decision had several practical implications for the research. Because we required indices of severity, chronicity and social impairment, it was essential to use interview methods. Questionnaires are not satisfactory for these purposes, although they are useful in other connections (see below). In addition, it was necessary to study children's behaviour in several settings, as previous research had shown that children often behaved in very different ways at home and at school (Rutter, Tizard and Whitmore, 1970).

The next point was what other information we needed to obtain. Because we wanted to find out why the two areas differed in rates of psychiatric disorder (if they did), it was also necessary to make an assessment of the various environmental circumstances which might predispose toward psychiatric disorder. These included family, school, biological and social variables. Obviously, it was impossible to study all of these in detail so we followed the strategy used in earlier investigations - namely to obtain some data on all types of variables in order to achieve balance and perspective, but to study a few of each type in more detail in order to gain a better understanding of the possible mechanisms involved.

Sample

The issues of which population to study and how to select samples involved several difficult choices - as they always do. We had already decided to study London and the Isle of Wight as examples of inner city and small town populations, because they appeared to be sound representatives of each and because we had extensive other data on both areas which would prove useful at the stage of explaining any differences found. However, that left the necessity at a later stage to determine how far London and the Isle of Wight were typical or atypical

of other similar areas.

Also we had to decide whether to focus on one particular age group or whether to try to cover the whole school age range. In this connection it was important to know if there were age differences in the type or frequency of psychiatric disorders in childhood. Our earlier studies on the Isle of Wight showed that disorders in adolescence differed from those in middle childhood in certain important respects (Rutter et al, 1975d). Accordingly, we chose to restrict the sample to 10 year-old children. This had the advantage of eliminating the need to make age corrections but obviously the findings could only apply to that one age group. To remedy that limitation we carried out more limited questionnaire surveys of 7 year-old and 14 year-old children to determine whether the area differences in psychiatric prevalence at age 10 years also applied in earlier and later childhood.

Having picked an age group, the next point was how to identify all children of that age. For this purpose we chose to use school records. In Britain, local authorities have to provide education for all children living in their area and the local authority records provide a reliable means of identifying children. However, they are incomplete in two respects. First, there are a few children (mostly with severe mental retardation) who do not attend any school. These are noted (with a fair degree of accuracy) in other local authority records and a comprehensive search in an earlier study on the Isle of Wight showed that very few children fell into this category (Rutter, Tizard and Whitmore, 1970). Second, they do not necessarily include children at private schools and if these are to be covered other checks must be employed. Again, our earlier studies had shown that at age 10 years the proportion of children at private schools is fairly small and as we were primarily interested in services provided by the State, this group was omitted.

Many epidemiological studies have had a non-response rate of 15 to 20 per cent or even higher. Often the authors have noted that the non-responders did not differ from the main sample in age and social class, and therefore concluded that the missed group did not bias the results. However, several systematic studies of non-responders have shown this to be a seriously mistaken view (Cox et al, 1975). Although people missed in surveys usually do not differ from others in demographic characteristics, in almost all cases the rate of disorder in non-responders has been twice that in responders. Accordingly, it was necessary both to take special steps to reduce the non-response rate to an absolute minimum and to obtain sufficient data on non-responders to make the necessary corrections. In the event, we obtained screening information on virtually all the children (so enabling us to make corrections) and interview data on 92 per cent of the population.

If it turned out that London children showed more psychiatric disorder, the

question would arise as to whether the high prevalence was due to some feature of London life or whether it was an artefact of selective migration from other parts of the country. This could be checked only if we obtained data on where the child and his parents were reared. Questions on this matter were included and, to anticipate later findings, the results showed that the families born and bred in London were closely similar to those coming to London from other parts of the country. That disposed of one kind of migration artefact but it left the possibility of selective out migration (i.e., healthy families were more likely to leave London). That possibility was examined by a separate 4 year longitudinal study of London families which showed that the out-migrants did not differ from those left behind.

Several studies have utilised surveys of children to provide information about families, but it is important to recognise that this is misleading. On the face of it, it would seem that a survey of children with families is the same as a survey of families with children, but it is not. It would be if there were only one child per family but a selection according to children of a particular age necessarily leads to an over-representation of large families. For most purposes this does not matter, but if two populations differ in terms of average family size (as do London and the Isle of Wight), then various corrections are needed before comparisons can be made with respect to parents or families.

One stage or Two stage

The next decision in the sampling procedure is whether to use one or two stages. In a one stage approach, the investigation procedures are simply applied to a random or representative sample of the general population (in this case in the two areas of London and the Isle of Wight). Undoubtably this is the most straightforward approach as it involves the least assumptions, and if we had been interested only in obtaining measures of psychiatric prevalence this might have been the procedure of choice. However, it is an uneconomic means of obtaining a large sample of individuals with psychiatric disorder, as it is necessary to interview some 10 normal persons in order to pick up only one with disorder (assuming a 9 per cent prevalence). This was a serious drawback from our point of view. We wished to examine the factors associated with psychiatric disorder and for this purpose we needed a sizeable sample of children with disorder as well as a sizeable sample of those without disorder.

Accordingly, instead we chose to employ a two stage strategy. This involved the application of psychiatric screening procedures to the total population, and for this purpose we used questionnaires completed by school teachers. Then after scoring the questionnaires, a sample of children with high scores (i.e., with a [illegible] of psychiatric disorder) was selected for the second stage which involved detailed interviews with parents and teachers. This is a very useful way of obtaining some information on a very large sample but also a most economic means of obtaining a large sample of persons with psychiatric disorder who may be studied intensively.

However, if this strategy is employed, several precautions must be taken. In the first place it is essential that there be empirical evidence that the screening instruments are in fact valid and efficient indicators of psychiatric disorder. In the case of the teachers' questionnaire which we used, this had been shown in a series of previous studies in which questionnaire scores were related to independent interview assessments of psychiatric disorder (Rutter, 1967; Rutter, Tizard and Whitmore, 1970). Secondly, it is also necessary in the second stage to interview a sample of persons not selected on the screening questionnaire. However good the screening instrument, there will always be individuals with psychiatric disorder who are missed. It is necessary to know exactly what proportion are missed in the population studied in order to make the necessary correction in calculating the true prevalence. The means of doing this are illustrated in Table 1 in terms of the calculations used in the Isle of Wight-London comparison*. Thirdly, in order to avoid biasing effects in the interview it is essential that interviewers do not know why the child was selected or what was his score on the screening questionnaire. As in our earlier surveys the interviewers knew only the child's name, age and sex.

Two other choices must be made in selecting samples. First, there is the question of whether to take a random sample or a stratified sample. Random samples are much easier to handle statistically at the stage of data analysis, as they do not require the corrections needed with stratified samples. With stratified samples, population estimates can only be made by corrections to reconstitute the original population distribution (see e.g., Douglas, 1964) and this introduces the possibility of inflating error. However, there are two important drawbacks to random samples. First, by chance alone, one in twenty random samples will differ significantly from the total population they are meant to represent and when this occurs corrections must be made. Second, if comparisons are to be made with respect to a small but important sub-sector of the population, the numbers involved may be too small in a random sample. For example, if there is a special interest in children from professional families it may be necessary to take a weighted sample in which a higher proportion of such children are included. These issues did not arise in a major way in the case of the London-Isle of Wight comparison, so we kept to random samples.

The second choice concerns the size of sample to be studied. The size needed can be calculated statistically provided estimates are possible on the likely proportions to be found (in this case with respect to psychiatric disorder) and provided the investigators decide in advance what size of difference they will regard as meaningful. On this basis a sample is chosen which will give rise to a statistically significant difference if the rates differ to the extent considered meaningful.

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*Footnote - In this case the number of children missed by the screening procedure was quite large because only one screening instrument was used. The number missed if a parental questionnaire is also employed is very much smaller (Rutter, Tizard and Whitmore 1970). There were special reasons in this study why we chose to use only the teachers' questionnaire but in most studies multiple screening procedures are to be preferred.

In practice it is probably wise to choose a sample slightly larger than this, in order to be covered if the estimates of the likely proportions prove to be inaccurate. In terms of these considerations we decided to include (from each area) 100 randomly chosen children and 100 with high (deviant) questionnaire scores in the second stage of the study.

Standardisation of Data Gathering

Whenever any kind of comparisons are to be made, careful attention must be paid at all stages of the study to the standardisation and callibration of measures. Obviously, this first arises in the case of the instruments to be used - in our case the interview protocols. Extensive piloting was needed to ensure that the questions were clear and unambiguous and accurately tapped the behaviours they were meant to elicit. Careful attention had to be paid to the balance and flow of the interview so that it ran smoothly, maintained the interest and involvement of the interviewee, and did not cause irritations or embarrassment. In this connection, the order of questions proved to be very important. Searching personal questions which would not be tolerated early in the interview are usually quite acceptable later on when the interviewer has established trust and rapport. The start of the interview is also critical. It is necessary to establish straight away that the interview is relevant and worthwhile, and for this reason too many demographic questions (age, number of children, job, etc.) may be counter-productive. On the other hand, it is useful at the beginning to get some idea of who is who in the family and some notion of the home setting. Again, it is a question of balance and flow. Obviously, this will be different for patients under psychiatric care than for members of the general population. Piloting is necessary to check that the interview is right for the purposes and populations in each particular investigation. Some of the issues involved in developing an interview to assess family functioning are discussed in Rutter and Brown (1966) and Brown and Rutter (1966), and psychiatric interviewing to assess child psychiatric disorder is considered in Graham and Rutter (1968) and Rutter and Graham (1968).

Whatever the type of interview to be used, interviewers must be trained in its use. This is so even in the case of investigators with extensive experience of interviewing as, to some extent, each interview has its own requirements. Several methods may be employed in training. We provided extensive written instructions on the interview protocol and its use, the trainee interviewers sat in on and observed more experienced interviewers, video and audio-taped interviews were discussed in detail , and we observed the interviews of trainees. At all stages free discussion of all aspects of interviewing was encouraged. This process took several months in the [illegible] of the London-Isle of Wight comparative study because we needed subtle and detailed measures of emotions, attitudes and family relationships. However, in previous studies involving more straightforward measures, we have found that the

training may be accomplished within a few days in the case of experienced psychiatrist or psychiatric social workers. Nevertheless, in all studies continuing quality control has been needed throughout the field work. We attempted to provide this in several ways. First, throughout the study there was a regular daily meeting with the interviewers each evening when practical, conceptual and administrative problems in interviewing could be discussed. Second, the interview protocols were checked every day so that where the information was at all unsatisfactory there was the opportunity to discuss the interview while it was fresh in the interviewer's mind. Third, interviews were audio-taped* so that points of ambiguity could be checked. Fourth, we continued to observe a sample of each interviewer's interviews.

Standardisation of Coding

Quite apart from the need to obtain a uniform and systematic approach to data gathering, there is the requirement of standardisation of coding. For this to be possible, the codings must be unambiguous and clear-cut, and there should be well prepared and pre-tested operational definitions. Piloting of the interview is absolutely essential for this purpose. Attention needs to be paid to the time period for behaviours as well as to their definition. Thus, it is necessary to decide whether ratings of psychiatric disorder are to be based on what the person is like on the day of interview, during the previous month or over the past year.

Having got the interview codings fully worked out and tested, it is then necessary to test the reliability of ratings. Frequently, this is done by merely running a correlation of some kind between the codings of two raters. However, while this gives a measure of how well they agree in their ordering of codings, it does not allow an assessment of whether they are using the same cut-off point - in short whether they are using the same callibration. For that purpose, it is necessary to compare the mean level of codings of the two raters.

In the London-Isle of Wight studies, we made several tests of this kind in order to assess rather different aspects of reliability. Two examples may be given. First, there was the question of how far the whole procedure of information gathering and coding was reliable. To test this, we saw 36 parents on two occasions, there being about 4 weeks between interviews. The interviews were always carried out by different interviewers without knowledge of the other interview. A balanced design was employed so that each of the three interviewers did an equal number of first and second interviews. The results showed that there was a satisfactory 76 per cent agreement between the two interviews on the rating of definite psychiatric disorder, but agreement was less on dubious or trivial abnormalities. This finding, among others, led us to decide not to use the 'dubious or trivial' coding in any compari-

The second examples concerns the level of agreement between psychiatrists and non-psychiatric social scientists in the rating of child psychiatric disorder. In

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*Footnote : This was possible in only some of the studies.

most psychiatric surveys, the final diagnosis has been made by psychiatrists on the basis of information supplied by social investigators. However, we were concerned to find out if this was necessary if properly tested oparational definitions were employed by experienced social scientists who had received special training in psychiatric diagnosis. Accordingly, a series of interview protocols (dictated and re-typed with codings deleted), originally rated by social scientists were re-rated in 'blind' fashion by a child psychiatrist. This was done for interviews both in London and the Isle of Wight and the findings are shown in Table 2. There was sufficiently close agreement between psychiatrists' and non-psychiatrists' diagnoses for the latter to be used in any comparisons.

Meaning of Psychiatric Diagnosis

As shown in Table 1, we found psychiatric disorder to be twice as common among London 10 year-olds as among children of the same age on the Isle of Wight. This difference applied to both boys and girls and to both emotional disorders and disturbances of conduct. Also, the same difference between the two areas was found using teacher questionnaire scores.

The next issue was whether a psychiatric diagnosis or questionnaire score had the same meaning in the two areas. This was examined in a variety of ways, mainly by determining whether the scores or diagnosis related to external criteria in the same way in the two areas. Thus, the questionnaire scores in both populations were compared with interview ratings and with psychiatric clinic attendance (see Table 3); and the psychiatric diagnosis was compared with the number of symptoms (see Table 4) and the mothers assessment of her child's emotional or behavioural difficulties (see Table 5). In each case, the results were closely similar in the two areas suggesting that psychiatric diagnosis had the same meaning and validity in London and the Isle of Wight. Thus, the findings indicated that the true prevalence of child psychiatric disorder was really much higher in London.

Explanation of the Differences

Tha last, and largest, stage of the study involved analyses to determine why disorder was more common in London children. Some of the findings were summari ed in the pre-circulated paper (Rutter, 1973). In short, in both areas, child psychiatric disorder was associated with parental illness and criminality, family discord and disruption, and various forms of social disadvantage such as large family size and over crowding. Furthermore, all these disadvantaging factors were much more [illegible] in London than on the Isle of Wight. It seemed that London children had more psychiatric disorder just because they were more likely to suffer from various forms of family and social disadvantage. However, the question remained - was this sufficient to explain the area difference in psychiatric prevalence? This could be tested by applying standardisation techniques in relation to socio-familial

disadvantage. First, an index was created using the 7 main items which were associated with psychiatric disorder, and a score of 2 or more was regarded as indicating socio-familial disadvantage. In London, 57 per cent of families were disadvantaged on this index, compared to 20 per cent on the Isle of Wight. Table 6 shows what happens when the two populations are equated on this index. Within the disadvantage categories, there was little difference between London and the Isle of Wight (and even less when school disadvantage was also taken into account). When the two populations were standardised for socio-economic disadvantage, the prevalence of disorder on the Isle of Wight was 19 per cent compared to 22 per cent in London. It may be concluded that child psychiatric disorder was more prevalent in London because social and family disadvantage was more common in London. Of course, that leaves open the question why social and family disadvantage was more common in the metropolis but that takes us too far from the original survey and the story will have to be left there.

Conclusions

An attempt has been made in this paper to outline some of the more important methodological issues which arise in any epidemiological study designed to determine whether child psychiatric disorder is more prevalent in one population than another. A particular English study has been used to illustrate the issues and this methodological discussion should be considered in conjunction with the pre-circulated paper (Rutter, 1973) which gives a few of the substantive findings.

TABLE 1

TOTAL PREVALENCE OF PSYCHIATRIC DISORDER

IOW 10 YEAR-OLDS

	No. in total population (a)	% of sample with psychiatric disorder (b)	Estimated number with disorder in total population (c = a x b)
Not selected on screening procedure	1143	8.6%	98
Selected on screening procedure	136	40.2%	55
Total	1279	---	153

Total prevalence = $\frac{153}{1279}$ = 12.0%

ILB 10 YEAR-OLDS

Not selected on screening procedure	1367	21.2%	289
Selected on screening procedure	322	43.3%	139
	1689	----	428

Total prevalence = $\frac{428}{1689}$ = 25.4%

Difference between rates significant at 1% level

TABLE 2

RELIABILITY OF PSYCHIATRIC DISORDER RATING IN THE TWO AREAS

OW

		'Blind' Re-rating of Disorder				
		None	Trivial	Slight	Marked	Total
Original Rating of Disorder	None	41	7	--	--	48
	Trivial	7	7	3	--	17
	Slight	6	3	9	1	19
	Marked	--	--	1	4	5
	Total	54	17	13	5	

r = 0.85

Mean for original rating = 0.79
Mean for re-rating = 0.65

t = 0.95; n.s.

ILB

		'Blind' Re-rating or Disorder				
		None	Trivial	Slight	Marked	Total
Original Rating of Disorder	None	49	7	--	--	56
	Trivial	8	24	2	1	35
	Slight	1	13	16	4	34
	Marked	--	2	6	7	15
	Total	58	46	24	12	

r = 0.81

Mean for original rating = 1.06
Mean for re-rating = 0.93

t = 1.09; n.s.

Table 3a

ILB TEACHER'S QUESTIONNAIRE SCORES AND PSYCHIATRIC RATINGS FROM TEACHER INTERVIEW

		TEACHER'S QUESTIONNAIRE SCORE					
		BOYS		GIRLS		TOTAL	
		Score<9	Score 9+	Score<9	Score 9†	Score<9	Score 9†
Psychiatric Diagnosis from Teacher Interview	No disorder	34	36	31	21	65	57
	Disorder	10(22.7%)	60(62.5%)	5(13.9%)	31(59.6%)	15(18.8%)	91(61.5%)
	Total	44	96	36	52	80	148

Table 3b

IOW TEACHER'S QUESTIONNAIRE SCORE AND ATTENDANCE AT PSYCHIATRIC CLINIC

		TEACHER'S QUESTIONNAIRE SCORE	
		Below 9	9 or more
Psychiatric Attendance in Last Year	None	91	82
	Attendance	2	11
	Total	93	93

Table 4

NUMBER OF SYMPTOMS AND PSYCHIATRIC DISORDER

	Mean No. Symptoms		
	BOYS	GIRLS	TOTAL
ILB			
No psychiatric disorder	1.1	1.2	1.1
Deviant on Questionnaire and Diagnosis of Psychiatric Disorder	8.0	7.9	8.0
TOW			
No psychiatric disorder	0.8	0.6	0.7
Deviant on Questionnaire and Diagnosis of Psychiatric Disorder	8.5	7.8	8.3

Table 5

MOTHER'S ASSESSMENT OF CHILD'S EMOTIONAL/BEHAVIOURAL DIFFICULTIES

IOW 10 Year-Olds

Mother's Assessment of Child's Emotional/ Behavioural Difficulties	Teacher's Questionnaire		Parental Interview	
	Non-deviant	Deviant	No disorder	Psychiatric disorder
	No. %	No. %	No. %	No. %
None	45	31	45	4
Some, but no more than average	32	28	29	9
Uncertain difficulties	10	11	7	6
Definite problems	3(3.3%)	20(22.2%)***	1(1.2%)	17(47.2%)***
Total	90	90	82	36

*** $p < 0.001$

ILB 10 Year-Olds

Mother's Assessment of Child's Emotional/ Behavioural Difficulties	Teacher's Questionnaire		Parental Interview	
	Non-deviant	Deviant	No disorder	Psychiatric disorder
	No. %	No. %	No. %	No. %
None	33	61	31	15
Some, but no more than average	32	38	25	14
Uncertain difficulties	8	14	2	9
Definite problems	4(5.2%)	26(18.7%)*	2(3.3%)	17(30.9%)***
Total	77	139	60	55

* $p < 0.05$
*** $p < 0.001$

TABLE 6a

SOCIO-FAMILIAL DISADVANTAGE AND DEVIANCE ON TEACHER QUESTIONNAIRE

		Isle of Wight		London	
		Normal	Deviant	Normal	Deviant
Socio-familial	Absent	78	3 (3.7%)	36	5 (12.2%)
Disadvantage	Present	15	5 (25.0%)	43	12 (21.8%)

TABLE 6b

SOCIO-FAMILIAL DISADVANTAGE AND CHILD PSYCHIATRIC DISORDER

		Normal	Psychiatric disorder	Normal	Psychiatric disorder
Socio-familial	Absent	74	7 (8.6%)	34	7 (17.1%)
Disadvantage	Present	15	5 (25.0%)	39	16 (29.1%)

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