DAMP and MBD versus AD/HD and hyperkinetic disorders

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"Deficits in attention, motor control and perception (DAMP): a simplified school entry examination", a paper presented by Landgren, Kjellman and Gillberg (1) in this issue of *Acta Paediatrica*, sets in focus the need to discuss the Swedish concept of DAMP and how it relates to the concepts of minimal brain dysfunction (MBD), AD/HD (according to the DSM-IV) and the hyperkinetic disorders (according to the ICD-10).

DAMP was introduced by Gillberg and Rasmussen in the early 1980s in studies on 6 and 7-year-old children in Gothenburg, Sweden. In the original theses, Gillberg (2) and Rasmussen (3) both addressed similar questions, and used the same sample of Gothenburg children and the same screening methods in a cooperation between paediatrics/child neurology and child and adolescent psychiatry. The main aims of Gillberg's study were to construct a screening instrument for detecting MBD in Swedish public pre-schools and to analyse and evaluate different aspects of the concept of MBD from a psychiatric point of view. Rasmussen's aims were similar, namely to analyse the prevalence of attention deficit, motor control and perception/conceptualization in 6-year-old children in public pre-schools and to analyse and discuss MBD in relation to the neurological findings.

Both Gillberg and Rasmussen used the concepts of MBD, MPD (motor perception dysfunction) and ADD (attentional deficit disorder) similarly. According to Gillberg (2) "MBD is in this context regarded as an operational diagnosis, requiring the presence of both attentional deficit signs and signs of either fine motor, gross motor or perception/conceptualization dysfunction. It is applied only in cases without cerebral palsy and mental retardation". Rasmussen (3) applied the term MBD "to children showing concomitant signs of marked attention deficit and marked gross motor, fine motor or perception/conceptualisation dysfunction. ADD was diagnosed in children having marked attention deficit without signs of marked motor or perception/conceptualisation dysfunction. In cases showing marked perception/conceptualisation or motor dysfunction but no marked attention deficit, a diagnosis of MPD was applied. These diagnostic categories were not used in children with cerebral palsy or MR".

The definition of MBD was based on the Scandinavian concept used at the time and as formulated by Clements et al. in the 1960s (4).

When discussing MBD and the concept of ADD as described above, the third edition of the American DSM system was referred to briefly. Gillberg wrote: "The vagueness of the definition of MBD in the international literature is exemplified in the DSM-III, where the delineation of the synonymously used concept of "attention deficit disorder" extends over some pages without clarity with regard to the most important issue of normality-abnormality. Where does the normal leave off and the abnormal begin? Strict operational criteria are needed to avoid vagueness."

The third edition of DSM-III (5) was an important step in the process towards clarifying criteria for different child and adolescent psychiatric disorders and, it might be said, also in relation to the concepts of MBD and ADD. The DSM-III states: "Attention Deficit Disorder—The essential features are signs of developmentally inappropriate inattention and impulsivity. In the past a variety of names have been attached to this disorder, including: hyperkinetic reaction of childhood, hyperkinetic syndrome, hyperactive child syndrome, minimal brain damage, minimal brain dysfunction, minimal cerebral dysfunction and minor cerebral dysfunction. Attention Deficit is the name given to this disorder, since attentional difficulties are prominent and virtually always present among children with these diagnoses. In addition, though excess motor activity frequently diminishes in adolescence in children who have the disorder, difficulties in attention often persist". Criteria are then given for ADD with or without hyperactivity.

When the concept of DAMP was first introduced as a variant of MBD, the local Swedish and Scandinavian debate began to deviate from the international discussion, in which more and more doubt was being raised about MBD. The following quotes are from Rutter et al.'s English textbook *Child and Adolescent Psychiatry. Modern Approaches* (6): "Cohort studies focusing on the later outcome of children with birth complications suggest that hyperactive and impulsive behaviour in childhood is a little more common than in children born normally, but the prediction is quite weak and not specific to hyperactivity (Neligan et al., 1976; Nichols & Chen, 1981). Maternal smoking in pregnancy, low fetal heart rate during labour and a small head circumference at birth are the strongest of the early factors. They all seem to bear witness of very early onset of the disorder rather than to any damaging effect around the time of the birth" . . . "Brain disease with localizing neurological signs is uncommon in children with ADDH and is excluded from most research series. By contrast, the more severe hyperkinetic disorder is disproportionately common in children with damaged brains: not only is it, like other psychiatric disorders, more common than in normal controls, but also it

accounts for a higher proportion of all the diagnoses that are made (Rutter et al., 1970; Thorely, 1984a). Some of this association, at least, can probably be explained by the prior association with intellectual retardation".

Finally, a German epidemiological study (7) presented in 1987 and highlighting the necessity to reconsider MBD showed up a weakness due to "the failure of its supposed components to be associated with one another in the same children and the failure of the condition to support coherent biological and prognostic findings".

In the 1981 Swedish study, a pre-school questionnaire was used for screening and diagnosing MBD among 67.4% of all 6-year-olds in Gothenburg (born in 1971). The questionnaire comprised "34 simple yes/no questions in five different groups: attention span/general behaviour, speech-language, gross motor function, fine motor function and perception-conceptualization. Seven of the questions referred to symptoms characteristic of the hyperkinetic syndrome".

Children with (a) at least one symptom in each of the five categories of questions or (b) abnormality in each of the five factors were identified as in the "high-load" index group. They comprised 31 children, i.e. 0.8% of the investigated group of 67.4% of the total group of 6-year-olds in Gothenburg. Another 340 children (9.9% of the investigated 67.4%) were identified as in the "low-index" group and as having abnormalities in either "attention deficit" or "conduct problems" in combination with abnormal "motor control" or "conceptualization".

In the final investigations leading to their conclusions, both Gillberg (2) and Rasmussen (3) compared 22 children (14 boys and 8 girls) from the "high-load" index group and another 60 children (52 boys and 8 girls) from the low-index group with a random sample of children from the 67.4% of 6-year-old Gothenburg children. The control group finally consisted of 59 children (29 boys and 30 girls). Of all 141 children, 42 (33 boys and 9 girls) were diagnosed as having MBD, and of these 40 were found in the index groups (18 children were in the "high-load" group and 2 in the control group, one of whom had no pre-school questionnaire "symptom" at all).

Moreover, 3 children in the index group were diagnosed as having mental retardation, another 7 (4 boys and 3 girls including 2 from the control group) were diagnosed as suffering from MPD, while 12 children (10 boys and 2 girls, including 4 from the control group) were diagnosed as suffering from ADD.

The design and methodology for the initial MBD/DAMP studies need further discussion. The Gillberg (2) and Rasmussen (3) definitions of MBD included conduct problems. Five items relating to conduct, and not found among the ADD items in DSM-III from 1980, were included in the Swedish definition of MBD/DAMP. In including conduct problems, the borderline between DAMP and conduct disorders became unclear. Perhaps this is one of the reasons why children from the index groups later developed delinquency? Could it also explain why the borderline between DAMP and ADHD has become unclear.

A discriminant analysis was run using the items of the pre-school questionnaire to see which of them could be used to distinguish between MBD and non-MBD cases. Six items/symptoms were found to be of importance: "limited vocabulary", "use of pen or pencil in immature way", "often spills or gets dirty", "immature drawings", "doesn't understand concepts of opposites" and "moves from task to task all the time". As items of this kind can reflect developmental aspects, and/or a variance in normal development, the borderline between the child's performance in terms of chronological age rather than mental age became unclear. This could be one of the reasons why the borderline between DAMP and the motor skill disorders has been found overlapping, especially in relation to developmental coordination disorder.

Another problem has to do with sampling procedures. Although the boy:girl ratio in the index groups varied from 2:1 up to almost 7:1, the way in which the comparison group was selected gave a sex ratio of 1:1 among the controls.

When the problems mentioned above are added to the complex pattern of comorbidity found among the index children—ranging from infantile autism to psychotic behaviour, conduct problems and depressive syndromes etc.—the question arises whether the pre-school questionnaire screened for MBD per se or for psychiatric disturbances in general. However, in relation to the stricter criteria presented in the different editions of the DSM from 1980 to 1994 some of the index children should not have been given a DSM diagnosis of ADD or ADHD.

In 1992, when the ICD-10 criteria were published (7), stricter criteria still were given for "hyperkinetic disorders", the ICD-10 disorders corresponding to AD/HD according to DSM and the Swedish DAMP. The ICD-10 manual states: "In recent years the use of the diagnostic term 'attention deficit disorder' for these syndromes has been promoted. It has not been used here because it implies a knowledge of psychological processes that is not yet available, and it suggests the inclusion of anxious, preoccupied, or "dreamy" apathetic children whose problems are probably different. However, it is clear that, from the point of view of behaviour, problems of inattention constitute a central feature of these hyperkinetic syndromes." With the ICD-10 criteria, the point prevalence of hyperkinetic disorders among boys from the general population is around 1%.

The paper by Landgren, Kjellman and Gillberg in this issue illustrates how complex and difficult it is to find alternative current and future explanations for the old but challenging concept of MBD. However, the design of their study bears similarities to the original DAMP

studies from 1981 and 1982, raising similar concerns about the sampling and screening procedures.

In the DSM system, MBD was abandoned in 1981 when ADD was introduced. A process has been going on since then and until now with the term AD/HD being used in the current edition of DSM, the DSM-IV (7). In ICD-10, MBD was abandoned when "hyperkinetic disorders" was introduced in the 1992 edition (8).

In Sweden, and as a local variant, MBD was renamed DAMP, and today the concept is in need of revision. The borders to other psychiatric disturbances, especially to AD/HD, hyperkinetic disorders, conduct disorders, borderline intellectual capacity, developmental coordination disorder and other developmental disorders and learning disorders are unclear.

The concluding words from the recently presented NIH consensus statement (Diagnosis and Treatment of Attention Deficit Hyperactivity Disorder, National Institutes of Health Consensus Development Conference Statement November 16–18, 1998) (9) indicate new ideas to come: "Finally, after years of clinical research and experience with ADHD, our knowledge about the cause or causes of ADHD remains speculative. Consequently, we have no strategies for the prevention of ADHD." As these same remarks are even more relevant in the case of the Swedish concept of DAMP, where the validity of the diagnosis is "shaky", it may be rewarding to concentrate future discussion in the way indicated in the current editions of the DSM and ICD and the concepts of ADHD and hyperkinetic disorders.

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