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Symptoms in the First Two Years of Life

A Preliminary Population Study of Infantile Autism

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Summary. A population sample of autistic children ($n = 26$) were compared retrospectively with age- and sex-matched mentally retarded children ($n = 20$) and age- and sex-matched population-representative children ($n = 25$) on a 130-item questionnaire to the mother concerning characteristic features of the child's behaviour in the first 2 years of life. Thirteen items discriminated clearly between the groups. The results are discussed in the context of early screening for autism.

Key words: Autism – Infants – Screening

Introduction

The need for clinically applicable early screening measures in autism is becoming increasingly recognized. The disorder usually has its onset in the first 2 years of life, but has previously often not been diagnosed until the child is 4–8 years old and sometimes even later.

The literature on early symptoms in autism is scanty (Polan and Spencer 1959; Prior and Gajzago 1974; Rosenthal et al. 1980; Schaffer 1973; Wing 1969). There are no prospective studies that we are aware of or systematic retrospective studies.

We describe a recently performed retrospective questionnaire study of early symptomes in a representative group of autistic children and their "normal" and IQ-matched contrast group.

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Subjects and Methods

Subjects

Seventy-two mothers of three groups of children – one with infantile autism (IA) ($n = 26$), one with mental retardation (MR) ($n = 20$) and one with population-representative age- and sex-matched children (P) ($n = 25$) were approached with the request that they complete a questionnaire containing questions about the child's behaviour during the first 2 years of life.

Sixty-five mothers returned questionnaires. The characteristics of each study group are as follows.

IA Group. Twenty-six children (20 boys, 6 girls) with IA – or autistic disorder (DSM-III 1980, DSM-III-R 1987; Coleman and Gillberg 1987) – were included in this group. These children in all probability constitute the vast majority of children with IA, born in 1962–1976 and living in Göteborg on 31 December 1980 (Gillberg 1984) and are considered representative of children with that diagnosis. Only 6 children in this group were of normal of near normal intelligence, whereas the remainder were severely ($n = 12$) or mildly ($n = 8$) mentally retarded. There was no attrition in this group.

MR Group. Seventeen children (13 boys, 4 girls) with MR (IQ < 70) were included in this group. Originally 20 children were sex-, age- and IQ-(± 10 points) matched with the mentally retarded IA-group children, but 3 of these were excluded for various reasons. (One child had been institutionalized at a very early age and the mother had no recollections of his early behaviour; the mother of one child would not answer repeated letters and a third mother declined participation altogether.) The children in the MR group were recruited from the local Board of Provision and Services to the Mentally Retarded by allocating successively the first non-autistic child meeting the sex, age and IQ criteria of the matching.

P Group. Twenty-two children (18 boys, 4 girls) were included in this population-based (P) group. Originally, there were 25

children in this group, who had been sex-, age- and maternity-clinic-matched with the children in the IA group. This group is considered representative of the general population (Gillberg and Gillberg 1983) and was recruited in the following manner: for each autistic child the "next" child of the same sex born in the same maternity clinic was chosen. One IA child had been born abroad and there existed no maternity clinic records for him (Gillberg and Gillberg 1983). Three children out of these 25 had mothers who declined to participate in the study. None of the children in this group had received child psychiatric treatment.

Procedure

A questionnaire (see below) was distributed to all mothers of the 65 children in the three groups in 1983–1984, i.e. when the children were 7–22 years old. The median age for all three groups was 13 years and there was no difference as regards range between the groups. We asked that they get acquainted with the questionnaire by first reading it through and then completing it within 2 weeks before returning it to us.

Questionnaire

The questionnaire (see Appendix) contained 130 different statements pertaining to the child's behaviour in the first 2 years of life. The type of statement is illustrated in Tables 1 and 2. Under each statement there was a line, 100 mm long, connecting the two extremes "applied" and "did not apply". By putting an X somewhere along the line, the mother indicated to what extent she had found a particular behaviour typical of her child in the first 2 years of life.

Rating

The questionnaires were rated blindly by a psychologist. For each of the 130 items of each of the 65 questionnaires the distance from the "normal" end of the line (the "applied" or "did not apply" end) up to the point where the "X centre" cut or vertically projected on to the line was measured (in mm) (visual analogue scaling).

Statistics

Means and standard deviations for each statement were calculated on a group basis. The means were compared across groups (IA-P, IA-MR, MR-P) using Student's *t*-test. A *P*-level of 0.02 was used to delineate "statistical significance". We also performed an ANOVA, which in the post hoc analysis showed the same variables as in the *t*-test to differ significantly across groups. However, the number of cases which could be included in the ANOVA was reduced from 72 to 45 (because all groups have to be of equal size and all items for all cases in all three groups have to be rated). Further, the ANOVA provides a possibility of finding group differences in respect to single variables. Given the design of the study with clinically clearly different groups, we must expect to find major group differences. However, for the purpose of this study we were concerned to find single items discriminating between the three groups. We therefore present the results of the *t*-tests, as we thought they provided us with a more detailed picture.

We performed 130 comparisons × 3 (130 items IA-MR, IA-P, MR-P). Using a *P* level of 0.02 we would expect 8 of these 390 comparisons to be "significant" by chance alone. A significance level of 0.002 would superficially seem more appropriate. However, for the vast majority of items included as "significant" the P level was under 0.01 or 0.002 for at least one of the three comparisons. In the tables we therefore present data on all items with a *P* level below 0.02 and caution the reader against drawing firm conclusions, in particular as regards items producing *P* levels of only 0.02 and 0.01.

Results

Boy/Girl Differences

There were no significant differences with regard to results obtained in boys and girls in any of the groups. Results for both sexes are therefore presented together.

General Comments on Results

For 112 of the 130 items there were no statistically significant differences between all three groups. Only data concerning the remaining items are detailed in Tables 1 and 2.

Put another way, out of the 390 comparisons, 54 fell below the 0.02 *P* level. As has already been pointed out, at least 8 of these could have been produced by chance alone.

Items Discriminating IA from MR and N, and also MR from P

Table 1 shows which items in the questionnaire discriminated IA from MR and P children, on the one hand, and MR from P children, on the other.

The items which showed the highest discriminating capacity of all were "Appeared isolated from his/her surroundings" and "Did not play like other children".

Items Discriminating IA from MR and P

Table 2 shows which items in the questionnaire discriminated IA from both the MR and the P groups.

Here, the items most "typical" of IA were "Strange reactions to sound", "Did not try to attract adult's attention to own activity", and "Empty gaze".

Discussion

There are important limitations in studies of this kind.

The major problem is that the study is retrospective, and that in some cases more than 15 years had elapsed between the onset of the child's symptoms and the time when the mother was asked to comment

on them. Such a long time may, of course, have affected the reliable reporting of certain symptoms. However, because of the age-match, differences observed between the three groups should not be attributable to this factor.

Another aspect of the study's retrospective nature is that selective recall might be operating in all three groups, owing to the mother's knowledge that the child has a diagnosis of autism or mental retardation or is considered normal. For instance, mothers of autistic children might well single out and focus on symptoms which she knows to be associated with autism, and mothers of normal children may tend towards a "no problem" attitude because they suspect that all the statements of the questionnaire describe abnormal features in the child. This factor is the one which places the most severe restrictions on the study. It is quite possible that some of the differences observed between the groups may be due to such selective recall. Nevertheless, the fact that some problems thought to be specific only to autism characterized both the IA and the MR groups and the finding that some problems considered typical of both handicap conditions singled out only one of the groups, give some, albeit indirect, support for the validity of the findings. Also, if knowing about early symptoms in autism had heavily influenced the parents' reporting in this study, we would have expected a rather small variation around the mean for many variables. This was not so. Rather, the autism group showed considerably greater variation than either of the two other groups.

Problems as regards validity of group representation should not be of major importance in this study. The autistic children constitute as typical a population of such children as possible considering that they were recruited from a population-based study. The other two groups were matched for some aspects (age, sex and maternity clinic/IQ), but we have no reason to believe that this affects their representativity except in respect of sex. The "normal" group, in spite of being considered normal by their mothers and not having applied for child psychiatric help, may, of course, have had behavioural problems, but it is unlikely that they had autistic features, since symptoms of autism usually prompt referral to child psychiatrists.

The attrition rate must be considered acceptable ($< 10\%$), and it is notable that all the mothers of the autistic children completed the questionnaire.

In spite of the problems associated with studies of this kind, we consider the results to be of interest to anybody trying to develop diagnostic instruments in the field of early detection of autism. We do not make claims that the symptoms we have found to discriminate between autism and mental retardation/normality are *the* symptoms to look for, but we do suggest that they can serve as a basis for future research. Retrospective studies of this kind, using mothers' questionnaires, have been shown to have some face validity, for instance in studies on motor-perceptual disordered children (Rasmussen and Gillberg 1983).

We have tried to explore the possibility that other symptoms than those inherent in the diagnosis of autism may be important at the time of onset. Most of the symptoms with high discriminating capacity that we found belonged in the three main symptom groups disturbance of social relationships, disorder of communication, and play-behavioural abnormalities of a specific kind. However, we did find another group of symptoms with powerful discriminating function, viz. in the field of abnormal responses to sensory stimulation. Particularly in respect of abnormal reaction to sound stimulation there was a very strong association with autism and virtually none with either mental retardation or normality. Examining the individual questionnaires in this respect, we found that all of the autistic, two of the mentally retarded, and none of the children in the population-based group had shown abnormal auditory responses in infancy. The two mentally retarded children were both diagnosed as suffering from hearing loss. If borne out by the results of prospective studies, this finding would argue in favour of including the abnormal sensory (auditory) responses among the diagnostic criteria for autism, as suggested by Coleman and Gillberg (1987). In an early, retrospective study by Wing (1969) abnormal response to sound appeared to be one of the most differentiating features of autism as compared with normal and Down's syndrome children, at least in the 1-to 5-year-old age range. In fact, Wing's overall findings from the preschool period were very similar to ours which pertained to the infancy period.

It is also noteworthy that sleep problems and a marked tendency for periodicity were features typical only of the autistic group.

Language variables of different kinds (in particular relating to peculiarities of babble development) as well as speech items (pitch tone and inflection of voice) were included, but we could not find any discriminating power in them in retrospect. However, several items in these fields yielded "abnormal" results both for the autistic and the mentally retarded children, so they are probably important when screening for "mental developmental deviance any kind". When one is dealing with the 2 first years of life it is probably very difficult to find clear differentiating features between autism and mental retardation in

Table 1. Items discriminating children with autism (IA) from those with mental retardation (MR) and the population-representative group (P), and MR from P

Area/item	M(IA)	M(MR)	M(P)	SD(IA)	SD(MR)	SD(P)	t(IA–MR)	t(IA–P)	t(MR–P)
Social									
30. Appeared isolated from his/her surroundings	6.87	2.2	0.11	3.92	3.66	0.25	3.80***	8.07***	2.68*
112. Did not smile when one expected him/her to	5.77	2.0	0.15	4.05	3.36	0.29	3.07**	6.50***	2.58*
Communication									
5. Difficulties imitating movements	7.57	4.2	0.67	3.17	4.48	1.91	2.55*	8.37***	3.25**
Perception									
43. Hearing deficit/deafness was suspected	5.7	1.9	0.08	4.48	3.24	0.14	3.00**	5.87***	2.64*
Play – behaviour									
27. Did not play like other children	1.35	5.0	9.35	2.87	4.41	1.72	3.14**	11.28***	4.22***
48. Occupied himself/herself only if left alone	5.79	2.3	0.18	4.29	3.73	0.44	2.69*	6.10***	2.65*

*** $P < 0.002$ ** $P < 0.01$ * $P < 0.02$

Table 2. Items discriminating IA from MR and P (and not MR from P)

Area/item	M(IA)	M(MR)	M(P)	SD(IA)	SD(MR)	SD(P)	t(IA–MR)	t(IA–P)	t(MR–P)
Social									
34. Did not like to be disturbed in his/her world	5.19	1.5	0.56	4.05	3.13	1.61	3.13**	5.00***	1.22
90. Contented if left alone	4.55	0.9	0.3	4.23	2.29	0.61	3.22**	4.61***	1.18
Communication									
108. Did not try to attract adults' attention to own activity	8.48	2.5	0.8	2.12	3.60	2.12	6.59***	12.15***	2.03
Perception									
7. Strange reactions to sound	6.25	1.6	0.36	4.23	2.94	0.99	3.93***	6.37***	1.85
53. Empty gaze	4.01	1.4	0.52	2.00	2.50	2.08	3.75***	5.86***	1.2
61. Overexcited when tickled	6.43	2.8	2.14	4.05	3.43	2.85	2.99**	3.96***	0.64
73. Seemed not to react to cold	3.35	0.8	0.34	3.83	1.51	0.34	2.60*	3.67***	1.39
24. Would engage in bizarre looking at objects, pattern and movements	5.17	1.8	0.59	4.68	2.51	2.05	2.68*	4.12***	1.64
Play – Behaviour									
60. Odd attachments to odd objects	6.62	2.7	1.69	4.24	3.4	3.44	2.86**	4.18***	0.89
19. Would play only with hard objects	3.13	0.7	0.48	3.68	1.22	1.12	2.61*	3.24**	0.59
Rhythmicity									
75. There were days and periods when he/she would seem much worse than usual	5.46	1.7	0.79	4.32	3.35	1.98	2.88**	4.59***	1.05
18. Severe problems over sleep	4.89	1.7	1.21	4.62	3.24	2.84	2.46*	3.23**	0.5

*** $P < 0.002$ ** $P < 0.01$ * $P < 0.02$

the field of language problems, at least when using questionnaires for completion by parents in retrospect.

Insistence on sameness and resistance or upset in connection with change (items 49, 64 and 116 on the questionnaire, see Appendix) did not distinguish between the groups. It is possible that such symptoms, typical of all the autistic children in this study, did not typify their behaviour until after the first 2 years.

In conclusion, this preliminary retrospective study of early symptoms in autism has confirmed the existence of three groups of symptoms currently thought to be diagnostic of autism. It is possible that a fourth group of symptoms ("abnormal responses to sensory stimulation") might also be important. The results must be interpreted cautiously but may serve as a basis when planning future prospective studies of early symptomatology in autism, rather than as the ultimate answer as to what should be looked for in clinical practice to arrive at a swift and correct diagnosis.

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Appendix

The Questionnaire
Concerning Early Symptoms of Autism
(*He* substituted throughout for *he/she*)

1. It was difficult to get eye contact with him
2. He would point to objects with the whole of his hand
3. He did not understand his own words
4. He was exceptionally still
5. *He had difficulties imitating movements*
6. He would eat only a very few dishes
7. *He showed strange reactions to sound*
8. He was interested only in parts of objects (such as wheels of toy cars)
9. There was something odd about his gaze
10. He did not react like other children to body contact
11. He could not make clear what he wanted
12. He was exceptionally sensitive to pain
13. He would stare into the sun, a lamp etc.
14. He reacted as though hurt when he was caressed
15. It did not matter much whether Mum or Dad was close by or not
16. He was exceptionally violent
17. When excited he would make odd movements
18. *He had severe problems over sleep*
19. *He would play only with hard objects*
20. He did not develop normally
21. His speech development was delayed
22. He ruminated
23. He would play only with old, well-known toys
24. *He would engage in bizarre looking at objects, pattern and movements*
25. He liked to constantly turn the light on and off
26. He often behaved as if he were freezing
27. *He did not play like other children*
28. He had an islet of exceptional ability
29. He could not stand cold as well as other children
30. *He appeared isolated from his surroundings*
31. There was something strange about his voice/cry/babble
32. He was suspected of having poor eye sight/being blind
33. He would hit or bite himself (or injure himself in other ways)
34. *He did not like to be disturbed in his world*
35. He had unusual reactions to pain
36. Eye contact was very unpredictable
37. He did not show signs of hunger
38. He often behaved as if he were hot
39. He babbled like other children
40. Getting him to eat solid food was difficult
41. He would hit other children (or bite or pinch them)
42. He was better than other children in one or two particular areas
43. *A hearing deficit/deafness was suspected*
44. He pointed at objects under age 2 years
45. He was exceptionally interested in lines and contours
46. He needed little sleep
47. He would sit on your knee in a strange manner
48. *He occupied himself only if left alone*
49. If changes were made in the surroundings, he lost previously acquired skills
50. He did not understand that things which had disappeared from sight still existed
51. Feeding him was problematic
52. He seemed not to react to heat
53. *He had an empty gaze*
54. He was exceptionally active
55. His pupils were exceptionally wide
56. His speech was different from that of other children
57. Holding him felt differently
58. There was no limit to his eating
59. He tolerated pain much better than other children
60. *He showed odd attachments to odd objects*
61. *He was overexcited when tickled*
62. He liked to constantly open doors and shut them
63. He seemed to be thirsty a lot of the time
64. He became very upset if interrupted in a favourite routine
65. Eye contact was established at a very early stage
66. He was late in developing
67. He reacted in an unusual way to cold
68. Somebody thought he was deviant already in the first month of life
69. He would sit all by himself doing nothing
70. In order for him to like it, you had to hold him in an unusual way
71. He had difficulties chewing
72. He was clumsy and ill-coordinated
73. *He seemed not to react to cold*
74. Sometimes the sight of something made him cover his ears instead of his eyes
75. *There were days and periods when he would seem much worse than usual*
76. He did not usually like to sit on one's knee
77. It was hard to know if he was hungry or not
78. He would point to objects only if they were within reach

79. Somebody thought there was already something the matter before age 2 years
80. He was exceptionally "good"
81. When you carried him he felt heavy
82. He "forgot" words which he previously knew
83. He seemed not to care whether there were people about or not
84. Sometimes the sound of something made him cover his eyes instead of his ears
85. He smiled when you least expected him to
86. He was not calm in his sleep
87. He enjoyed "soft and still" body contact
88. He was exceptionally sensitive to heat
89. Somebody thought there was already something the matter before age 1 year
90. *He was contented if left alone*
91. He was totally fascinated by certain things he saw
92. He reacted strongly to sound, regardless of level
93. He reached for the person who was going to pick him up
94. He did not like change
95. He walked on tiptoe
96. Sometimes he would sing in the middle of the night
97. He would often put his fingers in his ears
98. His movements were agile and graceful
99. He refused to be breastfed
100. It was difficult to comfort him
101. He screamed almost constantly
102. He never seemed to be cold
103. He was preoccupied with certain things
104. He loved to spin objects
105. He did not understand mime or gesture
106. He did not seek out contact like other children
107. He reacted in unusual ways to heat
108. *He did not try to attract adults' attention to own activity*
109. He would perform the same movement over and over again (with one hand, both hands, body etcetera)
110. He would not easily be comforted
111. He often turned to adults for contact
112. *He did not smile when one expected him to*
113. He did not speak at all before age 2 years
114. He treated people like objects (e.g. pinched their cheeks, poked their eyes or tried to "move" their heads)
115. There was something odd about his movements
116. He would protest if minor changes in his surroundings were made
117. He would cry a lot if left to himself
118. He was constantly engaged in looking at his hands, which he would turn or wave
119. He loved to look at the leaves in the tree
120. He sometimes reacted strongly to barely audible sounds
121. He chewed in an odd way
122. He would smell objects and people
123. He reacted as though certain sounds were painful
124. He liked extremely spicy food
125. He loved to watch running water
126. He drank very little
127. Once he started to walk he did it perfectly at once
128. He would toss his head fiercely backwards
129. He drank all the time
130. Somebody thought there was something the matter from very early on (e.g. on the day he was christened)

Items discriminating IA from MR and P are *highlighted*

All items were presented with a visual analogue scale on which the parent had to indicate to what extent the statement "applied" or "did not apply" *before the child's 2nd birthday.* Some items are used (albeit with a slightly different wording) more than once.

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