

## Enuresis and Behavioural Deviance: Some Epidemiological Considerations

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Enuresis is a common disorder, and only a minority of enuretic children get referred to hospital clinics. Of those that are referred, some are seen by paediatricians, some by child psychiatrists, and some by other specialists. It is highly likely that different sorts of enuretic children are seen at different clinics, and for this reason studies of hospital patients are potentially misleading because they may refer only to an atypical minority of enuretics. It is in just this situation that epidemiological studies of the general population are most useful.

The findings discussed in this paper all stem from a series of such studies on the Isle of Wight. Information on enuresis was obtained through a behavioural questionnaire (Rutter *et al.* 1970a), which was sent to the parents of all children in the age-groups studied who were resident on the Isle of Wight and attended local authority schools.\* One item on the questionnaire asked the parent to note the frequency with which the child 'wets the bed or pants'. In 1965, 9- and 10-year-old children were studied (Rutter *et al.* 1970b), in 1967, 5-year-old children, and in 1968/69, 7- and 14-year-old children. In the 5-year-old survey, 9.0 per cent of parents did not return the forms; the corresponding figure in the 7-year-old survey was 11.3 per cent, in the 9- to 10-year-old survey it was 11.5 per cent, and in the 14-year-old survey it was 17.2 per cent. The figures given for enuresis may be slight underestimates, in that children for whom parental questionnaires are not completed are more often deviant than the general population (Rutter *et al.* 1970b, Shepherd *et al.* 1971).

### Prevalence

The most obvious feature of the prevalence of enuresis is the very marked drop with age. Thus, at 7 years of age one in five boys wet their beds at least occasionally, but at 14 years only one in 33 boys did so. This sharp fall in the rate of wetting as children grow older was equally evident in boys and girls, and equally evident in those who wet occasionally and those who did so frequently.

There is, however, one exception to this falling prevalence. For boys, the rate of enuresis was higher at 7 years than at 5 years (the rate for girls at the two ages was closely similar). Some caution is necessary in taking these findings at face value, because the wording of the enuresis item at 5 years differed from that at all other ages in that diurnal and nocturnal enuresis were asked about separately. It is hard to see why this should lead to a lower rate of positive answers, but it might have done. On the other hand, the difference cannot be due to sampling error because the children

\*Children at special schools and junior training centres were also included.

TABLE I  
Prevalence of enuresis according to age and sex

| Age        | Total population | Boys<br>% wet | Girls<br>% wet | Sex ratio |
|------------|------------------|---------------|----------------|-----------|
| 5 years    | 395              | 13.4          | 13.9           | 1.00      |
| 7 years    | 359              | 21.9          | 15.5           | 1.41      |
| 9/10 years | 1814             | 9.0           | 5.6            | 1.61      |
| 14 years   | 1913             | 3.0           | 1.7            | 1.77      |

TABLE II  
Frequency of enuresis

| Age        | Wet less often than<br>once per week |       | Wet at least<br>once per week |       |
|------------|--------------------------------------|-------|-------------------------------|-------|
|            | Boys                                 | Girls | Boys                          | Girls |
| 7 years    | 15.2                                 | 12.2  | 6.7                           | 3.3   |
| 9/10 years | 6.1                                  | 3.5   | 2.9                           | 2.2   |
| 14 years   | 1.9                                  | 1.2   | 1.1                           | 0.5   |

at the two ages were the same. The issue requires further study, but it is relevant that Blomfield and Douglas (1956) in the National Survey and also MacFarlane *et al.* (1954) both found a similar slight increase in regular bedwetters in boys at about 6 to 7 years.

The findings emphasise that the group of children who are wet in later childhood consists not only of children wet when younger, but also of children dry when young who then lose bladder control. Thus, among the 158 boys for whom there was information at both ages, 16 who were dry at 5 years were wet at 7 years (only 4 boys became dry during this two-year period). Our data also show that even during the 9 to 14 year age period there are some children who become wet. Of the 34 children enuretic at 14 years for whom information was available at 9/10 years, 6 were reported as dry at 9/10 years. As we do not have information before this age, it is not possible to say whether these children became wet for the first time (after infancy) at 14 years or whether bladder control had been intermittent during childhood.

There are many items of deviant behaviour which become less frequent with increasing age (Shepherd *et al.* 1971), but apart from a few emotional features characteristic of the young child (such as crying and thumb-sucking), the only other items with such a marked and regular fall with age are those which concern specific delays in development related to biological maturation (such as speech and language delay, clumsiness, and encopresis). These, together with enuresis, are often grouped together under the general heading of developmental disorders (MacFarlane *et al.* 1954; Rutter *et al.* 1969, 1970b).

Another characteristic of developmental disorders is that they are very much commoner in boys than in girls—the sex ratio being as high as three or four to one in most examples of developmental disorder. This male preponderance is also found

with enuresis, particularly in older children, but the sex ratio is much lower, ranging from 1.0 to 1.8 to 1 in the Isle of Wight studies. Other investigations have produced similar sex ratios (Blomfield and Douglas 1956, Shepherd *et al.* 1971).

It is also noteworthy that the sex ratio in enuresis is near unity in younger children but rises as the children grow older—again something noted in other studies. This probably reflects the fact that sex differences within the normal range for developmental functions are nothing like so great as the sex differences for marked delays in development (Rutter *et al.* 1970*b*, Rutter and Martin 1972).

The fact that the excess of boys among enuretics, even in older children, is lower than in other developmental disorders raises the question whether enuresis differs in any important respects from other developmental disorders, or whether there are several varieties of enuresis only some of which should be classed in the 'developmental disorder' category, where maturational delay is thought to be often due to biological factors. This is an issue to which we will return when considering associations between enuresis and behavioural deviance. (See also comment in Appendix to this Chapter.)

### Social Class

Only a weak and inconsistent association was found between enuresis and parental occupation at age 9/10 years and no associations at age 14 years, the two age groups for whom social class data were available. At 9/10 years enuresis was most common in children from unskilled or semi-skilled families, but it was commoner in children from professional/managerial families than in those from the 'other non-manual' group. The differences were only significant in girls. These findings are in general agreement with other studies (Stein and Susser 1967*b*). Thus, Stein and Susser

TABLE III  
Enuresis at 9/10 years and parental occupation

|       | Professional/<br>managerial (I and<br>II) |         | Other non-<br>manual (III—<br>non-manual) |         | Skilled manual<br>(III—manual) |         | Unskilled or<br>semiskilled<br>manual (IV and V) |         |
|-------|---|---------|---|---------|--------------------------------|---------|--|---------|
|       | % wet                                     | Total N | % wet                                     | Total N | % wet                          | Total N | % wet  | Total N |
| Boys  | 5.7                                       | 297     | 4.3                                       | 186     | 7.1                            | 592     | 7.9  | 354     |
| Girls | 3.6                                       | 304     | 2.0                                       | 153     | 3.5                            | 568     | 6.8  | 352     |

Linear Trend significant at 5 per cent level for girls only

TABLE IV  
Enuresis at 14 years and parental occupation

|       | Non-manual |         | Manual |         |
|-------|------------|---------|--------|---------|
|       | % wet      | Total N | % wet  | Total N |
| Boys  | 3.5        | 282     | 2.9    | 559     |
| Girls | 1.8        | 272     | 1.8    | 554     |

Manual/non-manual differences not significant

(1967 *a* and *b*) found that the social gradient only applied at age 9/10 years and only in girls. Similarly, Blomfield and Douglas (1956) reported that the social class differences applied only to children with transient enuresis and were most marked in girls. Furthermore, children of agricultural workers showed a middle-class rather than a working-class pattern. The Baltimore study found no relationship between social class and enuresis, but children who had become dry and then relapsed more frequently came from the lowest social group (Oppel *et al.* 1968). These inconsistencies suggest that the social class gradient in enuresis, when it occurs, does not represent any effect of social values, expectations or patterns of child-rearing as such, but rather that the association is secondary to some other relationship. That this may be the case is suggested by the finding that stressful events in early childhood are associated with enuresis (Cust 1958, Douglas 1970, Douglas and Turner 1970). Perhaps social class is associated with enuresis only when the parental occupation differences are accompanied by differences in the frequency of stressful events or disruptive life experiences.

#### **Family Size, IQ, and Reading Retardation**

Associations between enuresis and family size, IQ, and reading retardation were examined in the 9/10-year-old children with few findings of significance (Rutter *et al.* 1970*b*). The only association significant at the 1 per cent level was between enuresis and reading backwardness in girls. In neither sex was enuresis associated with IQ or family size, although there was a slight but inconsistent tendency for enuresis to be commoner in children from large families.

#### **Enuresis and Deviant Behaviour**

Associations between enuresis and deviant behaviour were examined in several different ways. The presence of enuresis was established through the use of a behavioural questionnaire completed by parents. Other items on the scale covered emotional disturbance, antisocial conduct, and poor relationships with other children. Children with total scores of 13 or more on the questionnaire have been found to have a high likelihood of psychiatric disorder (Rutter *et al.* 1970*b*). Consequently, it was possible to determine what proportion of enuretic children had scores of at least 13, and to compare this with the proportion of deviant children amongst those who were dry. Table V shows this comparison. At all ages, in both boys and girls, about a third of the enuretic children had deviant scores, this proportion being some three times that in the general population. This finding suggests a fairly strong association between enuresis and deviant behaviour.\* However, it should be noted that the information comes from the same questionnaire, so that there is the possibility of a 'halo' effect—parents being more liable to report other deviant behaviours just because they are aware that the child is enuretic.

A more stringent test of the association is to use the teachers' questionnaire (Rutter 1967) as a measure of deviant behaviour. This is a 26-item scale basically

\*The *type* of deviant behaviour is also being examined, but this paper reports only the overall associations which do not take this into account.

TABLE V  
Enuresis and behavioural deviance (parental scale)

| Age        | BOYS      |           |                | GIRLS     |           |                |
|------------|-----------|-----------|----------------|-----------|-----------|----------------|
|            | Wet       | Dry       | Deviance ratio | Wet       | Dry       | Deviance ratio |
|            | % Deviant | % Deviant |                | % Deviant | % Deviant |                |
| 5 years    | 30.8      | 8.1       | (3.8)**        | 14.3      | 4.4       | (3.3)          |
| 7 years    | 25.6      | 7.9       | (3.2)**        | 28.6      | 7.8       | (3.7)*         |
| 9/10 years | 27.4      | 6.5       | (4.2)**        | 16.3      | 5.3       | (3.1)**        |
| 14 years   | 27.6      | 10.2      | (2.7)**        | 43.8      | 6.8       | (6.5)**        |

\*p < 0.05

\*\*p < 0.01

similar in wording to that completed by parents. It has been found to have a satisfactory reliability, and scores agree well with independent psychiatric ratings. A total score of 9 or more can be used to pick out deviant children. As it has been found that teachers are aware of enuresis in only a few of the children who wet (Rutter *et al.* 1970b) the teachers' scale score is both free of 'halo' effect with respect to enuresis, and measures deviance in a situation different from that in which the enuresis occurs.

On the teachers' scale, the enuretic boys were only slightly more often deviant than the boys who were dry, and the difference reaches significance at the 5 per cent level only in 9/10-year-olds. In sharp contrast, the enuretic girls were 3 or 4 times as often deviant as the dry girls. Thus, there was a strong and consistent association between enuresis and behavioural deviance in girls, which extended to both home and school and which was present at all ages. In boys, on the other hand, the behavioural deviance occurred largely in the home situation. Whether this means that the association is situation-specific to a considerable extent, or whether it implies that part of the association is explicable in terms of a 'halo' effect, cannot be determined from our data. Either way, the conclusion remains that the association between enuresis and behavioural deviance is a more pervasive one in girls. It should be added that in both

TABLE VI  
Enuresis and behavioural deviance (teachers' scale)

| Age        | BOYS      |           |                | GIRLS     |           |                |
|------------|-----------|-----------|----------------|-----------|-----------|----------------|
|            | Wet       | Dry       | Deviance ratio | Wet       | Dry       | Deviance ratio |
|            | % Deviant | % Deviant |                | % Deviant | % Deviant |                |
| 5 years    | 15.4      | 8.7       | (1.8)          | 17.9      | 3.8       | (4.7)          |
| 7 years    | 15.4      | 17.4      | (0.9)          | 39.3      | 11.3      | (3.5)**        |
| 9/10 years | 17.9      | 10.1      | (1.8)*         | 14.3      | 5.7       | (2.5)**        |
| 14 years   | 13.8      | 5.4       | (2.6)          | 25.0      | 3.9       | (6.4)**        |

\*p < 0.05

\*\*p < 0.01

sexes the association shows no age trend—it is as marked in young enuretic children as it is in the older ones.

This sex difference again raises the question of whether there is more than one variety of enuresis. The findings are in keeping with the view that in boys enuresis is largely a developmental disorder—perhaps mainly biologically determined—whereas in girls enuresis, relatively speaking, occurs more often in association with psychiatric disorder. If this second variety, which is commoner in girls, did *not* have such an important biological component this would go some way towards explaining why the sex ratio in enuresis is lower than in most other developmental disorders.

It should be noted that because enuresis is commoner in boys, enuresis associated with behavioural deviance is actually equally frequent in the two sexes. But because enuresis as an isolated symptom is so much commoner in boys, the *proportion* of cases of enuresis with behavioural deviance is greater in girls.

To test the view that there are (at least) two varieties of enuresis, the distribution of which differs in boys and girls, it will be necessary to show that there are *other* differences between enuresis in the two sexes, and that these are similar differences to those between enuresis associated with psychiatric disorder and enuresis which is not so associated.

This requires an examination of possible environmental influences with respect to enuresis. We have already noted that social class effects mainly apply to girls, a finding which is in keeping with the possibility that the determinants of enuresis differ somewhat in the two sexes.

Psychogenic stress factors might also be expected to show a somewhat stronger association with enuresis in girls than it does in boys, on the grounds of the hypothesis that enuresis in boys has a marked biological developmental component. At first sight, this prediction seems to run counter to the evidence that, in general, boys may be more vulnerable to psychological stress than are girls (Rutter 1970). However, the usual sex differences in psychiatric disorder do not hold when there is overt neurological disorder (Rutter *et al.* 1970*a*). If it is supposed that more cases of enuresis in boys are due to biological factors, and that enuresis associated with psychiatric disorder has different origins, then susceptibility to psychological stress would be expected to be more evident in the latter variety of enuresis which is commoner in girls.

Unfortunately, the evidence on sex differences with respect to stress factors in enuresis is largely lacking. In keeping with this prediction is the finding from the Baltimore study that maternal attitudes and behaviour were more strongly related to enuresis in girls than in boys (Oppel *et al.* 1968). Also in keeping is Douglas' finding reported in his paper in this volume (Chapter 15) that stress factors have a slightly greater association with enuresis in girls.

A better test of the hypothesis would be to determine whether stress factors showed a stronger association with enuresis when it was accompanied by psychiatric disorder than when it was not. Unfortunately we have no data on this point, and it has not been examined by other investigators.

If enuresis which is associated with psychiatric disorder occurs more often in girls, then the type of enuresis which is more characteristic of females—namely diurnal enuresis—should also be a feature of enuresis which occurs together with

psychiatric disorder. There is not much evidence available on this issue but what little there is provides support (Hallgren 1956, Rutter *et al.* 1970b).

#### Nature of Association Between Enuresis and Behavioural Deviance

It has been shown that, especially in girls, there is a strong association between enuresis and behavioural deviance, and it remains to consider the nature of the association. Several different mechanisms are possible.

In the first place, enuresis is a socially embarrassing symptom, and it could be that the emotional and behavioural difficulties are secondary to the enuresis, arising as a reaction to the stresses accompanying this symptom. This is certainly a plausible explanation. Chronic physical handicap has been found to be associated with an increased risk of psychiatric disorder (Rutter *et al.* 1970b), and the same could occur with enuresis. If that was the correct explanation of the association in most cases, it would be expected that the association should be weakest in young children when enuresis is common and more socially acceptable and increasingly stronger as children grow older. However, as we have seen (Tables V and VI), that is not the case. The association is as strong at 5 years as it is at later ages, with the exception of an increased association at 14 years.

Again, if the deviant behaviour arose as a reaction to the enuresis, it might be expected that this would happen more often with frequent wetting than merely occasional wetting. Table VII shows the findings in this connection. There was no association between the frequency of enuresis and behavioural deviance at age 7 years, at age 14 years, or in boys at 9/10 years. However, at 5 years, and in girls at 9/10 years, there was a significant association. The association was inconsistent, and the results neither support nor go against the view that the behavioural deviance is a secondary reaction.

The issue may also be examined by considering the behavioural characteristics of children *before* they are enuretic. Obviously this can only be done with respect to the sub-group of children who gain continence and then subsequently lose it. Table VIII shows the findings for the group of boys for whom information was available

TABLE VII  
Frequency of enuresis and behavioural deviance

| Frequency of Enuresis  | AGE AND SEX OF CHILDREN |      |                      |      |               |                |                       |      |      |      |
|------------------------|-------------------------|------|----------------------|------|---------------|----------------|-----------------------|------|------|------|
|                        | Boys and girls 5 yrs    |      | Boys and girls 7 yrs |      | Boys 9/10 yrs | Girls 9/10 yrs | Boys and girls 14 yrs |      |      |      |
|                        | % Deviant*              | (N)  | % Deviant            | (N)  | % Deviant     | (N)            | % Deviant             | (N)  |      |      |
| Occasional only        | 17.6                    | (17) | 34.7                 | (49) | 36.8          | (57)           | 10.0                  | (30) | 44.8 | (29) |
| At least once per week | 38.9**                  | (36) | 55.5                 | (18) | 40.7          | (27)           | 52.6**                | (19) | 43.8 | (16) |

\*Deviant on either parental scale or teachers' scale

\*\*Difference in deviance between occasional and regular enuretics significant at 1 per cent level.

**TABLE VIII**  
Deviance with respect to course of enuresis from five to seven years

|                                    | <i>Percentage deviant at 5 yrs</i> | <i>(N)</i> | <i>Percentage deviant at 7 yrs</i> | <i>(N)</i> |
|------------------------------------|------------------------------------|------------|------------------------------------|------------|
| Boys dry at 5 and 7 yrs            | 10.8**                             | (126)      | 21.7                               | (126)      |
| Boys dry at 5 yrs but wet at 7 yrs | 50.0**                             | (16)       | 31.3                               | (16)       |
| Boys wet at 5 and 7 yrs            | 38.9                               | (18)       | 27.8                               | (18)       |

\*\*These two figures differ at the 1 per cent level of significance

at 5 years and at 7 years. The boys who were dry at 5 years can be divided into two sub-groups—those who remained dry at 7 years and those who lost bladder control after having once become dry for at least 1 year. This latter group of relapsed enuretics had a 50 per cent rate of deviance at 5 years, compared with 11 per cent in the remainder. In other words, they showed a much increased rate of deviance at a time when they were still dry and *before* they became enuretic. These findings are incompatible with a 'reactive' view of behavioural disorder, at least so far as the group of acquired enuretics is concerned. However, it should be noted that at age 7 years these constitute nearly half the total group of enuretics in the boys. Whether or not these findings can be generalised to primary enuresis depends on evidence concerning their similarity or dissimilarity in other respects. The same table shows that at age 7 years the rate of behavioural deviance in the primary enuretics was the same as in the acquired enuretics, so that the two groups did *not* differ on the important question of associated emotional and behavioural disturbance. Surprisingly few attempts have been made to compare primary and acquired enuresis, but when comparisons have been made, as by Novick (1966), few differences have been found (see also the paper by Kolvin *et al.* in this volume, Chapter 26). Primary and acquired enuresis may well differ with respect to their pathogenesis and the nature of their associations with emotional disturbance, but if so such differences have yet to be demonstrated.

The nature of the association between enuresis and psychiatric disorder can also be examined by looking at factors predicting continence. Table IX compares, within a group of children all of whom were enuretic at 9/10 years, those who became dry by 14 years and those who remained wet. Fifty per cent of those who remained wet showed deviant behaviour at 9/10 years, compared with only 29 per cent of those who acquired continence. Although caution is clearly necessary in the interpretation of this finding (the difference falls just short of the 5 per cent level of significance), if it can be confirmed in other studies, it would show that behavioural disturbance can predict the outcome of enuresis—a finding out of keeping with the view that emotional disturbance is *purely* secondary to enuresis.

Finally, the question can be examined by determining what happens to the behavioural disturbance when the children cease to be enuretic. Of the enuretic children deviant at 9/10 years but who became dry by 14 years, 57 per cent became



TABLE IX  
Deviance with respect to course of enuresis from nine to fourteen years

|  | Percentage deviant at 9/10 yrs (N) | Percentage deviant at 14 yrs (N) | Percentage non-deviant at 14 yrs of those deviant at 9/10 yrs (N) |
|--|------------------------------------|----------------------------------|---|
| Children wet at 9/10 and 14 yrs            | 50.0* (28)                         | 39.3** (28)                      | 28.6 (14)   |
| Children wet at 9/10 yrs but dry at 14 yrs | 28.8* (73)                         | 13.7** (73)                      | 57.1 (21)   |

\* $\chi^2 = 3.15, p < 0.10$

\*\* $\chi^2 = 6.57, p < 0.02$

non-deviant, compared with only 29 per cent of those who remained wet. The difference falls well short of statistical significance as the numbers involved are small, but it seems to be in keeping with the hypothesis that the disturbance is secondary to the enuresis. On the other hand, the finding that 29 per cent were still deviant after becoming dry, a figure three times that for the population as a whole, is not in keeping with that view.

Putting together the findings presented in the last two paragraphs, it may be concluded that some of the evidence suggests that the behavioural deviance is primary, and some suggests that it is secondary to the enuresis. It is very unlikely that either explanation can account for all cases, and it appears that both mechanisms are operative to some extent.

### Conclusions

In summary, there is good evidence of a moderately strong association between enuresis and emotional or behavioural disturbance in girls, but the association is less marked in boys. Circumstantial evidence suggests that, although enuresis is probably usually multifactorially determined, there may be two varieties of enuresis. The first is commoner on boys, is less often associated with psychiatric disorder, and usually involves nocturnal enuresis only. Other studies (e.g. this volume Chapters 9 and 11) suggest that this may constitute a developmental disorder with important biological components. The second variety more often involves behavioural disturbance and diurnal enuresis, and is relatively more common in girls. To what extent this division is similar to the division into primary and secondary enuresis is not known.

Behavioural disturbance may often arise as a reaction secondary to enuresis, but the available evidence suggests that in many cases there is a more fundamental connection between the enuresis and the emotional disorder. In cases of acquired enuresis, the emotional disorder often *precedes* the enuresis, and may be a factor in its causation. Whether or not emotional disorder can be considered to cause enuresis (in the sense of preventing the acquisition of continence) in primary enuresis remains uncertain, but the evidence does not contradict that view.

If such a possibility is accepted, the question then arises of *how* the emotional disorder might cause the enuresis. It could be that it interferes with a learning process

required to achieve bladder control. That would be in keeping with Douglas' finding (page 109) of the importance of stress factors in the early childhood of enuretics. On the other hand, the stress factors were often ones associated with persisting family discord and disturbance, and it is not known how far *continuing* stress in the home prevents the acquisition of bladder control. In any case, it has yet to be shown that stress factors are commoner in enuretics with behavioural disturbance than in enuretics without emotional or behavioural difficulties. For this reason, while the association between stress events and enuresis is evident, it does not necessarily follow that the stress events are also associated with the emotional disturbance accompanying enuresis, although this is certainly plausible. Alternatively, the enuresis may not represent any failure of learning of bladder control, but rather the persistence of a symptom arising from psychiatric disorder, involving emotional conflicts or disturbance with respect to this aspect of child-rearing. Or again, the association may be more indirect. If enuresis is a result of immaturity of brain function due to delayed maturation, this same immaturity of function may itself render the child more susceptible to psychiatric disorder. The available evidence allows no choice between these alternatives. All that can be said is that the association between enuresis and behavioural deviance is both stronger and more basic than previously supposed, and that research to determine the mechanisms involved in the association is much needed.

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## APPENDIX

### *A Note on the Concepts of Developmental Disorder and Maturation Delay*

In view of controversy and confusion over the use of the terms 'developmental disorder' and 'maturation delay' (Mac Keith 1972) it is as well to make clear how the terms have been used in this paper.

Developmental disorder is used here purely in the *descriptive* sense of a disorder involving delay in the development of some specific skill related to biological maturation. Skills such as speech, bladder control and motor co-ordination would be included under this general heading, as they require a certain level of brain maturity for the skill to develop. As it happens, this group of disorders has some unity in other respects, for example a male preponderance. However, the term here carries no aetiological implications, and it is assumed that many factors (not necessarily biological) may be important in aetiology.

Maturation delay of neurological mechanisms, in contrast, is used here as an *aetiological hypothesis*, put forward as a possible explanation of a biological factor contributing to the origins of enuresis in some cases. The normal brain is known to develop unevenly, with some parts and some systems delayed behind others (Marshall 1968). Those who espouse the maturation hypothesis suggest that it is not unreason-

able to suppose that in some children this normal variation in the development of different parts of the brain may be exaggerated. In support, they would also point to the evidence that genetic factors are known to play a part in enuresis (see chapter by Bakwin in this volume page 71).

However, it is obvious that nocturnal enuresis cannot be entirely explained in terms of variations in the rate of maturation. The situation might be summarised as follows. (1) There is no direct evidence for the existence of delayed maturation of the brain in enuresis (Mac Keith 1972), although there is some circumstantial evidence which is compatible with that view. (2) If there is maturational delay it is unlikely to completely prevent the acquisition of bladder control except in very extreme cases, but it could make bladder control more difficult to acquire. (3) If bladder control develops through learning which takes place on the basis of brain maturation, then stress factors during the age-period when control is normally acquired could interfere with this learning (Cust 1958, Mac Keith 1968, and chapter 15 by Douglas in this volume). (4) The present state of evidence suggests that both maturational delay and stress factors probably play a part in the aetiology of enuresis. The relative importance of each and the possible rôle of other factors remain to be determined.

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