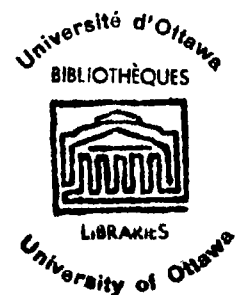


AN INVESTIGATION OF TEMPERAMENT AND
ITS RELATIONSHIP TO HYPERACTIVITY
IN CHILDREN

by
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Graduate Studies and Research of the University of Ottawa
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the M.A. degree in Psychology

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ABSTRACT

The present study attempted to identify the characterizing features of preschool hyperactive children which would be able to serve as infant high risk indicators, for the later development of hyperactivity. Towards this aim parent and teacher behavior and temperament ratings, plus a history of birth and pregnancy complications were examined.

A group of 20 hyperactive children referred to the Children's Hospital of Eastern Ontario, were compared with 20 control children selected from the Carleton Separate School Board's Junior Kindergarten classes. All subjects were male, and 3 to 6 years of age. Temperament information was gathered for parents and teachers utilizing the Thomas and Chess Temperament Questionnaires. Additional behavioral information was attained with the Conners Parent and Teacher Rating Scales.

Statistical analyses revealed that the best between group discriminators were: the Conners Scales, the temperament variables Activity, Adaptability, Intensity and Mood, and a total score of birth and pregnancy difficulties.

The results were discussed in light of those variables that might be of most use as infant risk indicators. Based on previous research suggesting greater stability, the individual temperament characteristics of high activity and low adaptability were emphasized as the best early risk discriminators. Difficulties with the parents' and teachers' temperament questionnaires were also discussed.

CHAPTER I

INTRODUCTION

Hyperactivity, one of the most common disorders of childhood, has been found to be widely pervasive across home, school and social situations, and to be stubbornly difficult to treat. The hyperactive child's basic difficulties include an inability to sustain attention and to control impulsivity. Although such problems generally come to professional attention when these children are unable to deal with increased demands for more controlled social and academic behavior, it is believed that their problems are evident from early infancy. For this reason it has been suggested that earlier identification and treatment of these children might result in more longstanding effectiveness.

In recent years the process of development of normal and atypical behaviors in children has broadened from an environmental orientation to include the importance of inborn temperamental behavioral styles. The present investigation is an attempt to relate information concerning temperament with the serious problem of hyperactivity in children. The relative stability of temperament for the first five years of life, suggests that the delineation of characteristic temperamental styles in hyperactive preschool

children could serve as possible early high risk indicators. Temperamental styles in infancy could then be utilized for identification of those children who are at risk for the later development of hyperactivity and allow for earlier intervention.

Hyperactivity

Clinical Description

The hyperactive child has been viewed with increasing concern in recent years. This type of disorder has been identified in a very heterogenous group of children. Varying definitions, etiologies, and treatments have added to the confusion surrounding this most common of diagnostic categories. Further complicating the picture is the over-inclusion, in much of the research, of subjects with varying symptom patterns (Langhorne and Loney, 1979; Ney, 1974).

This discussion will deal with a subgroup of "true" hyperactives, who do not evidence frank brain damage and are not intellectually retarded. These children generally show an early onset of behavioral problems, which are seen across situations and environments (Campbell, and Redfering, 1979; Sandberg, Rutter and Taylor, 1978; Schleifer, Weiss, Cohen, Elman, Cvejie and Kryger, 1975). The symptom pattern most

commonly found in these children is short attention span, impulsivity, low frustration tolerance and inappropriate activity (Campbell et al., 1979; Cantwell, 1977; Firestone, and Martin, 1979; Schrager, Lindy, Harrison, McDermott & Killins, 1966). Additional complications sometimes include poor peer relationships, aggressive behavior and learning disabilities (Campbell et al., 1979; Cantwell, 1977; Lambert and Sandoval, 1980; Safer and Allen, 1976).

It appears that hyperactive children have problems even at an early age. Parents report excessively high energy levels, sleep problems, fidgetiness excessive talking and disruptive meddlesome behavior (Cantwell, 1977; Safer and Allen, 1976; Werry, 1968). The children are brought to helping professionals because they are disruptive in the home, poor students, and generally difficult to manage. Although estimates vary due to different diagnostic practices, the seriousness of the problem is emphasized by prevalence levels in the U.S. of 4-10 percent of the school-age population, and up to 40% of all children referred to professionals (Huessy, et. al., 1970; Safer and Allen, 1976; Sandberg et. al., 1978). The ratio of boys to girls in this population is approximately 4 to 1 (Campbell et al. 1979; Cantwell, 1977; Safer and Allen, 1976).

Hyperactive children have been characterized as being more active than normal children. Although highly visible, such behavior does not appear to be the most critical aspect of their disorder (Douglas, 1972; Firestone and Martin, 1979). Parents or teachers may complain that they run about excessively, have difficulty sitting still, and seem to be always "on the go". These behaviors, however, are influenced by the child's preference for particular activity contexts and by external stimulation and structure (Cohen, Huls and Rhine, 1978; Zentall, 1980). As a result, activity level is not a stable characteristic of these children. For example, in a new or one-to-one situation, over activity may not even be noticeable. Excessive movement is most obvious when hyperactive children are younger, and motivated more by personal rather than socially acceptable goals. As they mature, this aspect of their problem becomes less central, but their attentional and impulsivity deficits remain (Hechtman, Weiss, Perlman, Hopkins and Werner, 1979).

The most central deficit, which has been experimentally isolated, is their inability to sustain attention. Douglas (1972) suggests that it is because of their short attention span that they tend to flit from one goal to another. As a result their behavior is often fragmented, contributing to the impression of overactivity. Behaviorally this problem

is seen in a failure to finish things, a tendency to be easily distracted, and difficulty with concentrating for prolonged periods on school work or play activities. Sykes, Douglas and Morgenstern (1973) studied the hyperactive child's ability to maintain attention on various tasks. They found that hyperactive children were no different from normal controls in their ability to direct their attention for brief periods, but that they were clearly deficient in their ability to sustain their attention, particularly on experimenter paced tasks. As a group hyperactives have been found to perform poorly on the WISC subtests requiring attentiveness to incoming information (Information, Arithmetic, Digit Span and Coding) (Milich and Loney, 1979). Attentional deficits have also been found in slower and more variable performance than controls on delayed reaction time tasks (Firestone and Douglas, 1975). Distractibility problems with hyperactive children are not evident in research examining the influence of extraneous environmental stimulation (Douglas, 1972). Research has shown that they have greater difficulty when intra-task distractions are introduced. In other words, when irrelevant information is included within the task they commit more errors than other children (Rosenthal and Allen, 1980). Finally, it seems that attentional

deficits are most central to the hyperactive child's problems, as it is the only deficit that was found to be capable of clearly differentiating such children from both normal controls and other pathological groups (Firestone and Martin, 1979).

In response to these current research findings, the Diagnostic and Statistical Manual (DSM-III) of the American Psychiatric Association, has chosen the term "attentional deficit", for children formerly diagnosed as "hyperactive". This term more realistically reflects the attentional difficulties which are so prominent among such children (Spitzer and Cantwell, 1980). Three subtypes were also introduced to allow for the variations in activity level, attention deficit disorder;with hyperactivity, without hyperactivity, and with only some residual symptoms remaining.

A second prominent area of difficulty for hyperactive children is impulse control. They are reported to often act without thinking, have difficulty organizing their work, frequently talk out in class, and have difficulty waiting their turn in group activities. Extensive investigations using such measures as Matching Familiar Figures, Porteus Mazes, and reaction time tasks, have found hyperactive

children to respond more impulsively than control subjects (Douglas, 1972; Firestone and Douglas, 1975; Firestone and Martin, 1979; Sykes, Douglas and Morgenstern, 1973). Through these various measures the hyperactive's deficits become evident. They display difficulties in holding back their tendency to respond long enough to look carefully and choose the best response. Hyperactives typically respond more quickly than controls and make more errors when reflective analysis is required. In addition, they will respond even more impulsively under conditions where they are given only positive feedback on their behavior, instead of an appropriate reward or punishment with each response. They appear to have more difficulty maintaining inhibitory control while coping with the increased level of arousal which accompanies solely positive reinforcement (Firestone and Douglas, 1975).

Another deficit often found is the inability to tolerate frustration. Hyperactive children have difficulty responding realistically to potentially frustrating situations on story completion tasks (Douglas, 1972; Firestone, and Martin, 1979; Schrager et. al., 1966). In comparison to controls, they are more likely to deny the existence of frustrating events or to respond with extreme pessimism. When compared to both controls and non-hyperactive

learning disabled children, they have been shown to be less willing to sustain effort when confronted with fatigue, complexity and frustration (Dykman, Ackerman and Oglesby, 1979).

In summary, although several related difficulties exist, the hyperactive child's most central deficits to be reliably isolated include a poor ability to: sustain attention, control impulsivity, and tolerate frustration.

Etiology

The underlying causes of hyperactivity are multiple and complexly related. Etiological bases have been investigated in three major areas: environmental, psychogenic and biological.

Environmental factors seen as contributing to the increase in hyperactivity include, the changes in family structure, increasing cultural tempo, population density and urban noise levels (Block, 1977). The increased usage of food additives and colorings in processed foods in recent years has also been implicated (Feingold, 1975). Additional speculation concerning societal contributions to the increasing levels of hyperactivity are exposure to

lead (David et al., 1972) and fluorescent lighting (Mayron et al., 1974; Mayron, 1978).

Block (1977) suggests that such factors in themselves are not sufficient to result in hyperactivity. Rather, the child's biological and psychological characteristics are seen as making him susceptible to developing problematic behavior in these environmental conditions. Although such children may be able to function better in a more agreeable environment, in modern society they become more obviously "hyperactive". The true contribution of these environmental factors is at present difficult to assess. There remains a need for more extensive long term research where hyperactive children can be studied under various environmental conditions. One possibility would be a comparison of hyperactive children found in urban vrs. rural communities.

Another causal factor is the emotional or psychogenic state of the child. Unstable family relationships are seen as increasing the child's potential to become hyperactive. The child's development is strongly influenced by such factors as parental warmth, consistent discipline, child control and realistic parental expectations. A stressful home environment might result in the child feeling insecure and

anxious. This could affect the child's inclination toward manifestations of behaviors associated with hyperactivity (Marececa, 1978; Schleifer et al., 1975).

Looking more closely into the family relationships of hyperactive children Cunningham and Barkley (1979) found that mothers of hyperactive boys were less likely to respond positively to the child's social interactions, solitary play activities, or compliant task behavior. In addition these mothers imposed more structure and control on their child's play, social interactions, and task oriented activities. This parental style was seen as an initial response to the child's overactive, impulsive inattentive problems, but also as further contributing to the child's behavioral difficulties. In other words, because of their child's behavioral style these mothers have adopted a controlling and intrusive manner, which unfortunately is accompanied by a reduction of positive responsiveness to their child's more appropriate behaviors. This places the child in a frustrating "no-pleasing-her" situation, which results in an increase of his behavioral problems.

The biological basis for hyperactivity has been investigated in numerous areas. Electroencephologram (EEG) studies were used as a means of determining neurological dysfunction. However, many of the early studies which found

a high incidence of EEG abnormalities in hyperactive children, suffered from methodological problems. These studies lacked control group data and utilized subjects with known neurological diseases. Therefore, although EEG abnormalities have been reported in 35-50 percent of hyperactive children, it is not clear how these percentages differ from normal or other disturbed children (Cantwell, 1977; Dubey, 1976). Later EEG studies are also questionable; finding mixed results, utilizing varying criteria of EEG "abnormalities", and not finding any differences in type of abnormality between diagnostic groups (Dubey, 1976; Werry et al., 1972).

Researchers have recently come to believe that such conflicting results are due to the diversity of psychophysiological responses in hyperactive children. When electroencephalogram differences were found, they appeared strongest among certain subgroups, such as good drug responders. Measures comparing these hyperactive children and controls have found greater power in lower EEG frequencies and slower, smaller evoked potential responses, suggesting the possibility of neurological underarousal (Hastings and Barkley, 1978). However, even these findings are rather tenuous and require replication.

An alternate area of investigation is with the so called "soft" neurological signs. These soft signs include characteristics like immature reflexes and poor motor-coordination. Unfortunately it is again unclear whether the presence of these signs are characteristic of hyperactive children, or of disordered children in general. Again, many early studies did not include comparison groups. Later studies showing significantly more soft signs in hyperactive than with normal children (Werry, et al., 1972) were unfortunately not always clearly replicated (Dubey, 1976). Finally, such studies are open to criticism because of the lack of "blind" analysis of neurological signs. In other words, the examiners were aware of which diagnostic category each child belonged to, introducing an unintentional bias into the subjective judgements required for the examination.

Biochemical imbalance has been posited as another possible etiological agent. This imbalance is thought to involve one or more of the central nervous system neurotransmitters, and is based largely on the known fact that the drugs which effect hyperactive behaviors also influence brain monoamines (Dubey, 1976). Since direct brain measurement is not possible without surgery, indirect measures of

peripheral monoamines, such as urinalysis, were utilized. These investigators however, have found no consistent evidence to support the hypothesis of biochemical abnormality in hyperactivity. Results were most clearly seen when comparisons were made between subgroups of hyperactive children. In one study, only drug responders were found to have significantly more neurological signs and lower monoamine levels in urinalysis. (Shekim, Dekirmengian and Chapel, 1979). There is however, a need for replication of this study utilizing larger samples. Although brain monoamine levels may yet be disturbed, at this point no conclusive statements can be made (Cantwell, 1977; Dubey, 1976; Khan and Dekirmenjian, 1981).

Investigations of birth and pregnancy complications such as prematurity, anoxia, toxemia and maternal bleeding have produced minimal support for their relationship to the occurrence of hyperactive disorders (Stewart, 1966; Stone, Smith and Murphy, 1973; Werry, 1968). The comprehensive longitudinal study involving all 670 children born on the island of Kauai contributed the strongest evidence in this area (Werner and Smith, 1977). While not specifically dealing with hyperactive children, these investi-

gators found that among the 2% of children who had suffered severe perinatal stress, 4 out of 5 who survived to age 18, had significant behavior, learning and/or physical problems. Those children diagnosed as learning disabled/minimal brain dysfunction (including hyperactive, attentional problems), were found to be significantly more likely to have moderate to severe degrees of perinatal stress, low birth weight and/or congenital defects (Werner & Smith, 1979). It has been suggested that such difficulties are not sufficient in themselves to result in hyperactivity, but must be combined with sufficient genetic conditions (Rapoport, Quinn and Lamprecht, 1974).

Another possible indication of biological problems is the presence of minor physical anomalies. Examples of these deviations from the norm are: large head circumferences, high arching of the palate and curvature of the little finger. The number of these anomalies has been shown to be higher in hyperactive than normal children (Waldrop & Halverson, 1971; Firestone, Lewy & Douglas, 1976). The occurrence of such anomalies is thought to suggest the occurrence of some genetic and/or toxic factors acting during pregnancy to produce both the central nervous system dysfunction and the minor physical anomalies.

These anomalies have been shown to remain over a 5 year period (Waldrop & Halverson, 1971), to be related with soft signs of brain damage (Paulsen & O'Donnell, 1980), and to be associated with increased plasma dopamine beta hydroxyase activity (Rapoport, et al., 1974). However, it is important to note, that such anomalies are not an exclusive characteristic of hyperactive children. They have also been isolated in several diverse groups including: overactive preschoolers (Waldrop, Pederson & Bell, 1968), children with congenital speech, and hearing disorders (Waldrop & Halverson, 1971), mentally retarded children (Firestone, Peters, Rivier & Knights, 1978b), children prone to academic failure (Rosenberg & Weller, 1973), and distractible boys with fine and gross motor incoordination (O'Donnell, O'Neill and Staley, 1979; O'Donnell and Van Tuinan, 1979).

Genetic, family, twin and adoption studies suggest that there may be a strong inherited component in hyperactivity (Cantwell, 1975; Cantwell, 1976; Dubey, 1976). Unfortunately considerable methodological problems such as; non-blind analysis, confounding environmental effects

in familial comparisons, failure to examine biological family members in adoption studies, and unbalanced sex ratios in twin studies, limits the conclusiveness of these results. The gene transmission hypothesis still remains a plausible, though most likely an incomplete explanation of hyperactivity. More rigorous research may well establish the likelihood of genetic predisposition in some cases, but hyperactivity will always develop through an interaction of these factors with other biological and non-biological environmental factors (McMahon, 1980).

The evidence taken as a whole does not strongly support any particular organic agent as the single etiological factor. Although organic factors seem to play a role in hyperactivity in some children, an assumption of organicity is not always justified. It seems that within the heterogeneous group of hyperactive children there appear to be indications of the existence of a specific subgroup of children suffering from some sort of biological deviation (Dubey, 1976; Hastings and Barkley, 1978; Sandberg and Rutter et al., 1978). Since no single etiological solution can be located it seems most likely that different causative agents are active in different children. There is a need for future research to attempt

to subdivide hyperactive children into more homogeneous subgroups. Separations on the basis of: severity of symptoms, age of disorder onset, response to medication, and generality vrs situational specificity of symptoms, may aid in the clearer identification of etiological factors.

Treatment

The assumed source of hyperactivity plays an important role in the choice of treatment. Those investigators who view such behaviors as a symptom of underlying biological difficulties emphasize medical interventions. Those who view the problem as originating in psychogenic sources tend to emphasize modifications of family interactions. Finally, those who see etiological basis in more environmental areas, emphasize the importance of diet, noise, lighting and other environmental variables.

As discussed earlier, a simple etiological source is difficult to identify. It seems most likely that a combination of various factors is in operation for each hyperactive child. For this reason, the present trend is towards more differential diagnosis and treatment. Although multiple approaches are being utilized there is still a

great need to clarify the usefulness of the unique or joint contributions of various treatments (Cantwell, 1977; Lambert, Windmiller, Sandoval and Moore, 1976).

Psychopharmacological treatment is the easiest, least time consuming and most frequently used intervention in the management of hyperactivity (Cantwell, 1977; Lambert, Sandoval & Sassone, 1979). Stimulant medications (methylphenidate and the amphetamines) are most commonly prescribed. They have repeatedly been shown to result in reductions of the child's activity level and distractibility, and improvements in his impulse control. It is believed that their major effect is to allow the child to attend better to the tasks at hand (Barkley and Cunningham, 1978 and 1979; Dykman, Ackerman and McCray, 1980; Firestone, Davey, Goodman and Peters, 1978a; Kolata, 1978; Lambert et al., 1976; Sostak Buchsbaum and Rapoport, 1980).

At one time it was widely believed that hyperactive children reacted to stimulant medication in a "paradoxical" manner. To external observers they seemed to be calmed by these medications while adults and normal children were stimulated. Rapoport et al. (1978) has

recently demonstrated that such stimulants produce heightened efficiency and attentiveness in normal children and adults as well. Clearly, their effect cannot be considered paradoxical nor, as some researchers propose, necessary for a diagnosis of hyperactivity (Loney, 1980; Pihl, 1980; Zahn, Rapoport and Thompson, 1980).

In spite of the more positive short term effects, some children taking these medications develop annoying side effects which may include: loss of appetite, sleeplessness, headaches, stomach aches, and irritability (Cantwell, 1977; Firestone et al., 1978a; Safer and Allen, 1976). Research into the long term use and discontinuation of stimulant medication suggests that the greatest improvement in behavior and academic functioning occurs in the early months of treatment. These improvements seem to be only partially maintained during long-term therapy and little change occurs upon discontinuation of medication (Charles, Schain and Guthrie, 1979). Although many children initially show marked improvement in classroom manageability, over longer periods of time this does not seem to be accompanied by improvements in academic performance (Barkley and Cunningham, 1978; Kolata, 1978; Lambert et. al., 1976).

Several explanations have been suggested to account for the lack of academic improvement. First, it is thought that the hyperactive child may only receive these medications when he is too old and is already missing basic academic skills necessary for more advanced learning. For this reason some researchers emphasize the importance of early employment of such medications to enable hyperactive children to make a good start in school (Barkley and Cunningham, 1978; Stewart, 1970). It is also believed that stimulant medication may make hyperactive children less alert to other people and their surroundings, decreasing the inquisitiveness necessary to promote academic learning (Barkley & Cunningham, 1978).

The failure of medications to improve academic success can also be viewed as an inability to influence all the specific variables responsible for such failure. For instance, while medication improves the child's attentiveness it is an inappropriate treatment for such factors as specific learning disability, neurological immaturity, low intelligence, emotional immaturity and/or general emotional disturbances (Barkley and Cunningham, 1978; Bower and Mercer, 1975; Lambert et al., 1976).

It has been suggested that poor results in long-term outcome studies may be partially due to non-adherence to

the prescribed medication. Inadequate monitoring by physicians (Solomons, 1973) and failure of patients to take medication as prescribed (Briant, 1978) has no doubt contributed to the inconsistency of drug outcome studies. Firestone (1981) examined specific factors involved in non-adherence, and found that 45% of the subjects stopped using their prescribed medication during the course of a 12 month intervention study. These findings represent a potentially important influence on outcome studies as parents usually terminated medication without professional consultation.

It has also been suggested that the improved behavioral manageability of children taking medication may result in teachers overlooking their basic academic difficulties (Barkley & Cunningham, 1978). Related to this point is the effect of various dosage levels on such children. Sprague & Sleater, (1973) have found evidence that suggests that the most calming dosage of stimulants may be so high that they inhibit the child's ability to learn. Since the correct dosage for each child is often determined by behavioral improvements, it is possible that such children are routinely given doses that are either too high or too low (Kolata, 1978).

These results suggest that stimulant medications are most useful for improved manageability in relatively immediate settings and that treatment of the whole child requires that it be used in conjunction with other intervention strategies (Algozzine and Algozzine, 1978; Backman and Firestone, 1979; Barkley and Cunningham, 1978).

Behavior modification is an alternate form of treatment. In addition to helping control more disruptive hyperactive behaviors, this method is also capable of establishing more adaptive behaviors (Bower et al., 1975; Cole and Moore, 1976). This form of intervention views the development of hyperactivity as having a more psychogenic origin in faulty behavioral training, and approaches treatment through corrective learning strategies.

Wolraich (1979) in his review of 157 studies employing behavior modification with hyperactive children found:

- (1) that it was effective in alleviating problem behaviors
- (2) the most effective and commonly applied program was token systems
- (3) it was effective through both positive reinforcement and punishment but that positive reinforcement also resulted in improved self esteem

(4) home behavioral problems required home based interventions

(5) behavior modification seemed to work with additive effects when used with stimulant medication

(6) long term effects beyond one year have not been clearly assessed.

Importantly however, it seems that behavior modification programs need to be ongoing, requiring continued supervision of parents and/or teachers. As such, continued positive changes seems to require intensive effort on the part of many helping professionals. Comparative research has found that while behavior modification offers a valuable therapeutic alternative, it is less effective in producing behavioral improvements than, stimulant medications (Firestone, Kelly, Goodman, and Davey, 1981; Gittelman-Klein, Abikoff, Katz, Gloisten, and Kates, 1976).

Some investigators have become concerned that interventions such as behavior modification and psychopharmacology, may convey to the child the message that he is not responsible for his own behavior (McMahon and Sulzbacher, 1979). As alternatives, there also exist behavioral techniques which allow the child to manage his own behavior. These self-control procedures include: self instructional training in verbal

mediation, learning to stop-look and-listen before acting (Cameron and Robinson, 1980; Douglas, 1972; Sherman, and Anderson, 1980); and biofeedback-relaxation training to help improve self control (McMahon and Sulzbacher, 1979; Omizo, 1980). These treatment approaches hold promise for the future but further evaluation of their comparative effectiveness is still needed.

Other intervention strategies emphasize the importance of psychogenic origins through family counselling (Algozzine et al., 1978; Wolraich, 1979). Information on the family interactions of hyperactive children suggest that changes in the parent's management strategies can result in demonstrable improvements in the child's behavior (Cunningham & Barkley, 1979).

Additional interventions have been suggested based upon a view of psychogenic etiology, but which have not been extensively researched. These include: individual psychotherapy with the child to help him with secondary emotional symptoms, low self esteem, and poor peer relationships (Cartwell, 1977; Freeman, and Cornwall, 1980; Werry, 1968); observational learning where such children learn to be more reflective through modeling of their teachers (Bower et al., 1975); and remedial education and perceptual-motor training to help learning deficits, motor-coordination and body image problems (Werry, 1968).

Consideration of more environmental factors include such intervention strategies as increased environmental structuring (Werry, 1968), decreased environmental distractions (Bower et. al., 1975), and diet control (Feingold, 1975; Rapp, 1979).

Feingold (1975) hypothesized that hyperactive children are born with a genetic predisposition to hyperactivity which is then triggered by such food substances as salicylates, artificial food coloring and artificial flavoring. In reviewing the existing studies which have attempted to investigate Feingold's hypothesis, Williams and Cram (1978) found that none of the experimental studies gave unqualified support for such dietary control. It seems that 10-25% of hyperactive children, mostly the younger ones, respond favorably to diets without artificial additives but which contained salicylate food preservatives, but the degree of improvement is not as great as that achieved by stimulant medication. In addition, it appears that the negative behavioral effects of artificial colors are only short term. Diet does seem to warrant further experimental work, but there is a need for more objective measures of change and more independent evidence of allergy (Taylor, 1979).

The repetitive message of much of the research into intervention emphasizes the need for greater communication and collaboration among teachers, physicians and parents, the use of multiple treatment approaches depending on the specific child's needs, and the need for the earliest intervention possible (Algozzine et al., 1978, Cantwell, 1977; Firestone et al., 1981; Lambert, et al., 1979; Pihl, 1980; Robin and Bosco, 1976; Stewart, 1980; Williamson, Anderson and Lundy, 1980).

Outcome

Originally it was thought that the hyperactive behavioral disturbances would spontaneously disappear as the child grew older (Laufer and Denhoff, 1957). Later evidence seems to suggest that such disorders are much more stable. The seriousness of hyperactivity becomes evident in these research findings which imply that current treatment strategies do not alter the long term prognosis of hyperactive children (Cantwell, 1977).

Preschool children diagnosed as hyperactive continue to manifest these problems, along with added poor self esteem in later elementary school years (Campbell et al., 1977; Schleifer et al., 1975). Campbell, Schleifer and Weiss (1978) found continuity over time for both maternal

reports and child behaviors. More specifically; maternal reports of infant sleep difficulties were related to maternal ratings of hyperactivity at $4\frac{1}{2}$ to $6\frac{1}{2}$ years, high activity at age $4\frac{1}{2}$ was predictive of hyperactivity and conduct problems at age $6\frac{1}{2}$, and nursery school behavior at $4\frac{1}{2}$ was predictive of teacher's ratings of problems and classroom behavior in grade two. Mendelson, Johnson and Stewart (1971) conducted a 2-5 year follow-up of 83 hyperactive children and found that although most had been treated with stimulants and judged improved at the time, they were still doing poorly in school in both academic and conduct areas. Similar studies which checked upon hyperactive children in their teenage years found the same negative outcomes of antisocial behavior, school failure, and drop-outs (Huessy, Metoyer and Townsend, 1974; Minde, Weiss and Mendelson, 1972; Weiss, Kruger, Danielson and Elman, 1975). In addition, these studies found that it didn't seem to make any difference how much medication the child had received or whether he had received any medication whatsoever (Barkley & Cunningham, 1978).

When seen in their teens, hyperactive boys were rated as being considerably less over-active than they had been in middle childhood. However direct observation showed that they remained more active and distractable than the contrast group. Their previous excess of gross

motoractivity was now expressed as a less obvious restlessness. Even though hyperactivity per se seems less prominent, these adolescents continued to be distractible, had problems maintaining goals, failed more grades in school, were more emotionally immature, had lower self-esteem and had more problems with antisocial behaviors, than a matched control group (Minde et al., 1972; Weiss, et al., 1975).

In a retrospective study, Boreland & Heckman (1976) compared 20 previously hyperactive adult males, of average intelligence, to their unaffected male siblings. They found that although half of the hyperactive subjects continued to show similar behavior problems, most were steadily employed and self-sufficient. However, they had a significantly lower socio-economic status than their brothers. Most of the subjects traced however, came from good stable families, Morrison (1979) studied adult psychiatric patients retrospectively. He found that those who had been previously hyperactive as children had fewer affective disorders but still showed significantly more sociopathy, more alcoholism, and more personality disorders of all types.

A prospective outcome study, has also found some evidence of relatively poor adult prognosis (Hechtman, Weiss, Perlman, Hopkins & Werner, 1979). These investigations reported that even though few hyperactive subjects showed serious pathology, they continued to have impulsive and immature personality trait disturbances. They found that these previously diagnosed hyperactives reported having fewer friends, lower self esteem, more anxiety, tension and general hostile feelings, than matched controls. As well, they reported and were observed to be more restless, had more car accidents, moved more frequently, and had a lower level of education than controls. More positively; they had a tendency to return to school part time to upgrade their academic standing, were measured to have similar work satisfaction, and were no more likely to have had recent court referrals than controls. This indicates a decrease in antisocial behavior.

There does not seem to be any clear prognostic indicators, but both Mendelson et al., (1971) and Minde et al., (1972) found that antisocial outcomes seem to be associated with family disturbances and parental abnormalities.

In summary, the most stable problem areas in later years of children diagnosed as hyperactive, seem to be

those related to poor self-esteem, immature and impulsive personality traits and poor socialization (Hechtman et al., 1979). In this light, it seems that the hyperactive child's problems do not go away. Moreover, present intervention seem to be doing little to remedy the situation. It has been suggested by many investigators (Cantwell, 1978; Cunningham and Barkley, 1978; Stewart, 1970; Loney, Prinz, Mishalow and Joad, 1978) that earlier intervention may be more helpful for these children. In addition, in view of the suggested importance of family disturbances in later outcome, it might be helpful if intervention strategies dealt more directly in this area.

The problem in early intervention is identifying hyperactive children at a young enough age. They are generally not brought for help until they start causing problems. As a result, they are usually identified as they enter grade one, when they are unable to cope with the demands of school requirements and interpersonal controls.

There has been some work which suggests that hyperactive children can be identified in their pre-school years (Campbell et al., 1979; Schliefer et al., 1975).

Intervention at even younger ages depends on the delineation of fairly stable high risk indicators which are present from the child's earliest years. One possibility is the identification of early temperamental characteristics.

Temperament

High Risk Indicators

Temperament can be defined as a behavioral style. It refers to 'how' a behavior is performed rather than what is done or why it happens. It has been extensively researched as a means of identifying individual behavioral styles in early childhood (Thomas, Chess & Birch, 1963, 1968, 1977). It has been suggested as a possible high risk indicator for various problem areas including; teenage high blood pressure (Wantuch, 1977), later psychiatric disorders (Graham, Rutter & George, 1973), learning disabilities (Scholom & Schiff, 1980), poor academic achievement (Perlin, 1977), and later behavioral disturbances (Field et al., 1978; McInerny and Chamberlin, 1978; Paulsen and O'Donnell, 1979; Thomas, Chess, and Birch, 1977).

Recent literature reflects the growing interest in the identification of high risk indicators. It is hoped that defining childhood disorders as early as possible will allow for the implimentation of more preventive styles of inter-

vention. However, there are several problems related to the identification process utilized in such work.

Risk indicators cannot be considered stable factors, and need to be periodically re-evaluated (Kocharek, 1980). It must be recognized that even though children are identified as being "at risk" for later behavior disorders, their development remains an ongoing process which is ultimately unpredictable. The incredible resiliency of the infant/young child, and his potential responsiveness to his environment, cannot be denied. Therefore, high risk factors should never be seen as immutable predictive indicators but as only increasing the child's possibility of developing later difficulties.

Another major problem associated with high risk indicators, is the possibility of creating a self fulfilling prophecy. Davie (1979) considers this possibility to be more likely when the type of high risk factor is pre-symptomatic. Birth and pregnancy stress, poor newborn neurological health, slow infant motor development, and other early medical complications have been suggested as increasing the child's risk for developing later problems (Kocharek, 1980). When combined with social and cultural factors (for example: family stability, socio-economic status, parental intelligence, education and mental health),

medical risk factors become amplified (Werner, et al., 1979).

Unfortunately, while suggesting possible risk for later development, there is little evidence allowing for precise operational definitions of when the need for intervention is justified. These factors can be identified before there are any overt signs of difficulty in the child. If preventive intervention occurs at this time it might focus attention on the child, thus producing parental anxiety and increasing the risk of producing a self fulfilling prophecy.

On the other hand, if the type of high risk factor is more symptomatic, it is based on present conditions in the child. Intervention based on these present conditions is much more defensible and is more likely to result in anxiety reduction in the parents and less risk of producing a self-fulfilling prophecy. Symptomatic possibilities suggested by Davie (1979) include: unusual behavior and developmental delays in the child. Preliminary research into the relationship between developmental progress and later behavioral problems, has found the strongest risk associated with speech and language delays after two years of age (Jenkins, Bax and Hart, 1980). Educational pre-school screening for high risk indicators has examined various factors, including: personal-social, visual-motor, cognitive, and academic development.

(Book, 1980; Colarusso, Mathis and Shessel, 1979; Rickel, Smith and Sharp, 1979). Evaluations of educational screening programs suggest that the results from these objective but individualized types of measurements are relatively stable over time, and allow for successful individually designed interventions. These more symptomatic characteristics of the child can be dealt with directly and allow for more specific preventive measures. One difficulty with relying on these early developmental risk factors, is that reliable measures of developmental delay and behavioral difficulty cannot be made earlier than 3-4 years of age. Prior to this time reported problems are more transient and less reliable (Jenkins et al., 1980).

Temperamental characteristics have several advantages as high risk indicators. These behavioral styles can be identified as early as two months of age through objective questionnaire measures. They describe the child as he is at present and so lessen the danger of a self-fulfilling prophecy. In addition, as these temperamental behavioral styles are seen as originating from within the child, intervention can be presented to the parents in a non-threatening manner.

Researchers investigating the importance of temperamental constitutional elements in the development of a child's personality, do not discount the importance of enviromental

influences (Buss and Plomin, 1975; Keogh and Pullis, 1980; Thomas and Chess, 1977). In general, they conceptualize the developmental process as one in which a unique organism is enmeshed in an interactive environment. The environment is seen as a decisive factor, but not as the only one. Behavioral disturbances are seen as resulting from excessive stress originating from "poorness of fit", which involve dissonances between environmental expectations and the capacities of the child. Within such a framework, the child cannot be blamed for his or her constitutional uniqueness, and the parent cannot be blamed for the child's reaction to the socially acceptable child rearing norms which they are using. Both are seen as being involved in the problems that develop, but not as responsible.

Brown (1973) points out that although the child's individual temperament differences seem to be under volitional control, children have difficulty applying logic, will, and intelligence to their temperament systems. As a result, the child's good intentions may be misunderstood. The use of temperament related terms with the parents and teachers serves to encourage them to accept the child as he is, and avoids the use of more negative judgemental terms.

The extensive outcome research of the New York Longitudinal Study, discovered that it was the demand that the

child becomes a different person which seemed to result in later behavioral disturbances (Chess, 1967). As a result, parental counselling based on temperamental characteristics, is designed to help the parent's understand and accept their child as he is. Viewed in this perspective, the child is most 'at risk' when certain constitutional aspects of his personality are unacceptable to the significant adults in his life. In general, certain temperamental characteristics seem to be more difficult for parents to accept in their children. It is these characteristics which indicate possible risk to later development.

Related Theory and Evidence

The possible contribution of constitutional factors to personality and behavior has long been of interest to philosophers, physicians and psychologists. In their extensive review of related theory, Keogh and Pullis (1980) consider Sheldon's concept of specific body types with related personality and temperamental attributes, to be one of the earliest psychological investigations in this area. Sheldon's basic physical prototypes have been widely criticized. Yet, they are considered the conceptual beginning of later theories of temperament; specifically, Eysenck's work on introversion - extroversion. Eysenck viewed personality differences as being partially caused by individual differences in the

organization of central nervous system processes. He suggested that variations in arousal and activation form the basis of personality development. This is closely related to temperament theories.

There are many infancy studies which have examined the existence of individual differences on temperament-like dimensions. Korner (1971) for one, described how much infants differ from each other right from birth. She reported how some infants characteristics including: frequency and length of cry, soothability, level of arousal and restlessness, affect the infants early experience. She argued that these differences suggest the need for more flexible and individualized mothering styles. Bayley and Schaefer (1964), examined the relationship between maternal behaviors and children's intelligence. They noted in the course of their study that 1-3 year olds who were active, responsive and generally calm children, had higher mental scores. They also identified differences in stability and persistence of characteristics according to the infant's sex. Birns, Barten and Bridger (1969) also found that individual differences existed among infants. They isolated several temperament-like characteristics (irritability, sensitivity, tension and soothability) which remain stable for the first four months of life. Moss (1967), examined infant individual differences and their

relationship to mother-infant interaction. He isolated infant sex differences on the following variables: crying, fussiness, irritability, activity level and passivity. Again, these behavioral styles were found to directly influence maternal behavior. These types of studies repeatedly emphasize that individual differences among normal infants are identifiable, and that some of these behavioral styles serve as mediating influences in parent-child interactions.

Several important longitudinal studies, although not planned within a temperament framework, provide information relevant to temperament questions. Grace Heider (1966) researched vulnerability in young children in a study sponsored by the Menninger clinic. She followed the same children from infancy through their preschool years. While exploring factors related to individual vulnerability or susceptibility to stress she examined several temperament-like variables. These factors included: Physique (build, energy of movement, fatigability); Vegetative Functioning (sleep, digestion, elimination); Sensory Reactivity (threshold, markedly high reactivity in various modalities, especially tactile); Functional Stability (across changing conditions, noting areas where there is loss of stability, tempo arousal and decline); and Tendency of Delay Response. Although Heider's research was based on a more

subjective case-study method her findings have direct relevance to the consideration of temperament in young children. She suggested that: vulnerability decreases as certain physiological factors increase (robust physique, good energy resources, and easy vegetative functioning); vulnerability also shows an inverse relationship to good mother-child interaction; vulnerability seems to be complexly related to high and low drive levels; there is a relationship between consistency of relative activity level during sleep and waking behavior, and the ability to resist stress effects; narrowness of range of drive or interest may be a source of vulnerability; extreme variability in physiological factors and in maternal environment may affect the development of trust and identity and result in vulnerability. Finally, she noted that discomfort related to special qualities of stimuli, rather than to their intensity, may also be related to vulnerability.

Another study from the Menninger group was conducted by Sibylle Escalona (1972). While reviewing her extensive work with infants and their development of later behavior, she pointed out that most infant behaviors are not maintained over time. In fact, normal development is characterized as a breaking up of schemas and adaptive patterns to permit new behavior integrations. She suggested that individual differences among infants are predispositions which shape the "infant's respon-

siveness and adaptation" in the early months of life. These early attributes become differentiated and integrated through experience and lead to the emergence of more stable characteristics. Her most important finding for temperament research was that certain infant characteristics (activity level, movement qualities and irritability) were most likely to persist into later childhood in overtly identical or similar forms, among children who experienced significant developmental deviation or maladjustment.

The extensive longitudinal study conducted on the island of Kauai, Hawaii, also deserves consideration. Wener and Smith (1979) reported the highlights of their investigation after an 18 year period. They found a relationship between the likelihood of persistence of childhood disorders, and biological or temperamental characteristics. As part of their assessment of infant development they obtained mother's ratings of various temperament-like characteristics including: activity level, social responsiveness, ease of handling and presence of distressing habits such as head banging and tantrums. Those ten year old children who were diagnosed as learning disabled were rated by a significantly higher proportion of mothers as, "not cuddly, not affectionate" and "not good-natured, fretful", than were controls. Of these same children four out of five indicated continued academic underachievement, absenteeism,

truancy, and repetitive, impulsive, acting out behavior. In addition, infants rated with very low activity levels and low social responsiveness, were noted more frequently among children later recognized as learning disabled and in need of long term mental health services. In other words, their problems were more likely to persist into adulthood. These temperamental traits were suggested to have initiated disturbed caretaker-child relationships, especially in the presence of family instability.

Investigators at the Fels Institute have also provided extensive longitudinal data with some implications for the study of temperament. Kagan and Moss (1962) attempted to identify how possible patterns of child variables interacted with maternal behaviors. Child variables included: motive related behaviors, sources of anxiety and conflict, defensive responses to anxiety arousing situations and modes of interpersonal interaction (tendency to approach or avoid social objects, degree of spontaneity or tension in social interactions and tendency to dominate or submit). Their discoveries that the characteristic of passive approach tendencies in novel situations is relatively stable over the first two years, and that the propensity to passivity seems to be established during the first six years of life, are of significant consequence to later studies in temperament.

There seems to be considerable and diverse evidence which supports the position that individual differences in temperament-like characteristics exist and influence development and adjustment. Although a number of theoretical approaches to the study of temperament exist, the Thomas and Chess approach is the most empirically demonstrated from an applied point of view. Among the best known investigators of temperament, they have amassed considerable clinical evidence to support their views. The temperamental frame of reference proposed by Thomas and Chess (1963, 1968, 1977) was adopted by the present study and will be discussed in great detail.

Within the conceptual framework of the New York Longitudinal study conducted by Thomas and Chess, temperament is defined in terms of behavioral styles. These within-child stylistic characteristics are seen as a means of accounting for individual differences which mediate the interaction of the child and his personal and social environment. Thomas and Chess (1977) suggest that:

Temperament may best be viewed as a general term referring to the how of behavior. It differs from ability, which is concerned with the what and how well of behaving, and from motivation which accounts for the why a person does what he is doing. Temperament, by contrast, concerns the way in which an individual behaves (1977, p9).

The New York Longitudinal Study (NYLS)

The NYLS was conducted by Thomas, Chess and Birch (1963, 1968, 1977) over a 15 year period beginning in the mid 1950's. One hundred and forty-one infants from 85 middle class New York families were studied extensively. They began with semi-structured interviews with the parents about their infants actual behavior in every day situations. These interviews began when the child was 3 months old and were conducted four times during the first year of life then continued at a rate of once a year. When the child reached age 3, they interviewed the parents individually, to discuss their attitudes towards the infants. Information on the children's behavior was also collected from nursery and grade schools through interviews with teachers and through direct observation of the children.

On the basis of these extensive behavior protocols, they then selected nine temperamental variables which could be identified as early as 2-3 months of age. These variables included:

- (1) Activity level; which is the child's cycle of active/inactive motor functioning.
- (2) Rhythmicity, the predictability of hunger, elimination, sleep etc.
- (3) Approach/withdrawal; the child's typical reaction to new food, people, places, etc.
- (4) Adaptability; the speed and ease with which the child can respond to environmental alterations.

- (5) Intensity of reaction; the energy level of responses either good or bad.
- (6) Threshold of responsiveness; the amount of stimulation required to evoke a discernible response.
- (7) Quality of mood; proportion of pleasant, joyful behavior to unpleasant, unfriendly behavior.
- (8) Distractibility; the effectiveness of environmental stimuli in interfering with the direction of ongoing behavior.
- (9) Attention span and persistence; time spent on an activity with or without obstacles.

Through qualitative analysis three different temperament patterns of functional significances were also delineated. The first pattern accounted for 40% of the overall sample and was called the "easy child". These children were characterized by high rhythmicity, positive approach, high adaptability and mild or moderately intense mood which is mostly positive.

The second pattern accounted for 10% of the overall sample and was called the "difficult child". These children exhibit low rhythmicity, adaptability and approach and have high intensity of mood expressions which are often negative.

The third pattern called the "slow to warm up child" accounted for 15% of the overall sample. These children showed

negative mood responses of mild intensity to new stimuli, reaching only slow adaptability after many contacts. They generally have low approach reactions, high rhythmicity, and low activity.

These temperamental patterns were found to account for 65% of all subjects leaving 35% unclassified. Later investigators subdivided this remaining percentage into intermediate high (closest to difficult pattern) and intermediate low (closest to easy pattern) as a means of accounting for all the subjects (Carey, & McDevitt, 1978; McInerny et al., 1978).

A factor analysis of the sample over 5 years of life, combined with a varimax rotation yielded a single Factor "A", which met a consistency criteria over this 5 year period. This factor included heaviest weightings on the temperamental variables of mood, intensity, approach/withdrawal and adaptability. Factor "A" is therefore similar to the difficult/easy child temperament patterns except for the absence of rhythmicity. This finding supports the validity of these more theoretical patterns.

Research examining the NYLS temperament dimensions gives further support to the position that these variables do not exist as independent characteristics. Klein (1980) found

significant clusters of correlations among the ratings obtained using the Thomas and Chess (1977) parent questionnaire for 2-5 year old children. She isolated three groupings: (1) activity, intensity, and distractibility (2) mood and intensity and (3) threshold and persistence. Scholom, Zucker and Stollack (1979) conducted a factor analysis of retrospective parent rating on the Carey Infant questionnaire for 3 to 4 year old children, and found three distinct factors. They labeled the first a "Mood" factor which is very similar to the Thomas and Chess (1977) Factor "A", composed of: Adaptability, approach/withdrawal, mood and threshold. The second "energy" factor included activity, intensity and distractibility as the temperament variables. A third "consistency" factor included rhythmicity and persistence. Keogh et al. (1980) utilized the Thomas and Chess (1977) temperament questionnaire for both teachers and parents of 3-6 year old children. She isolated three independent factors for both parents and teachers. The first factor for the parents was again very similar to the Thomas and Chess (1977) Factor A, and included: adaptability and approach/withdrawal and Mood. The second parent factor loaded only on Intensity and the third loaded heaviest on Mood. These last two factors were not found with the teacher ratings. The first teacher factor was interpreted as "task related" and loaded on persistence, distractibility and activity. The second teacher factor focussing on

"sociability", was similar to both Factor "A" and the first parent factor. It loaded heaviest on the subscales, adaptability, approach/withdrawal and mood. The third teacher factor loaded on the more "negative behaviors" of intensity, activity and approach/withdrawal.

Similarities between studies investigating patterns of temperament dimensions suggest the existence of meaningful groupings. The evidence is strongest for the temperament pattern similar to the Thomas and Chess (1977) Factor "A" (Adaptability, approach/withdrawal, mood and intensity). These findings support the theoretical belief in the importance of this temperament pattern as a meaningful unit of interpersonal behavioral styles. The second most consistent pattern is one which seems related to task performance (namely: activity, distractability and persistence or intensity). These findings suggest the existence of a meaningful unit of temperament variables which is descriptive of hyperactive behavior disorders.

Follow-up data of the NYLS after 4-10 years showed that 30% of their sample presented evidence of behavioral disorders. When compared with controls, both the "active and passive" disturbed subjects, showed few specific temperament differences

before 4 years of age. By aged 4 to 5, however, the disturbed subjects and controls were found to differ from each other on most of the temperament variables (see Appendix A). More specifically, the clinical group with "active" symptoms was found to be characterized by: high activity in the first year of life; high intensity in the third through fifth years of life; irregularity, distractability, and low persistence in the fourth year of life; and low adaptability and low threshold in the fourth and fifth years of life. In addition, Factor "A" was found to discriminate between the active clinical group and controls at age three, four and five. When only the children who had developed active symptoms of disturbance before the fifth year of age, were compared with the clinical group, these differences in temperamental traits were sustained and magnified. For each of the temperament characteristics and Factor "A", these early onset children demonstrated greater adaptational difficulty in at least four of the five first years of life. Statistically, they differed from the non-clinical group on the temperamental characteristics of rhythmicity, adaptability, approach/withdrawal, threshold, intensity, distractability, persistence and for Factor "A" (Thomas, and Chess, 1968, 1977).

The group of children characterized by more passive symptoms was also analysed but not as extensively. Despite

limited numbers, when this group was compared to the non-clinical group, it was differentiated by: low activity, low approachability, and high persistence in the fifth year of life, and by low mood and less adaptable Factor "A" at 4 and 5 years of life.

The NYLS also examined the relationships between the temperament, patterns and the development of later behavioral disturbances. They found that of all those infants classified as difficult, 70% developed later problems. This is even more striking when it is compared with the development of disturbances in the other classifications. Only 18% of the easy child pattern, 2.7% of no specific pattern and 45% of those with slow to warm-up patterns developed later difficulties. It was these remarkable findings which first suggested the possibility of utilizing temperamental patterns as high risk indicators for later behavioral disturbances.

The findings of the NYLS seem to be firmly based for many reasons. These include: the large sample size utilized, the low attrition rate, the study's prospective nature, the young beginning subject age, the extensive consideration of the validity and reliability of parental reports, the large number of data points, and the length of the subject follow-up (Persson - Blennow, & McNeil, 1979). The strengths of these

findings is also heightened by several independent studies, which were able to replicate findings of similar temperamental patterns. (Carey, 1970; Graham et al., 1973; McDevitt & Carey, 1978; Maures, Cadoret and Cain, 1980; Scholom, Zucker and Stollak, 1979). Additional evidence has been reported that suggests that these findings also apply to wider, more representative samples. (Person-Blennow et al., 1979). Finally, several investigators have found that temperament information can be reliably gathered through questionnaires (Carey, 1970; Keogh, 1980; McDevitt and Carey, 1978; Person-Blennow et al., 1979; Person-Blennow and McNeil, 1980).

Origin

Temperament then, seems to be a fairly reliable means of differentiating between children at relatively early ages. As outlined earlier, these individual behavioral styles can be measured as early as 2 months of age and are assumed to be constitutional in origin. To date, the most decisive study on the origin of temperament was completed by Torgensen & Kringler (1978). She and her colleagues studied genetic factors by comparing 53 monozygotic (MZ) and dyzygotic (DZ) same sexed twins, at 2 and 9 months.

They found that for all temperament variables MZ were more similar than DZ pairs, supporting the genetic hypothesis.

More specifically, at 2 months of age, the DZ twins were significantly less similar for rhythmicity, threshold and intensity. By 9 months the differences between DZ twins continued to increase while those between MZ pairs held constant. As a result, by 9 months of age the DZ pairs were significantly less similar on all 9 temperament variables. Confounding effects of mothers knowledge of zygosity were checked and eliminated. Also, the possible effect of some relationship between closeness of appearance and temperament similarity was investigated. This effect was not detected for DZ pairs and only weakly significant for MZ twins, and suggests only a modest influence of degree of physical closeness.

The late appearance of greater temperamental differences was explained as resulting from interference at 2 months by the remaining influences of intrauterine and perinatal processes. These influences are thought to have dissipated by 9 months. In addition, the greater range of behavior observable in 9 month old infants is thought to have created a better possibility for differentiating temperament.

Buss and Plomin (1975), provide additional evidence of temperament's genetic origin. Their theoretical basis compliments, but is not identical to that of Thomas & Chess (1977). Buss and Plomin's work has centered around four

broader temperamental dimensions: Emotionally, Activity, Sociability and Impulsivity. They place strong emphasis on the importance of genetic components of temperament. The bulk of their empirical work has utilized twin studies. Through correctional computations they have demonstrated greater similarity of their temperamental dimensions between identical than fraternal twins.

Thomas and Chess (1977) also point out some suggestion of genetic influence within their very small sample of twins in the NYLS. When they compared their three monozygotic and five dyzygotic twins they found the strongest evidence for genetic components in activity, approach/withdrawal and adaptability.

Development

Although there is a strong genetic component in the development of temperamental characteristics, heredity is only one factor once the child is born, and is interacting in his environment. The effects of maternal anxiety on later temperament development was investigated in a study comparing adopted and foster babies. Carey (1974) found that pregnancy anxiety did not result in more difficult babies. These findings

suggest that any lasting effects of maternal anxiety appear to be attributable to the distress of the mother caring for the infant after the delivery.

As the child develops and interacts in his environment his unique temperamental characteristics play a large factor in influencing the mutuality of parent-child relations. Not only does the child respond to his environment but his environment responds to him. Milliones (1978) and Feiring (1976) have found evidence that suggests that mothers who demonstrated positive maternal behavior, perceived their children as less difficult. The more difficult the child, the less positive maternal responsiveness was evident. In other words, adaptive maternal behavior is influenced by the nature of the infants temperament. These findings emphasize the importance of the child's as well as the mother's contribution to the development of the infant-mother attachment relationship.

Chess (1977) explains that organism-environment interactions produce new behavioral patterns over succeeding age periods. These patterns then interact with old and new features of the environment, maintaining some temperamental characteristics and decreasing the significance of others. The young infant is born with unique temperamental characteristics. These never exist in isolation, however, and are constantly interacting with his individual abilities, motives, external environmental stresses and opportunities.

Some temperament variables seem to be more easily modified by such factors as parental child rearing characteristics. Cameron (1977) correlated the temperaments of pre-school children aged 0 to 5 years, with eight parental domains. He found that parental intolerance, inconsistency and conflict were associated with negative changes in temperament. Parental strictness and maternal concern/protectiveness were found to be associated with both positive and negative change depending on age and sex of the child. Those temperamental traits which seemed most responsive to parental conditions were adaptability and intensity; but mostly in the fourth and fifth years. Only rhythmicity showed earlier associations; reflecting parental conditions in the first two year period. All other temperaments showed some associations in the 4th to 5th years, except activity level which did not correlate with any of the parental dimensions at any age.

Stability

Taking into account all the extraneous influences on temperament development, it is not surprising that they do not remain fixed personality structures within the child. Nevertheless, there is some stability of these characteristics, especially for the first five years of life.

The question of stability is most suited to longitudinal research. Evidence of consistency over time was isolated in several previously mentioned studies of temperament-like dimensions. (Birns, Barten & Bridger, 1969; Escalona, 1972; Feiring and Lewis, 1980; Kagan & Moss, 1962). Taken in conjunction with the Thomas and Chess (1977) work, it seems that early patterns of reactivity may be related to basic subtraits of autonomic arousal and sensory responsiveness. These inborn response tendencies compose the predispositions which influence the infants responsiveness and adaptation to his early environment. In turn, patterns of experience will influence later development. Because of its constitutional nature temperament is assumed to remain fairly stable over time. Research suggests that the stability of temperamental characteristics increases with those children who demonstrate developmental deviations or maladjustments (Escalona 1972). As well, temperament has been shown to remain more stable with those children seen as having more difficult temperamental patterns (Carey and McDevitt, 1978).

More specifically, Thomas and Chess (1977) found evidence of stability of those characteristics composing their factor "A".

This factor composed of approach/withdrawal, adaptability, intensity, and mood, was found to be statistically consistent over the first five years of life. Within individual temperaments, stability has also been found, but not as reliably. Significant correlations from year to year, were found to be strongest for activity level and adaptability. Most other categories had some evidence of stability during this age period. The weakest evidence was found for approach/withdrawal, distractibility and persistence, while moderate levels of stability seem to exist for intensity and threshold (Carey, 1977).

Carey and McDevitt (1978) found stability for 30% of their sample on the five temperament patterns (easy, difficult, slow-to-warm-up, intermediate high, and intermediate low) over a period from infancy to ages 3 to 7. This stability however, is higher in the earlier years. They found 40% stability from infancy to ages 3 to 5 but only 20% from infancy to ages 5 to 7. In addition, they found more stability in those children who had been classified as difficult or intermediate high. Among these children, 40% remained so classified from infancy to ages 3 - 7, 36% from infancy to age 5 - 7 and 44% from infancy to age 3 - 5. Even more striking was the finding that among those children who remained stable in the difficult or intermediate high diagnosis from infancy to age 3 - 7, 15 of 17 (88%) were above the mean

in activity, and 11 of 17 (64%) had very negative moods. This stable association between high activity and difficult temperament at this early stage of life, emphasizes the importance of investigating the relationship between early temperament and a later behavioral disturbance:hyperactivity.

Risk for the Later Development of Behavior Disturbance

Temperament appears to interact with the child's environment to either support or disrupt development. In addition to the extensive work done by Thomas & Chess (1977), there are several independent investigators who have attempted to clarify how temperament affects subsequent development.

Klein (1980) studied the relationship between individual temperament characteristics and adjustment of 2-5 year old children, when placed in a community-based early childhood group. Temperament was measured prior to the beginning of group care using the Thomas & Chess (1977) questionnaire. Correlational data supported a relationship between activity level and various measures of adjustment difficulty, both immediately after entrance to day care, and after several months in the day care setting.

Scholom, Zucker and Stollak (1979) investigated the role of both infant and parent temperament in determining child

adjustment at age 4. They had some difficulty because of the lack of instruments available to measure both parent and infant from the same conceptual and empirical base. Despite this problem, their results suggest that the mother's temperament, especially her mood (adaptability, mood, cheerfulness, placidity) plays an important role in determining later adjustment for both sexes. The father's temperament was also significant, but less consistent, than the mother's. More specifically, it seems that for the girls in the study, positive adjustment was related to similarity of temperament among infant, mother and father, and high ratings on the infant mood factor (adaptability, approach, mood and threshold). This factor is very similar to the Thomas & Chess difficult/easy child concept and supports the validity of their findings. In addition strong sex differences were identified. Positive adjustment for boys was related to dissimilarity between infant and father and not to any specific infant temperament. Clearly, temperament, in both infants and parents, seem to interact with sex differences and influence both early family interaction and later outcome.

Terestman (1980) studied two aspects of emotional temperament; mood and intensity. Her investigation was centered around high risk factors and how they relate to the later development of emotional disorders. She gathered behavioral data through teacher interview and direct observation of 3-5 year old nursery

school children. After a 5 year period, the children within the original group who developed significant behavior disorders (mostly reactive in type) were designated as the clinical group. The results of group comparisons suggest that mood quality and intensity, as seen in nursery school children are powerful predictors of developing behavior disorders. For every four year old in the group, and six of seven younger children, placement in the lowest mood quartile was associated with the later development of difficulties. All of the younger (3-4 year old) children placed in the category of high intensity became clinical referrals. In addition, all ten children seen as both negative in mood and high in intensity level developed subsequent clinical difficulty.

Carey, Fox and McDevitt (1977) investigated infant and contemporaneous temperament profiles in relation to school adjustment and impulsivity of 5½ to 7 year old children. Infant temperament was related to later behavior, but in a non-linear fashion which was difficult to interpret. Therefore, infant temperament was not seen as a good risk indicator for later school adjustment. However, current temperament information proved very useful. That is, lower adaptability was found to be related to both poor school adjustment and impulsive problem solving styles. It is important to note that adaptability is

a temperament characteristic which was part of the Thomas and Chess risk factor. These results suggest that current information about temperament is more reliable as a risk indicator in areas related to scholastic achievement.

Attempts have been made to relate temperamental characteristics to intellectual functioning. Evaluation of the subjects from the New York Longitudinal Study (Thomas & Chess, 1977) indicates that when the mental age is taken into account, the temperamental characteristics of mentally retarded children are very similar to those of normal children. Baron (1972) found that in early life, a child with Down's syndrome has comparable temperament characteristics to those of normal children. Despite these findings it appears that temperament effects teachers' judgements of children's intelligence when they reach school age. Gorden and Thomas (1967) found that teachers tend to overestimate the intelligence of children who react positively and quickly to new situations. These teachers also underestimate the intelligence of children who react negatively to most new situations and who require a prolonged period of time to adapt themselves. These findings carry two implications for the child's later development. First, since the child's self concept develops, in part, from judgements significant adults in their life make of them, inaccurate estimations of their intelligence by teachers will influence the child's view of himself.

Second, distorted judgements of their pupil's abilities may influence the teachers expectations, and result in unrealistic demands being placed on specific children. Both these factors serve to increase the risk of the development of later difficulties.

Scholom and Schiff (1980) investigated the role of infant temperament in the development of learning disabilities. This study has several weaknesses. One problem is that infant temperament information was gathered retrospectively. Another is that the age level of the control group was not comparable to the learning disabled group. Nevertheless their findings suggest that slow-learning "hypoactive" type learning disabled boys were characterized by low activity level, irregular habits, low level of approach and negative mood. In the terminology of the Thomas and Chess study, these boys were described as being similar to the more at risk or "difficult" infants.

Graham, Rutter and George (1973) attempted to replicate the Thomas and Chess results with a population of children more 'at risk' for developing behavior disorders. Their sample was comprised of 60 children, all of whom had a mentally ill parent. At the time of initial assessment, 41% of the children were judged to be abnormal. During the first year of study the temperament factors of intensity and fastidiousness were of most importance

in characterizing the disturbed children. One year later, the now 43% of the children judged to be abnormal, were characterized as more negative in mood and less regular in biological functions.

In summary, many of the studies reviewed, support the findings of the Thomas and Chess NYLS. The development of later behavioral disorders is often reported as being related to some of the temperamental characteristics defined as the difficult/easy child profile (Mood, Intensity, Approach, Adaptability and Rhythmicity). These adverse temperament characteristics appear to make the child more vulnerable to unfavorable family conditons and other stress factors. There is no simple unidirectional model to explain the relationship between adverse temperamental characteristics and the developmental of later disorders. However, there exists considerable justification to support the hypothesis that specific temperamental attributes increase the risk that difficulties may develop at a later time.

Temperament and Hyperactivity

Kinsborne (1979) suggests that hyperactivity could be conceptualized as a behavioral disturbance based on temperament extremes of low attention span, high distractibility and high activity level. Garside et al., (1975) constructed a temperament questionnaire for 209 young school children based on the NYLS

dimensions. They found in their factor analysis that high activity, intensity, distractibility and poor attention span, formed a component similar to hyperactive disturbances.

McDevitt et al., (1978) developed a questionnaire for identifying temperamental characteristics at ages 3 to 7, and suggested that the "difficult" child should be redefined at this level. They suggest that rhythmicity is now less important, and that activity, attention span/persistence and distractibility are now more important. They based their comments on the importance of these characteristics for school achievement. Again, the temperamental characteristics of concern are closely related to hyperactive-like difficulties. McDevitt (1977) explains the drop in stability level at age 5 to 7, as a result of the child's reaction to the marked environmental changes that occur when he enters the more structured school situations.

In an attempt to relate children's temperament to their educational competence, Hall and Keogh (1978) followed the progress of a group of Kindergarten children over a three year period. On the basis of behavioral observations and teacher's ratings, a subgroup of children were identified as educationally at risk. Among this group 82% were seen as experiencing difficulties after one year and 72% after two years. At the grade 3 level temperament information was collected for the risk children

through individual interviews with the teachers, based on Thomas & Chess rationale. Within the total group three characteristic patterns of temperament were delineated. Of these, one set of risk boys was described as low in adaptability, distractible and lacking in persistence and in self-regulation. They were characterized by high activity, intense reactions, low thresholds and negative and uneven mood. Although these findings were based on small numbers, they suggest that hyperactive-like behavior styles can be isolated within a subgroup of boys found to be at high risk for educational difficulties.

Thomas and Chess (1977) also pointed out that those children with low persistence, short attention span and high distractibility, are placed in excessively stressful situations when asked to conform to academic demands. They suggest that when identified, the teachers of these children should be counselled to provide them with more structured and shorter task assignments.

The NYLS did not deal specifically with the problem of hyperactivity, but they did investigate the earlier temperamental characteristics of those children who later developed more "active" behavioral disturbances. Children with these problems were found to differentiate from the non clinical control group as early as age 3 on the Thomas and Chess factor "A". Children with a negative rating on factor "A", were described as: irregular in biological

functions; making frequent and loud crying, laughing or other sounds; and being easily frustrated which resulted in numerous temper tantrums (Thomas, Chess, Birch, 1963, 1968, 1977). These behavioral descriptions fit closely with those used by parents of hyperactives, when outlining their child's developmental history (Cantwell, 1977; Safer & Allen, 1976; Werry, 1968). As hyperactive children are similar to this group of more active behavioral disturbances in the NYLS, it seem realistic that the present investigation can expect to differentiate between these children and more normal controls by ages 4 and 5 on various temperamental characteristics.

To date, there have been only two specific studies which have attempted to relate the temperamental characteristics of the NYLS with hyperactive disturbances. Lambert & Windmiller (1977), developed their own interview method for use with elementary school hyperactives. Their subjects were in grades 2, 4 and 6. The parents were interviewed with only two questions per temperamental characteristic, and the information gathered was retrospective in nature. The rather general type questions asked the parents to remember what their children were like at a younger age. As result, their overall procedure lacked the precision of staying with more recent, objective behavioral situations. Despite these drawbacks they found that the hyperactive children had extreme scores on attention span,

threshold, rhythmicity and adaptability, but only achieved significant difference from controls on distractibility. The lack of experimental knowledge about the measurement and stability of temperamental characteristics at these older age levels, makes it unjustifiable to use these results as an indication of high risk in a younger child.

A second study attempting to highlight temperamental characteristics of hyperactive children was conducted by Carey, McDevitt and Baker (1979). They investigated the current temperament of 3 to 7 year old children by means of a parent questionnaire based on Thomas and Chess conceptualization. In an effort to clarify characteristic temperamental attributes of a variety of behavior and learning problems, they created four diagnostic groups: (1) minimal brain dysfunction (MBD), (2) hyperactivity, (3) learning disability, and (4) other (mostly emotionally based). The MBD and hyperactive group were characterized by similar behavioral characteristics (high activity, distractibility and low persistence), but the MBD group was also required to have at least soft neurological signs. The total diagnostic group differed from the normal controls on four of the nine temperamental characteristics. They were seen most often as having low adaptability, low persistence, high activity level and low approach. In addition, they were more commonly

characterized by the Thomas & Chess "difficult" temperament patterns (difficult, slow-to-warm-up and intermediate high) than the control group. When specific diagnostic groups were compared, very few differences were isolated. The MBD group differed from the control group on measures of low adaptability, low persistence, high activity, negative mood, and over representation of "difficult" temperament patterns. The MBD children only differed from the total diagnostic group in an emphasis on negative mood rather than low approach. The hyperactive and learning disabled group were described as similar to the other diagnostic groups but could not be statistically compared because of small numbers. Finally the "other" diagnostic group was significantly different from controls on adaptability, activity, persistence and over-inclusion of "difficult" patterns. Clearly, the diagnostic group (children with various forms of behavior and learning problems) does not appear to include distinct subgroups of temperament patterns. These results suggest that a difficulty exists in defining precise diagnostic criteria. The overlap of behavioral and temperamental characteristics raises questions about the validity of the assumption of independent diagnostic subgroups within the overall population of children included in this study. Further research is required to clarify this issue.

The overall low level of temperament stability for many children, serves as a caution against attempting to predict the

development outcome of any individual. There is, however considerable evidence that certain temperamental characteristics place a child at greater risk for later behavioral disturbances. In addition, stability seems to be more pronounced in those children who have more "difficult" temperament clusters. This suggests that early temperamental characteristics of hyperactive children might serve as the high risk indicator necessary to allow for earlier intervention strategies, which might result in more positive developmental outcomes.

Goals of this Study

The primary goal of the present investigation is to examine the relationship between temperament and hyperactivity. It is hoped that the information gained will support the feasibility of using a child's temperamental make-up as a high risk indicator for the later development of hyperactivity.

The temperament questionnaires for both parents and teachers developed by Thomas and Chess (1977), were administered to two groups of 3 to 6 year old children. A clinically diagnosed group of hyperactive children were compared to a group of control children. The relationships among the temperamental characteristics will be examined to see how they differentiate between the groups. The specific temperaments which

are identified as characteristics of the young hyperactive children can then serve as possible high risk indicators for later problems. Between group differences will be examined for both individual temperament variables and temperament style categories.

While the study of choice would be an extensive longitudinal investigation, pragmatic considerations limited the present study to a cross-sectional analysis. Therefore, the present investigation is essentially exploratory. It provides information about whether temperament is capable of delineating hyperactivity as it exists in pre-school children. Then, based on the relative stability of temperament it is hoped that these characteristics can be generalized down to earlier age levels and make possible earlier identification of high risk factors.

Temperament descriptors represent a means of identifying individual differences during early developmental periods. Parents have consistently reported difficulties with their hyperactive children dating back to early infancy. The value of investigating the relationships between temperament and hyperactivity lies in this possibility for early identification in infancy. The increasing stability of temperament in those children with more difficult behavior patterns, suggests that they could have specific temperamental indicators of long standing, which would allow for earlier identification and treatment. Counselling given to their parents and teachers would then hopefully improve their development.

Identification of temperamental characteristics in infancy would rely on parent ratings. At earlier than pre-school age levels it is the mother who spends the most amount of time with the children and would thus be the best source of information on which to base these ratings. Research examining parent and teacher temperament ratings (Keogh, Pullis and Cadwell, 1980) has found that teachers are more reliable raters of school aged children. Low correlations between parent and teacher ratings can be interpreted as a result of different perceptions of children or as situational differences. It is important for the present study to examine parent and teacher differences in ratings. Although earlier than pre-school aged intervention based on temperamental attributes must depend on parent ratings, the teachers' ratings offer a valuable cross reference point. For example, those temperamental variables which are seen as characteristic of hyperactive children by both teachers and parents would appear to be most reliable and valid.

For these reasons the secondary goal of the present investigation is a comparative analysis of parent and teacher ratings on the Thomas and Chess (1977) Temperament Questionnaires. Correlations between parent and teacher ratings on the temperament and behavior rating scales and a comparison of factor analytic structure on the temperament questionnaires

will provide information about parent and teacher similarities and differences.

A final goal of the study is to gather information concerning the importance of birth and pregnancy difficulties in relation to preschool temperament and reported behavior problems. Research in this area (Werner et al., 1979) suggests that this information might strengthen the discriminating power of temperament early risk factors.

The specific hypotheses for the present study are the following:

1. The hyperactive children will be rated by their mothers as significantly more active, more distractible and less persistent than the control children, on the Parents' Thomas and Chess Temperament questionnaire (TCTQ).
2. The hyperactive children will be rated by their teachers as significantly more active more distractible and less persistent than the control children, on the Teacher's TCTQ.
3. The hyperactive children will be rated by their mothers as more negative on "Factor A" (significantly; less approaching, less adaptable, lower in mood and more intense) than the control children, on the Parent's TCTQ.

4. The hyperactive children will be rated by their teachers as more negative on "Factor A" (significantly less approaching, less adaptable, lower in mood and more intense) than the control children, on the Teachers' TCTQ.
5. In comparison to the control children, the hyperactive children will be rated by their mothers as having a significantly; higher frequency of difficult and intermediate high temperament styles and a lower frequency of easy and intermediate low temperamental styles, on the Parents' TCTQ.
6. In comparison to the control children, the hyperactive children will be rated by their teachers as having a significantly higher frequency of difficult and intermediate high temperament styles and a lower frequency of easy and intermediate low temperament styles, on the Teachers' TCTQ.
7. Parent and teacher ratings of temperament will not differ significantly on the Parent's and Teacher's TCTQ's.
8. Parent and teacher ratings will not differ significantly on the Connors Parents' and Teachers' Rating Scales.

9. Children with difficult and intermediate high temperament styles will be reported by their parents to have a significantly greater incidence of birth and pregnancy difficulties than children with easy or intermediate low temperament styles.
10. The hyperactive children will have significantly more birth and pregnancy difficulties than the control children.

In view of the large number of statistical analyses to be performed, a significance level of at least .01 will be required for all analyses.

CHAPTER II

METHODOLOGY

Subjects

Forty children between 3 and 6 years of age were studied (see Table 1). This age group was chosen for various reasons. First, it was the youngest possible age at which the behavior rating scales could be utilized at both home and school to determine cross-situational presence of symptoms. Second, temperament has been shown to have remained relatively stable from infancy and to be capable of differentiating between various groups at this age level. Finally, hyperactive children are generally not referred to professionals before this age.

Boys only, were studied because of their marked preponderance among hyperactive children. In addition, sex differences have been isolated in the measurement of both temperament (Hall and Keogh, 1978; Keogh, Pullis and Cadwell, 1980; Scholom et al., 1979; Garside et al., 1975) and hyperactivity (Goyette, Conners, Ulrich, 1978; O'Donnell and Tuinan, 1979). The use of only male subjects eliminated possible confounding by the variable of sex.

All children included in the study met the following criteria: attended a preschool or regular school program, were living at home with at least one parent, had no definite signs of brain damage, epilepsy or psychosis, had I.Q. scores on the Peabody Picture Vocabulary Test of 90 or greater, and were not on medication when ratings were completed.

The group of twenty hyperactive children were selected from a population of referrals to the Children's Hospital of Eastern Ontario in Ottawa. Each subject was diagnosed by two professionals. The initial diagnosis by a physician was later verified by a psychological assessment. The diagnosis followed the guidelines of the DSM-III category; Attention Deficit Disorder with Hyperactivity. Each child displayed signs of developmentally inappropriate inattention, impulsivity and hyperactivity, and an early onset of behavior problems. In addition, they might have shown aggressiveness, tantrums or oppositional behaviors. The diagnosis was verified by means of the Revised Conner's Parent and Teacher Rating Scales (Goyette et al., 1978). Each hyperactive subject received a score of 1.5 or higher on the Hyperactivity Index of these scales, insuring that the hyperactivity was present at both home and school.

The twenty normal control children were selected from six Junior Kindergarten classes from three schools in the Carleton Separate School Board in Ontario. These children were included in this group only if: they did not have chronic illnesses or suspected psychological problems (as-certained by interview with parent and teacher), and had a score of 1.0 or lower on the Conner's Hyperactivity Index at home and at school.

Measurement Instruments

Conners Teacher Rating Scale (CTRS) (Appendix B)

Conners (1969) developed a 39 item teacher rating scale to aid in the identification of hyperactive children and to evaluate treatment effectiveness. This scale has been shown to be capable of: discriminating between normal and hyper-active children (Kupietz, 1972; Werry, 1976), to be sensitive to drug effects (Firestone, 1978a), to be easily administered, and to have high test-retest reliability (Goyette, Conners and Ulrich, 1978). Ratings made by teachers have the advantage of being based on a continuous sample of behavior which can be compared with similar aged children in different settings and with different tasks. Teacher's ratings on the Conners' scale have been validated by high correlations with

another accepted rating scale for hyperactivity (Zentall and Barack, 1979), and by high correspondence to observed behavioral and attitudinal differences in hyperactive and non-hyperactive males (Copeland and Weissbrod, 1978).

The present investigation will make use of a recent revision of this scale by Goyette, Conners and Ulrich (1978). They extended the norms on this scale down to include the age levels investigated in this study. Although the new factor analysis has simplified and rearranged some items, the new 28 item rating scale is very similar to the original. The new scale is composed of three factors.

1. Conduct Problem
2. Hyperactivity
3. Inattentive-passive

These factors correlate with those on the original questionnaire at a highly significant level, ranging from .82 to .92.

The teacher is asked to observe the child for a few days and then to check the appropriate box for each item. The score for each factor is based upon the mean of the item within the factor. Each item is given a numerical scoring weight of 0, 1, 2, or 3, where a higher score is indicative of greater symptomatology. (Appendix G).

The recent Goyette et al. (1978) revision also presents normative data on a Hyperactivity Index, which has been shown to correlate at the .94 level with the Hyperactivity factor. This index will be used by the present study to investigate comparability between parent and teacher ratings. It is composed of 10 overlapping items, which are among those most often checked by both parents and teachers. Correlations between parents and teachers on the revised Index is reported to be .49(.001). The cut off point of 1.5 on this index has been shown to discriminate between normal controls and hyperactives (Kupietz et al. 1972; Goyette et al. 1978).

Conners Parent Rating Scale (CPRS) (Appendix B)

Conners also developed a rating scale for parents which can discriminate between hyperactive and control children but which has not been used in research extensively or shown to be sensitive to drug effects.

Goyette et al. (1978) also revised the original 93-item scale and produced a new 48-item questionnaire, containing five factor analysed structures:

1. Conduct problem
2. Learning problem
3. Psychomatic
4. Impulsive-hyperactive
5. Anxiety

Again, the revised questionnaire, although shortened and simplified is highly similar to the original. The correlations with the original factors range from .63 to .94. The new questionnaire is much improved on the between parent correlations and the new factor items were chosen to create identical factors by both mother and father ratings. Although parent ratings may not show high statistical correlations with teacher ratings, they appear to show higher agreement on a gross categorization of presence on absence of problems (Campbell, Schleifer and Weiss, 1978). The cut off point of 1.5 on the hyperactive index appears to reliably discriminate between hyperactive and non-hyperactive children (Goyette et al., 1978).

Thomas and Chess Questionnaire for Children 3 - 7 Years of Age (TCTQ) (Appendix C)

These questionnaires are based on the 20 year follow-up study conducted in New York by Thomas, Chess and Birch (1977).

Experienced interviewers and senior staff from the NYLS, selected the original 132 item pool which was then administered to 100 mothers, and the teachers of 60 children for refinement. Although not yet extensively utilized the questionnaires were carefully composed, including items only

if they met the following criteria:

1. Statistically significant level of correlation of mean score of item with mean category score of questionnaire and of interview.
2. Absence of marked skewing in distribution of mother's response to the item.
3. Zero or only small percentage of mothers failed to respond to the item.
4. Agreement among the four judges as to which category the item was applicable.
5. The behavior described in the item should define the category unambiguously i.e. the criterion for the category should be clear from the content of the item.
6. The event cited in the item should be one with a fairly frequent occurrence of a representative daily activity unless it is a specially exceptional event of functional significance.
7. The item should apply generally and not relate to a special activity found only in a minority or bare majority of the families.
8. Compounded items should be avoided. Thus, in the statement, "When playing with other children my child is generally happy", playing may be equaled with being happy, and the item should be changed to

"When with other children my child is generally happy".

9. The terminology should be behavioral rather than attitudinal. Thus, "My child prefers" should be changed to an appropriate behavioral term such as, "My child selects".

The final parents questionnaire, includes 72 items, divided equally among 9 temperament categories. The final teachers questionnaire includes 64 items, equally divided among 8 categories. For the teachers, the category of rhythmicity was eliminated, as its rating required knowledge of a child's functioning over 24 hour periods. (Appendix G).

In each category half of the items were phrased in terms of one extreme (high activity) and the other half for the other extreme (low activity). Each item is scored on a seven point Likert-type scale and then combined to form the various temperament categories, including: Mood, Distractability, Persistence, Activity, Adaptability, Approach/Withdrawal, Threshold, Intensity and Rhythmicity. These categories can then be combined to form the earlier described, five temperamental clusters; Easy child, Intermediate low, Intermediate high, Difficult child, and Slow to Warm-up (Thomas, Chess, 1977; Carey, 1978; McInerny, 1978). Combinations of categories

was achieved by dividing the seven point scales into three strength levels, Low (1 to 3) Medium (3 to 5) and High (5 to 7).

Keogh, Pullis and Cadwell (1980) examined the psychometric properties of these two questionnaires. The Teacher's TCTQ was completed by 35 teachers from three schools on one hundred and ninety seven, 3 to 6 year old children. Interrater reliability, demonstrated by correlations between teachers' ratings were all significant beyond the .001 level, ranging from .327 to .727 with a mean of .566. Test-retest reliability was examined with a selected subsample of children and three teachers. Mean subscale correlations ranged from .691 to .876. Internal reliability of each temperament subscale ranged from .459 to .854. In general, reliability measures were moderately high, with the subscales Mood and Distractability appearing less reliable than others. Teachers tended to rate the children relatively close to the possible numerical average with an item mean of 3.5 as the average score. Some test construction difficulties were seen as contributing to lower internal consistency of the dimensions of Threshold, Mood and Distractibility.

Analysis of the Parents' TCTQ was conducted with information collected on 128 children from two schools.

Mothers and fathers rated their children in similar ways with reliability coefficients ranging from .254 to .734 with a mean correlation of .579. ($p < .001$ for all subscales except threshold with $p < .025$). Internal reliability coefficients ranged from .157 to .749. Parents also rated children close to the possible numerical average with an average item mean of 3.9. The subscales Persistence and Mood appeared less reliable than the other temperament dimensions.

In general the reliability of the parent's ratings were lower than those for the Teacher Survey. Correlations between mothers' ratings and teachers' ratings as well as between teachers and fathers were low, with mean correlations of .171 and .179. This finding suggests that parents and teachers either perceive the children differently or interact with the children in different settings so that different temperamental aspects are highlighted. Discrepancies between the teacher and parent ratings of temperament were also noted in a factor analysis of the two scales. The teachers placed more emphasis on a Persistence-Distractibility factor, possibly reflecting the relative importance of these aspects of behavior in school settings. Despite minor difficulties, the Teacher and Parent TCTQs

have been demonstrated to be useful and reliable instruments for the delineation of temperament with preschool children (Keogh, Pullis and Cadwell, 1980; Klein, 1980).

Revised Birth and Pregnancy Questionnaire (Appendix D)

This questionnaire was used previously by Links, Stockwell, Abichandani and Simeon (1980), and indicated that autistic children had more pre and perinatal complications than their same sexed twin. The scale was adapted from Zax, Sameroff and Babigian (1977).

It is divided into four major parts which gather information about a) pregnancy complications b) labor c) delivery and d) postnatal complications. In addition, this questionnaire collects information on length of pregnancy, age of mother at birth of child, and birth weight of child. The score to be reported in the present study is a measure of the total number of complications as the subscores did not achieve significance.

The information for this questionnaire was gathered by means of interview of the child's mother. These maternal reports were not verified by physician reports or hospital records as such an endeavor was not pragmatically possible for the present study.

Peabody Picture Vocabulary Test (Appendix F)

This widely used test of receptive language and general intelligence was administered to each subject as a means of eliminating the confounding effect of low levels of general intelligence. It consists of a series of pages, each showing four illustrations. The administrator orally presents a stimulus word to the subject, who is then required to point to, or otherwise indicate, the picture on each plate which he thinks best illustrates the meaning of the stimulus. This procedure continues until six errors are made over eight presentations. The child's number of correct responses is then transformed into an IQ of 10 to 176 or a mental age from 21 months to 18 years. The Peabody was chosen for the present study because of its wide usage and the short time required for administration. Even though the reliability is lower with young pre-school children (.64) (Bochner, 1978), it is thought that this measure will provide the rough estimate of general intelligence necessary for the needs of the present study.

Procedure

The hyperactive children were diagnosed by a registered psychologist at the Children's Hospital of Eastern Ontario,

who has specialized in the treatment of hyperactive children for 7 years (Philip Firestone, Ph.D.). Parents of the children were then contacted, for permission to include their sons in the study. Selections were made from among this group until 20 subjects were isolated who filled all requirements for inclusion. Parents were informed that the purpose of the study was to investigate early behavioral styles in preschool children. An individual appointment was then set for each hyperactive child and his mother. At the time arranged, an informed consent form (Appendix E) was signed and the various measures were administered. Each child completed the Peabody Picture Vocabulary, while the mother completed the Temperament and Conners questionnaires and was interviewed to gather information about birth and pregnancy difficulties. The name of the child's teacher and school were obtained and the teachers' questionnaires were delivered to them personally. Any questions were answered, and the experimenter remained available via telephone to deal with any uncertainties. Seventeen of the twenty teachers returned the forms by means of the supplied self addressed envelopes. The remaining teachers would not cooperate with the investigation resulting in three sets of incomplete data.

The 20 normal control children were selected from among 6 preschool classes so as to meet all inclusion criteria. Parents were sent a consent form (Appendix E) from the school and then contacted by telephone to make arrangements for their participation in the study. Whenever possible the mothers were met personally at the participating schools in small groups. It was assumed that the questionnaires provided the standardised environment in which information was gathered for all subjects. When necessary, forms were sent via the mail for mother's to complete. The experimenter remained available to answer all questions. Each child completed the Peabody Picture Vocabulary individually, during school hours. In addition to completing the Temperament and Conners Questionnaires, each mother was interviewed to gather information about birth and pregnancy difficulties. Each of the six participating teachers then completed the Conners and Temperament Questionnaires.

All questions concerning the investigation were answered in detail following the completion of the forms. Interested parents and teachers received the results of the study once the analyses were completed. All parents of children in the investigation were thoroughly briefed as to the measures to be taken and the reasons for the measures. During the investigation it became obvious that two of the participating families were experiencing continued difficulties, and they were referred to appropriate sources for assistance.

Chapter III

RESULTS

The findings of the present investigation were analysed in three basic areas. The first area was concerned with an examination of between group differences, in an attempt to isolate characterizing features of the hyperactive group as compared with the control group. The second area examined parent and teacher similarities and differences. The final area looked at the relationships between birth and pregnancy difficulties, and hyperactivity and temperament.

Descriptive information on the two experimental groups was gathered for age and IQ levels. ANOVAs revealed that there were no statistical differences between the two groups in age or IQ (see Table 1).

Differences Between Hyperactive and Control Children

Mothers Temperament Ratings

ANOVAs comparing mothers' ratings (see Table 2) on the TCTQ, revealed that five of the original nine variables: Mood, Distractability, Activity, Adaptability and Intensity

Table 1
AGE AND IQ LEVELS OF SUBJECTS

Variables	Groups		F	(df)	P $\leq$
	Hyperactive	Control			
	Means	Means			
Age in years	4.77 $\pm$ 0.85	4.85 $\pm$ 0.41	0.140	(1,38)	0.710
I.Q.	112.25 $\pm$ 11.88	114.70 $\pm$ 8.94	0.298	(1,38)	0.588

N = 20

Table 2
DIFFERENCES BETWEEN HYPERACTIVE AND
CONTROL CHILDREN ON THE MOTHERS'
TEMPERAMENT RATINGS

Variables	Groups		F	(df)	P $\leq$
	Hyperactive	Control			
	Means	Means			
Mood	4.27 $\pm$ 0.64	5.28 $\pm$ 0.71	22.03	(1,38)	0.001
Distractability	3.98 $\pm$ 1.26	5.31 $\pm$ 0.89	14.64	(1,38)	0.001
Persistence	4.14 $\pm$ 0.72	3.78 $\pm$ 0.85	2.017	(1,38)	0.164
Activity	5.24 $\pm$ 0.87	3.60 $\pm$ 0.87	35.78	(1,38)	0.001
Rhythmicity	4.51 $\pm$ 1.20	5.27 $\pm$ 1.03	4.615	(1,38)	0.038
Adaptability	4.71 $\pm$ 0.99	6.13 $\pm$ 0.48	32.83	(1,38)	0.001
Approach	4.53 $\pm$ 1.12	4.87 $\pm$ 0.66	1.413	(1,38)	0.242
Threshold	3.50 $\pm$ 0.93	3.45 $\pm$ 0.98	0.017	(1,38)	0.896
Intensity	5.28 $\pm$ 0.94	3.72 $\pm$ 0.97	26.46	(1,38)	0.001

N = 20

were significantly different between groups. The hyperactive children were significantly lower in mood, less adaptable, and more intense than the control children. The hyperactive children were also characterized by their mothers' ratings as more active and less distractable than control children.

Mothers' temperament ratings were also examined by a discriminant analysis (see Table 3) to identify which variables could best differentiate between the hyperactive and control children. All discriminant analyses performed in the present study employed the direct method of variable selection which considers all variables simultaneously. The Mothers' discriminant function was highly significant ($\leq .001$) and accounted for 85.09% of the overall variance. The function was capable of correctly predicting 95% of the subject groupings. The discriminant function coefficients indicated that the strongest discriminators between the two groups were: Adaptability, Mood, Threshold, Persistence and Approach/Withdrawal.

The temperament style categories proposed by Thomas and Chess were examined by means of chi square analyses to see if hyperactive children were characterized by a higher fre-

Table 3

RESULTS OF DISCRIMINANT FUNCTION
ANALYSIS OF THE MOTHERS' TEMPERAMENT
RATINGS FOR HYPERACTIVE Vrs. CONTROL CHILDREN
STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFF

Standardized Canonical Discriminant Function Coefficients

Parents Ratings of	Mood	-1.288
	Distractability	0.760
	Persistence	1.023
	Activity	0.743
	Rhythmicity	-0.411
	Adaptability	-1.340
	Approach/Withdrawal	0.995
	Threshold	1.107
	Intensity	0.607

Discriminant Function	Eigenvalue	Canonical Correlation	Wilk's χ^2	df	P $\leq$
1	5.708	0.922	0.149	9	0.001

CLASSIFICATION RESULTS

<u>Actual Group</u>	<u>N</u>	<u>Predicted Group Membership</u>	
		<u>Hyperactive</u>	<u>Control</u>
Hyperactive	20	18 90.0%	2 10%
Control	20	0 0%	20 100%

Percent of "Grouped" Cases Correctly Classified: 95.00%

quency of more "difficult" temperament types. Of the five temperament types only four were isolated from within the present sample. None of the children included in either the hyperactive or the control groups were characterized as "slow to warm up".

When mothers' temperament ratings were considered (see Table 4) it was found that among the hyperactive children: none were seen as an "Easy Child", 15 (75%) were seen as "Intermediate Low", 4 (20%) were "Intermediate High", and 1 (5%) was rated as a "Difficult Child" temperament type. Among the children in the control group there were: 8 (40%) characterized by the "Easy Child" temperament type, 11 (55%) were seen as "Intermediate low", 1 (5%) as "Intermediate High" and none were characteristic of the "Difficult Child" type. The chi square analysis was significant ($p < .01$) and a relatively strong relationship was indicated (Cramer's $V = 0.53421$).

Further analysis was necessary due to the small number of subjects in certain cells. Subjects were collapsed into "More Easy" and "More Difficult" temperament types (see Table 5). Despite this, there remained two cells with fewer than five subjects. As a result this analysis should be

Table 4
COMPARISON OF HYPERACTIVE
AND CONTROL CHILDREN ON THE
MOTHER RATED TEMPERAMENT CATEGORIES

Groups	Temperament Categories				Row Total
	Easy Child	Intermediate Low	Intermediate High	Difficult Child	
Hyperactive	0	15	4	1	20
Control	8	11	1	0	20
Column Totals	8	26	5	1	40

Chi square = 11.415

df = 3

p ≤ 0.010

Cramer's $V_3 = 0.534$

Table 5
COMPARISON OF HYPERACTIVE
AND CONTROL CHILDREN ON THE
MOTHER RATED COLLAPSED
TEMPERAMENT CATEGORIES

Groups	<u>Collapsed Temperament Categories</u>		Row Totals
	More Easy	More Difficult	
Hyperactive	15	5	20
Control	19	1	20
Column Totals	34	6	40

Chi square = 3.137
df = 1
p ≤ 0.076
phi = 0.280

viewed with some caution. The relationship between these collapsed groups was not significant ($p \leq .076$). The lack of strength of the relationship was indicated by the Phi coefficient of only 0.280.

Teachers Temperament Ratings

ANOVAs of the teachers' ratings (see Table 6) on the TCTQ indicated significant differences between groups for the variables: Mood, Distractability, Activity, Adaptability and Intensity. The hyperactive children were significantly lower in mood, less adaptable and more intense than the control children. The hyperactive children were also seen as significantly more active and more distractable than controls.

The teachers' temperament ratings were also examined by a discriminant analysis. The resulting discriminant function included all eight variables and was highly significant ($p \leq .001$), accounting for 82.499% of the original variance (see Table 7). The strength of the function in differentiating between the two groups was evident in that 97.3% of the children were correctly classified. The discriminant function coefficients indicated that the most powerful discriminators among the teacher rated temperament variables were: Activity, Adaptability, Persistence and Approach/Withdrawal.

Table 6
DIFFERENCES BETWEEN THE HYPERACTIVE
AND CONTROL CHILDREN ON THE
TEACHERS' TEMPERAMENT RATINGS

Variables	Groups		F	(df)	P ≤
	Hyperactive (N = 17)	Control (N = 20)			
	Means	Means			
Mood	4.37 ± 0.88	6.01 ± 0.80	35.26	(1,35)	0.001
Distractability	4.70 ± 0.80	3.75 ± 0.58	17.58	(1,35)	0.001
Persistence	3.74 ± 1.08	4.39 ± 0.59	5.31	(1,35)	0.027
Activity	5.44 ± 0.78	2.91 ± 0.71	105.20	(1,35)	0.001
Adaptability	3.95 ± 1.09	5.60 ± 1.09	21.08	(1,35)	0.001
Approach	4.43 ± 1.02	4.77 ± 1.26	0.80	(1,35)	0.377
Threshold	4.12 ± 1.18	3.84 ± 1.10	0.55	(1,35)	0.465
Intensity	4.94 ± 0.94	3.41 ± 1.09	20.47	(1,35)	0.001

Table 7

RESULTS OF DISCRIMINANT FUNCTION
ANALYSIS OF THE TEACHERS' TEMPERAMENT
RATINGS FOR HYPERACTIVE Vrs CONTROL CHILDREN
STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

Standardized Canonical Discriminant Function Coefficients		
Teachers Ratings of	Mood	-0.304
	Distractability	0.284
	Persistence	0.485
	Activity	0.858
	Adaptability	-0.498
	Approach/Withdrawal	0.456
	Threshold	0.362
	Intensity	-0.049

Discriminant Function	Eigenvalue	Canonical Correlation	Wilk's χ^2	df	P
1	4.714	0.908	0.175	8	0.001

CLASSIFICATION RESULTS

<u>Actual Group</u>	<u>N</u>	<u>Predicted Group Membership</u>	
		<u>Hyperactive</u>	<u>Control</u>
Hyperactive	17	17 100%	0 0%
Control	20	1 5.0%	19 95%

Percent of "Grouped" Cases Correctly Classified: 97.30%

Teacher rated temperament style categories were also examined by means of chi square analyses. Inspection of Table 8 revealed that: none of the hyperactive children were of the "Easy Child" temperament type, 9 (52.9%) were "Intermediate Low", 7 (41.2%) were characteristic of the "Intermediate High" type and 1 (5.9%) was characterized as a temperamentally "Difficult Child". In comparison there were: 11 (55%) control children characterized by the "Easy Child" temperament type, 6 (30%) were "Intermediate Low", 3 (15%) were "Intermediate High", and none were characterized as a "Difficult Child". The chi square comparison of these frequencies was highly significant ($p \leq .003$). The strength of the relationship was indicated by a Cramers V of 0.616.

Because of the low number of subjects in some cells a further analysis was performed after collapsing the temperament types into two groups called "More Easy" and "More Difficult" (see Table 9). Even collapsed in this way there still remains one cell with only three subjects. Since chi square analysis is most meaningful with at least 5 subjects in each cell, these data should be viewed with some caution. The chi square analysis was not significant ($p \leq .03$) and the relationship showed less strength ($\phi = 0.350$).

Table 8
COMPARISON OF HYPERACTIVE
AND CONTROL CHILDREN ON
THE TEACHER RATED TEMPERAMENT CATEGORIES

Groups	Temperament Categories				Row Totals
	Easy Child	Intermediate Low	Intermediate High	Difficult Child	
Hyperactive	0	9	7	1	17
Control	11	6	3	0	20
Column Totals	11	15	10	0	37

Chi square = 14.049
df = 3
p ≤ 0.003
Cramers V = 0.616

Table 9
COMPARISON OF HYPERACTIVE AND
CONTROL CHILDREN ON THE TEACHER
RATED COLLAPSED TEMPERAMENT CATEGORIES

Collapsed Temperament Categories			
Groups	More Easy	More Difficult	Row Totals
Hyperactive	9	8	17
Control	17	3	20
Column Totals	26	11	37

chi square = 4.521
 df = 1
 P ≤ 0.034
 Phi = 0.350

Mothers Behavior Ratings

ANOVAs were also conducted on the Mothers' Connors Rating Scales (CRS) (see Table 10). The hyperactive children were rated significantly higher than controls on the: Hyperactive Index, Impulsive/Hyperactive scale, Psychosomatic Scale, Learning Problem Scale and Conduct Problem Scale. The Anxiety scale was the only one which did not discriminate between groups.

Teachers Behavior Ratings

ANOVAs examining the teachers' ratings on the CRS indicated that the hyperactive children were rated significantly higher on the: Hyperactivity Index, Inattentive-Passive Scale, Hyperactivity Scale and Conduct Problem Scale (see Table 11).

Comparison of All Dependant Variables

A discriminant analysis was performed on all of the dependant variables to compare their relative discriminating power (see table 12). The resulting discriminant function accounts for 98.80% of the original variance, including all variables. The discriminant function was highly significant ($p \leq .001$) and was able to correctly classify 100% of the subjects. The relative contribution of each variable in the

Table 10
DIFFERENCES BETWEEN THE HYPERACTIVE
AND CONTROL CHILDREN ON THE
MOTHERS' BEHAVIOR RATINGS

Variables	Groups		F	(df)	P _≤
	Hyperactive	Control			
	Means	Means			
Hyperactivity Index	2.10 ± 0.37	0.61 ± 0.28	211.82	(1,38)	0.001
Anxiety	0.81 ± 0.68	0.63 ± 0.69	0.73	(1,38)	0.398
Impulsive/ Hyperactive	2.12 ± 0.81	0.95 ± 0.54	29.12	(1,38)	0.001
Psychosomatic	0.50 ± 0.44	0.07 ± 0.19	15.96	(1,38)	0.001
Learning Problem	1.72 ± 0.82	0.56 ± 0.40	32.53	(1,38)	0.001
Conduct Problem	1.28 ± 0.77	0.34 ± 0.26	26.61	(1,38)	0.001

N = 20

Table 11
DIFFERENCES BETWEEN THE HYPERACTIVE
AND CONTROL CHILDREN ON THE
TEACHERS' BEHAVIOR RATINGS

Variables	Groups		F	(df)	p _≤
	Hyperactive (N= 17)	Control (N= 20)			
Hyperactivity Index	1.93 ± 0.32	0.30 ± 0.28	265.57	(1,35)	0.001
Inattentive Passive	1.31 ± 0.57	0.37 ± 0.31	40.23	(1,35)	0.001
Hyperactivity Scale	1.95 ± 0.55	0.31 ± 0.41	106.64	(1,35)	0.001
Conduct Pro- blem	1.23 ± 0.57	0.16 ± 0.17	63.60	(1,35)	0.001

Table 12
RESULTS OF DISCRIMINANT FUNCTION
ANALYSIS OF ALL DEPENDANT
VARIABLES FOR HYPERACTIVE
Vrs. CONTROL CHILDREN

Standardized Canonical Discriminant Function Coefficients

Total Birth and Pregnancy Difficulties	-0.535
Parents Mood	0.174
Distractability	-1.205
Persistence	0.411
Activity	1.898
Rhythmicity	-0.645
Adaptability	0.722
Approach	0.748
Threshold	0.280
Intensity	-0.812
Anxiety	1.756
Impulsive-Hyperactive	-0.704
Psychosomatic	0.245
Learning Problem	0.356
Conduct Problem	1.337
Teachers Mood	
Distractability	0.405
Persistence	0.879
Active	0.484
Adaptability	0.062
Approach	0.047
Threshold	1.618
Intensity	-0.700
Inattentive Passive	-2.444
Hyperactivity	2.502
Conduct Problem	2.303

Discriminant Function	Eigenvalue	Canonical Correlation	Wilk's χ^2	df	p $\leq$
1	78.933	0.994	0.013	26	0.001

Classification Results

<u>Actual Group</u>	<u># of Cases</u>	<u>Predicted Group Membership</u>	
		<u>Hyperactive</u>	<u>Control</u>
Hyperactive	16	100% 16	0% 0
Control	20	0% 0	100% 20

Percent of "Grouped" Cases Correctly Classified: 100%

function as represented by the coefficients, indicated that the parent and teacher behavior ratings on the CRS are of greatest importance to the discriminating power. These behavior ratings accounted for four of the top five variables: Teacher's Hyperactivity, Teachers' Inattentive-Passive, Teachers' Conduct Problem, and Parents' Anxiety. Additional Conners variables which showed relative strength were Parents' Conduct Problem and Parents Impulsive-Hyperactive. The nine strongest temperament variables in relative order, were: Parents' Activity, Teachers' Threshold, Parents' Distractability, Teachers Persistence, Parents' Intensity, Parents' Approach, Parents' Adaptability, Teachers' Intensity and Parents Rhythmicity.

Comparison of Mothers and Teachers Ratings

Pearson Correlations between the three behavior rating scales on the CRS which the parents and teachers have in common, were all highly significant ($p \leq .01$, see Table 13).

Pearson correlations between the eight temperament variables that the parents and teachers have in common were highly significant ($p \leq .001$) for: Mood, Activity, Adaptability and Intensity (see Table 14). However, the remaining variables: Persistence, Approach/Withdrawal, Threshold and Distractability did not correlate at all.

Table 13
CORRELATIONS BETWEEN
PARENTS AND TEACHERS RATINGS
ON THE CONNERS RATING SCALES

Variables	r	p $\leq$
Hyperactivity Index	0.895	0.001
Impulsive/Hyperactive Scale	0.634	0.001
Conduct Problem Scale	0.451	0.003

N = 37

Table 14
 CORRELATIONS BETWEEN
 PARENTS' AND TEACHERS' RATINGS ON
 THE THOMAS AND CHESS TEMPERAMENT
 QUESTIONNAIRE

Variables	r	p ≤
Mood	0.679	0.001
Distractability	-0.291	0.040
Persistence	-0.108	0.261
Activity	0.686	0.001
Adaptability	0.509	0.001
Approach	0.055	0.374
Threshold	0.232	0.083
Intensity	0.586	0.001

N = 37

Parent and teacher raters were also compared by an inspection of the intercorrelations between the CRS and the TCTQ (see Table 15 and 16). Comparisons of the intercorrelations revealed a similar patterning for all temperament variables except Distractability and Persistence. Parent ratings of Distractability (Table 15) correlated negatively with the Conners: Hyperactivity Index, Impulsive/Hyperactive Scale and Conduct Problem Scale. Teachers ratings of Distractability (Table 16) on the other hand were positively correlated with the Conners variables. Parent ratings of Persistence did not correlate at all with the Conners variables. The teachers' ratings of Persistence however, were negatively correlated with both the Hyperactive Index and the Hyperactivity Scale.

Parent and teacher ratings were further examined by a comparison of factor analytic clustering. Principle factoring and iterations with Varimax rotation was adopted as it is the most widely used and accepted method in the literature.

Factor analysis of the mothers' ratings of the total group of children yielded three distinct factors, accounting for 71.8% of the original variance (see Table 17).

Table 15
 INTERCORRELATIONS BETWEEN THE
 PARENTS' RATINGS ON THE CONNORS BEHAVIOR
 RATING SCALES AND THE THOMAS AND
 CHESS TEMPERAMENT QUESTIONNAIRE

Temperament Variables	Conners Variables		
	Hyperactivity Index	Impulsive/ Hyperactive Scale	Conduct Problem Scale
Mood	-0.670**	-0.535**	-0.531**
Distractability	-0.645**	-0.504**	-0.672**
Persistence	0.153	0.288	0.144
Activity	0.802**	0.698**	0.465**
Adaptability	-0.713**	-0.585**	-0.479**
Approach	-0.157	-0.123	0.103
Threshold	0.096	-0.113	0.337*
Intensity	0.751**	0.670**	0.724**

* $p \leq .01$

** $p \leq .001$

N = 37

Table 16
 INTERCORRELATIONS BETWEEN THE
 TEACHERS' RATINGS ON THE CONNERS
 BEHAVIOR RATING SCALES AND THE THOMAS
 AND CHESS TEMPERAMENT QUESTIONNAIRE

Temperament Variables	Connors Variables		
	Hyperactivity Index	Hyperactivity Scale	Conduct Problem Scale
Mood	-0.751**	-0.744**	-0.677**
Distractability	0.674**	0.667**	0.462*
Persistence	-0.466*	-0.488**	-0.255
Activity	0.885**	0.896**	0.670**
Adaptability	-0.606**	-0.608**	-0.487**
Approach	-0.174	-0.147	-0.103
Threshold	0.044	0.034	-0.178
Intensity	0.646**	0.581**	0.602**

* $p \leq .01$

** $p \leq .001$

N = 37

Table 17
 FACTOR ANALYSIS OF THE MOTHERS' RATINGS
 ON THE THOMAS & CHESS TEMPERAMENT QUESTIONNAIRES

Temperament Variables	Communa- lity	Factors		
		1	2	3
Mood	.479	0.637	0.239	0.125
Distractibi- lity	.840	0.865	-0.108	0.283
Persistence	.495	-0.219	-0.032	-0.668
Activity	.426	-0.614	-0.220	0.024
Rhythmicity	.261	0.390	0.306	0.122
Adaptability	.860	0.701	0.607	-0.022
Approach/ Withdrawal	.410	0.187	0.612	0.035
Threshold	.791	0.181	0.629	0.602
Intensity	.821	-0.899	-0.084	-0.073
Eigenvalue		3.10	1.36	0.93
% of Variance		57.5%	25.2%	17.3%

N = 40

Factor 1, explained 57.5% of the total variance and had strongest loadings on the variables Intensity, Distractability, Adaptability, Mood and Activity. Factor 2, explained 25.2% of the total variance, and loaded heaviest on the temperament variables Approach, Threshold and Adaptability. The final Factor 3, explained 17.3% of the variance and loaded heaviest on the variables, Persistence and Threshold.

Factor analysis of the total group of children as rated by their teachers, also yielded three distinct factors accounting for 82.3% of the original variance (see Table 18). The three factors each contributed about one third of the total variance. Closer examination of the factorial loadings revealed that each factor was composed of basically three temperament variables. Factor 1, accounted for 39.2% of the variance, and had strongest loadings on Intensity, Mood and Activity. Factor 2, accounted for 31.3% of the variance and had strongest loadings on Distractability, Persistence and Activity. Factor 3, accounted for 29.5% of the variance and had strongest loadings on the variables, Adaptability, Approach, and Mood.

Birth and Pregnancy Difficulties

The relation between birth and pregnancy difficulties and the temperament categories of "More Difficult" and "More

Table 18
 FACTOR ANALYSIS OF THE TEACHERS RATINGS
 ON THE THOMAS AND CHESS TEMPERAMENT QUESTIONNAIRES

Temperament Variables	Communa- lity	Factors		
		1	2	3
Mood	.849	-0.778	-0.207	0.449
Distractibi- lity	.680	0.197	0.793	-0.113
Persistence	.578	-0.118	-0.744	0.101
Activity	.886	0.721	0.590	-0.136
Adaptability	.932	-0.402	-0.246	0.844
Approach/ Withdrawal	.680	0.027	-0.076	0.821
Threshold	.332	-0.374	0.370	-0.235
Intensity	.773	0.870	0.119	-0.052
Eigenvalue		2.24	1.79	1.60
%of Variance		39.2%	31.3%	29.5%

N = 37

Easy" was investigated by a series of ANOVAs (see Table 19). The total group of children was divided into two groups, based on temperament categories for both parents and teachers. When compared for differences on birth and pregnancy difficulties, both analyses were non-significant.

The relation between birth and pregnancy difficulties and hyperactivity was examined by an ANOVA of the differences between the hyperactive and control children (see Table 20). The analysis revealed that the hyperactive group was characterized by the presence of significantly more birth and pregnancy difficulties than the control group.

Table 19
 DIFFERENCES BETWEEN MORE EASY
 AND MORE DIFFICULT TEMPERAMENT
 TYPES ON BIRTH AND PREGNANCY DIFFICULTIES

Groups	N	Means	F	(df)	p $\leq$
Parent Rated More Easy Temperament	33	2.12 1.58	0.333	(1, 37)	0.568
Parent Rated More Difficult Tempe- rament	6	2.50 0.55			
Teacher Rated More Easy Temperament	25	1.84 1.55	3.404	(1, 34)	0.07
Teacher Rated More Difficult Tempe- rament	11	2.82 1.25			

Table 20
 DIFFERENCES BETWEEN HYPERACTIVE
 AND CONTROL CHILDREN ON BIRTH
 AND PREGNANCY DIFFICULTIES

Groups	N	Means		F	(df)	p $\leq$
Hyperactive	19	2.947	1.39	13.495	(1,37)	0.001
Control	20	1.450	1.15			

CHAPTER IV

DISCUSSION

The expectations of the present investigation were generally supported. Characterizing features of the hyperactive group were isolated, partially supporting the hypothesized descriptors. Parent and teacher raters were largely in agreement, and a relationship between hyperactivity and birth and pregnancy complications was indicated.

Mothers' temperament ratings partially supported expectations. Three of the variables that were found to be significantly different between hyperactive and control children (Mood, Adaptability, and Intensity) are included among the four temperament variables in the Thomas and Chess "Factor A". The discriminant analysis of the mothers' ratings, emphasized the discriminating power of the variables: Adaptability, Mood and Approach/Withdrawal. The discriminant analysis of all the dependant variables, supported the importance of the Intensity, Approach and Adaptability variables.

There appears to be only limited support for the hypothesized negative weighting for the hyperactive children on "Factor A". It should be pointed out that nowhere in the present study was an exact replica of "Facotor A" isolated.

What repeatedly emerged from the analyses of the results, were groupings of variables which were only similar to "Factor A". These variable clusters seem to emphasize the importance of the four "Factor A" descriptors (Mood, Intensity, Approach/Withdrawal and Adaptability), but not the reliability of this grouping. These findings agree with previous research which also found that "Factor A" variables do not always form a stable structure (Keogh, Pullis and Cadwell, 1980). However partial groupings of these variables appear to represent an important indicator of sociability. From among these sociability descriptors, the mothers' temperament ratings most strongly characterized the hyperactive children as low in adaptability and negative in mood.

Mothers' temperament ratings also characterized the hyperactive children as more Active and less Distractable than the control children. The finding of greater Activity is in the predicted direction, and the importance of this variable is emphasized by the discriminant analysis. However, the finding of less Distractability and no difference between groups on Persistence is not as hypothesized, and does not agree with previous hyperactivity research (Douglas, 1972; Campbell et al., 1979; Lambert and Windmiller, 1977).

Inspection of the specific items measuring Distractability indicates that this variable may be mislabelled on the Parents' Questionnaire. The majority of the items (7/8) do not tap the child's ability to attend or concentrate, and deal only with the child's manageability. For example, the highly Distractable child on the Parents' Questionnaire is one who; can be easily joked out of a bad mood, will stop pestering if given something else to do, is easily comforted when upset, and can be easily persuaded to accept other objects or activities which the parent selects, over his own preferences. Clearly these items are not examining attention span but how easily a child is distracted from a preferred activity. Within the hyperactivity literature, the term distractability normally refers to an inverse of the ability to concentrate and sustain attention (Dougals, 1972; Firestone and Douglas, 1975; Rosenthal and Allen, 1980; Spitzer and Cantwell, 1980). Inspection of the teachers' questionnaire reveals that the majority of their distractability items (6/8), deal specifically with the child's ability to concentrate and attend to his work assignments. This is the more common usage of the term distractable.

Similar difficulties also exist with the Persistence variable . Inspection of the items measuring Persistence

on the parents' questionnaire , reveals problems with tapping these behaviors in a home environment. Several of the parents' items (4/8) seem confounded by issues of emotional stability and ease of manageability. For example, the child's degree of Persistence includes: his preference for working alone on projects, his tendency to accept his mother's preferences over his own, and how quickly he recovers from emotional upset. Persistence, as studied within hyperactivity research is most concerned with the child's ability to finish what he or she starts, and work for prolonged periods of time. The items on this variable are not always sensitive to these difficulties alone. In addition, previous research has reported a low level of internal reliability for the parents' Persistence variable (Keogh, Pullis and Cadwell, 1980). Inspection of the teachers' questionnaire reveals that the majority of their items (7/8) deal more specifically with the types of behaviors studied in hyperactivity research.

As a result of these questionnaire irregularities with the mothers' temperament ratings, the only typically hyperactive descriptor which was found to characterize the hyperactive children was high Activity.

The analysis of the temperament style categories revealed several problems. The lack of children categorized as "Slow-to-Warm-up" seems to be due to the type of sample

selected to participate in the study. This category is incompatible with the diagnosis of hyperactivity as it is characterized by low activity level. The absence of this category among the control children is possibly a result of the relatively small size of this group and the selection procedure, which eliminated children experiencing behavioral problems. It is also possible that the Thomas and Chess questionnaire itself, is structured so as not to be sensitive to this temperament category.

There were also difficulties with the chi square statistical analyses, due to the small number of subjects in certain categories. The findings were however, in the expected direction. A greater frequency of hyperactive children were rated as being "more difficult" in temperament category, than the control children. Through inspection of the data it appears that the most discriminating categories are those of the "Easy" and "Difficult" Child. No hyperactive child was seen as "Easy" and no control child was seen as "Difficult". A greater number of subjects in each category would be necessary to allow more conclusive statistical analyses. The present results suggest only a trend in the predicted direction, that hyperactive children would be rated by their mothers as more "difficult" in temperament.

The teachers' temperament ratings characterized the hyperactive children as being more negative in Mood, less Adaptable, and more intense than the control children. The discriminant analysis of the teachers' ratings, emphasized the importance of Adaptability and Approach/Withdrawal. The discriminant analysis of all the dependant variables, supported the importance of the Intensity variable. These findings each partially support the expectations that the hyperactive children would be characterized by a negative weighting on "Factor A". The greatest emphasis among these sociability descriptors is placed on Adaptability.

Teachers' temperament ratings also characterized the hyperactive children as more Distractable and more Active than the control children. These hyperactive descriptors are as expected except for the absence of a difference on the Persistence variable. The discriminant analysis of the teachers' ratings emphasized the importance of the Activity and Persistence variables. The discriminant analysis of all the dependent variables supported the importance of Persistence. These findings are as predicted, but suggest that the most powerful discriminator is the Activity variable.

Problems similar to those experienced with the analyses of the mothers' ratings, were experienced in the analyses

of the teachers' ratings of temperament categories. Once again the slow-to-warm-up category was not isolated. This finding is possibly a result of either an incompatibility with selection procedures or a difficulty with the Thomas and Chess questionnaire. The small number of subjects in certain categories again limited the usefulness of the results. The hyperactive children showed an even stronger tendency towards more difficult temperament categories than seen with the mothers' ratings. Inspection of the data revealed that again not one of the hyperactive children were characterized by the "Easy Child" pattern and none of the control children were rated as a "Difficult Child". Overall, it appears that there is a strong tendency towards hyperactive children being rated by their teachers as more "difficult" in temperament.

The mothers' and teachers' ratings on the CRS were both very powerful discriminators between the hyperactive and control children. Mothers perceived the hyperactive children as more troublesome on all behavior scales except Anxiety. Teachers rated the hyperactive children as more difficult on all of their scales. These results for the Hyperactivity Index are not surprising, since it was an important defining criterion for the selected sample. However, there may be a halo effect in operation, resulting

in a tendency for the raters to generalize across all problem areas. It is also possible that these ratings reflect the widespread nature of the difficulties these children experience or a lack of independence between the Conners' factors. This finding of extreme scores across the Conners rating scales is supported by previous research (Firestone and Martin, 1979). The discriminant analysis of all the dependant variables included in the study emphasized the relative strength of the Conners' scales. For the purpose of discriminating hyperactive from control children these variables are the most powerful. This discriminating strength has been well documented by previous research (Goyette et al., 1978).

Comparisons between the mothers and teachers on the CRS and TCTQ gave partial support to the hypothesized similarity of mother and teacher ratings. All three Conners variables which tap similar behavior (Hyperactivity Index, Hyperactivity Scale and Conduct Problem Scale), were significantly correlated between mothers and teachers. The temperament ratings however, showed agreement on only four of the total eight variables. Teachers and parents correlated highly on the variables: Mood, Activity, Adaptability and Intensity. This similarity could be a result of close comparability

between the items contained on the parents' and teachers' questionnaires for these variables, and a comparability across environments for these behavioral styles.

Correlations were also conducted between the CRS and the TCTQ. For the mothers' questionnaire a negative correlation between the ratings of Distractability and the Hyperactivity Index, and the lack of correlation between the ratings of Persistence and the Hyperactivity Index seem contrary to previous hyperactivity research (Douglas, 1972; Campbell et al., 1979; Lambert and Windmiller, 1977). As previously noted, this finding appears to be a result of the item composition of the Distractability and Persistence variables. In their present form, the mothers' ratings on these variables are not measuring difficulties with attention span, that are the primary deficits of hyperactive children. In comparison however, the teachers' ratings correlated in the expected direction suggesting that their questionnaire is much more sensitive to these deficiencies of hyperactive children.

Factor analyses of the mothers' and teachers' ratings revealed very few similarities. The greatest comparability can be observed on the factors most descriptive of sociable behaviors (Mood, Adaptability, Approach,). More specifically,

two of the parents factors: i) Intensity, Distractability, Adaptability, Mood and Activity, and ii) Approach, Threshold and Adaptability are somewhat similar to one of the teachers factors: Adaptability, Approach and Mood. While not showing exact overlap, this comparability on social behaviors suggests they are of importance to both teachers and parents. Similar to previous research (Keogh, Pullis and Cadwell, 1980), the factor analysis of the teachers ratings appeared more clearly interpretable, forming more meaningful patterns. Besides placing emphasis on sociability descriptors, the teachers' ratings also formed clusters which are suggestive of hyperactive disorders. Two of the teachers factors: i) Intensity, Mood and Activity and ii) Distractability, Persistence and Activity, both contain hyperactive descriptors and show consistency with previous research (Keogh, Pullis and Cadwell, 1980). These findings suggest that hyperactive descriptors are of importance within the school environment.

In summary, the parents and teachers showed most similarity on the CRS. This finding is not surprising in light of previous research which supports the validity of both parents and teachers on various behavior rating scales (Green, Beck, Forehand and Vosk, 1980; Goyette et al., 1978; McMahon, Kuncie and Salamak, 1975; Vann and Kogan, 1979).

In addition, this similarity is probably augmented by the fact that the inclusion criteria for the present study were partially based on agreement between parents and teachers on the Conners Hyperactivity Index.

Comparisons between the parents' and teachers' TCTQ were less similar. The greatest similarity between raters was found with four of the eight temperament variables: Mood, Activity, Adaptability and Intensity. The greatest differences were seen with the variables of Distractability and Persistence, which were thought to be descriptive of hyperactive disorders. This dissimilarity calls into question the validity of the items composing these variables on the mothers' questionnaire. It may also reflect the fact that parents are not as reliable reporters as teachers (Sprague and Sleator, 1973; Campbell et al. 1978). In addition, it is possible that these behavior styles are of more importance in school settings.

There appear to be no relationship between temperament and birth and pregnancy difficulties in the present study. Children with more difficult temperament did not have significantly more pre and perinatal complications. However, examination of the group means reveals that there is a tendency, although not statistically significant in this direction. This is especially true for teacher rated temperament categories. It is also possible that a larger

sample of more difficult subjects would have revealed more significant results. Previous research in this area has utilized infant samples and different questionnaires, possibly accounting for differences in results. (Werner, 1979; Rapoport, Pandoni, Renfield, Lake and Ziegler, 1977).

As hypothesized the hyperactive children were found to have significantly more birth and pregnancy difficulties than the control children. The indication of pre and perinatal complications utilized, was a total of all difficulties identified. When broken down into sub-categories (Pregnancy, Labor, Delivery and Post Natal) no significant between group differences were isolated. This finding is consistent with previous research in which birth and pregnancy complications of hyperactive children do not seem to be concentrated in any specific stage of pre or perinatal development (Firestone and Prabhu, 1981; Links et al., 1980; Quinn, Renfield, Burg and Rapoport, 1977). The discriminant analysis of all the dependant variables, placed the lowest level of importance on the discriminating power of birth and pregnancy complications. This comparatively weak discriminatory ability supports previous research which has found that these factors are significant only when combined with other conditions such as minor physical anomalies (Rapoport et al., 1974; Firestone and Prabhu, 1981) and social stress (Werner et al., 1977 and 1979).

In summary, when results are considered across observers, there appear to be several features that characterize the hyperactive children. The most important discriminators of all the variables considered appear to be: all the Conners scales (except mothers Anxiety), the temperament variables of Mood, Adaptability, Intensity and Activity, and the presence of birth and pregnancy difficulties.

For this study, of most interest are those variables which can be utilized within an infant population for the purpose of formulating high risk indicators. For this goal the Conners' variables would not be useful. Both the temperament characteristics and the birth and pregnancy complications are variables which could be identified during infancy.

The present results are largely in keeping with previous research. The characterizing feature of high Activity ratings has been shown: to be associated with increased stability of more difficult temperament categories (Carey and McDevitt, 1978), to be one of the characterizing features of children presently experiencing behavioral difficulties (Carey, McDevitt and Baker, 1979), and to be capable of discriminating children at ages 1 to 5 who were found to later experience behavioral problems (Klein, 1980; Thomas and Chess, 1977). In addition, this variable has

been shown to be one of the most stable temperament variables (Escalona, 1972; Cameron, 1977; McDevitt et al., 1978). Activity level is also the only characterizing variable which relates directly to previous research with hyperactivity. While not the best characterizing feature of older hyperactive children (Douglas, 1972; Hechtman et al., 1979), hyperactive preschool children and infants have been reported to display a high level of activity (Cantwell, 1977; Safer and Allen, 1976; Werry, 1968).

The importance of the temperament variable Adaptability is also supported by previous work. Low adaptability has been shown: to be characteristic of behaviorally disturbed children at ages 3, 4, and 5 (Thomas & Chess, 1977), to be one of the characteristics of children presently experiencing several behavioral difficulties (Carey, McDevitt and Baker, 1979; Carey, Fox and McDevitt, 1977), to be predictive of the development of later adjustment difficulties (Scholom, Zucker and Stollack, 1979), and to be one of the most stable temperament variables (McDevitt et al., 1978).

The temperament characteristic of low mood: has been isolated as a risk variable for the development of later behavioral disorders (Scholom, Zucker, Stollack, 1979; Graham, Rutter and George, 1973; Terestman, 1980), was one of the descriptors of children diagnosed as minimal brain

dysfunctioned (Carey, McDevitt and Baker, 1979), and was related to increased stability of difficult temperament categories (Carey and McDevitt, 1978).

Previous research has found that the temperament variable of high intensity: was moderately stable for the first five years of life (McDevitt et al., 1978) was able to characterize children who later experienced behavioral disorders from age 3 to 5 (Thomas and Chess, 1977), and was predictive of the later development of behavioral problems (Terestman, 1980; Graham, Rutter and George, 1973).

The results from the Lambert and Windmiller (1977) study do not support the present findings. They found that the best temperament descriptor of infants, who were later diagnosed as hyperactive, was parent rated high distractability. Due to the difficulties previously described with the mothers' TCTQ, the variable Distractability was not isolated as a strong descriptor of hyperactive children in the present study. Their study differed from the present investigation in that they utilized older hyperactive children, retrospective temperament information and a different questionnaire. It seems likely that these methodological differences account for the discrepancies between their results and those of this investigation.

However, the other study which attempted to characterize the temperament of hyperactive MBD children, isolated variables which partially overlap with those of the present

investigation. The Carey, McDevitt and Baker (1979) study isolated the temperament characteristics of low adaptability, low persistence and high activity within several of their diagnostic groups. Their investigation utilized a different questionnaire and alternate diagnostic criteria, making it difficult to assess the comparability of results.

The main goal of the present study was to investigate the possibility of utilizing temperament as an early risk indicator for the later development of hyperactivity. Based on previous research it seemed likely that earlier intervention strategies might prove more effective (Williams and Cram, 1978; Loney et al. 1978; Barkley and Cunningham, 1978; Stewart, 1970). The present findings characterize preschool hyperactive children. In light of previous stability research, it appears that those individual temperament variables most likely to remain stable from infancy and thus might compose the best high risk indicators, are high Activity and low Adaptability. However, the total grouping of variables found to be characteristic of the hyperactive children (low Adaptability, high Intensity, negative Mood and high Activity) is very similar to the Thomas and Chess "Factor A". This is encouraging, as previous research has demonstrated the stability of

this factor over the first five years, and its ability to identify both children presently experiencing behavioral difficulties and those at risk for developing later problems (Thomas and Chess, 1977; Carey, McDevitt and Baker, 1979). While "Factor A" itself, was never strongly supported within the present study, the similarities between this factor and the temperament variables isolated as characteristic of the hyperactive children, suggests that stability from infancy is more probable.

These risk indicators however, are not specific to hyperactivity. It seems likely that children characterized by these features may develop a variation of later behavioral disorders, one of which would be hyperactivity. Previous research has emphasized that no simple unidirectional model can explain the relationship between temperament and later developmental disorders. Certain temperament characteristics when combined with unfavorable family, environmental or biological stress factors, appear to render the child more vulnerable (Werner et al., 1979; Chess, 1967; Cameron, 1977; Scholom et al., 1979; Fisher, Kokes, Harder and Jones, 1980). Since the most risk arises when certain inborn characteristics of the child are unacceptable in his environment it would appear that behavior styles related to

poor sociability are most unacceptable by parents, and hyperactive descriptors are most unacceptable by teachers.

Teachers' ratings are not useful until children start going to school. In addition, if we wish to deal only with three to six year old children, temperament ratings best serve as general information about the child, and teachers' Conners ratings provide the best discriminators of hyperactivity.

Infant identification of possible risk for later development of hyperactivity can also be assisted by knowledge of the presence of birth and pregnancy complications. Although the present findings could not support the relationship between such complications and temperament characteristics, they were isolated more frequently among hyperactive children.

There are several difficulties with the present study which require consideration. The first is the inherent limitations of cross-sectional research data. Although the present findings are able to delineate current temperament as it exists in hyperactive preschool children, the assumption of stability of these characteristics from infancy is not absolute and should be further researched. Longitudinal investigations however, must take into consideration other interactional factors, such as parental

personality and attitudes in relation to various temperament and biological characteristics. The development of the child is too complex to be explained by unidimensional variables.

The measurement of temperament itself presents specific difficulties. At different age levels alternate temperament scales are utilized. This variability could influence the comparability of temperament characteristics across different age levels. The Thomas and Chess (1977) questionnaire utilized by the present study, appears to have construction difficulties with the reliability and validity of some temperament variables. Additional research and revisions of this questionnaire appear to be called for to improve its usefulness.

Part of the difficulty with the temperament questionnaires seems related to limitations of relying upon partially subjective ratings. This factor was especially obvious during the comparison of parent and teacher raters. Research into person perception and attribution suggests that such ratings are often influenced by environmental and personality variables (Bem and Allen, 1974; Jones and Nisbett, 1972).

The problems which arose with the uncertainty of some of the statistical analyses could be overcome in future

research by the inclusion of a larger sample of children.

Uncertainties surrounding whether the temperament characteristics isolated in the present study are specific to hyperactive children or of disturbed children in general, could be investigated by the inclusion of contrast clinical groups. Previous research suggests that the characteristic of attention span difficulties is most specific to hyperactive children (Firestone and Martin, 1979; Douglas, 1972). The results of the present study however, suggest that the mothers temperament questionnaire is not sensitive to this characteristic of hyperactive children. This difficulty seems partially related to difficulties with the questionnaire itself, and with the difficulty of observing these behaviors in the relatively unstructured home environment.

In conclusion, the very heterogeneous nature of those children diagnosed as hyperactive, suggests that the delineation of general risk factors such as those isolated by the present study, may represent the best accuracy that can be attained. Development is very complex and not absolutely predictable. Perhaps the goal of extending extra assistance to those families who seem most likely to experience later difficulty is enough in itself, without hoping to isolate what specific form that difficulty might adopt.

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SIGNIFICANT DIFFERENCES BETWEEN ACTIVE
AND PASSIVE BEHAVIOR PROBLEMS AND
NON-CLINICAL GROUPS IN THOMAS AND CHESS
NEW YORK LONGITUDINAL STUDY.

Significant t Tests—Passive (N = 8)
Versus Nonclinical (N = 66)

Activity	Year 5	t = 1.97	p < .05
Rhythmicity		None	
Adaptability		None	
Approach/withdrawal	Year 5	t = 3.27	p < .01
Threshold		None	
Intensity		None	
Mood	Year 4	t = 2.55	p < .05
	Year 5	t = 2.12	p < .05
Distractibility		None	
Persistence	Year 5	t = 2.47	p < .05

SIGNIFICANT t TESTS—TOTAL ACTIVE
(N = 34) VERSUS NONCLINICAL (N = 66)

Activity	Year 1	t = 2.60	p < .01
Rhythmicity	Year 4	t = 2.09	p < .05
Adaptability	Year 4	t = 2.67	p < .01
	Year 5	t = 2.53	p < .05
Approach/withdrawal		None	
Threshold	Year 4	t = 3.19	p < .01
	Year 5	t = 2.26	p < .05
Intensity	Year 3	t = 2.08	p < .05
	Year 4	t = 3.82	p < .01
	Year 5	t = 3.72	p < .01
Mood		None	
Distractibility	Year 4	t = 3.02	p < .01
Persistence	Year 4	t = 3.03	p < .01

Significant t Tests—Factor A

a) Total active (N = 34) versus nonclinical (N = 66)

Year 3	t = 1.96	p < .05
Year 4	t = 3.10	p < .01
Year 5	t = 2.63	p < .01

b) Passive (N = 8) versus nonclinical (N = 66)

Year 4	t = 2.43	p < .05
Year 5	t = 2.62	p < .01

APPENDIX A-2

SIGNIFICANT DIFFERENCES BETWEEN EARLY
ONSET ACTIVE CASES AND NON-CLINICAL
GROUPS IN THOMAS AND CHESSE
NEW YORK LONGITUDINAL STUDYTABLE 8 / SIGNIFICANT t TESTS—ACTIVE BEFORE
5 YEARS (N = 14) VERSUS NONCLINICAL (N = 66)

Activity		None	
Rhythmicity	Year 2	t = 3.35	p < .01
	Year 4	t = 2.52	p < .05
Adaptability	Year 3	t = 2.74	p < .01
	Year 4	t = 5.48	p < .01
	Year 5	t = 2.92	p < .01
Approach/withdrawal	Year 5	t = 2.18	p < .05
Threshold	Year 4	t = 2.05	p < .05
	Year 5	t = 2.23	p < .05
Intensity	Year 4	t = 3.42	p < .01
	Year 5	t = 5.03	p < .01
Mood		None	
Distractibility	Year 4	t = 3.08	p < .01
Persistence	Year 5	t = 2.54	p < .01
Factor A	Year 4	t = 3.56	p < .01
	Year 5	t = 3.54	p < .01

REVISED CONNERS PARENTS RATING SCALE

Instructions: Listed below are items concerning children's behavior or the problems they sometimes have. Read each item carefully and decide how much you think your child has been bothered by this problem during the past month

NOT AT ALL, JUST A LITTLE, PRETTY MUCH, or VERY MUCH

Indicate your choice by placing a check mark () in the appropriate column to the right of each item

ANSWER ALL ITEMS

Observation	Degree of Activity			
	Not at all Present	Just a little Present	Pretty Much Present	Very Much Present
1. Picks at things (nails, fingers, hair, clothing)				
2. Sassy to grown-ups				
3. Problems with making and keeping friends				
4. EXcitable, impulsive				
5. Wants to run things				
6. Sucks or chews (thumb, clothing, blankets)				
7. Cries easily or often				
8. Carries a chip on his shoulder				
9. Daydreams				
10. Difficulty in learning				
11. Restless in the "squirmy" sense				
12. Fearful (of new situations, new people or places, going to school)				
13. Restless, always up and on the go				
14. Destructive				
15. Tells lies or stories that aren't true				
16. Shy				
17. Gets into more trouble than others the same age				
18. Speaks differently from others same age (baby talk, stuttering, hard to understand)				
19. Denies mistakes or blames others				
20. Quarrelsome				
21. Pouts and sulks				
22. Steals				
23. Disobedient				
24. Worries more than others (about being alone, illness or death)				
25. Fails to finish things				
26. Feelings easily hurt				
27. Bullies others				
28. Unable to stop a repetitive activity				
29. Cruel				
30. Childish or immature (wants help he shouldn't need, clings, needs constant reassurance)				

- 2 -

Observation	Degree of Activity			
	Not at all Present	Just a little Present	Pretty Much Present	Very Much Present
31. Distactibility or attention span a problem				
32. Headaches				
33. Mood changes quickly and drastically				
34. Doesn't like or doesn't follow rules or or restrictions				
35. Fights constantly				
36. Doesn't get along well with sisters or brothers				
37. Easily frustrated in efforts				
38. Disturbs other children				
39. Basically an unhappy child				
40. Problems with eating (poor appetite, up between bites)				
41. Stomach aches				
42. Problems with sleep				
43. Other aches and pains				
44. Vomiting or nausea				
45. Feels cheated in family circle				
46. Boasts and brags				
47. Lets self be pushed around				
48. Bowel problems (frequently loose irregular habits, constupation)				

APPENDIX B-2

REVISED CONNERS TEACHERS RATING SCALE

Listed below are descriptive terms of behavior. Place a check in the column which best describes this child. ANSWER ALL ITEMS.

Observation	Degree of Activity			
	Not at all Present	Just a little Present	Pretty Much Present	Very Much Present

CLASSROOM BEHAVIOR

1. Restless in the "squirmy" sense				
2. Makes inappropriate noises when he shouldn't				
3. Demands must be met immediately				
4. Acts "smart" (impudent or sassy)				
5. Temper outbursts and unpredictable behavior				
6. Overly sensitive to criticism				
7. Distractibility or attention span a problem				
8. Disturbs other children				
9. Daydreams				
10. Pouts and sulks				
11. Mood changes quickly and drastically				
12. Quarrelsome				
13. Restless, always up and on the go				
14. Submissive attitude toward authority				
15. Excitable, impulsive				
16. Excessive demands for teacher's attention				
17. Appears to be unaccepted by group				
18. Appears to be easily led by other children				
19. No sense of fair play				
20. Appears to lack leadership				
21. Fails to finish things that he starts				
22. Childish and immature				
23. Denies mistakes or blames others				
24. Does not get along well with other children				
25. Uncooperative with classmates				
26. Easily frustrated in efforts				
27. Uncooperative with teacher				
28. Difficulty in learning				

APPENDIX C-1

Thomas and Chess (1977) Parents
Temperament Questionnaire for
Children 3-7 Years of Age

This questionnaire is designed to gather information on the way your child behaves in different situations of everyday life. Each statement asks you to judge whether that behavior occurs *hardly ever, infrequently, once in a while, sometimes, often, very often* or *almost always*. Before each statement, please circle the number from 1 to 7 that best describes your child's behavior. The statements often involve making judgments (such as whether your child does something "quickly" or "slowly," for a "long time" and so on). Please try to make these judgments to the best of your ability, based on how you think your child compares to other children of about the same age.

Some statements may seem similar to each other because they ask about the same situation. However, each one looks at a different area of the child's behavior. Therefore, your answers may be different in each case. Should you feel that some of the choices you make need more explanation because you are uncertain about that particular choice, or because you feel that your child's behavior in that area is special enough to call for more information, *please circle the choice that seems to fit best*, and then write a brief note under "comments" at the end of the questionnaire. For example, if you feel that on some specific item your child's behavior "never" occurs or "always" occurs, circle the "almost always" or "hardly ever" and indicate that it is "always" or "never" in the comment.

A few items may not apply to your child (such as questions about school for those children not yet in school). In that case, please write "NA" (not applicable) next to the item.

	1	2	3	4	5	6	7	
	hardly ever	infrequently	once in a while	sometimes	often	very often	almost always	
1. My child splashes hard in the bath and plays actively.	hardly ever	1	2	3	4	5	6	7 almost always
2. When with other children, my children seems to be having a good time.	hardly ever	1	2	3	4	5	6	7 almost always
3. My child quickly notices odors and comments on unpleasant smells.	hardly ever	1	2	3	4	5	6	7 almost always
4. My child is shy with adults he/she does not know.	hardly ever	1	2	3	4	5	6	7 almost always
5. When my child starts a project such as model, puzzle, painting, he/she works at it without stopping until completed, even if it takes a long time.	hardly ever	1	2	3	4	5	6	7 almost always
6. My child has a bowel movement at about the same time every day.	hardly ever	1	2	3	4	5	6	7 almost always

- | | | | | | | | | | |
|---|----------------|---|---|---|---|---|---|---|------------------|
| 7. My child now eats food that she/he used to dislike. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 8. My child shows strong enthusiasm for food he/she likes or strong dislike for food he/she does not like. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 9. If my child is in a bad mood, he/she can easily be "joked" out of it. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 10. When first meeting new children, my child is bashful. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 11. My child ignores loud noises. For example, he/she is the last to complain about music being too loud, sirens, etc. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 12. If my child is not permitted to wear an item of clothing he/she selects, he/she accepts wearing mother's choice after a short discussion. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 13. My child asks for or takes a snack at approximately the same time every day. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 14. My child is happy and pleased when telling about something that has happened during the day. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 15. My child is at ease within a few visits when visiting at someone else's home. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| <hr/> | | | | | | | | | |
| 16. When upset or annoyed with a task my child may throw it down, cry, yell or slam door, etc. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 17. If my child wants a toy or candy (while shopping) he/she will easily accept something else offered instead. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 18. When my child moves about in the house or outdoors, he/she runs rather than walks. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 19. My child enjoys going shopping with parents. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |

- | | | | | | | | | | |
|--|----------------|---|---|---|---|---|---|---|------------------|
| 20. After my child is put to bed at night it takes about the same length of time to fall asleep. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 21. My child likes to try new foods. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 22. When mother is busy and cannot do what child wants, he/she goes away and does something else instead of keeping after mother. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 23. My child quickly notices colors (for example, may comment on how pretty or ugly they are). | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 24. In the playground, my child runs, climbs, swings and is constantly on the go. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 25. If my child resists some procedure, such as having hair cut, brushed or washed, he/she will continue to resist it for at least several months. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 26. If there is a sudden noise or activity nearby when my child is playing with a favorite toy, he/she ignores it, or at most, looks up briefly. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 27. When taken away from an activity that my child really enjoys, he/she protests only mildly, with a little bit of fussing or some whining. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 28. When my child is promised something in the future, he/she keeps reminding parents constantly. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 29. When playing with other children, my child argues with them. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 30. When in the park, at a party or visiting, my child will go up to strange children and join in their play. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 31. My child sleeps more one night and less another night, rather than the same number of hours each | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |

- | | | | | | | | | | |
|---|----------------|---|---|---|---|---|---|---|------------------|
| 32. My child ignores the temperature of foods (hot or cold). | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 33. If my child is shy with a strange adult he/she quickly (within a half-hour or so) gets over this. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 34. My child sits still to have a story told or read, or a song sung. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 35. When scolded or reprimanded by parents, my child reacts mildly, such as whining or complaining rather than strongly with crying or screaming. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 36. When my child becomes angry about something, it is difficult to sidetrack him/her. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 37. When learning a new physical activity (such as hopping, skating, bike riding) my child will spend long periods of time practicing. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 38. My child gets hungry at different times each day. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 39. My child is highly sensitive to changes in the brightness or dimness of light. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 40. When away from home with parents, my child has a problem (even after a few nights) in falling asleep in a new bed. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 41. My child looks forward to going to school. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 42. When the family takes a trip, my child immediately makes self at home in the new surroundings. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 43. When shopping together and mother does not buy candy, toys or clothing that child wants, he/she cries and yells. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 44. If my child is upset, it is hard to comfort him/her. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 45. When the weather is bad and my child is confined to the house, he/she runs around and cannot be entertained by quiet activities. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |

- | | | | | | | | | | |
|---|----------------|---|---|---|---|---|---|---|------------------|
| 46. My child is immediately friendly with and approaches unknown adults who visit our home. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 47. My child eats a lot one day and very little the next day, rather than the same amount each day. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 48. When a toy or game is difficult, my child will turn quickly to another activity. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 49. My child ignores differences in temperature, indoors or outdoors. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 50. If a favorite toy or game is broken, my child gets noticeably upset. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 51. In a new situation, such as a nursery, day care center, or school my child is still uncomfortable even after a few days. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 52. Although my child dislikes some procedures (such as nail cutting or hair brushing), he/she will easily allow it if watching television or being entertained while it is done. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 53. My child can sit quietly through an entire children's movie, baseball game, or a long TV program. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 54. When my child objects to wearing certain clothing, he/she argues loudly, yells, cries. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 55. On weekends and holidays my child wakes himself/herself up at the same time each morning. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 56. My child complains to own parents about other children if anything goes wrong. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 57. My child is sensitive and complains about clothing being tight, itchy or uncomfortable. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 58. If my child is angry or annoyed, he/she gets over it quickly | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |

- | | | | | | | | | | |
|---|----------------|---|---|---|---|---|---|---|------------------|
| 59. When there is a change in daily routine, such as not being able to go to school, change of usual daily activities, etc., my child goes along with the new routine easily. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 60. When outdoors, in a playground or park, my child plays quietly with toys or dolls. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 61. My child complains quietly when another child takes his/her toy away. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 62. The first time my child is left in a new situation without mother (such as school, nursery, music lesson, camp), he/she gets upset. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 63. If my child starts to play with something and I want him to stop, it is hard to turn his attention to something else. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 64. My child gets involved in quiet activities such as crafts, watching television, reading or looking at picture books. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 65. My child becomes easily upset when he/she loses a game. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 66. My child would rather wear familiar clothes than new clothes. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 67. If my child gets dirty or wet, he/she ignores this and appears quite comfortable. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 68. My child has difficulty in adjusting to rules of another household, if they are different from those at home. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 69. My child seems to take things matter of factly. Accepts events in stride without getting very excited. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 70. If meals are delayed for an hour or more, my child easily waits without seeming to mind. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |

71. My child can be stopped
from pestering if he/she is
given something else to do.
- | | | | | | | | | |
|--------|---|---|---|---|---|---|---|--------|
| hardly | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost |
| ever | | | | | | | | always |
72. When assistance is offered
in doing a task, my child
continues to do it on his/
her own.
- | | | | | | | | | |
|--------|---|---|---|---|---|---|---|--------|
| hardly | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost |
| ever | | | | | | | | always |

1	2	3	4	5	6	7					
hardly ever	infrequently	once in a while	sometimes	often	very often	almost always					
1. Child seems to have difficulty sitting still, may wriggle a lot or get out of seat.			hardly ever	1	2	3	4	5	6	7	almost always
2. When with other children, this child seems to be having a good time.			hardly ever	1	2	3	4	5	6	7	almost always
3. Child is very conscious of odors, comments on pleasant or unpleasant smells.			hardly ever	1	2	3	4	5	6	7	almost always
4. Child is shy with adults he/she doesn't know.			hardly ever	1	2	3	4	5	6	7	almost always
5. If child's activity is interrupted, he/she tries to go back to the activity.			hardly ever	1	2	3	4	5	6	7	almost always
6. Child seems to take things matter-of-factly (such as a visitor to class, trips or other special events), without getting very ex-			hardly ever	1	2	3	4	5	6	7	almost always

- | | | | | | | | | | |
|--|----------------|---|---|---|---|---|---|---|------------------|
| 7. When teacher establishes safety rule (such as behavior during fire drill), child learns to obey quickly. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 8. When telling a story, such as what happened on the weekend or during a vacation, the child talks about it loudly, with enthusiasm and excitement. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 9. Child is easily drawn away from his/her work by noises, something outside the window, another child's whispering, etc. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 10. Child will initially avoid new games and activities, preferring to sit on the side and watch. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 11. Child does not notice colors, and does not comment on how pretty or ugly they are. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 12. Child quickly becomes impatient with a task he/she cannot grasp, and goes on to something else. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 13. If child is in a bad mood, he/she can easily be "joked" out of it. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 14. Child enjoys going on errands for the teacher. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 15. If initially hesitant about entering into new games and activities, child gets over this quickly. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 16. Child's responses are loud. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 17. If another child has a toy he/she wants, this child will easily accept a substitute. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 18. Child runs rather than walks. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 19. Child smiles, laughs. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 20. After an absence of many days or after a long holiday, it takes time for this child to readjust to school routine. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 21. Child gets involved im- | hardly | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost |

- | | | | | | | | | | |
|---|----------------|---|---|---|---|---|---|---|------------------|
| 22. If teacher is busy when child wants teacher's attention, child goes away, instead of keeping after the teacher. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 23. Child remarks if teacher or classmates wear new clothes. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 24. In outdoor play, child is active and energetic, rough and tumble, compared to other children. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 25. Child takes a long time to become comfortable in a new physical location (e.g., different classroom, new seat, etc.). | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 26. If another child tries to interrupt when this child is engaged in an activity, he/she will ignore them. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 27. Child will show little or no reaction when another child takes his/her toy or possession away. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 28. When class is promised something in the future (trip, party, etc.), this child keeps reminding the teacher of it. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 29. When playing with other children, this child argues with them. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 30. Child plunges into new activities and situations without hesitation. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 31. Child can continue at the same activity for an hour. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 32. Child has to be seriously hurt before he/she comments or cries about cuts or bruises. | | | | | | | | | |
| 33. If he/she initially does not get along well with another child, this child's relationship with them improves quickly. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 34. Child is able to sit quietly for a reasonable amount of time (as compared to classmates). | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 35. It is hard to tell what this child is feeling (either positive or negative) as there is little change in | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |

- | | | | | | | | | | |
|--|----------------|---|---|---|---|---|---|---|------------------|
| 36. Child cannot be distracted when he/she is working (seems able to concentrate in the midst of bedlam). | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 37. When assistance is offered in doing a task, child prefers to do it on his/her own. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 38. Child becomes easily upset when he/she loses a game. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 39. Child is sensitive to temperature and likely to comment on classroom being hot or cold. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 40. Child takes a long time to become comfortable in a new situation. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 41. Child enjoys listening to stories. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 42. Child will get up and perform before the class (sing, recite, etc.) with no hesitation, even the first time. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 43. Child over-reacts (becomes very upset) in a stressful situation. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 44. If other children are talking or making noise while teacher is explaining a lesson, this child remains attentive to the teacher. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 45. If recess must be skipped so child doesn't have usual physical outlet, he/she becomes restless. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 46. When given a new school assignment, child responds with immediate interest. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 47. Child is bashful when meeting new children. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 48. Child starts an activity and does not finish it. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 49. Child doesn't react if accidentally touched or lightly brushed by another child. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 50. Child complains to teacher about other children. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 51. Child adjusts to changes in school routine, rules or procedures, only after a | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |

- | | | | | | | | | | |
|--|----------------|---|---|---|---|---|---|---|------------------|
| 52. This child is easily side-tracked. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 53. Child's movements are slow. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 54. Child lets other children know when he/she does not like something by yelling or fighting. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 55. Child is not bothered by loud noises (for example, fire alarm, siren, etc.) | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 56. When child can't have or do something he/she wants, child becomes annoyed or upset. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 57. Child is highly sensitive to changes in the brightness or dimness of light. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 58. During free play, child will stick to any one activity for only a short time. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 59. Child will adjust quickly to a game if others want to play in a different way. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 60. During free play time, child prefers quiet activities (such as reading or coloring) over play involving more movement (such as ball, jump-rope, tag, etc.) | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 61. When child loses a game, he/she takes it lightly. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 62. Child prefers familiar toys and games to new play equipment. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 63. Teacher may have to speak to child several times before child hears or responds if he/she is engaged in a task. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |
| 64. Child sits still when a story is being told or read. | hardly
ever | 1 | 2 | 3 | 4 | 5 | 6 | 7 | almost
always |

REVISED BIRTH AND PREGNANCY QUESTIONNAIRE

___	Proband Number	(1,2,3)
___	Card Number	(4,5,6)
___	Date of Birth (mo., yr.)	(7,8,9,10)
___	Sex 1 - male	(11)
	2 - female	
First Code for (12-20) (22-25) (30-35) (38-45) (50-55)		
	1 - document only	
	2 - undocumented only	
	3 - both	
	4 - no evidence of complication	
Pregnancy Complications		
___	Pre eclampsia	(12)
___	Eclampsia	(13)
___	Illness (specify)(and time of occurrence)	(14)
___	Emotional stress	(15)
___	Accidents	(16)
___	Hospitalization	(17)
___	Medications	(18)
___	Rh incompatibility	(19)
___	Vaginal Bleeding (code as above)	(20)
___	Bedridden for bleeding	(21)
	Yes - 0	
	No - 1	
___	Trimester of bleeding 1,2,3.	(22,23,24)
___	Other (specify)	(25)
___	Total Documented	(26,27)
___	Total Undocumented/Documented	(28,29)
<u>Labor</u> - use First Code		
___	Induced labor	(30)

___	Placenta Praevia	(32)
___	Prolapsed Cord	(33)
___	Cord around neck (if O ₂ given at birth)	(34)
___	Other (specify)	(35)
___	Total Documented	(36)
___	Total Documented/Undocumented	(37)

Delivery - use First Code

___	Low Forceps	(38)
___	Medium Forceps	(39)
___	High Forceps	(40)
___	Vacuum Extraction	(41)
___	Breech Extraction	(42)
___	Face, shoulder, hand presentation	(43)
___	Caesarian	(44)
___	Other	(45)
___	Total Documented	(46,47)
___	Total Documented/Undocumented	(48,49)

Post Natal Complications - Use First Code \

___	Low birth weight (<2500 gm)	(50)
___	Incubation	(51)
___	Slow to thrive	(52)
___	O ₂ at birth	(53)
___	Surgery/Illness	(54)
___	Other (specify)	(55)
___	Total Documented	(56,57)
___	Total Documented/Undocumented	(58,59)
___	Total Number of P.D.C. Documented	(60,61)
___	Total Number of P.D.C. Documente/Undocumented	(62,63)

— —	Gestational Period - Lunar Weeks	(66,67)
— —	Age of Mother at Birth of Child	(68,69)
— —	Birth Weight - code in grams -as ounces take to nearest full ounce - $\frac{1}{2}$ ounce = 1	(70,71,72,73)
—	Source of birth weight 1 - documented (use over undocumented) 2 - undocumented	(74)
—	Has the child ever seen a doctor regarding a psychological problem 1 - yes 2 - no	(75)
—	Has the child ever been in trouble with the law 1 - yes 2 - no	(76)
— —	Present Occupation of the major provider in the family (code using Pineo-Porter Scale)	(77,78)
—	Is/was subject behind appropriate grade level for age 1 - yes 2 - no	(79)

PARENTAL CONSENT FORM SENT FROM THE
SCHOOLS FOR THE CONTROL GROUP.

Dear Parents

Your son _____ has been selected to participate in an investigation into the behavior styles of 3-5 year old children. It is being conducted by Pamela Morel of the University of Ottawa, School of Psychology, under supervision of Dr. Philip Firestone.

If you agree, such participation would involve the completion of two questionnaires to assess your child's typical manner of behaving in various situations. These forms would have to be completed by both his mother and his teacher, and would require approximately $\frac{1}{2}$ an hour of your time.

In addition, your son will be given a measure of receptive language for group formation purposes only.

Strict confidentiality and anonymity will be maintained at all times and you would be free to withdraw from the investigation at any time.

Finally, if you are interested, the results will be forwarded to you at a later date.

Yours truly,

Pamela Morel
telephone # - 745-7645
- 231-2363

Please sign below and return to the school if you agree to participate.

date _____
(signed) _____
relationship _____

PARENTAL CONSENT FORM USED DURING
INTERVIEW OF HYPERACTIVE GROUP

INFORMED CONSENT

This is to affirm that I was informed of and agreed to the following conditions, prior to participation in this investigation into the relationship between temperamental behavior styles and hyepractivity. This study is being conducted by Pamela Morel under the supervision of Dr. Philip Firestone at the University of Ottawa.

- 1 - Strict confidentiality and anonymity will be maintained.
- 2 - Participants are free to withdraw from the investigation at any time
- 3 - results of the investigation will be forwarded to participants if requested
- 4 - Participation of the parents involves the completion of two questionnaires to assess their child's typical manner of behaving in various situations for the purpose of investigating it's relationship to hyperactivity.
- 5 - Participation of the child's teacher involves the completion of two similar questionnaires for the above stated purpose.
- 6 - That _____ could be given a measure of receptive language and general intelligence for group formation purposes.

(SIGNED) _____

RELATIONSHIP _____

DATE _____

WITNESS _____

by Lloyd M. Dunn, Ph.D.



NAME _____ SEX: M F GRADE _____
 (last) (first) (initial) (circle) (or phone)

SCHOOL _____ TEACHER _____
 (or agency or address) (or counselor or supervisor)

EXAMINER _____ TIME _____ CODE _____
 (min.) (or race or descent)

TEST SCORES

Raw score (from page 3)

Intelligence quotient (I.Q.)

Mental age (M.A.) _____

Month	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. of Month:	1	2	3	4	5	6	7	8	9	10	11	12

Names of tests	Date	CA	Score	Type of score
PPVT, Form B				

Language of the home: _____
(if other than standard English)

Quality of language: ☐ good for age ☐ fair for age ☐ poor for age
Quantity of speech: ☐ talkative ☐ average ☐ taciturn
Intelligibility of speech: ☐ good ☐ fair ☐ poor

REASON FOR TESTING _____

AGS

AMERICAN GUIDANCE SERVICE, INC.

Publishers' Building, Circle Pines, Minnesota 55014

SCORE SHEET FORM

a

Suggested Starting Points (see manual page 8)

Age Category	Begin with:	Age Category	Begin with:
below 3-3	Plate No. 1	9-6 to 11-5	Plate No. 60
3-3 to 4-2	Plate No. 15	11-6 to 13-5	Plate No. 70
4-3 to 5-5	Plate No. 25	13-6 to 15-5	Plate No. 80
5-6 to 7-5	Plate No. 40	15-6 to 17-5	Plate No. 90
7-6 to 9-5	Plate No. 50	above 17-6	Plate No. 100

BASAL: 8 consecutive correct responses

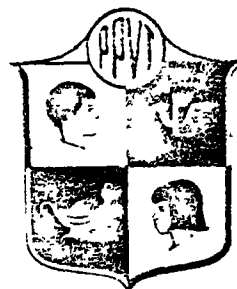
CEILING: 6 errors in 8 consecutive responses

*TO RECORD ERRORS: Make oblique strokes through the geometric figures. Every eighth figure is identical.

Plate No.	Word	Key Resp. Errors*	Plate No.	Word	Key Resp. Errors*	Plate No.	Word	Key Resp. Errors*
1	car	(4) 	26	teacher	(2) 	51	submarine	(4) 
2	cow	(3) 	27	building	(3) 	52	thermos	(4) 
3	baby	(1) 	28	arrow	(3) 	53	projector	(3) 
4	girl	(2) 	29	kangaroo	(2) 	54	group	(4) 
5	ball	(1) 	30	accident	(3) 	55	tackling	(3) 
6	block	(3) 	31	nest	(3) 	56	transportation	(1) 
7	clown	(2) 	32	caboose	(4) 	57	counter	(1) 
8	key	(1) 	33	envelope	(1) 	58	ceremony	(2) 
9	can	(4) 	34	picking	(2) 	59	pod	(3) 
10	chicken	(2) 	35	badge	(1) 	60	bronco	(4) 
11	blowing	(4) 	36	goggles	(3) 	61	directing	(3) 
12	fan	(2) 	37	peacock	(2) 	62	funnel	(4) 
13	digging	(1) 	38	queen	(3) 	63	delight	(2) 
14	skirt	(1) 	39	coach	(4) 	64	lecturer	(3) 
15	catching	(4) 	40	whip	(1) 	65	communication	(2) 
16	drum	(1) 	41	net	(4) 	66	archer	(4) 
17	leaf	(3) 	42	freckle	(4) 	67	stadium	(1) 
18	tying	(4) 	43	eagle	(3) 	68	excavate	(1) 
19	fence	(1) 	44	twist	(2) 	69	assaulting	(4) 
20	bat	(2) 	45	shining	(4) 	70	stunt	(1) 
21	bee	(4) 	46	dial	(2) 	71	meringue	(1) 
22	bush	(3) 	47	yawning	(2) 	72	appliance	(3) 
23	pouring	(1) 	48	tumble	(2) 	73	chemist	(4) 
24	sewing	(1) 	49	signal	(1) 	74	arctic	(3) 
25	wiener	(4) 	50	capsule	(1) 	75	destruction	(4) 

RAW SCORE CALCULATIONS

Ceiling item _____
 Less errors _____
 Raw score _____



tical to facilitate the determination of the basal or ceiling.

Plate No.	Word	Key Resp. Errors*	Plate No.	Word	Key Resp. Errors*	Plate No.	Word	Key Resp. Errors*
76	porter	 (3)___ ☆	101	graduated	(3)___ △	126	dormer	 (2)___ ◇
77	coast	 (2)___ ◇	102	hieroglyphic	(2)___ +	127	coniferous	.. (2)___ ○
78	hoisting	 (4)___ ○	103	orate	(1)___ ♥	128	consternation	(4)___ □
79	wailing	 (1)___ □	104	cascade	.. (3)___ ☆	129	obese	 (3)___ △
80	coil	 (2)___ △	105	illumination	(4)___ ◇	130	gauntlet	.. (4)___ +
81	kayak	... (3)___ +	106	nape	.. (1)___ ○	131	inclement	.. (1)___ ♥
82	sentry	... (2)___ ♥	107	genealogist	(2)___ =	132	cupola	... (1)___ ☆
83	furrow	 (4)___ ☆	108	embossed	.. (2)___ △	133	obliterate	(2)___ ◇
84	beam	 (1)___ ◇	109	mercantile	(4)___ +	134	burnishing	.. (3)___ ○
85	fragment	... (3)___ ○	110	encumbered	(2)___ ♥	135	bovine	.. (1)___ □
86	hovering	.. (2)___ □	111	entice	(4)___ ☆	136	eminence	.. (4)___ △
87	bereavement	(3)___ △	112	concentric	(3)___ ◇	137	legume	... (3)___ +
88	crag	... (4)___ +	113	vitreous	.. (3)___ ○	138	senile	... (4)___ ♥
89	tantrum	.. (2)___ ♥	114	sibling	(1)___ =	139	deleterious	(2)___ ☆
90	submerge	.. (1)___ ☆	115	machete	(2)___ △	140	raze	 (4)___ ◇
91	descend	.. (3)___ ◇	116	waif	.. (4)___ +	141	ambulation	.. (2)___ ○
92	hassock	... (2)___ ○	117	cornice	(1)___ ♥	142	cravat	.. (1)___ □
93	canine	 (1)___ □	118	timorous	.. (3)___ ☆	143	impale	.. (2)___ △
94	probing	.. (1)___ △	119	fettered	(1)___ ◇	144	marsupial	(4)___ +
95	angling	.. (1)___ +	120	tartan	(2)___ ○	145	predatory	.. (3)___ ♥
96	appraising	.. (3)___ ♥	121	sulky	.. (3)___ □	146	incertitude	.. (1)___ ☆
97	confining	.. (4)___ ☆	122	obelisk	(4)___ △	147	imbibe	.. (2)___ ◇
98	precipitation	(4)___ ◇	123	ellipse	.. (2)___ +	148	homunculus	(3)___ ○
99	gable	.. (1)___ ○	124	entomology	(2)___ ♥	149	cryptogam	.. (4)___ □
100	amphibian	.. (1)___ □	125	bumptious	(4)___ ☆	150	pensile	.. (3)___ △

APPENDIX G

SCORING KEY FOR REVISED
CONNORS TEACHER RATING SCALE

Factor Title	Items to be summed	Total Sum	Divided by	Av. Score
Hyperactivity Index	1,5,7,8,10,11,14,15, 21,26	-	10	-
Hyperactivity	1,2,3,8,14,15,16	-	7	-
Conduct Problem	4,5,6,10,11,12, 23,27	-	8	-
Inattentive Passive	7,9,18,20,21,22, 26,28	-	8	-

SCORING KEY FOR REVISED
CONNERS PARENT RATING SCALE

Factor Title	Items to be summed	Total Sum	Divided by	Av. Score
Hyperactive Index	4,7,11,13,14,25,31, 33,37,38	-	10	-
Conduct Problem	2,8,14,19,20,27,35, 39	-	8	-
Anxiety	12,16	-	2	-
Impulsive Hyper- active	4,5,11,13	-	4	-
Learning Problem	10,25,31,37	-	4	-
Psychosomatic	32,41,43,44	-	4	-

APPENDIX G
 SCORING KEY FOR PARENTS THOMAS AND
 CHESS TEMPERAMENT QUESTIONNAIRE

Q#	APPROACH/ WITHDRAWAL	Q#	THRESHOLD	Q#	INTENSITY
21:	1 2 3 4 5 6 7	11:	1 2 3 4 5 6 7	8:	1 2 3 4 5 6 7
30:	1 2 3 4 5 6 7	32:	1 2 3 4 5 6 7	16:	1 2 3 4 5 6 7
42:	1 2 3 4 5 6 7	49:	1 2 3 4 5 6 7	43:	1 2 3 4 5 6 7
46:	1 2 3 4 5 6 7	67:	1 2 3 4 5 6 7	54:	1 2 3 4 5 6 7
N		N		N	
	x x x x x x x		x x x x x x x		x x x x x x x
xW	1 2 3 4 5 6 7	xW	1 2 3 4 5 6 7	xW	1 2 3 4 5 6 7
WS	+ + + + + =	WS	+ + + + + =	WS	+ + + + + =
Q#		Q#		Q#	
4:	1 2 3 4 5 6 7	3:	1 2 3 4 5 6 7	27:	1 2 3 4 5 6 7
10:	1 2 3 4 5 6 7	23:	1 2 3 4 5 6 7	35:	1 2 3 4 5 6 7
62:	1 2 3 4 5 6 7	39:	1 2 3 4 5 6 7	61:	1 2 3 4 5 6 7
66:	1 2 3 4 5 6 7	57:	1 2 3 4 5 6 7	69:	1 2 3 4 5 6 7
N		N		N	
	x x x x x x x		x x x x x x x		x x x x x x x
xW	7 6 5 4 3 2 1	xW	7 6 5 4 3 2 1	xW	7 6 5 4 3 2 1
WS	+ + + + + =	WS	+ + + + + =	WS	+ + + + + =
Category Total*	_____	Category Total*	_____	Category Total*	_____
APPROACH SCORE	_____	THRESHOLD SCORE	_____	INTENSITY SCORE	_____

* Divide by 8, or the number of questions in the category answered.

NAME: _____

AGE: _____

DATE: _____

PARENT'S THOMAS AND CHESS QUESTIONNAIRE

Q#	MOOD	Q#	DISTRACTABILITY	Q#	PERSISTENCE
2:	1 2 3 4 5 6 7	9:	1 2 3 4 5 6 7	5:	1 2 3 4 5 6 7
14:	1 2 3 4 5 6 7	17:	1 2 3 4 5 6 7	28:	1 2 3 4 5 6 7
19:	1 2 3 4 5 6 7	52:	1 2 3 4 5 6 7	37:	1 2 3 4 5 6 7
41:	1 2 3 4 5 6 7	71:	1 2 3 4 5 6 7	72:	1 2 3 4 5 6 7
N		N		N	
	x x x x x x x		x x x x x x x		x x x x x x x
xW	1 2 3 4 5 6 7	xW	1 2 3 4 5 6 7	xW	1 2 3 4 5 6 7
WS	+ + + + + =	WS	+ + + + + =	WS	+ + + + + =
Q#		Q#		Q#	
29:	1 2 3 4 5 6 7	26:	1 2 3 4 5 6 7	12:	1 2 3 4 5 6 7
50:	1 2 3 4 5 6 7	36:	1 2 3 4 5 6 7	22:	1 2 3 4 5 6 7
56:	1 2 3 4 5 6 7	44:	1 2 3 4 5 6 7	48:	1 2 3 4 5 6 7
65:	1 2 3 4 5 6 7	63:	1 2 3 4 5 6 7	58:	1 2 3 4 5 6 7
N		N		N	
	x x x x x x x		x x x x x x x		x x x x x x x
xW	7 6 5 4 3 2 1	xW	7 6 5 4 3 2 1	xW	7 6 5 4 3 2 1
WS	+ + + + + =	WS	+ + + + + =	WS	+ + + + + =
Category Total*	_____	Category Total*	_____	Category Total*	_____
MOOD SCORE	_____	DISTRACT SCORE	_____	PERSIST SCORE	_____

* Divide by 8, or the number of questions in the category answered.

Q#	ACTIVITY	Q#	RHYTHMICITY	Q#	ADAPTABILITY
1:	1 2 3 4 5 6 7	6:	1 2 3 4 5 6 7	7:	1 2 3 4 5 6 7
18:	1 2 3 4 5 6 7	13:	1 2 3 4 5 6 7	15:	1 2 3 4 5 6 7
24:	1 2 3 4 5 6 7	20:	1 2 3 4 5 6 7	33:	1 2 3 4 5 6 7
45:	1 2 3 4 5 6 7	55:	1 2 3 4 5 6 7	59:	1 2 3 4 5 6 7
N		N		N	
	x x x x x x x		x x x x x x x		x x x x x x x
xW	1 2 3 4 5 6 7	xW	1 2 3 4 5 6 7	xW	1 2 3 4 5 6 7
WS	+ + + + + =	WS	+ + + + + =	WS	+ + + + + =
Q#		Q#		Q#	
34:	1 2 3 4 5 6 7	31:	1 2 3 4 5 6 7	25:	1 2 3 4 5 6 7
53:	1 2 3 4 5 6 7	38:	1 2 3 4 5 6 7	40:	1 2 3 4 5 6 7
60:	1 2 3 4 5 6 7	47:	1 2 3 4 5 6 7	51:	1 2 3 4 5 6 7
64:	1 2 3 4 5 6 7	70:	1 2 3 4 5 6 7	68:	1 2 3 4 5 6 7
N		N		N	
	x x x x x x x		x x x x x x x		x x x x x x x
xW	7 6 5 4 3 2 1	xW	7 6 5 4 3 2 1	xW	7 6 5 4 3 2 1
WS	+ + + + + =	WS	+ + + + + =	WS	+ + + + + =
Category Total*	_____	Category Total*	_____	Category Total*	_____
ACTIVITY SCORE	_____	RHYTHMIC SCORE	_____	ADAPTAB SCORE	_____

* Divide by 8, or the number of questions in the category answered.

SCORING KEY FOR TEACHERS THOMAS AND
CHESS TEMPERAMENT QUESTIONNAIRE

Q#	<u>APPROACH/ WITHDRAWAL</u>	Q#	<u>THRESHOLD</u>	Q#	<u>INTENSITY</u>
21	1 2 3 4 5 6 7	11	1 2 3 4 5 6 7	8	1 2 3 4 5 6 7
30	1 2 3 4 5 6 7	32	1 2 3 4 5 6 7	16	1 2 3 4 5 6 7
42	1 2 3 4 5 6 7	49	1 2 3 4 5 6 7	43	1 2 3 4 5 6 7
46	1 2 3 4 5 6 7	55	1 2 3 4 5 6 7	54	1 2 3 4 5 6 7
N		N		N	
	x x x x x x x		x x x x x x x		x x x x x x x
xW	1 2 3 4 5 6 7	xW	1 2 3 4 5 6 7	xW	1 2 3 4 5 6 7
WS	+ + + + + = _____	WS	+ + + + + = _____	WS	+ + + + + = _____
Q#		Q#		Q#	
4	1 2 3 4 5 6 7	3	1 2 3 4 5 6 7	6	1 2 3 4 5 6 7
10	1 2 3 4 5 6 7	23	1 2 3 4 5 6 7	27	1 2 3 4 5 6 7
47	1 2 3 4 5 6 7	39	1 2 3 4 5 6 7	35	1 2 3 4 5 6 7
62	1 2 3 4 5 6 7	57	1 2 3 4 5 6 7	61	1 2 3 4 5 6 7
N		N		N	
	x x x x x x x		x x x x x x x		x x x x x x x
xW	7 6 5 4 3 2 1	xW	7 6 5 4 3 2 1	xW	7 6 5 4 3 2 1
WS	+ + + + + = _____	WS	+ + + + + = _____	WS	+ + + + + = _____
Category Total	_____	Category Total	_____	Category Total	_____
APPROACH SCORE	_____	THRESHOLD SCORE	_____	INTENSITY SCORE	_____

Category Total is divided by 8 or by the number of questions
in the category answered

NAME: _____

Q# MOOD

2 1 2 3 4 5 6 7

14 1 2 3 4 5 6 7

19 1 2 3 4 5 6 7

41 1 2 3 4 5 6 7

N

 x x x x x x x

xW 1 2 3 4 5 6 7

WS + + + + + = _____

Q#

29 1 2 3 4 5 6 7

38 1 2 3 4 5 6 7

50 1 2 3 4 5 6 7

56 1 2 3 4 5 6 7

N

 x x x x x x x

xW 7 6 5 4 3 2 1

WS + + + + + = _____

Category Total _____

MOOD SCORE _____

Q# DISTRACTABILITY

9 1 2 3 4 5 6 7

13 1 2 3 4 5 6 7

17 1 2 3 4 5 6 7

52 1 2 3 4 5 6 7

N

 x x x x x x x

xW 1 2 3 4 5 6 7

WS + + + + + = _____

Q#

26 1 2 3 4 5 6 7

36 1 2 3 4 5 6 7

44 1 2 3 4 5 6 7

63 1 2 3 4 5 6 7

N

 x x x x x x x

xW 7 6 5 4 3 2 1

WS + + + + + = _____

Category Total _____

DISTRACTABILITY SCORE _____

Q# PERSISTENCE

5 1 2 3 4 5 6 7

28 1 2 3 4 5 6 7

31 1 2 3 4 5 6 7

37 1 2 3 4 5 6 7

N

 x x x x x x x

xW 1 2 3 4 5 6 7

WS + + + + + = _____

Q#

12 1 2 3 4 5 6 7

22 1 2 3 4 5 6 7

48 1 2 3 4 5 6 7

58 1 2 3 4 5 6 7

N

 x x x x x x x

xW 7 6 5 4 3 2 1

WS + + + + + = _____

Category Total _____

PERSISTENCE S. _____

Q# ACTIVITY

1 1 2 3 4 5 6 7

18 1 2 3 4 5 6 7

24 1 2 3 4 5 6 7

45 1 2 3 4 5 6 7

N

 x x x x x x x

xW 1 2 3 4 5 6 7

WS + + + + + = _____

Q#

34 1 2 3 4 5 6 7

53 1 2 3 4 5 6 7

60 1 2 3 4 5 6 7

64 1 2 3 4 5 6 7

N

 x x x x x x x

xW 7 6 5 4 3 2 1

WS + + + + + = _____

Category Total _____

ACTIVITY SCORE _____

Q# ADAPTABILITY

7 1 2 3 4 5 6 7

13 1 2 3 4 5 6 7

17 1 2 3 4 5 6 7

52 1 2 3 4 5 6 7

N

 x x x x x x x

xW 1 2 3 4 5 6 7

WS + + + + + = _____

Q#

26 1 2 3 4 5 6 7

36 1 2 3 4 5 6 7

44 1 2 3 4 5 6 7

63 1 2 3 4 5 6 7

N

 x x x x x x x

xW 7 6 5 4 3 2 1

WS + + + + + = _____

Category Total _____

ADAPTABILITY SCORE _____