Early identification of autism by the CHecklist for Autism in Toddlers (CHAT)

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The CHecklist for Autism in Toddlers (CHAT) is a screening instrument that identifies children aged 18 months who are at risk for autism. This article explains how the CHAT was developed and how it should be used. First we offer a brief introduction to autism.

WHAT IS AUTISM?

Autism, first described by Kanner in 1943[1], is one of a family of 'pervasive developmental disorders[2]. The most severe of the childhood psychiatric conditions, it is characterized by a triad of impairments—in socialization, communication and flexible behaviour. The exact cause is unclear but family and twin studies suggest a genetic basis[3–5]; molecular genetic studies are underway[6]. Altered central nervous system function is evident in several different brain regions including the medial prefrontal cortex[7] and the amygdala[8–10]. Autism occurs in about 1 per 1000 children[11].

The general view is that autistic conditions exist in a spectrum, with classic autism at the extreme. In *DSM–IV* this is referred to as autistic disorder, and in *ICD–10* as childhood autism. To qualify for this diagnosis, the difficulties in social interaction, communication, and flexible behaviour must have begun before the age of three years. Atypical autism and 'pervasive developmental disorder not otherwise specified' (PDD-NOS) also lie on the autistic spectrum, but children with these conditions do not meet criteria for autism because of late age of onset, atypical symptoms, symptoms which are not very severe, or all of these. Asperger's syndrome is thought to be another condition on the autistic spectrum: individuals with this syndrome have the social interaction difficulties and restricted patterns of behaviour and interests but their IQ is normal and there is no general delay in language. A final subtype are individuals with 'high functioning autism' (HFA), who are diagnosed when all the signs of Asperger's syndrome are present, together with a history of language delay (defined as not using single words by two years old or phrase speech by three years old).

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EARLY DETECTION

Until recently, autism was seldom detected before the age of three years. This is not surprising since it is a relatively uncommon condition and can have subtle manifestations. No specialized screening tool exists and most primary healthcare professionals have little training in the detection of autism in toddlers. However, the earlier a diagnosis can be made, the sooner family stress can be reduced; moreover, intervention can improve outcome[12]. In addition, early professional recognition of parental concerns may prevent secondary difficulties developing. The challenge is to identify a cost-effective method of detecting the early signs.

Which behaviours might be important?

Parents of children with autism often report that they first suspected that their child was not developing normally around the age of eighteen months[13]. At this age, certain behaviours are present in the normally developing child that are lacking or limited in older children with autism. Two of these are *joint attention*[14,15] and *pretend play*[11,16].

Joint attention refers to the ability to establish a shared focus of attention with another person via pointing, showing or gaze monitoring (e.g. glancing back and forth between an adult's face and an object of interest or an event)[17]. Joint attention allows children to learn through others—both learning what words refer to[18,19], and what to pay attention to in the environment ('social referencing')[20]. Joint attention is seen as the earliest expression of the infant's 'mind-reading' capacity, in that the child shows a sensitivity to what another person is interested in or attending to[21]. Pointing to share interest (or declarative pointing) can be distinguished from a simpler form of pointing (pointing to request, or imperative pointing). This distinction comes from child language research[22]. It is the declarative form which is of particular importance simply because in this type of pointing mind-reading may be the driving force ('*Look at*

Box 3 **Risk assignment**

High risk for autism group	Fail A5, A7, Bii, Biii, BIv
Medium risk for autism group	Fail A7 BIv (but not in maximum risk group)
Low risk for autism group	Not in other two risk groups

estimate of the prevalence of autism spectrum conditions in the general population, 0.34%[26], this is still at least ten times less than the recurrence risk rate among siblings of children with autism (3%)[4]. So the likelihood of finding cases of undiagnosed autism in the sibling group was much higher than in the control group.

The toddlers in both groups were assessed with the CHAT. None of the children in group A failed all five key items whilst 4 of the children in group B failed all five key items. A year later, when the children were thirty months old, a follow-up was arranged. None of the children in group A had autism. The 4 children in group B who had failed the five key items were all diagnosed as having autism. This strongly confirmed the prediction that absence of joint attention and pretend play at eighteen months of age is a marker that a child is highly likely to receive a diagnosis of autism.

Population screening study

After the preliminary success of the CHAT in detecting children at risk for autism in the sibling group, a more stringent test of the CHAT was set up in a population screening study[27]. 16 235 children aged eighteen months were screened with the CHAT from April 1992 to April 1993 by health visitors or GPs and parents. These were all children born in the South Thames Region of the UK. 38 children matched the high risk for autism profile and 369 the medium risk profile, with the remainder at low risk by the criteria in Box 3. One month later, all 38 of the high risk for autism group were re-screened by a psychologist in our research team, and 12 continued to meet this profile. Limited resources meant that only about half of the medium risk group could be re-screened: 22 met the criteria on the second CHAT, 2 of whom did not continue to participate in the project. 16 children were selected at random from the low risk group to receive a second CHAT and continued to match this profile. Thus 12 children in the high risk for autism group, 20 children in the medium risk for autism group and 16 children in the low risk for autism group were assessed clinically at twenty months and forty-two months. The diagnoses made at twenty months were provisional since this is earlier than the age at which children have usually been seen for diagnostic assessment and there is little evidence about the accuracy and stability of childhood autism and PDD diagnoses made in infancy. Substantive diagnoses were made at the forty-two month clinical assessment. We were able to diagnose children with childhood autism reasonably accurately at twenty months of age, in that most were thought to have either autism or PDD at that time.

By forty-two months, 10 of the 12 children in the high risk for autism group had received a diagnosis on the autistic spectrum. The eleventh child was clinically normal and the twelfth child had language delay. In the medium risk for autism group, half the children were diagnosed with autism spectrum conditions (childhood autism, Asperger's syndrome, or PDD), 2 received no diagnosis and the rest had language or learning difficulties. In the low risk for autism group, although 1 child was diagnosed with language delay, the other 15 were normal. Figure 1 summarises how the diagnoses in each group changed between twenty and forty-two months. Full details of diagnostic methods can be found elsewhere[28].

KEY ISSUES IN ANY SCREENING PROGRAMME

To be appropriate for screening, a condition should meet the following criteria[29]: (1) It should be serious; (2) treatment given early (before symptoms are fully developed) should be more beneficial in terms of reducing morbidity or mortality than treatment given later; and (3) the prevalence of the condition should be high among the population screened. Autism meets all three of these criteria. In addition a screening test should ideally be inexpensive, easy to administer, and cause negligible discomfort. The CHAT meets these too.

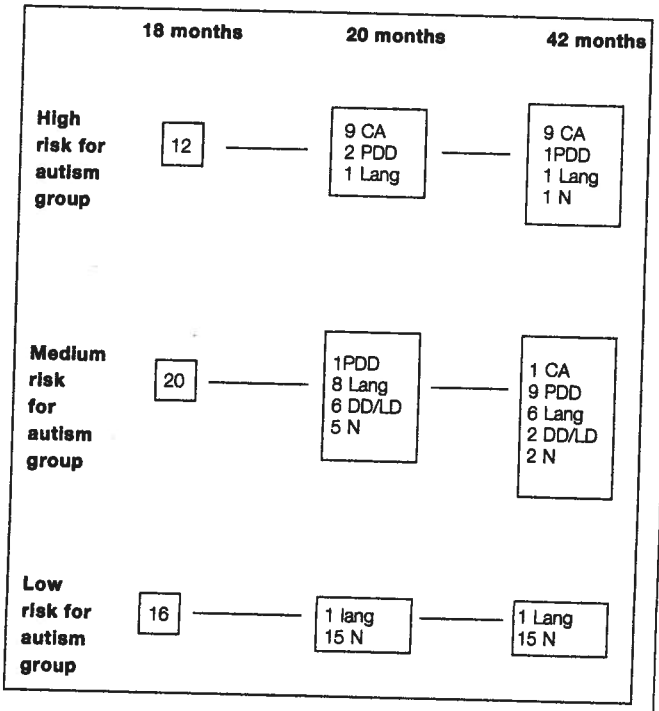

Figure 1 **Summary of changing diagnosis.** A=Childhood autism; DD/LD=developmental delay/learning difficulties; Lang=language disorder; N=normal; PDD=pervasive developmental disorder

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