



National Library
of Canada

Bibliothèque nationale
du Canada

Canadian Theses Service

Service des thèses canadiennes

Ottawa, Canada
K1A 0N4

NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30, and subsequent amendments.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30, et ses amendements subséquents.

An Examination into the Relationship Between the
Attention Deficit Hyperactivity Disorder and Aggression

Dissertation

Submitted to the School of Graduate Studies

of

University of Ottawa

In Partial Fulfillment of the Requirements for
The Degree of Doctor of Philosophy

by

David William Rynard

Ottawa, Ontario

1991



National Library
of Canada

Bibliothèque nationale
du Canada

Canadian Theses Service Service des thèses canadiennes

Ottawa, Canada
K1A 0N4

The author has granted an irrevocable non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of his/her thesis by any means and in any form or format, making this thesis available to interested persons.

The author retains ownership of the copyright in his/her thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without his/her permission.

L'auteur a accordé une licence irrévocable et non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de sa thèse de quelque manière et sous quelque forme que ce soit pour mettre des exemplaires de cette thèse à la disposition des personnes intéressées.

L'auteur conserve la propriété du droit d'auteur qui protège sa thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

ISBN 0-315-70476-4

Canada



UNIVERSITÉ D'OTTAWA
UNIVERSITY OF OTTAWA

To Jill

ACKNOWLEDGEMENTS

The completion of this dissertation could not have been achieved without the support and technical guidance of a great many people. I would like to express my sincere gratitude to my supervisor, mentor, and friend, Dr. Phil Firestone whose support, guidance and encouragement throughout my stay at the University of Ottawa was unconditional and contributed to both my personal and professional development.

The research team of Dr. Firestone, Dr. Lewis Leikin, Dr. Sue Pisterman and Dr. Jovan Simeon who were all coinvestigators on the NHRDP grant were instrumental in securing and ensuring that the research was carried out in an efficient and consistent manner. A special thanks goes to Victoria Williams for running subjects, scoring protocols, entering data and ensuring data was ready for statistical analysis at critical times throughout the study. Thanks also to Dr. John Goodman, Dr. Anne Schleiper, and Dr. Bruce Ferguson for their support in identifying and recruiting subjects.

I would also like to thank the members of my academic committee Dr. Jane Ledingham, Dr. Catherine Lee, Dr. Ian Manion and Dr. Ray Peters who among many other things taught me the importance of thoroughness and attention to detail.

For technical assistance, thanks go to Dr. Bob Gardner, Dwayne Schindler and Dr. Lewis Leikin who shared their knowledge of computer and statistical analysis, and experimental design.

The members of the department of pediatric psychology at Victoria Hospital deserve honorable mention for their ongoing encouragement, confidence and support. To Mike, Vicki, Sid, Janet, Mary, Ian, Vuyo, Paul, Ann, and Anne, I say guess what? I just did it!

A special thanks to Dr. Beth Mitchell who has, and continues to be, a role model for me both professionally and personally.

For emotional support I would like to thank my mom, Barbara, and dad, Bill, sister Lorrie, stepdad, Jchn, grandparents, Vera and Paul, cousin Paul, brother-in-law Virgil, stepmom Audrey and departed Gladys, and in laws, Joyce and Alex. Thanks also to Doug Snow, Kim Burgess, Hugh Piggins, Ernie MacKinnon, and Bill Kartechner, and of course, Mr. Jake.

My greatest appreciation by far goes to my best bud and life long partner, Jill. Your endless encouragement, support, selflessness, and love were by far the most crucial in allowing this dissertation to be completed in years of great change and adjustment. To you I express my deepest gratitude. This is truly a symbol of our devotion. As such, I devote this dissertation in honour of you.

Table of Contents

ABSTRACT	1
INTRODUCTION	4
Hyperactivity and Aggression	9
Deficits in Hyperactivity and Aggression	10
Attention and Impulsivity	11
Cognition	13
Attribution	15
Social Information Processing	17
Family Functioning	21
Self-Report Measures	23
Rationale for Present Study	26
Hypotheses	27
METHOD	31
Subjects	31
Experimental Design	32
Procedure	33
Conners Teacher Rating Scale	37
Inattention Overactivity with/out Aggression Conners	38
Swanson, Nolan and Pelham Rating Scale	40
Dependent Measures	41
ATTRIBUTION	42
ATTENTION AND IMPULSIVITY	46
COGNITION	48
FAMILY FUNCTIONING	51
SELF-REPORT	53
RESULTS	58
Statistical Analyses	58
Preliminary Analyses	60
Group Composition and Characteristics	61
Diagnostic Interview for Children and Adolescents - Parents	62
Swanson, Nolan, Pelham Teacher Rating Scale	67
Divergent and Convergent Interview for Behavior Disorders	71
Testing the Hypotheses	74
Hypothesis Ia and Ib	74
Hypothesis IIa and IIb	85
Hypothesis III	88
Hypothesis IV	91
Hypothesis V	98
Hypothesis VIa, VIb and VIc	103
DISCUSSION	109
Group Assignment	109
Vigilance	115
Impulsivity	119
Cognition	123

General Attributions	126
Social Information Processing	128
Family Functioning	131
Self-Report	133
Summary	136
Limitations of the Current Study and Future Directions	139
REFERENCES	143
APPENDICES A-M	158

List of Tables

Table 1 Background, Dependent Measures, and Corresponding Scores used in the Present Study	56
Table 2 Group Means and Standard Deviations on Demographic and Background Characteristics	63
Table 3 Group Means and Standard Deviations on DICA-P	66
Table 4 Means and Standard Deviations on SNAP Scales	68
Table 5 Group Means, Standard Deviations and Differences on Loney DCIBD Scales	72
Table 6 Group Means, Standard Deviations and Differences on Vigilance Task	76
Table 7 Power of the Statistical Tests Conducted on the Vigilance Task	78
Table 8 Group Means and Standard Deviations on GDS Vigilance Task across Blocks	79
Table 9 Group Means, Standard Deviations and Differences on GDS Delay Task	81
Table 10 Group Means and Standard Deviations on Delay Task across Blocks	83
Table 11 Power of the Statistical Tests Conducted on the GDS Delay Task	84
Table 12 Group Means and Standard Deviations on Sort/Recall Task Before and After Training	87
Table 13 Power of the Statistical Tests Conducted on the Sort/Recall Task	87
Table 14 Group Means and Standard Deviations on GPC Success and Failure Items	90

Table 15	
Group Means, Standard Deviations and Univariate F Ratios on Individual AIT Items by Peer Type	95
Table 16	
Proportion of Subjects Falling into Balanced, Midrange and Extreme Classifications from the Circumplex Model by Group	99
Table 17	
Subjects' Scores on the Adaptability Dimension of the Circumplex Model by Group	101
Table 18	
Subjects' Scores on the Cohesion Dimension of the Circumplex Model by Group	104
Table 19	
Group Means and Standard Deviations of Factor Scores on the CSRRQ	105
Table 20	
Power of the Statistical Tests Conducted on the CSRRS	108

ABSTRACT

Recent research indicates that the presence of aggressive behaviour in boys diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) is related to a poorer prognosis, different etiological factors, interpersonal problems, and the selection of appropriate treatment components than ADHD without aggression. Unfortunately, many studies examining various deficits thought to be specific to ADHD children have failed to utilize data from different diagnostic sources to allow for comparisons between attention/overactivity and aggressive symptomatology.

The present investigation utilized a between groups comparison design with group assignment based on a two step-multisource inclusion criterion (DICA-P Interview and IOWA Conners) to make comparisons across four groups: hyperactive-only (IO, $N = 12$), aggressive-only (AGG, $N = 16$), hyperactive/aggressive (IO/AGG, $N = 35$) and normal controls ($N = 33$). Subjects were compared on parent and teacher rating scales and interviews, laboratory measures of vigilance, impulsivity, higher-order learning / memory, family functioning, general and social attribution, and self-report ratings.

The results of this study partially support the use of parent and teacher rating scales in making distinctions between aggressive and hyperactive children. In agreement with previous studies, mothers of boys in the AGG and IO/AGG groups described a

greater number of depressive, anxious, oppositional behaviours, and family psychosocial stress than did mothers in IO and Control groups. All clinical groups were rated by parents and teachers as displaying a higher frequency of disruptive and impulsive behaviours, and peer-related difficulties. Discriminant analyses on parent and teacher ratings revealed that boys in the AGG and IO/AGG group were the most similar in terms of symptomatology. Prediction on scales of the separate rating and interviews was best for IO and Control groups. The IO/AGG received the highest ratings on parent and teacher rating scales.

In contrast to the predictions made between experimental groups, the IO/AGG subjects displayed only some common characteristics with IO subjects. IO subjects displayed more evidence of cognitive dysfunction on the high-order learning task and Delay task of the Gordon Diagnostic System (GDS). The lack of reliable group differences on the GDS Vigilance task and Efficiency Ratio of the Delay task questions the validity of the GDS in the diagnosis of ADHD and highlights the importance of designing new tasks to assess impulsivity and attention which hold important social/motivational and age-related factors constant. Predicted group differences were also not evident on the Beitchman self-report rating or general attribution questionnaire. All clinical groups described greater rigidity in family interactions and were more likely to display evidence of social information processing biases than control subjects.

Overall, these results suggest that the ADHD category includes a heterogeneous group of behaviour disordered boys, and that further study into the cognitive, social, familial, and attributional styles of aggressive and hyperactive boys warrants continued exploration.

INTRODUCTION

The Attention Deficit Disorder (ADHD; DSM III-R: APA, 1987), also referred to as hyperactivity, is a commonly diagnosed and well studied psychopathological phenomenon of childhood. One enumeration of scientific articles revealed that 7000 articles were published in the three years between 1977-1980 on hyperactivity and it is the most common condition found in children referred to child psychiatry clinics (Weiss, 1985). Epidemiological studies in North America report that between 3% and 15% of all school-age children in the general population may be considered hyperactive (e.g. Offord, et al., 1987; Trites, 1979). Indeed, the pervasiveness of this common syndrome and its costs to both the individual and society are highlighted by studies that report higher than average rates of accidents, divorces, job changes, alcoholism, social inadequacies and psychiatric antisocial disturbances into adulthood (e.g. Weiss & Hechtman, 1986; Whalen, 1988).

A great deal of controversy has risen in the past few years regarding research findings with respect to the etiology, diagnosis, and prognosis of the hyperactive syndrome (see Werry, Reeves & Elkind, 1987 for a review). This debate has been fueled from two main sources. The first of these concerns attempts to clearly operationalize the nature of the deficit(s) in hyperactivity. According to the most recent version of the

Diagnostic and Statistical Manual of the American Psychiatric Association (DSM III-R; APA, 1987) the core characteristics of hyperactivity include difficulties with inattention, overactivity and impulsivity. Many of these children, but not all, are also aggressive and have poor social relations (Cunningham & Siegal, 1987; deHass, 1986; Johnston, Pelham & Murphy, 1985; Loney, 1987; Milich & Landau, 1989; Whalen, Henker, Castro, & Granger, 1987). Often children who receive a diagnosis of ADHD will also qualify for an additional diagnosis of Conduct Disorder (CD) or Oppositional Defiant Disorder (ODD), or will develop CD in adolescence (APA, 1987; Biederman et al., 1987; Cantwell, 1985; Gittelman, Mannuzza, Shenker, & Bonagura, 1985).

The diagnosis of ADHD in many clinics and research studies is based on a clinical interview and scores on parent and/or teacher rating scales. Typically, factor analytic studies conducted on these scales yield two factors relevant to the present discussion. The "conduct problems" factor taps behaviours that transgress social and legal norms such as lying, stealing, cheating, talking back, fighting and hitting. A "hyperactive" factor also usually emerges which includes items tapping problems in sustaining and modulating attentional deployment, excessive motor activity, and impulsive behaviours. Inclusionary criteria into hyperactive groups in many studies is generally based on a deviant hyperactivity score on parent and/or teacher rating scales. However, factor analytic studies have

demonstrated that these "hyperactive" indices typically correlate very highly with scores on the conduct problems factors, but this fact is often ignored in the selection criteria. In eight such studies, Hinshaw (1987) reported that the median correlation between hyperactivity and conduct problem scales was .70.

Another source of confusion comes from a parallel line of research which has attempted to make a distinction between children who display attention deficits with and without accompanying problems in overactivity (ADD/H and ADD/WO). These two categories of behaviour were delineated as separate diagnostic groups in the DSM III, but were combined into the current single ADHD in the DSM III-R. This line of research suggests that children who exhibit difficulties in attention and impulsivity in the absence of motor hyperactivity (ADD/WO) can be identified in clinical samples (Edelbrock, Costello & Kessler, 1984), special education samples (Carlson, Lahey & Neeper, 1986), and epidemiological samples (King & Young, 1982; Lahey et al., 1984; Pelham, Atkins & Murphy, 1981), and tend to be more anxious and shy (Lahey et al., 1984) than ADD/H children. On the other hand, ADD/H children are generally found to exhibit more conduct problems (Edelbrock et al., 1984; King & Young, 1982; Lahey et al., 1984; Lahey et al., 1985; Pelham et al., 1981) to be more impulsive and distractible (Lahey et al., 1985) and to be more socially rejected (King & Young, 1982; Lahey et al., 1984) than ADD/WO children. Lahey et al. (1989) have demonstrated in factor

analyses of DSM-III and DSM III-R symptom lists similar separate inattention-disorganization and motor hyperactivity-impulsivity factors. Loeber and Lahey (1988) recommend that future studies in hyperactivity must take this important factor into account before drawing any conclusions regarding etiology, prognosis and treatment.

The above review points to a pervasive problem in the hyperactivity literature. First, it is not clear what the defining characteristics of the syndrome referred to as hyperactivity are. The literature is replete with studies that define hyperactive groups on the basis of DSM III guidelines and/or a deviant score on the hyperactivity index of one or more of the rating scales. As noted however, some children diagnosed as hyperactive will also display conduct problems, while others will not. Furthermore, as the Lahey research suggests, ADD/H is more likely to be associated with conduct problems and social rejection than is a separate yet similar syndrome of ADD/WO. If the above observations are accurate, then much of the existing research in hyperactivity is contaminated with heterogeneous samples. This potential bias was nicely highlighted by Loney and Milich (1982) who suggest that the hyperactivity literature is actually one about externalising problems (attention deficits and oppositional behaviours).

Aggression

Developmental studies use the term aggression to describe a variety of acting-out behaviours that have in common an intrusive demand and an aversive effect on others (Olweus, 1979; Patterson, 1982). These include physically and verbally aggressive acts, disruptive behaviour, and disagreeable and egocentric behaviour. These behaviours have been linked to negative adult outcomes such as antisocial personality disorders, poor interpersonal and marital relations, alcoholism, and other psychiatric disorders (Kohlberg, LaCross & Ricks, 1972; Robins, 1972), and to family factors such as high rates of parental coercive behaviour, marital discord, and low SES (cf. Patterson, 1982). In addition, aggressive behaviour is often associated with negative attributional biases, social skills deficits, and peer rejection (Milich & Landau, 1989; Parke & Slaby, 1983; Price & Dodge, 1989).

Another line of research has likened the disruptive behaviour seen in hyperactivity to those commonly associated with aggressive traits in children. For example, the presence of aggression in hyperactivity has been found in a number of studies to be related to adverse family environments (August & Stewart, 1983; McGee, Williams & Silva, 1984; Reeves, Werry, Elkind & Zanstkin, 1987) and to increased severity and poor prognosis (Loney & Milich, 1982; Loney, 1987; Lilienfield & Waldman, 1990;

McGee et al., 1985; Stewart, Cummings, Singer & deBlois, 1981). Children displaying both aggressive and hyperactive behaviours are the most likely to be referred to clinics (e.g. Anderson, Williams, McGee, & Silva, 1987; Werry et al., 1987; Loney & Milich, 1982).

Hyperactivity and Aggression

A central question regarding the syndrome we call hyperactivity and the developmental research on aggression arises from this brief review. Several authors have suggested that the distinction between hyperactivity and aggression is not important for diagnostic purposes other than the fact that the presence of aggression is the most debilitating characteristic of hyperactivity (Prior & Sanson, 1986; Sandberg, Rutter, & Taylor, 1978). Moreover, the common diagnostic practice in Europe is to disregard the diagnosis of hyperactivity in favour of Conduct Disorder when aggression is present (Taylor, 1986). However, it is the presence of aggression in hyperactivity that seems to hold the worst prognosis in terms of severity of behavioral problems, social deficits and long-term outcome (see Whalen, 1988). It is quite possible that group data on hyperactive children may be misleading, since these children represent a heterogeneous group. The symptoms of overactivity, inattention and impulsivity exhibited by hyperactive children may be inappropriately attributed to aggressive type behaviours, possibly because of

their salience and disruptiveness (Schachar, Sandberg, & Rutter, 1985; Schachar & Logan, 1989). Furthermore, the developmental literature describing the correlates of aggression in children has failed to describe samples in terms of the presence or absence of concurrent hyperactive symptomatology.

The similarity between aggressive and hyperactive symptomatology may contribute to the present confusion regarding the relationship between these two proposed categories and dimensions of disruptive behaviour. In order for diagnostic distinctions to be meaningful, they should serve a number of functions. Loeber and Lahey (1989) suggest that diagnostic categories should have distinct characteristics, and be associated with different correlates of patient behaviour and background characteristics. These distinctions may eventually prove useful in terms of their ability to predict discrete outcomes over time, and choosing treatment best suited for each particular disorder. The present study is intended as one attempt at evaluating whether or not the aggression/hyperactive distinction is useful in terms of its ability to differentiate various hypothesized cognitive and affective processes, and familial and background correlates.

Deficits in Hyperactivity and Aggression

In order to determine what pertinent elements of

hyperactivity and aggression should be included in a study designed to examine the role of aggression in hyperactivity, it is necessary to review some of the research describing the various deficits consistently reported in studies of hyperactivity and aggression.

Attention and Impulsivity

As its name implies, the essential feature of ADHD is a pervasive difficulty with attentional processes and a great deal of research has been devoted to explicating the nature of the attentional deficit (see Douglas and Peters, 1979 for a review). At least 5 of the 14 diagnostic criteria listed in DSM III-R refer to difficulties in the attentional realm. Direct observations of "on task" behaviour have yielded consistent differences between hyperactive and normal control children (e.g., Cunningham & Seigel, 1987; Whalen et al., 1979). Unfortunately, behavioral observations do not measure attentional processes exclusively. Off task behaviour can also be the result of boredom, noncompliance or anxiety.

Consistent and robust indicators of deficient attentional processes have been reported on objective measures which require among other skills, prolonged concentration over time. A common index of sustained attention is the vigilance or continuous performance task (CPT) in which the child is required to detect

rare signals in the presence of similar but irrelevant stimuli. ADHD children consistently make more errors of commission (false alarms) and errors of omission (missed signals) than do their normal peers (e.g. Douglas, 1983; Sykes, Douglas & Morganstern, 1973) on different variations of this test. Variable rates of responding and lower reaction time scores have also been reported in ADHD children relative to peers on similar delayed reaction time tasks (e.g. Firestone & Douglas, 1975; Parry & Douglas, 1983).

Impulsivity, also defined as a deficit in inhibitory control, was listed as one of the main components of ADD-H in DSM III and continues to be included as a core feature in DSM III-R's ADHD. Deficits in impulse control have been reported in ADHD children on measures of sustained attention (errors of commission) reflected in the failure to inhibit responding before the target stimulus. Deficits in this area have also been reported on the Delay Task of the Gordon Diagnostic System (GDS: Gordon, 1982). According to Gordon, ADHD children typically have more difficulty than are age-matched normal peers in inhibiting responses for an unknown period of time in order to earn points (Gordon, 1979; McClure & Gordon, 1984).

Studies have recently questioned what precise elements of skill deficits are being assessed by objective instruments. The CPT for example, requires not only prolonged concentration, but

is influenced by various other factors including motivation, cognition, stimulus variables, and behaviour. It has been proposed that the symptom complex of ADHD - inattention, hyperactivity and impulsivity - is relatively non specific and may be either a primary or secondary finding in heterogeneous samples of behaviour and learning disabled children (August & Garfinkel, 1989).

Deficits on laboratory measures of sustained attention and impulsivity should be found in children identified as ADHD, if the attention/impulsivity dimension is to be a useful one for descriptive and diagnostic purposes. Further, aggressive children not displaying behaviours associated with these dimensions should not display deficits on measures of these processes if these tasks measure attentional processes exclusively. For a task to be a good diagnostic tool, it must possess both sensitivity and specificity of measurement. That is, it must be sensitive enough to detect differences in the specific skill or process it is intended to measure. The present investigation will address this important consideration.

Cognition

The study of the attention deficit in hyperactive children has been paralleled recently with investigations into more complex aspects of cognitive functioning. Information processing

theories describe processes which "drive" or guide one's ability to effectively encode, recall and manipulate information. These higher-order processes serve an executive function by regulating effective cognitive processing. Self-regulatory mechanisms are used by the active learner during an attempt to solve problems (Baker & Brown, 1984) and have been referred to as metacognitive processes (Flavell, 1976). Metacognitive activities include planning, checking, monitoring, testing, revising and evaluating which aid the individual in the processing, encoding and retrieval stages of information processing.

The hyperactive child's attentional and/or inhibitory deficits may interfere with cognitive performance on complex problem-solving tasks that require metacognitive processes (Hamlett, Pellegrini & Conners, 1987). Inferior performance relative to normal controls is seen in ADHD children when the processing load on working memory is particularly heavy, and when sophisticated cognitive strategies or executive functions are required (Douglas, 1988). For example, Weingartner et al. (1980) report specific deficits on free recall and semantic processing tasks in ADHD subjects relative to controls, but not in cued recall and acoustic processing. Semantic clustering is proposed to be a higher order cognitive task and free recall places a heavier demand on retrieval and search mechanisms than does cued recall. This suggests that ADHD children are relying on less developed cognitive strategies to perform memory related tasks

than do age-matched controls.

Tant & Douglas (1982) suggest that hyperactive children possess the ability to effectively problem solve, but fail to develop appropriate strategies because their deficits impair their development. If this is the case, it is apparent that hyperactive children would be at risk for developing deficits in various aspects of intellectual and social skills. Socially, the failure to stop, look and evaluate one's behaviour and others' reactions could contribute to a limited repertoire and/or inability to use effective problem solving strategies.

There have been recent attempts to more fully explicate the nature of these processing deficits (Douglas, 1988) and to examine them with respect to the presence or absence of accompanying learning disabilities (August & Garfinkel, 1989). This promising and ambitious approach suggests that children who are identified as ADHD without aggressive behaviours are most likely to display these higher-order processing deficits and possess learning disabilities.

Attribution

A considerable amount of attention has been directed into investigating and explaining the role that self-attributions play in children's development. These enquiries have been directed

largely from attribution theory (Weiner, 1979) and social-learning theory (Bandura, 1977). These theorists propose that frequent failures experienced by some children can lead to the development of beliefs regarding unavoidable helplessness and to a decreased amount of self-efficacy. Those affected by these processes come to believe that many events are largely out of their control and consequently give up or put little effort into situations which require new ways of thinking and behaving. These processes have been demonstrated in learning disabled (Licht, 1983; Licht, Kistner, Ozkargoz, Shapiro & Clausen, 1985) as well as hyperactive children (Bugental, Whalen & Henker, 1977; Linn & Hodge, 1982). In addition, a variety of training programs including an attributional component have been developed (Andrews & Debus, 1978; Dweck, 1975; Kendall & Wilcox, 1980; Reid & Borkowski, 1987).

It has been demonstrated that ADHD children differ from controls on a variety of tasks developed to assess attributional processes. For example, Linn & Hodge (1982) reported that hyperactive boys are more likely to ascribe reinforcement or punishment to factors beyond their personal control on a task measuring locus of control. In contrast, depressed children are more likely to attribute failure or bad events to internal, stable and global factors than are nondepressed subjects (Seligman et al., 1984). Reid and Borkowski (1987) recently demonstrated that attributional retraining was a significant

contributing component in training successful and long-term use of metacognitive strategies and beliefs about the importance of effort in ADHD children.

It is clear that attribution plays a significant role in childhood psychopathology. However, further information regarding attributional processes in ADHD and aggressive children is required before we are able to develop therapeutic programs which include this important variable.

If failure and success experiences are attributed to external causes, it is possible that children displaying this cognitive style will put little effort into new learning experiences. In ADHD children, frequent failure experiences in the classroom may promote the development of this schemata. Similarly, aggressive children who experience frequent failure interpersonally may also adopt this self-defeating cognitive style. It is proposed that in the case of these two externalising disorders, both success and failure experiences will be attributed to external causes beyond personal control.

Social Information Processing

Little is known regarding the relationship between ADHD symptomatology and social information processing deficits. Hyperactive children consistently display difficulty with peer

relations (e.g. Campbell, 1973; Campbell & Paulauskas, 1979; Milich & Landau, 1982; Pelham & Bender, 1982) and social skills (e.g. Whalen, Henker, Collins, McAuliffe & Vaux, 1979; Klien & Young, 1979). Unfortunately, these studies use the hyperactivity index of a parent or teacher rating scale to define their samples and as such may be contaminated by heterogeneous samples. Therefore, it is not known whether a hyperactivity/aggression distinction would differentiate social difficulties in these children.

Dodge (1985) reports that aggressive children consistently display social information processing deficits relative to normal school age controls. Many of these, like hyperactive children (e.g. Milich & Landau, 1989), are rejected by peers. Dodge and others form their groups on the basis of teacher and peer sociometric instruments, are obtained from normal classrooms, and no formal diagnostic system or standardized rating scales are utilized. It is not known how many of these children would meet the criteria for hyperactivity as well as being aggressive.

In a number of studies Dodge has consistently demonstrated that aggressive boys display a higher number of aggressive solutions in response to hypothetical situations (Richard & Dodge, 1982), are more likely to attribute hostile intent to peers under hypothetical ambiguous provocation (Dodge & Frame, 1982), and make less use of social cues when evaluating intent

(Dodge & Newman, 1981) when compared to normal controls. Dodge proposes that deficits in encoding of social cues lead aggressive children into making biased attributions regarding peers' behaviour, and in turn result in a response repertoire that includes the utilization of aggressive responses to problem situations.

How hyperactive children perform on social information processing measures has not been adequately investigated. In the only study that exists to date, Milich & Dodge (1984) reported that Hyperactive/Aggressive (H/A) boys were more likely to display social information processing deficits relative to normal controls. Specifically, H/A boys were more likely to attribute hostile intentions to peers following hypothetical ambiguous provocation, to expect aggressive acts from those peers in the future, to respond aggressively to the peer and to attend to aggressive rather than neutral cues. These authors likened their H/A group of clinic boys to Dodge's samples of aggressive classroom boys. Although a purely aggressive group of boys was described in this study, no statistical comparisons were presented.

It may be the case that the aggression commonly seen in ADHD is a reaction to the frustration felt by these children because of their impulsivity in social situations and the rejection they

commonly experience. On the other hand, aggression without ADHD could be more of a proactive event, occurring as a result of reinforcement from peers and/or the attention received for aggressive acts. Studies have consistently demonstrated that hyperactive children are likely to be rejected by peers (see Milich & Landau, 1989 for a review) whereas only some aggressive children will be rejected (Bierman, 1986; Price & Dodge, 1989).

It is quite possible that negative attributional biases are present in some ADHD children as well as in aggressive ones. ADHD children's impulsive style in social situations may result in consistent failure interpersonally for some, leading many of them to become frustrated, aggressive and expectant of negative responses from peers. Others (who are not aggressive) may not have been confronted with consistent aggressive responses to their behaviour. However, the intrusive nature of their behaviour may increase the probability of rejection. Aggressive children may derive reinforcement from peers, teachers and parents for aggressive behaviour, and have learned such behaviours in the context of their development. In the case of aggressive children and those who are both aggressive and hyperactive, negative reactions to their behaviour are expected. When presented with provocative events, these biases produce aggressive responses which are in turn reinforced and confirmed by the reactions of others. A similar pattern of schemata development is described by Dodge (1985).

Therefore, both aggressive and aggressive-ADHD children may possess similar cognitive schemata for aggression. Conversely, ADHD children who are not aggressive may not produce aggressive responses, but nevertheless expect rejecting behaviours from peers. Information regarding differences in social information processes in these groups could have important prognostic and therapeutic implications.

Family Functioning

As discussed by Whalen (1989), the association between low socioeconomic status, poor family relationships and the expression and course of hyperactivity is often cited as evidence in support of a causal relationship between family problems and the behaviour problems in hyperactive children. However, the data are inconsistent and the implications uncertain, as it is extremely difficult to partial out the relative contributions of the biological, psychosocial and environmental variables subsumed under the SES construct. Whalen's social ecological perspective (Whalen & Henker, 1985) views the development of behaviour problems as determined through the interaction of biological or constitutional factors and environmental factors such as family adaptability and tolerance, psychological and socioeconomic resources, and stressful life events. Any correlational study can at best only point to possible causal relationships between these variables. Research in this area is further potentially

contaminated by the heterogeneous samples of hyperactive subjects commonly used in these studies.

Despite the methodological shortcomings, it has been proposed that family adversity is more strongly linked to aggressive and antisocial than to hyperactive behaviour patterns (e.g. McGee et al., 1985; Patterson, 1982; Sandberg, Wieselberg, & Shaffer, 1980; Taylor, et al., 1986). In addition, children with both ADHD and CD are most likely to have parents with psychiatric problems (Lahey, Piacentini, Stone, Hartdagen, & Hynd, 1988). Others have reported that aggressive children are more likely to have adverse family environments than are hyperactive children (August & Stewart, 1983; Reeves et al., 1987).

If as the reviewed research suggests, aggression and hyperactivity are separable behavioral dimensions, it is possible to speculate regarding the relationship between family functioning and aggressive behaviour in hyperactive children. If the family is unable to cope and adapt to the problematic behaviour of their hyperactive child, poor parent-child interactions may become a frequent occurrence. Over time, frustration and aggressive-type patterns may develop. On the other hand, good parental management of the problematic behaviours in the context of a supportive family environment may help to decrease the likelihood of the development of aggressive

behavioral repertoires. If aggressive symptomatology is more related to familial influence than ADHD alone, families with aggressive children should display more deviance on reliable measures of family functioning than families with nonaggressive children.

Self-Report Measures

One relatively neglected area of research in the literature concerns how clinical populations of children perceive their problems. It is not clear whether they are cognizant and/or will openly admit the disrupting nature of their behaviour, interpersonal difficulties, family difficulties, and anxieties. These are important factors of which the clinician ought to be aware because they may have different diagnostic, therapeutic and prognostic implications (Beitchman et al., 1985). If self-report scales are to be of use in both research and clinical settings, they must display good discriminant validity in terms of the ability of their different factors to discriminate various psychological problems. They would be especially important for research in hyperactivity given the conflicting findings regarding the efficacy of various treatment programs and long-term outcome.

A number of different self-report inventories have been developed to assess three main areas of interest: self-concept,

anxiety/depression and personality. The Piers-Harris self-concept scale is one of the better researched self-concept scales, but it has not been studied extensively with clinical populations, is recommended only for research purposes (Piers, 1969), and has been criticized for its factor structure (Platten & Williams, 1979). More specialized scales for assessing anxiety (e.g. The Children's Manifest Anxiety Scale: Reynolds, 1980) and depression (Children's Depression Inventory: Kovacs, 1981) have also been developed. More global self-report measures of child psychopathology exist (e.g. Children's Personality Questionnaire: Porter & Cattell, 1972; Children's Self-Report Rating Scale: Beitchman, Kruidenier, & Clegg, 1985; Self-Report Profile: Achenbach, 1987).

The Children's Personality Questionnaire has been criticized because of the lack of evidence regarding the validity of its factor structure (Willis & Seymour, 1978; Grove & Levinson, 1980). The Self-Report Profile has more encouraging validity evidence (Achenbach, 1987), but its use is restricted to older age groups and as such is not valid for preadolescents. The Children's Self-Report Rating Questionnaire (CSRRQ) is intended for use with younger children (aged 6-13 years), has a factor structure based on a priori predictions, and possesses some validation support. However, it is still in the validation phase and as such is not recommended for clinical use.

The CSSRQ, however, is a self-report instrument which contains factors which if valid, are directly relevant to the present discussion. Items were chosen from widely used self-report measures like the Piers-Harris and Children's Manifest Anxiety Scale which have direct bearing on the hypothesized factors. The Conduct Problems factor taps behaviours related to aggression such as "I have a bad temper" and "I often get into fights". It also includes a Lie-Immaturity factor assessing defensiveness or immaturity with items like "I am always nice and tell the truth", and is correlated with hyperactivity and distractibility. The Positive-Self Peer factor taps feelings of global self-image which partially relates to peer relationships. A more specific Negative Peer-Relations factor includes items tapping perceptions around interpersonal relationships. Finally, the Positive-Family Relations factor assesses negative child-parent relations with items like "My parents are not proud of me".

The subscales on the CSRRQ may provide extremely important clinical information regarding aggression and ADHD. For example, if aggressive children admit that they have poor conduct, peer and family relationships as was hypothesized earlier, they should show significant elevations on the corresponding subscales tapping these perceptions. On the other hand, if the Lie-Immaturity factor for this group of children is significantly elevated, it may be the case that they are harder to deal with in

therapy because of their reluctance to admitting problems. Conversely, ADHD children who are not aggressive would be expected to score lower on the above scales which purport to assess behaviours hypothesized to be related to aggression.

Rationale for Present Study

The above review has pointed out some of the short-comings of the existing literature on hyperactivity and aggression. At this stage in the literature, it is clear that more attention needs to be directed towards delineating the characteristics of the hyperactive syndrome. As suggested earlier, hyperactivity as it is commonly conceived in clinics is not a homogeneous entity. Specifically, the presence or absence of aggression may be pivotal with respect to the etiology, diagnosis, prognosis and prevention of later psychiatric disturbances. In addition, measures which have been used extensively to examine processes related to hyperactivity and aggression have not been evaluated with respect to their utility in discriminating between these two dimensions.

The present study will explore various processes and factors related to aggression and hyperactivity. A clinical population of hyperactive and aggressive children will be assessed as to their aggressive and hyperactive traits and compared to a normal control group. In accordance with recent multidisciplinary group

recommendations, multiple measures will be used to describe the defining characteristics of subject group assignment and membership (Loeber & Lahey, 1989; Loney, 1987). Various measures will be used as dependent variables to assess the hypothesized defining processes and factors.

Hypotheses

Based on the above review, the following hypotheses are proposed:

- I. Deficits in sustained attention and impulsivity will be present to a greater extent in hyperactive groups than in aggressive-only and normal control groups, who will not differ from each other. Hyperactive groups will:
 - a) obtain fewer correct responses and commit a greater number of errors of omission and commission on the Vigilance Task of the Gordon Diagnostic System (GDS: Gordon, 1982), a purported measure of sustained attention.
 - b) obtain significantly lower Efficiency Ratios on the Delay Task of the GDS, a purported measure of impulsivity.

- II. a) Hyperactive groups will display significant deficits relative to aggressive-only and normal control groups, who will not differ from each other on a task designed to tap higher-order organizational cognitive processes. Specifically, hyperactive groups will evidence poorer spontaneous semantic clustering having significantly lower Adjusted Ratio Clustering (ARC) scores and remember fewer items on a sort-memory task (August, 1987).
- b) All subjects will display an increase in semantic clustering following a training task.
- III. All clinical groups will show more evidence of general attributional deficits relative to normal controls. Specifically, hyperactive and/or aggressive groups will attribute causes of relatively common situations to external factors, whereas normal controls will attribute these causes to more internal or personal factors. That is, they will display significantly lower Personal Causality scores on the General Personal Causality Questionnaire (Reid & Borkowski, 1987).
- IV. Aggressive groups will display more evidence of social information processing deficits relative to hyperactive-only and normal control groups, who will not differ from each

other. Specifically, aggressive subjects will produce a significantly greater number of hostile perceptions of peer intent, aggressive expectations of future peer behaviour, and aggressive responses to hypothetical ambiguous provocation on the Attribution of Intention Task (Dodge & Frame, 1982).

- V. Aggressive groups will display poorer levels of adaptability and cohesion in their families than hyperactive-only and normal control groups, who will not differ from each other. Specifically, they will have significantly higher Distance From Centre scores on the FACES III (Olson, Portner, & Lavee, 1985), a self-report measure of family functioning.
- VI. Clinical groups will display elevated levels of psychopathology relative to normal controls on a self-report rating scale of psychiatric disturbance. With respect to different scales on the Children's Self-Report Rating Scale (CSRRS; Beitchman et al., 1985), the following predictions are made:
 - a) Aggressive groups will score significantly higher than hyperactive-only and normal controls, who will not differ from each other, on the Conduct Problems, Antisocial-Permissive, and Positive Family factors of the CSRRS.

- b) All clinical groups will score significantly higher than normal controls on the Lie-Immaturity and Negative-Peer scales on the CSRRS.
- c) All clinical groups will score significantly lower than normal controls on the Positive Self-Peer factor of the CSRRS.

METHOD

Subjects

Clinical subjects were recruited from the clinical services of the Psychology and Psychiatry Clinics associated with the Special Education classrooms of behaviour disordered and learning disabled children in the Ottawa area (Children's Hospital of Eastern Ontario, Ottawa and Carleton School Boards, McHugh Schools). Only boys between the ages of 7 and 12 were considered for the study because the psychometric properties of a number of the measures employed are established for these age and sex groups only. All subjects spoke English as their primary language and achieved Peabody Picture Vocabulary Test IQ equivalents of 80 or higher, and regularly attended school. Each child was living with at least one natural parent or was in a residential program at the Child Study Centre or the Centre for Educational Growth. Children in residential programs had weekly contact with parents. Children evidencing psychosis, brain damage or epilepsy were excluded. All experimental subjects were nonmedicated for 24 hours prior to the study day. All teacher ratings were completed when the child was off medication.

All subjects included in the normal control group were recruited through the medical files at the Children's Hospital of Eastern Ontario. They included boys between the ages 7 and 12,

who had no chronic physical disabilities or history of physical/mental abuse, were living with at least one parent, had no history of psychological or adjustment difficulties, and had Peabody Picture Vocabulary IQ's of greater than 80. Potential control families were contacted by phone by the principal researcher to ensure eligibility according to inclusion criteria and to request participation, after receiving permission from their primary physician explaining the nature of the study. All consent forms were the same as those for experimental subjects (Appendix A).

Experimental Design

All experimental subjects met the criteria for ADHD, Conduct Disorder or Oppositional Defiant Disorder on the Diagnostic Interview for Children and Adolescents - Parent version (DICA-P: Reich, Herjanic, Welner & Gandhi, 1982), and obtained scores on the IO and A subscales of the Inattention Overactivity With/out Aggression (IOWA: Loney & Milich, 1982) within the cutoff range. Based on these results, subjects were assigned to one of three experimental groups based on the following criteria:

1. All experimental groups received a diagnosis of ADHD, CD and/or ODD. Control subjects did not receive any DSM III-R diagnosis and met inclusionary criteria outlined above.

2. Group inclusion criteria was based on IOWA Conners scores (Age norms from Pelham, Atkins, Murphy & Murphy, 1989) as follows:

Ages 7 to 8				Ages 9 to 12			
A Score				A Score			
		< 9	> 9			< 6	> 6
IO	< 11	Control	AGG	IO	< 9	Control	AGG
Score	> 11	IO	IO/AGG	Score	> 9	IO	IO/AGG

This resulted in four groups: an IO-only (IO), Aggressive-only (AGG), Aggressive and IO (IO/AGG), and Normal Control.

Procedure

Clinicians associated with those clinics listed above were approached by the principal researcher or research assistant who described the purposes and procedure of the study, and requested assistance in identifying potential subjects. Once they indicated their support, clinicians were asked to identify potential subjects and to contact parents by letter to indicate their support of the project and to request participation. In some cases, clinicians allowed direct access to files and granted permission for the researchers to contact the parents of

potential subjects directly. In each case, a letter (Appendix A) which included a description of the project and a consent form was given to the potential subject's parent. After the parent's questions were answered, formal consent was obtained. The initial recruitment phase was often conducted over the phone. Following this initial contact, an appointment time was set up if the parents agreed to participate. Because mothers have been found to differ from fathers with respect to their responses on rating scales (e.g. Jensen, Xenakis, Davis & DeGroot, 1988), typically have more contact with children at these ages, and single parent families were expected to participate, mothers were asked to provide the information regarding the child. Fathers were encouraged to participate if they wished, however to maintain consistency, measures filled out by mothers only were used in the study.

Following informed consent (Appendix B) teachers were contacted and asked to fill out rating scales regarding the child's behaviour in school on a particular day when the child was not on medication (see below). If the child met criteria for the study, the parent was again contacted and an appointment time for the child and parent was scheduled. During the time the experimenter conducted the various assessment procedures of the study with the child, the mother spent time filling out the various background and dependent measures. The computerized version of the Diagnostic Interview for Children and Adolescents

- Parent version (DICA-P: Reich, Herjanic, Welner & Gandhi, 1982) was converted into a pencil/paper format (Appendix C). Mothers filled this out as well as other measures to be described below.

The DICA-P provides a detailed developmental and medical history, demographic information and is based on DSM III criteria. Reliability evidence has been reported in two studies. In one study, ten interviewers independently coded two taped interviews with children. Agreement on symptom items averaged 85% (Herjanic & Reich, 1982). In the same study, within-interviewer agreement on individual symptoms when five psychiatrists coded the same child interview twice over a 2 -3-month interview averaged 89%. In another study (Welner, et al., 1987) the inter-rater agreement was reported to be .83, and there was 81% agreement between DICA-P and clinician diagnoses.

Validity evidence for the DICA-P is available in one study which reported significant discriminations between matched samples of children referred to pediatric and psychiatric clinics. The best discrimination was reported for relationship and academic problems where the sensitivity and specificity were reported to be 72% and 76% for relationship problems respectively (Herjanic & Campbell, 1977).

Parents also answered the Loney (1987) Divergent and Convergent Interview for Behavior Disorders (DCIBD) which includes 27 questions with both convergent and divergent validity

for assessing the Attention Problem, Hyperactive Impulsive, and Aggressive Behaviour Disorders (Appendix D). The parent also completed the FACES III (Appendix E), a dependent measure to be described later, and a demographic questionnaire (Appendix F) designed to provide information regarding family income and size, history and socioeconomic status based on the index for Canadian families provided by Blishen and McRoberts (1976).

Teachers of children who were identified as potential subjects and whose parents agreed to let their child participate by signing the appropriate consent forms were asked to fill out rating scales on children who were potential subjects. The experimenter contacted teachers by phone to notify them that the forms would be coming in the mail. Teachers were asked to return the forms as quickly as possible in a self-addressed envelope. They were asked to rate children who are taking medication for behaviour problems to rate these children when they were off medication and to record this status on the rating form. All subjects were off medication for at least 24 hours prior to the rating of the child. This was coordinated with the parents and teacher by the experimenter in conjunction with the child's physician if necessary.

Teachers filled out the following behavioral rating scales:

Conners Teacher Rating Scale (CTRS)

The CTRS (Appendix G) is comprised of 39 items which the teacher rates on a scale of "not at all", "just a little", "pretty much" and "very much" with each response scored 0-3 respectively. A total score is obtained by summing across all items, and factor scores are derived by summing across only items on factors of interest.

The CTRS has well established reliability and validity. Conners (1973) reports test-retest reliability coefficients between .70 and .90 across all factor scores. Inter-rater reliability between teachers was .92 for the total score (Vincent, Williams, Harris, & Duvall 1977). Many samples have yielded similar factor structures in factor analyses (Conners, 1969; Glow, Glow, & Rump, 1982; Taylor and Sandberg, 1984; Trites et al., 1981). Factor scores correlated highly with direct observations of activity level and negative parent child interactions in the home (Rapoport & Benoit, 1975) and achievement test scores (Lahey, Green & Forehand, 1980). Achenbach and Edelbrock (1983) report good concurrent validity between the CTRS and the Child Behavior Checklist. The Hyperactive Index on the CTRS is sensitive to changes as a result of stimulant medication (e.g. Barkley, 1987).

The majority of studies in North America comparing ADHD

children and normal controls use some version of the Conners rating instruments to define groups (Conners 1969, 1970, 1973; Goyette, Conners & Ulrich, 1978; Werry, Sprague & Cohen, 1975). Typically a deviant score on the Hyperactivity Index factor of the CTRS (1 or 2 standard deviations above the age norm) is employed as a cutoff score for inclusion into an ADHD group.

Loney and Milich (1982) have demonstrated that the cutoff scores on the CTRS for group inclusion produce heterogeneous samples which mix both hyperactive and aggressive descriptors.

Inattention Overactivity with/cut Aggression Conners (IOWA)

The IOWA version of the CTRS (Loney & Milich, 1982) was used to assign subjects to experimental groups. This scale, which was derived from items of the original CTRS, is commonly utilized when a clear distinction between aggressive and hyperactive symptomatology is required (Barkley, 1987). The scale was constructed by correlating individual items on the Conduct Problem and Hyperactive factors with medical chart derived ratings of hyperactivity and aggression. The resultant Hyperactivity (IO - Inattention/Overactivity) and Aggression (A) subscales of five items each include only those items which correlated with chart ratings of one factor and not the other. It should be noted that these factors are highly correlated.

The psychometric properties of the IOWA are not as well established as the CTRS, however several studies (Atkins, Pelham & Licht, 1989; Loney & Milich, 1982; Loney, 1987; Milich & Landau, 1988; Pelham, Milich, Murphy & Murphy, 1989) report acceptable levels of reliability and validity from the original and subsequent validation samples. In a clinic sample of 50 boys the two subscales displayed significant correlations with their respective factors from chart ratings (Loney & Milich, 1982). In addition, high scores on the IO subscale were predictive of three behavioral measures of activity in a free play situation, whereas high scores on the A subscale were not. In a restricted academic situation, off task behaviour was predictive of high scores on the IO subscale only. These results were replicated in a subsequent study published by Milich, Loney, and Landau (1982).

The IOWA displays good discriminant validity in its ability to distinguish between clinic and nonclinic populations. Significant differences on both the IO and A subscales are reported between the clinic and classroom samples in the original Loney & Milich validation study. The internal consistency within the latter sample of 120 boys was .87 for the IO subscale and .85 for the A subscale. These are comparable to those obtained with the clinic sample which were .80 and .87 respectively. One week stability coefficients for the classroom sample were .89 and .86 for the IO and A subscales.

In a more recent replication/validation study by Pelham,

Milich, Murphy, and Murphy (1989), ratings on the IOWA were obtained on 608 boys and girls from kindergarten to sixth grade in two different schools. This study reported similar psychometric properties as Loney and Milich, however, the norms for different age groups decrease for older children. For this reason and the sample characteristics, the cutoff scores recommended by Pelham et al. will be used in the present study.

Swanson, Nolan and Pelham Rating Scale (SNAP)

The SNAP (Swanson, Nolan & Pelham, 1986) was derived from the DSM III criteria for ADD/H and includes all items central to the syndrome. Five items of overactivity, 6 items of inattention, 6 items of impulsivity, as well as 7 items of peer interaction are included. The latter items are not central to the diagnosis but are often found in "hyperactive" samples. The version of the SNAP used in the present study also includes new items from the DSM III-R for ADHD with items tapping disruptive and oppositional behaviours. Teachers rated the children on a 0-3 point scale on each item (see Appendix H).

The SNAP was validated on a sample of 616 public school boys and girls from kindergarten to grade six (Pelham, Atkins, Murphy, & White, 1981). Test-retest correlations using teacher ratings taken a year apart were .47, .54 and .55 for hyperactivity, inattention and impulsivity scales respectively. Test-retest

correlations made approximately six weeks apart by mothers were .69, .68 and .64 corresponding to the same three scales. In a subsample of 79 children, mother and father ratings correlated .73, .62 and .67 for hyperactivity, inattention and impulsivity scales.

Evidence for external validity was obtained on the Abbreviated Conners Teacher Rating Scale total score which correlated .85, .84 and .93 with the hyperactivity, inattention and impulsivity scales of the SNAP respectively. Ratings on the hyperactivity index of the CTRS were also reported to be strong with correlations of .87, .75 and .88 with the three corresponding SNAP scales above.

Dependent Measures

The experimenter accompanied the child to the experimental room at the Research Institute of the Children's Hospital of Eastern Ontario. Initially, it was explained how time would be spent together, and then a few minutes were spent developing rapport with the child. Once the child indicated he was ready to begin, the measures were administered. Order of presentation of the measures was random with the exception of the Peabody Picture Vocabulary Test which was administered and scored first. If the child achieved a score of less than 80, he was tested but not included in the study. The following sections describe the

measures which were administered and were used to test the hypotheses outlined above.

ATTRIBUTION

In order to evaluate whether distinctions can be made between the proposed experimental groups in terms of attributional processes, the following two dependent measures were used:

General Personal Causality Questionnaire (Reid & Borkowski, 1987)

This questionnaire was developed from a structured interview used by Bugental, Whalen & Henker (1977) designed to assess self-attributions about events common to elementary school children. The General Personal Causality Questionnaire (GPC) is not a well researched scale, and as such has no external validity support other than what is presented by its developers. However, at the time of the study's conception, no comparable measure existed which assesses general attributions about external events.

One similar measure, the Children's Attributional Style Questionnaire (CASQ: Kaslow, Tanenbaum & Seligman, 1978) was considered for the present study. This scale contains six basic subscales, two of which assess internal/external attributions about good and bad events, but the reliability of these subscales

is poor, and the overall composite score (which is the most reliable and valid) is intended to measure depressogenic attributional styles, and correlates well with measures of depression (Kaslow, Rehm, Pollack, & Siegel, 1988). The CASQ contains a large pool of items and is time consuming to administer. For these reasons, the General Personal Causality questionnaire was chosen over the CASQ.

Another advantage of the GPC is that the child is asked to rate the importance of specific thoughts to events on a scale from 0 to 3. On the CASQ, the child is not given this flexibility being forced to select yes or no to each situation. Scores on the GPC have also been shown to be sensitive to changes in a hyperactive children's attributional style to more internal causes as a result of training designed to enhance general and program-specific beliefs about the importance of effort in enhancing performance (Reid & Borkowski, 1987).

On the GPC, subjects were presented with eight hypothetical items (four failure and four success experiences) such as failure on a math test or success on a spelling drill (Appendix I). For each experience subjects were presented with four attributional choices corresponding to effort, teacher bias, luck or task difficulty. For each item, the subject was asked to rate his hypothetical performance on each of the four attributional dimensions on a barometer marked no importance (0), a little

difference (1), some (2) and a lot of difference (3). A personal causality (PC) score was derived to assess the extent to which the child attributes importance to his or her own efforts over and above the importance assigned to external events, such as teacher bias, luck and difficulty. PC scores were computed for each item using the formula $PC = \text{Effort} - [(\text{teacher bias} + \text{luck} + \text{task difficulty}) / 3]$. Two separate scores for success and failure were derived by summing the PC score across the four items for each experience.

Attribution of Intention Task (Dodge, 1980; Dodge & Frame, 1982)

The Attribution of Intention Task (AIT) was developed to assess various social attribution processes as proposed by Dodge (1985). The AIT used in this study included ten hypothetical stories which were read to the subject by the experimenter (see Appendix J). For each story, the child was asked to imagine that an identified peer was involved in some activity in which a particular negative outcome occurred for the subject. In the present study, the subject was asked to nominate two peers: one fitting the behavioral descriptions for aggressive (mean, bossy, etc), the other for not aggressive (nice, popular, a good friend). Following the story, the subject was asked six questions - two each to assess their perception of the peer's intent (INT), their response to the event (RES), and their expectation regarding the future behaviour of the peer (EXP).

INT was scored as benign, hostile or benevolent, EXP as peer-social or peer-aggressive, and RES as benevolent, neutral or aggressive. Five stories included the nominated aggressive peer and the other five the nonaggressive peer. The ten stories were read in the same order with peer condition randomly assigned to story for each subject. Each of the six questions were summed across five stories (aggressive versus neutral peer) to form six dependent variables with two levels.

All ratings were conducted by two independent raters who received training on scoring the AIT. Inter-rater reliability was established by having raters independently score 25% of all protocols which were randomly chosen from the sample. Scores on each of the individual items for each question were compared to determine scoring accuracy and agreement. Ratings were in 95% agreement.

The six probes of the AIT purport to assess two social information processes. INT and EXP probes tap how the child interprets the behaviour of the peer (attributional biases). RES probes are designed to assess how the child would react to ambiguous provocations (response biases). Dodge and his colleagues (Dodge, 1980; Dodge & Newman, 1981; Dodge and Frame, 1982) and others (Nasby, Hayden, & dePaulo, 1981) have consistently shown that aggressive preadolescent boys attribute hostile intention to peers significantly more often than do

nonaggressive boys (INT and EXT probes) when the question is asked in an open-ended format. Further, when the target child in the stories is aggressive, aggressive boys are significantly more likely to expect continued aggressive behaviour from the hypothetical peer than are nonaggressive boys.

These results have been extended to boys identified as hyperactive/aggressive who were more likely to attribute hostile intent to peers and to expect future aggressive behaviour from them under hypothetical ambiguous provocation than were normal controls (Milich & Dodge, 1984). In this latter study, group membership was predicted with 82% accuracy for hyperactive/aggressive boys and 91% correctly for normal controls based on scores on these two variables exclusively.

ATTENTION AND IMPULSIVITY

Although many instruments for measuring attention and impulsivity exist, one of the more recent automatized versions was used in the present study. The Gordon Diagnostic System (GDS; Gordon, 1982) was designed to provide a reliable clinical instrument to identify hyperactive children. The GDS is purported to be an objective behavioral measure of a child's ability to inhibit responding and sustain attention. The Delay Task requires the child to inhibit responding in order to earn points. The child is instructed to press a button, wait a while, and then press the button again. The object of the "game" is to

earn as many points as possible in eight minutes. If the child refrains from responding for at least 6 seconds, a light flashes and the child earns a point. If s/he responds before the time interval elapses, the timer counter resets itself and no points are awarded. The Vigilance Task is a version of the CPT in which the subject is required to press a button every time a "1" follows a "9" during a nine minute period.

The GDS Delay Task yields three fundamental sets of data including the absolute number of responses, the total number of rewarded responses, and an efficiency ratio (ER). The ER is simply the proportion of the total number of rewarded responses to the absolute number of responses. The three scores are computed for each two minute block for a total number of four blocks (eight minutes). The GDS Vigilance Task automatically records the number of correct responses, the number of times the child failed to respond (errors of omission), and the number extraneous button presses (errors of commission).

The GDS was standardized on 1300 boys and girls from 4 to 16 years of age (Gordon & Mettleman, 1985) and norms are provided. Test-retest stability correlations at 45 days for 90 of these children were .60 for the ER, .77 for total responses and .68 for total correct. SES, sex and age were not significantly predictive of any GDS score. The GDS has been shown to discriminate between hyperactive and normal children from both

outpatient and day program settings (Gordon, 1979; McClure & Gordon, 1984). It has also been used for determining drug responsivity and for evaluating the efficacy of various forms of pharmacotherapy, and is currently being used at over 20 university and medical research centres (Gordon, 1987).

The present study used the ER, total number of responses and number of correct responses of the Delay Task as dependent measures of impulsivity, and the EO, EC and number of correct responses on the Vigilance Task as dependent measures of sustained attention. All subjects received the same instructions as provided in McClure & Gordon (1984).

COGNITION

To examine cognitive functions on more complex problem solving tasks in the present study, a sort-recall memory task adopted from August (1987) was administered to subjects. This task has been found to discriminate between hyperactive and age-matched controls. There were two separate trials. In part 1, each subject was presented with 24 words in a random sequential order at a 3 second/item rate. The words in the task were combined of six groups, each of four weakly categorizable nouns. The following six groups were employed:

dog	moon	school	cup	train	village
family	tree	floor	lunch	wheel	king

man	rain	paper	salt	road	gold
hair	sky	window	table	ship	army

Subjects were instructed prior to list presentation to read each word aloud, and that following presentation, recall would be requested.

Part 2 of the recall/sort task involved the sorting procedure. Subjects were handed a deck of 24 - 3 X 5 inch cards; each card contained one of the stimulus words used in Part 1. Immediately in front of the subject on a table was a sorting board consisting of eight rectangular boxes drawn on it (two rows of four boxes). Subjects were told that the sorting board should be used to help them remember the words. Instructions of the sorting procedure were read to each subject verbatim. These instructions are included in Appendix K.

Two measures were calculated from each subject's performance on parts 1 and 2. Item recall (total number of words recalled) and a measure of recall organization derived from the Adjusted Ratio of Clustering Index (ARC) were calculated for both trials. The ARC metric is an empirical index of clustering in recall and represents the proportion of actual category repetitions above chance to the total possible category repetitions above chance for any given protocol. It was calculated using the formula:

$$ARC = \frac{R - E(R)}{R} ,$$

$$\text{maxR} - E(R)$$

where: R = total # of observed category repetitions,

maxR = maximum possible # of category repetitions or,

N - K (N = total number of items recalled,

K = # of categories) and,

E(R) = expected number of category repetitions based on

$$\text{chance or } \frac{n_i^2}{N} - 1, \quad n_i = \# \text{ of items recalled for category } i.$$

The total number of category repetitions (R) is the number of times a category item follows an item from the same category in recall. The "categories" are a subjective approximation of clustering for each subject which are calculated based on the groups into which the subject sorts during the sorting procedure.

The ARC metric as an index of spontaneous semantic clustering in free recall has been shown to discriminate hyperactive children (August, 1987; Reid & Borkowski, 1987; Weingartner et al., 1980) and educable mentally retarded adults (August, 1980) from normal control subjects. With the set of stimuli to be used in the present study, August (1987) found that sort-clustering (ARC) and mean recall was significantly lower for a group of 20 ADDH boys compared to a reading disabled and normal control group of 15 boys each. These results support the use of the stimuli and scoring procedure to be used in the present study.

FAMILY FUNCTIONING

Subjects' mothers filled out the FACES III (Olson, Portner, & Lavee, 1985) a 20 item clinical/research tool designed to assess two major dimensions of family functioning. This theoretically derived scale is based on the Circumplex Model developed by David Olson and his colleagues in an attempt to bridge research, theory and practice related to family processes (Olson, Russell, & Sprenkle, 1983). Currently being used in approximately 30 research projects, the FACES III is the third revision in it series and has good psychometric properties.

Two relatively independent dimensions are assessed by the scale - adaptability and cohesion. Adaptability refers to the "ability of a marital or family system to change its power structure, role relationships , and relationship rules in response to situational and developmental stress" (Olson, McCubbin, Barnes, Larsen, Muxen, & Wilson, 1985, pp. 3). Cohesion refers to the emotional bonding that family members have toward one another. Once scores of adaptability and cohesion are computed for an individual, these scores can then be combined to categorize an individual into a specific family system type. Separate and/or combined scores are computed from the scale to determine where a family falls within the Circumplex Model (ie. balanced versus extreme).

One method of scoring involves classifying scores into either balanced (cohesion scores ranging from 32-43, and adaptability scores ranging from 20-29), uneven (having one set of scores in the balanced and one set in the extreme ranges), or extreme (cohesion scores ranging from 10-31 or 44-50, and adaptability scores ranging from 10-19 or 30-50). This typology identifies families as healthy, marginal, and unhealthy in a manner consistent with the Circumplex Model. A score classified as balanced indicates both cohesion and adaptability totals were in the balanced range; a mid-range score indicates one score was in the extreme range; and an extreme rating reflects both cohesion and adaptability scores fell within the extreme range.

Another method of classifying families is to convert scores on adaptability and cohesion scales into a linear score that is suitable for correlational analysis. This score is called Distance from Centre of the Circumplex (DFC) indicating the distance of an individual's cohesion and adaptability score from the centre of the model and is calculated using the formula:

$$DFC = \text{Square Root} [(CS - 39.8)^2 + (AS - 24.1)^2],$$

where CS = Cohesion Score, AS = Adaptability Score

A review of studies using the FACES III indicates that the scale has supportive evidence regarding construct and

discriminant validity as well as acceptable levels of reliability. In a normative sample of 2453 adults (Olson et al., 1985) the internal reliability of the scale was $r=.68$ with test-retest stability over 4-5 weeks of $r= .81$. Correlation between family members was not high in a sample of 370 families with Pearson coefficients of .41 for cohesion and .25 for adaptability scales. The two scales display good divergent validity ($r= .03$ between cohesion and adaptability scales) and have low correlations with social desirability ($r =.30$ on cohesion; $r= .00$ on adaptability). Extreme scores on the earlier FACES II version are reported to discriminate between families with neurotic and schizophrenic members, alcoholics, and sex offenders and normal control families with a high degree of accuracy (Olson et al., 1985).

Both the DFC and classification of family systems methods were used in the present study based on the norms for parents provided by Olson et al. (1985).

SELF-REPORT

The Children's Self-Report Rating Scale (CSRRS: Beitchman et al., 1985) is a 55 item self-report questionnaire designed to detect and diagnose childhood deviance (Appendix L). Suitable for children aged 7 to 12, the CSRRS yields eight clinically relevant factors. Orthogonal factor analyses on a total item

pool of 200 questions yielded the following factors: Conduct Problems, Lie-Immaturity, Positive Peer-Self, Worry, Negative Peer, Antisocial Permissive, Sensitive-Emotional and Positive Family.

Each of the above factors displayed moderate construct validity (correlations between 0.25 and 0.50) with psychiatrists' ratings of the presence and degree of 24 symptom and 9 positive health items, and discriminant validity between clinical and nonclinical samples in the original validation study (Beitchman et al., 1985). The scales displaying the best discriminant validity in subsequent analyses (see Beitchman et al., 1987) are the Lie-Immaturity, Conduct Problems, Negative-Peer, Positive Self-Peer, and Positive Family Factors. Since these factors have the most relevance to the present study, they were the most closely examined in relation to hyperactive and aggressive dimensions.

Each subject was asked to respond yes or no to the 55 items on the questionnaire. Since it is a self-report instrument which requires adequate reading skills, the experimenter read each item to the child who had difficulty with it and the child circled the yes or no response following each item. In addition, the subject was encouraged to inquire regarding any difficulty they may have had with the questionnaire.

A summary of all of the measures utilized in this investigation is presented in Table 1.

Table 1

Background, Dependent Measures, and Corresponding Scores used in
the Present Study

Descriptive Measures

Diagnostic Interview for Children and Adolescents - Parents
(DICA-P)

Scales Include: Prenatal History (PH)
Delivery Problems (DP)
Temperament and Developmental Milestones (TDM)
Behaviour Problems in 1st Five Years (BP)
Psychosocial Stress (PS)
Attention Deficit Hyperactivity Disorder (ADHD)
Oppositional Disorders (OD)
Conduct Disorder (CD)
Depression (D)
Mania (M)
Anxiety (A)

Swanson, Nolan and Pelham Rating Scale (SNAP)

Scales Include: Hyperactivity (HYP)
Inattention (IATT)
Impulsivity (IMP)
Peer Interactions (PEER)
Disruptive Behaviours (DIS)
Oppositional Behaviours (OPP)

Loney Divergent and Convergent Interview for Behaviour Disorders
(DCIBD)

Scales Include: Attention Problems (AP)
Aggressive Behaviours (AB)
Hyperactive Impulsive (HI)

Table 1 Continued

Dependent Measures

1. GDS Delay Task
 - Total Number Correct, Total Number of Responses, Efficiency Ratio
2. GDS Vigilance Task
 - Total Number Correct, Total Number of Commissions, Total Number of Omissions
3. General Personal Causality Scale (GPC)
 - Total Success, Total Failure
4. Attribution of Intention Task (AIT)
 - scores on INT (items 1 and 2), RES (items 3 and 4), EXP (items 4 and 5) for Aggressive and Neutral Peers
5. Sort Recall Task
 - Mean Recall and Adjusted Ratio of Clustering Indexes
 - scores on each for pre and post sort procedure
6. Beitchman Children's Self-Report Psychiatric Rating Scale

Scales Include: Conduct Problems (CP), Antisocial/Permissive (AP), Positive Self (PS), Positive Family (PF), Negative Peer (NP)
7. Family Adaptability and Cohesion Scale (FACES III)
 - Distance From Centre Score (DFC), Olson's categories

RESULTS

Statistical Analyses

The analyses proceeded in two ways. First, group membership was examined with respect to sample characteristics defined from parent and teacher rating scales and interviews. The intention here was to provide a description of the sample characteristics of the various groups (e.g. demographics, history, psychosocial stress from the DICA-P) and to provide a comparison regarding the similarities/differences between clinical groups with respect to subscale scores on the DICA-P, SNAP and Loney DCSIC. The second set of analyses examined the hypothesized differences between experimental groups and controls on the dependent measures.

Multivariate Analyses of Variance (MANOVAS) were used to test group differences between sets of variables for each set of dependent variables and descriptive measures. An overall significance criterion of .05 was adopted. Univariate Analyses of Variance (ANOVA) using planned comparisons to control for inflated type I error were used to test group differences following significant F ratios from MANOVA. Post-hoc comparisons using the Tukey-Kramer Ranges test were conducted in cases when planned comparisons did not reveal significance but the ANOVA did. Following Huberty and Morris (1989) in the absence of significant group differences from MANOVA's, significant univariate F's are evaluated with the significance level adjusted

using the Bonferonni correction for the number of dependent variables being evaluated.

Although there were no significant age differences between groups (see below), age was used as a covariate in all analyses of differences between groups on all dependent measures. This was done in a effort to control for developmental variations on the tasks which involved cognitive processes known to be influenced by age (e.g. memory, attentional processes). It was also deemed useful for the purpose of identifying developmental influences on each measure.

Following each significant result, a Discriminant Function Analysis (DFA) was conducted to investigate the power of the variable(s) to discriminate between groups. When there was more than one variable involved, the analysis was conducted in a hierarchical stepwise fashion.

Finally, due to unequal sample sizes, a post hoc power analysis for unequal samples was conducted using the formula suggested by Cohen (1988) for determining effect size and power tables. The effect size is the standard deviation of the weighted standardized means (p. 359) and is approximated assuming an additive model of ANOVA using the following formula:

$$f = \frac{s_b}{s_e}, \quad \text{where } f = \text{effect size}$$

s_b = between group variance
 s_e = error variance

For main effects,

$$s_A^2 = \frac{a-1}{nba} (MS_A - MS_{S/A}), \quad \text{where } a = \# \text{ of groups}$$

within subject effects (repeated measures),

$$s_B^2 = \frac{b-1}{nba} (MS_B - MS_{BS/A}), \quad \text{where } b = \# \text{ of observations per subject}$$

interactions

$$s_{AB}^2 = \frac{(a-1)(b-1)}{nba} (MS_{AB} - MS_{BS/A})$$

Therefore, s_b and s_e are calculated by taking the square root of the appropriate between and within variances (R. Gardner, University of Western Ontario, personal communication, 1991).

Preliminary Analyses

Prior to analyses, all variables were examined with various SPSS-PC programs for accuracy of data entry, missing values, and outliers. Multivariate Analysis of Variance (MANOVA), like Univariate Analysis of Variance (ANOVA), is robust to modest violation of normality if the violation is created by skewness rather than by outliers, and that a sample size produces 20 degrees of freedom for error in the univariate case. Outliers that were greater than 3 standard deviations from the mean for each variable were assigned a value that was one unit higher than the next most extreme score on the variable to control for Type I or Type II errors. To control for unequal sample sizes, Pillais'

criterion was used to evaluate multivariate significance (Tabachnick and Fidell, 1989).

For clarity, group mean scores on each variable are presented in tables which are described in the text. Separate ANOVA tables containing sums of squares, mean squares and actual p values are available to the reader in Appendix M.

Group Composition and Characteristics

The entire sample consisted of a total of 96 boys between 7 and 12 years of age ($M = 121.8$ months, $SD = 18$). A total number of 89 behaviour disordered boys were screened. Of these, 61 qualified for one of the three groups: IO = 12, AGG = 16, IO/AGG = 35. Demographic and background characteristics are displayed in Table 2. ANOVAs revealed no group differences with respect to age, PPVT-R scores, or SES as measured on the Blishen Index. The family income ANOVA for parents who reported it was significant, $F(3,79) = 5.33$, $p < .01$. The post hoc Tukey-Kramer Ranges test revealed the control group had a significantly higher income than both the AGG and mixed IO/AGG groups.

The relative proportion of subjects in the IO, AGG and IO/AGG groups who were being treated with methylphenidate or other stimulant medication was 41%, 64% and 67% respectively, with no significant differences between groups. There was a

significantly greater proportion of boys in the IO/AGG (29%) and AGG (53%) groups whose parents were either separated or divorced versus only 10% of the IO and 15% of the Controls ($\chi^2(3) = 24.93$, $p < .01$). A greater proportion of subjects in the AGG and IO/AGG groups were in a residential program ($\chi^2(3) = 10.99$, $p < .05$). All control and IO only subjects lived at home. The relative proportion of subjects in a residential program in the AGG and IO/AGG groups was 7% and 25% respectively.

Diagnostic Interview for Children and Adolescents - Parents

The overall MANOVA for all scales on the DICA-P using Pillais' criterion was highly significant, $F(33,240) = 3.96$, $p < .001$. Group mean scores and standard deviations on the developmental history and DICA-P clinical scales used in the present investigation are presented in Table 3.

Table 2

Group Means and Standard Deviations on Demographic and Background Characteristics

Variable		Control N=33	AGG N=16	IO N=12	IO/AGG N=35
PPVT-R	<u>M</u>	107.7	105.1	105.8	100.8
	<u>SD</u>	11.2	21.3	14.4	16.6
AGE(mos.)	<u>M</u>	124.0	125.2	113.2	124.8
	<u>SD</u>	20.2	18.3	18.4	14.7
Blishen Index	<u>M</u>	56.10	57.02	57.90	55.26
	<u>SD</u>	20.44	25.29	24.11	21.77
Family Income	<u>M</u>	75,129	36,350	57,166	46,080
	<u>SD</u>	38,526	21,498	38,378	35,859

There were no significant group differences on the Prenatal, Delivery History and Generalized Anxiety scales. The main effect of the Temperament and Milestones scale was significant, $F(3,88) = 4.62$, $p < .01$, with mean scores on these items for the AGG and IO/AGG groups significantly higher than mean scores for the Control group only. The main effect of the Behaviour Problems First Five Years scale was also significant, $F(3,88) = 7.11$, $p < .01$, indicating that mean scores on these items for all clinical groups were significantly higher than mean scores of Controls. The main effect of the Psychosocial Stress scale was significant, $F(3,88) = 8.40$, $p < .001$, with mean scores for the AGG and IO/AGG groups significantly higher than those of the IO and Control groups.

As expected, there were significant group differences on all three externalising behaviour clinical scales. The main effect of the ADHD scale was significant, $F(3,88) = 30.56$, $p < .001$, with the IO, IO/AGG and AGG groups receiving significantly higher means scores than the Control group. In addition, the IO group's mean score on the ADHD scale was significantly higher than the AGG group.

The main effect of the Oppositional Disorders scale was significant, $F(3,88) = 24.83$, $p < .001$, with the IO/AGG, AGG and IO groups receiving significantly higher mean scores than the Control group. In addition, the IO/AGG mean score on the

Oppositional Disorders scale was significantly higher than the IO group.

The main effect of the Conduct Disorders scale was significant, $F(3,88) = 17.21$, $p < .001$, with the IO/AGG and AGG groups receiving significantly higher mean scores than the Control and IO groups.

On the affective disorders subscales there were some group differences of interest. The main effect of group mean scores on items tapping depressive behaviours was significant, $F(3,88) = 5.23$, $p < .01$, with the IO/AGG and AGG receiving significantly higher scores than the IO and Control groups. The main effect of group mean scores on items tapping manic behaviours was also significant, $F(3,88) = 6.44$, $p < .001$, with the IO/AGG receiving significantly higher scores than the IO and Control groups.

Table 3

Group Means and Standard Deviations on DICA-P

Variable		Control N=33	AGG N=16	IO N=11	IO/AGG N=33	GP DIFFS
Prenatal History	<u>M</u> <u>SD</u>	2.09 1.7	2.81 2.4	2.45 1.8	2.53 1.9	n.s.
Delivery History	<u>M</u> <u>SD</u>	0.60 0.9	0.31 0.7	0.73 1.1	1.06 1.1	n.s.
Temperament Milestones	<u>M</u> <u>SD</u>	0.94 1.1	2.25 2.6	1.73 1.6	2.67 2.4	IA, A > C
Behaviour 1st 5 Years	<u>M</u> <u>SD</u>	0.67 1.6	2.50 2.6	2.81 3.3	3.9 3.5	IA, A, I > C
Psychosocial Stress	<u>M</u> <u>SD</u>	1.89 1.2	3.44 2.6	1.45 1.6	2.94 2.2	A, IA > I, C
ADHD	<u>M</u> <u>SD</u>	6.69 4.6	12.68 6.4	18.36 4.0	16.97 4.2	I, IA, A > C I > A
Oppositional Disorder	<u>M</u> <u>SD</u>	1.94 2.1	5.94 2.6	4.73 2.8	7.09 2.6	IA, A, I > C IA > I
Conduct Disorder	<u>M</u> <u>SD</u>	1.97 2.7	6.56 4.8	3.55 3.8	8.21 3.9	IA, A > I, C
Depression	<u>M</u> <u>SD</u>	3.94 5.1	8.94 8.1	6.63 7.3	10.69 8.2	IA, A > C
Mania	<u>M</u> <u>SD</u>	0.48 1.3	1.69 1.4	1.27 1.7	3.00 1.3	IA > I, C
Anxiety	<u>M</u> <u>SD</u>	1.67 1.9	3.38 3.3	2.18 1.9	3.33 3.1	n.s.

(note: I = IO, A = AGG, IA = IO/AGG)

In order to investigate the discriminating power of the DICA-P clinical scales, a DFA was performed on the seven significant scales. These analyses revealed that four of the variables contributed unique and significant information to the prediction of group membership, $F(12,227) = 14.24$, $p < .001$. The combined ADHD, Conduct Disorder, Oppositional Disorder and Psychosocial Stress variables classified 68 % of all subjects correctly. This prediction was best for Control (82%) and IO (82%) groups. The subjects in the mixed IO/AGG (63%) and AGG (38%) were not as well predicted. All tests of significance between pairs of groups were significant ($p < .01$).

When clinical groups were combined in the analysis, the discriminating power improved to 91% correct using ADHD, Oppositional, Mania and Psychosocial Stress variables, $F(4,88) = 26.70$, $p < .001$. In this case, 94% of the Control and 90% of the clinical groups were correctly classified.

Swanson, Nolan, Pelham Teacher Rating Scale (SNAP)

Not surprisingly, the overall MANOVA for all scales on the SNAP using Pillais' criterion was highly significant, $F(18,255) = 9.12$, $p < .001$. Mean group scores and standard deviations on each SNAP scale are presented in Table 4.

Table 4

Means and Standard Deviations on SNAP Scales

Variable		Control N=32	AGG N=16	IO N=10	IO/AGG N=34	GP DIFFS
Hyperactivity	<u>M</u>	1.97	5.06	10.00	10.35	I, IA > A, C
	<u>SD</u>	0.4	1.0	1.1	0.7	
Inattention	<u>M</u>	2.93	6.65	11.20	11.41	IA, I > A, C
	<u>SD</u>	2.9	3.7	1.7	3.3	
Impulsivity	<u>M</u>	2.41	8.65	11.92	14.34	IA, I, A > C IA > A
	<u>SD</u>	3.3	4.1	2.2	2.9	
Peer Interactions	<u>M</u>	1.44	9.59	5.08	12.88	IA, A > I, C
	<u>SD</u>	2.2	5.0	3.9	4.3	
Disruptive Behaviours	<u>M</u>	2.13	6.17	5.81	8.68	IA, A, I > C
	<u>SD</u>	2.7	3.7	2.6	3.0	
Oppositional Behaviours	<u>M</u>	1.50	14.90	5.40	16.67	IA, A > I, C
	<u>SD</u>	2.3	5.8	4.7	5.6	

All scales on the SNAP achieved statistical significance indicating group differences. The main effect of the Hyperactivity scale (see Appendix E for items) was significant, $F(3,88) = 36.03$, $p < .001$, with the IO and IO/AGG groups receiving significantly higher ratings than the AGG and Control groups on items tapping activity level at school.

The main effect for the Inattention scale was significant, $F(3,88) = 46.67$, $p < .001$, with the IO and IO/AGG again receiving significantly higher ratings than the AGG and Control groups on items tapping attention problems in the classroom.

The main effect for the Impulsivity Scale was also significant, $F(3,88) = 77.05$, $p < .001$, with the IO/AGG, IO and AGG groups receiving significantly higher ratings than the Control group on items tapping impulsive behaviours at school. The IO/AGG group also received significantly higher mean ratings on the Impulsivity scale than the AGG group.

The main effect on the Peer Interactions scale was significant, $F(3,88) = 52.21$, $p < .001$, with subjects in the IO/AGG and AGG groups receiving significantly higher mean ratings from teachers than IO-only and Controls suggesting aggressive boys in the clinical groups experience difficulties with peer interactions.

The main effect on the Disruptive scale was significant, $F(3,88) = 25.93$, $p < .001$, with the IO/AGG, AGG and IO groups receiving significantly higher mean ratings than Controls indicating once again that all clinical groups display a greater number of disruptive behaviours at school.

Finally, the main effect on the Oppositional scale was significant, $F(3,88) = 67.18$, $p < .001$, with the IO/AGG and AGG groups displaying a significantly greater number of oppositional behaviours than the IO and Control groups.

The DFA on SNAP scales indicated the Impulsivity, Oppositional, Inattention, Peer Interaction and Hyperactivity subscales contributed unique and significant information to the prediction of groups, $F(15,232) = 17.01$, $p < .001$, which was successful for 76% of the cases. As was the case with the DICA-P DFA, the prediction was best for Controls (81%) and IO subjects (89%). The IO/AGG group was predicted with 74% accuracy, while 65% of the AGG group was correctly classified. All tests of significance between pairs of groups were significant ($p < .01$).

When all clinical groups were combined in the analysis, prediction increased to 96%, $F(4,87) = 52.62$, $p < .001$, with 97% of the Controls and 95% of the clinical groups predicted accurately from all of the same scales except Peer Interaction.

Divergent and Convergent Interview for Behavior Disorders (DCIBD)

The overall MANOVA for all scales on the DCIBD using Pillais' criterion was highly significant, $F(9,270) = 10.38$, $p < .001$. Group means and standard deviations on the 3 DCIBD scales are presented in Table 5.

Like the SNAP, all scales on the DCIBD achieved statistical significance indicating group differences. The ANOVA on the Attention Problems scale was significant, $F(3,90) = 21.73$, $p < .001$, indicating mothers describing subjects in the IO/AGG and IO groups viewed their children as displaying a significantly greater number of attention related problems than mothers of AGG and Controls. Despite these differences however, the mothers of the AGG group described their children as exhibiting a significantly greater number of attention problems than controls. An examination of the individual items on this scale (see Appendix G) reveals that at least two questions appear to be questionable with respect to attention problems specifically (e.g. interrupting and running around inappropriately).

Table 5

Group Means, Standard Deviations and Differences on Loney DCIBD Scales

Variable		Control N=33	AGG N=16	IO N=11	IO/AGG N=34	GP DIFFS
Attention Problems	<u>M</u>	2.18	4.25	6.45	6.59	IA, I > A, C A > C
	<u>SD</u>	2.6	3.1	1.1	0.7	
Aggressive Behaviours	<u>M</u>	1.21	3.94	2.18	4.79	IA, I > C IA > I
	<u>SD</u>	1.7	2.4	2.4	2.2	
Hyperactive Impulsive	<u>M</u>	0.67	2.88	5.55	5.97	IA, I > A, C A > C
	<u>SD</u>	1.4	3.0	2.8	2.4	

The main effect on the Aggressive Behaviour Problems scale was significant, $F(3,90) = 18.14$, $p < .001$, with mothers of the IO/AGG and AGG groups describing their boys as displaying a significantly greater number of aggressive behaviours than mothers of boys in the Control group. In addition, the mixed IO/AGG group received a greater number of aggressive items than the IO group.

Finally, the main effect on the Hyperactive/Impulsive scale was significant, $F(3,90) = 34.01$, $p < .001$, with boys in the IO/AGG and IO groups receiving a significantly higher number of items tapping activity levels and impulsive behaviours from their mothers than the AGG and Controls. There was still some overlap on this scale however, as the AGG boys' mothers described them as exhibiting a significantly greater number of hyperactive/impulsive behaviours than controls.

The DFA used all three DCIBD scales to predict group membership with 65% accuracy overall. The discriminant function in this case, $F(9,214) = 13.13$, $p < .001$, was able to predict 82% of the Control, 73% of the IO, 38% of the AGG and 59% of the IO/AGG groups correctly. The test of significance between pairs of groups revealed the function significantly discriminated all groups from each other.

When clinical groups were combined in the DFA, the three DCIBD scales produced a significant discriminant function, $F(3,90) = 27.44$, $p < .001$, predicting 91% of the Controls and 80% of the clinical group correctly.

Testing the Hypotheses

Hypothesis Ia and Ib: Measures of Sustained Attention and Impulsivity. Hypothesis Ia predicted that IO and IO/AGG groups would display a greater difficulty sustaining attention on a laboratory measure of this behavioral construct than subjects in the AGG and Control groups who would not differ from each other. More specifically, it was hypothesized that IO and IO/AGG groups would achieve fewer correct responses and commit a greater number of omissions and commissions on the Gordon Diagnostic System (GDS) Vigilance Task. Hypothesis Ib predicted that IO and IO/AGG groups would display a greater number of impulsive behaviours (i.e. higher Efficiency Ratios) on the GDS Delay task than the AGG and Control groups who would not differ from each other. As noted earlier, this task required the subject to inhibit responses for a unknown consistent interval in order to earn points. The proportion of the total number of correct responses to the total number of responses (the Efficiency Ratio) was calculated as a measure of impulsivity. This task also required the subject to sustain attention long enough to complete the task which takes 12 minutes to complete. For this reason, the total

number of responses and the total number of correct responses were evaluated in addition to the Efficiency Ratio.

Group mean scores on the various dependent measures of the Vigilance and Delay tasks were compared on total scores with repeated measures MANOVAs which evaluated mean scores across block intervals as suggested by the developer of the GDS.

The MANOVA comparing total group scores on the Vigilance Task was not significant using Pillais' criterion, $F(9,270) = 0.9869$, $p > .05$, controlling for age which was highly significant, $F(3,88) = 6.26$, $p < .001$. Group mean, standard deviations and differences on each variable are presented in Table 6.

Only the Total Commissions variable was significant, $F(3,91) = 3.35$, $p < .05$, when the variables were analyzed in separate ANOVAs. Post hoc analyses revealed that the AGG group committed a significantly greater number of commissions than the control group.

On each of the three measures, the AGG group looks very similar to the IO/AGG and IO group which was not predicted.

Table 6

Group Means, Standard Deviations and Differences on Vigilance Task

Variable		Control N=33	AGG N=17	IO N=11	IO/AGG N=34	GP DIFFS
Total Correct	<u>M</u>	40.48	38.36	39.00	39.30	ns
	<u>SD</u>	4.9	6.4	4.0	4.6	
Total Omissions	<u>M</u>	4.67	7.35	6.36	6.24	ns
	<u>SD</u>	5.1	7.6	5.1	5.0	
Total Commissions	<u>M</u>	11.21	23.05	19.45	14.21	A > C (.05)
	<u>SD</u>	16.7	16.7	15.8	14.9	

The reader is cautioned with respect to the interpretation of results from the Vigilance Task. Group means in each case are very high (40/45). Thus, ceiling effects are likely. As well, the error terms for each F ratio are very high. It is quite possible that the variation within groups is responsible for masking any true group differences. This is supported by the power analysis conducted on each separate measure which revealed a small effect size in each case and low power (see Table 7).

The DFA was conducted using all three measures from the Vigilance task due to the marginal effects obtained on each measure in the ANOVAs. It did not reach significance in analyses using groups separately or combined.

Block Analysis

The MANOVA examining vigilance measures across blocks using Pillais' criterion was consistent with these results. The overall group by block interaction, $F(18,546) = 1.06$, $p > .05$, and block main effect, $F(6,362) = 1.19$, $p > .05$, were not significant. Therefore, subjects in all groups displayed relatively consistent performances across blocks. No drop off in performance was noticeable for any of the IO groups. Once again however, the power was low. Mean scores and standard deviations across blocks for each vigilance measure are displayed in Table 8. Separate univariate analyses are available in Appendix M.

Table 7

Power of the Statistical Tests Conducted on the Vigilance Task

MEASURE	EFFECT SIZE	u	POWER
Total Correct			
Group	.12	3	.15
Block	.10	2	.10
Group by Block	.10	6	.12
Total Omissions			
Group	.04	3	.05
Block	.12	2	.12
Group by Block	.12	6	.14
Total Commissions			
Group	.24	3	.50
Block	.04	2	.06
Group by Block	.10	6	.12

Table 8

Group Means and Standard Deviations on GDS Vigilance Task across Blocks

Variable		Control N=33	AGG N=17	IO N=11	IO/AGG N=34
Correct					
Block 1	<u>M</u>	13.18	11.88	13.77	13.27
	<u>SD</u>	2.3	3.4	1.2	2.2
Block 2	<u>M</u>	13.39	12.88	12.91	12.94
	<u>SD</u>	2.4	3.0	2.9	1.8
Block 3	<u>M</u>	13.48	11.53	12.27	12.59
	<u>SD</u>	2.2	3.7	3.2	2.4
Omissions					
Block 1	<u>M</u>	1.76	2.65	1.73	1.68
	<u>SD</u>	2.1	2.9	1.2	2.0
Block 2	<u>M</u>	1.61	2.06	2.00	2.06
	<u>SD</u>	2.4	2.9	2.6	1.8
Block 3	<u>M</u>	1.49	3.3	2.55	2.41
	<u>SD</u>	2.1	3.2	2.7	2.4
Commissions					
Block 1	<u>M</u>	3.91	10.24	6.18	4.21
	<u>SD</u>	5.1	7.5	5.7	5.3
Block 2	<u>M</u>	4.00	8.53	6.27	5.79
	<u>SD</u>	5.9	8.1	6.9	7.2
Block 3	<u>M</u>	3.55	9.35	7.0	5.71
	<u>SD</u>	6.8	8.5	6.3	6.9

The MANOVA comparing total group scores on the Delay Task was not significant using Pillais' criterion, $F(9,273) = 1.69$, $p > .05$. The age covariate in this case was also not significant, $F(3,89) = 1.52$, $p > .05$. Group mean differences and standard deviations on each measure are presented in Table 9.

Separate ANOVA's did not support Hypothesis Ib. The main effect of the Efficiency Ratio variable was not significant, $F(3,92) = 0.30$, $p > .05$. As indicated earlier, this score is simply the ratio of the total number of correct responses to the total number of responses made. As these two measures require the subject to sufficiently attend to the task, they were evaluated as well.

There were group differences on the Total Correct variable, $F(3,92) = 4.80$, $p < .01$, with post hoc comparisons revealing the IO group obtained a significantly fewer number of correct responses than the Control, IO/AGG and AGG groups. The main effect of Total Responses approached significance, $F(3,92) = 2.69$, $p < .06$, with the IO group pressing the button significantly fewer times than all other groups.

Table 9

Group Means, Standard Deviations and Differences on GDS Delay Task

Variable		Control N=33	AGG N=17	IO N=11	IO/AGG N=35	GP DIFFS
Total Correct	<u>M</u>	49.30	48.77	38.55	45.91	A,AI,C > I
	<u>SD</u>	9.1	6.5	10.3	9.8	
Total Responses	<u>M</u>	64.00	68.47	55.09	66.74	A,AI,C > I
	<u>SD</u>	14.9	10.0	18.6	13.7	
Efficiency Ratio	<u>M</u>	0.784	0.727	0.768	0.712	ns
	<u>SD</u>	0.21	0.14	0.15	0.21	

The main effect for block was significant as well, $F(9,819) = 5.69$, $p < .001$, with subjects improving their scores across blocks on the total number of correct, $F(3,273) = 15.00$, $p < .001$, and Efficiency Ratio, $F(3,273) = 8.42$, $p < .001$, variables. The group by block interaction for the MANOVA was not significant, $F(27,819) = 0.64$, $p > .05$. Group Mean scores and standard deviations across blocks for each Delay Task measure are displayed in Table 10. The power to detect differences of these magnitudes was again quite low (see Table 11).

The DFA used the total number of correct responses and total responses to produce a significant discriminant function, $F(6,182) = 2.82$, $p < .02$, with membership predicted poorly with only 38% accuracy. This was best for Controls (58%), followed by IO (46%), IO/AGG (23%) and AGG (23%). Tests between pairs of groups were significant for IO-Controls, IO-AGG, and IO-IO/AGG comparisons ($p < .01$ in each case). When clinical groups were combined in the analysis, the DFA was not significant, $F(1,94) = 3.72$, $p > .05$.

Table 10

Group Means and Standard Deviations on Delay Task across Blocks

Variable		Control N=32	AGG N=17	IO N=10	IO/AGG N=34	Block
Total Correct						
Block 1	<u>M</u>	10.88	10.94	8.09	10.71	10.16
	<u>SD</u>	3.6	2.2	3.4	2.7	3.0
Block 2	<u>M</u>	12.24	12.18	9.45	11.11	11.50
	<u>SD</u>	3.5	2.0	3.9	3.2	3.3
Block 3	<u>M</u>	12.88	12.12	9.45	12.03	12.04
	<u>SD</u>	3.6	2.5	2.6	3.6	3.4
Block 4	<u>M</u>	12.61	13.53	11.09	12.51	12.56
	<u>SD</u>	3.6	2.8	2.7	3.0	3.2
Total Responses						
Block 1	<u>M</u>	16.94	17.29	13.64	17.06	16.67
	<u>SD</u>	6.5	5.6	8.6	5.4	6.2
Block 2	<u>M</u>	15.91	17.41	12.00	16.51	15.95
	<u>SD</u>	3.6	3.7	5.0	4.5	4.3
Block 3	<u>M</u>	15.28	17.12	13.73	16.17	15.75
	<u>SD</u>	3.6	3.9	6.6	4.3	4.4
Block 4	<u>M</u>	15.27	16.35	13.91	16.03	15.88
	<u>SD</u>	3.6	2.0	4.0	3.4	3.4
Efficiency Ratio						
Block 1	<u>M</u>	0.7374	0.6906	0.7346	0.6858	0.7100
	<u>SD</u>	0.27	0.21	0.25	0.22	0.24
Block 2	<u>M</u>	0.7903	0.7344	0.7980	0.7112	0.7524
	<u>SD</u>	0.22	0.20	0.18	0.22	0.21
Block 3	<u>M</u>	0.8813	0.7394	0.7792	0.7705	0.8033
	<u>SD</u>	0.11	0.20	0.22	0.24	0.20
Block 4	<u>M</u>	0.8495	0.8259	0.8223	0.8103	0.8279
	<u>SD</u>	0.19	0.13	0.13	0.21	0.18

Table 11

Power of the Statistical Tests Conducted on the Delay Task

MEASURE	EFFECT SIZE	u	POWER
Total Correct			
Group	.20	3	.34
Block	.16	3	.30
Group by Block	.01	9	.04
Total Responses			
Group	.13	3	.17
Block	.02	3	.05
Group by Block	.05	9	.07
Efficiency Ratio			
Group	.10	3	.11
Block	.13	3	.17
Group by Block	.05	9	.07

Hypothesis IIa and IIb: Recall and Higher Order Cognitive Processing. Hypothesis IIa predicted that subjects in the IO and IO/AGG groups would display poorer recall of a list of weakly categorizable nouns, and that their recall protocols would display evidence of poorer spontaneous semantic clustering than AGG and control groups. Hypothesis IIb predicted that subjects in all groups would display increased evidence of semantic clustering following training in clustering. The tests of Hypothesis IIa and IIb were conducted using repeated measures MANOVA's with the mean number of items recalled and mean Adjusted Ratio of Clustering (ARC) scores evaluated before and following training. Group mean and standard deviation scores on both variables before (Trial 1) and after (Trial 2) training are presented in Table 12.

The overall Group by Trial interaction MANOVA using Pillais' criterion approached significance, $F(6,180) = 2.878$, $p < .10$, with a significant main effect for trial, $F(2,89) = 88.14$, $p < .001$, but not for group, $F(6,188) = 0.84$, $p > .05$. The test of hypotheses are best understood by examining the group means and standard deviations presented in Table 12 and the univariate ANOVAs for each variable available in Appendix M.

The Trial main effect for ARC scores was significant, $F(1,92) = 14.94$, $p < .001$, and the Group by Trial interaction was not, $F(3,92) = 0.66$, $p > .05$, indicating support for Hypothesis

IIb that subjects in all groups would display an increase in semantic clustering following training. This result does not support Hypothesis IIa which predicted lower spontaneous ARC scores in IO/AGG and IO groups versus AGG and Controls. The means are similar for all groups.

The Group by Trial interaction for Total Recall was significant, $F(3,90) = 2.83, p < .05$. There was an increase in recall for all groups combined following training (Trial main effect, $F(1,90) = 177.40, p < .001$). However, Hypothesis IIa was not supported. Post hoc analyses revealed that subjects in all groups recalled relatively the same mean number of items in Trial 1. The interaction is due to fewer items being recalled following training by the IO group.

It should be noted that subjects' scores on the total number of items recalled was highly influenced by age, as the age covariates for both Trial 1, $F(1,86) = 9.223, p < .005$, and Trial 2, $F(1,86) = 16.92, p < .001$, were highly significant. ARC scores were not influenced by age. The power of each statistical comparison was quite low as displayed in Table 13 with the exception of the Block comparisons for total number of words recalled.

Table 12

Group Means and Standard Deviations on Sort/Recall Task Before and After Training

Variable		Control N=33	AGG N=17	IO N=11	IO/AGG N=33	Trial
Total Number Recalled						
Trial 1	<u>M</u>	8.91	8.06	9.00	8.36	8.59
	<u>SD</u>	2.7	1.7	2.9	2.5	2.6
Trial 2	<u>M</u>	14.64	12.92	11.82	14.03	13.32
	<u>SD</u>	3.8	2.9	2.4	3.7	3.0
ARC Scores						
Trial 1	<u>M</u>	0.128	0.106	0.125	0.085	0.111
	<u>SD</u>	0.47	0.55	0.54	0.51	0.52
Trial 2	<u>M</u>	0.452	0.207	0.401	0.411	0.353
	<u>SD</u>	0.46	0.43	0.34	0.37	0.26

Table 13

Power of the Statistical Tests Conducted on the Sort/Recall Task

MEASURE	EFFECT SIZE	u	POWER
Total Words Recalled			
Group	.06	3	.07
Trial	.49	1	.91
Group by Trial	.09	3	.10
ARC Scores			
Group	.05	3	.06
Trial	.14	2	.17
Group by Trial	.04	3	.06

Taken together these results indicate that while IO subjects displayed semantic clustering both before and after training to the same extent as all other groups, they were unable to utilize this strategy following training to aid their recall, and this was separate from the influence of age.

Both ARC and Recall variables were used in the DFA because of the interaction. There were no significant functions produced by the combination of these variables for clinical groups evaluated separately or combined.

Hypothesis III: General Attributions. This hypothesis predicted that subjects in the clinical groups would tend to attribute the causes of success and failure experiences to external rather than internal causes to a greater extent than control subjects. The General Personal Causality questionnaire which includes items for both failure and success experiences was used to test this hypothesis. As subjects complete both failure and success items, the following ANOVA uses groups as the between subject factor and question type as the within subject factor.

The results of this analysis lend little support for Hypothesis III. The Group main effect, $F(3,92) = 2.01, p > .05$, and Group by Question interaction, $F(3,92) = 0.09, p > .05$, were not significant, indicating that subjects in all groups tended to attribute success and failure experiences to similar causes.

There was a significant Question effect, $F(1,92) = 76.40$, $p < .001$, with groups attributing success experiences to more internal causes to a greater extent than failure experiences. Positive scores indicate internal attributions. Group Mean and Standard Deviation scores for both success and failure items are presented in Table 14.

It should be noted that the age variable was significantly related to GPC scores for Failure items only, $F(1,90) = 16.83$, $p < .001$, suggesting a relationship between attributions for failure experiences and age.

When success and failure means were examined separately, no group differences emerged. The main effect for success items, $F(3,92) = 1.47$, $p > .05$, and failure items, $F(3,92) = 0.87$, $p > .05$, were not significant. The power of this statistical test was quite small ($\beta=.11$, $ES=.10$, $n=24$, $u=3$).

The DFA using failure and success attributions was not significant when attempting to predict group membership from these variables.

Table 14

Group Means and Standard Deviations on GPC Success and FailureItems

Variable		Control N=33	AGG N=17	IO N=11	IO/AGG N=35	Total
Success Items	<u>M</u>	1.44	1.31	0.86	1.17	1.20
	<u>SD</u>	0.7	0.8	1.1	0.9	0.9
Failure Items	<u>M</u>	0.11	-0.21	-0.48	-0.21	-0.19
	<u>SD</u>	1.2	1.1	1.4	1.1	1.3
Both Items	<u>M</u>	0.78	0.55	0.20	0.48	
	<u>SD</u>	0.7	0.6	0.9	0.7	

Hypothesis IV: Social Attribution. This hypothesis was based to a large extent on Dodge's work which predicts that aggressive boys attribute the causes of peers' behaviour in ambiguous situations to hostile intentions. The hypothesis predicted that AGG and IO/AGG subjects would be more likely to attribute hostile intentions to peers, respond aggressively either physically or by prescribing punishment, and expect aggressive and less prosocial behaviour of the peer in the future.

Hypothesis IV was analyzed using a 2 by 2 MANOVA in which group was the between factor and peer type (aggressive versus neutral) the within subjects factor. In an earlier study using this task (Milich and Dodge, 1984) with hyperactive boys, items were summed across aggressive and neutral peer items so they did not examine any differential effects of peer type. The analysis used in the present investigation allowed for a test of differences between subjects' attributions regarding aggressive and neutral peers separately. It follows Dodge's original investigation to determine if any discrimination between peer type is made by groups.

When the peer types were combined in the analysis, the overall group differences from the MANOVA using Pillais' criterion was not significant, $F(6,184) = 1.87$, $p > .05$. The group by peer type interaction was significant, $F(18,920) = 3.11$, $p < .001$, indicating that peer type influences to some extent how

individual groups respond to the items. When summed across all items, the main effect for peer type was highly significant as well, $F(10,920) = 30.92$, $p < .001$, indicating that groups do indeed respond to aggressive and neutral items differently. Subjects' responses to the Attribution of Intention Task (AIT) was not influenced by age.

Now that it has been determined that groups respond to aggressive and neutral peer items differently, it was necessary to examine how groups responded to individual items with respect to Hypothesis IV. In each case, the overall group effect was examined with peer group combined and separately. Group means, standard deviations and the results of univariate analyses for each item both combined and separately are presented in Table 15.

An examination of Table 15 reveals that significant group differences exist for hypothetical aggressive peers only. In all cases, the overall F ratios are significant for aggressive peers and not significant for neutral peers. When examining aggressive and neutral peers as combined items, differences were significant, but not as strong in the majority of cases for each item. Therefore, Hypothesis IV was only true when the imagined peer was identified by the subject as aggressive. For this reason, post hoc analyses were conducted on aggressive peer items only.

Items I and II assessed subjects' attribution of the peer's intent in hypothetical ambiguous stories. In contrast to the prediction that AGG groups would display a greater tendency toward hostile attributions, post hoc analyses revealed that all three clinical groups described hostile intentions in both open ended and forced choice formats to a greater extent than Controls. All groups attributed more hostile intentions to aggressive versus neutral peers for both item I, $F(1,92) = 94.95$, $p < .001$, and item II, $F(1,92) = 100.81$, $p < .001$. As noted earlier, there were no group differences when the identified peer was neutral.

Items III and IV assessed subjects' hypothetical responses regarding the ambiguous event. Again, all clinical groups were more likely to respond in an aggressive manner to the aggressive peer than Controls. Similarly, the post hoc analysis of item IV revealed that all clinical groups indicated that they would prescribe punishment to the aggressive peer for the hypothetical act more often than Controls. All groups were less likely to respond aggressively $F(1,92) = 18.69$, $p < .001$, and prescribe punishment, $F(1,92) = 60.41$, $p < .001$, when the peer type was neutral. As was the case with items I and II, there were no group differences when the peer type was neutral.

Items V and VI assessed subjects' attributions regarding the future behaviour of the peer following the ambiguous act.

The planned comparison predicting less prosocial and more aggressive behaviour from the aggressive peer in the future for AGG and IO/AGG groups versus IO and Controls was not supported. However, in both cases post hoc analyses revealed that clinical subjects were more likely to predict negative and antisocial behaviours from aggressive peers in the future compared to Controls. All groups were less likely to expect negative future behaviour when the peer was neutral, Item V $F(1,92) = 56.83$, $p < .001$, and Item VI $F(1,92) = 68.62$, $p < .001$. Once again, there were no group differences on these items when the identified peer was neutral.

Table 15

Group Means, Standard Deviations and Univariate F Ratios on Individual AIT Items by Peer Type

I Peer's Intent (open ended)

<u>Peer Type</u>	<u>Control</u> N=33	<u>AGG</u> N=17	<u>IO</u> N=11	<u>IO/AGG</u> N=35	<u>F</u>
Aggressive	1.48(.34)	1.85(.29)	1.76(.27)	1.73(.33)	6.52***
Neutral	1.15(.22)	1.12(.41)	1.14(.31)	1.30(.36)	1.97
Combined	1.32(.19)	1.49(.25)	1.45(.23)	1.52(.24)	5.05**

II Peer's Intent (forced choice)

<u>Peer Type</u>	<u>Control</u>	<u>AGG</u>	<u>IO</u>	<u>IO/AGG</u>	<u>F</u>
Aggressive	1.52(.31)	1.25(.26)	1.29(.30)	1.27(.28)	5.20**
Neutral	1.77(.19)	1.81(.26)	1.93(.10)	1.71(.38)	1.86
Combined	1.64(.19)	1.53(.21)	1.61(.15)	1.49(.22)	3.70*

III Behavioral Response

<u>Peer Type</u>	<u>Control</u>	<u>AGG</u>	<u>IO</u>	<u>IO/AGG</u>	<u>F</u>
Aggressive	1.47(.33)	1.76(.26)	1.65(.46)	1.69(.29)	4.15**
Neutral	1.22(.25)	1.49(.39)	1.36(.48)	1.40(.38)	2.47
Combined	1.34(.23)	1.62(.28)	1.51(.44)	1.55(.32)	4.97**

IV Punishment Suggested

<u>Peer Type</u>	<u>Control</u>	<u>AGG</u>	<u>IO</u>	<u>IO/AGG</u>	<u>F</u>
Aggressive	1.49(.35)	1.23(.27)	1.11(.14)	1.24(.26)	7.29***
Neutral	1.65(.29)	1.64(.34)	1.60(.32)	1.62(.34)	0.10
Combined	1.57(.26)	1.44(.26)	1.35(.15)	1.43(.22)	3.42*

* $p < .05$

** $p < .01$

*** $p < .001$

Continued.....

Table 15 Continued

V Future Behaviour (Prosocial)

<u>Peer Type</u>	<u>Control</u>	<u>AGG</u>	<u>IO</u>	<u>IO/AGG</u>	<u>F</u>
Aggressive	1.48(.34)	1.68(.34)	1.84(.22)	1.63(.40)	3.24*
Neutral	1.19(.24)	1.26(.31)	1.35(.40)	1.30(.35)	0.92
Combined	1.34(.24)	1.46(.27)	1.59(.24)	1.47(.28)	3.21*

VI Future Behaviour (Aggressive)

<u>Peer Type</u>	<u>Control</u>	<u>AGG</u>	<u>IO</u>	<u>IO/AGG</u>	<u>F</u>
Aggressive	1.38(.42)	1.73(.38)	1.76(.39)	1.55(.42)	4.04**
Neutral	1.12(.27)	1.12(.25)	1.09(.19)	1.15(.29)	0.21
Combined	1.25(.25)	1.42(.24)	1.43(.24)	1.35(.25)	2.77*

* $p < .05$

** $p < .01$

*** $p < .001$

In summary, the results indicate that children have similar attributions towards ambiguous events when the hypothesized peer is neutral. Although Hypothesis IV was not supported, all clinical groups were more likely to attribute hostile intent, respond aggressively and expect future negative behaviour from aggressive peers than controls when the hypothesized peer was aggressive.

Based on the above results, the DFA used aggressive peer items from the ALT to predict group membership. This analysis yielded a highly significant discriminant function, $F(9,219) = 3.52$, $p < .001$, using items IV, I and V to predict group membership with 38% overall accuracy. This discrimination was best for the IO group (73%), and somewhat poorer for Control (55%) and AGG (53%) groups. This function predicted group membership for IO/AGG with only 3% accuracy. Tests between pairs of groups were significant between all Control pairs (p 's $< .01$).

When clinical groups were combined in the analysis, the discriminant function was highly significant, $F(2,93) = 12.86$, $p < .001$, using items I, IV to predict group membership with 67% accuracy. This function predicted group membership equally well for the combined clinical groups and Controls.

Hypothesis V. This hypothesis predicted that subjects in AGG and IO/AGG groups would display more extreme levels of adaptability and cohesion than IO or Control groups when plotted into the Circumplex Model of family functioning. This was tested statistically in two ways. First, groups were compared on Distance From Centre (DFC) scores in a one way ANOVA. Higher DFC scores reflect greater deviance on FACES III. Second, subject scores on the FACES III were classified into balanced, midrange and extreme types based on norms provided by Olson et al. (1985), and groups were compared on the relative proportion of subjects falling into these groups.

The one way ANOVA examining group differences on the DFC was not significant, $F(3,88) = 0.68$, $p > .05$, indicating no support for Hypothesis V. Thus, when subjects' scores on the cohesion and adaptability factors are combined, groups appear quite similar in the amount of deviance parents report on this scale.

When subjects were classified into balanced, midrange and extreme types based on cohesion and adaptability scores, there again was no support for Hypothesis V, $\chi^2(6) = 1.66$, $p > .05$. As can be seen in Table 16, the majority of subjects fell in the midrange classification (53%), followed by the balanced family type (38%). Few subjects in the sample fell into the extreme family category (9%).

Table 16

Proportion of Subjects Falling into Balanced, Midrange and Extreme Classifications from the Circumplex Model by Group

	Control	AGG	IO	IO/AGG	
Balanced	12 (36%)	6 (38%)	4 (36%)	13 (41%)	35 (38%)
Midrange	18 (55%)	8 (50%)	7 (64%)	16 (50%)	49 (53%)
Extreme	3 (9%)	2 (12%)	0 (0%)	3 (9%)	4 (9%)
	33 (36%)	16 (17%)	11 (12%)	32 (35%)	92 (100%)

Both the ANOVA and chi square analyses of mothers' FACES III scores based on traditional analyses of these data did not support the hypothesis that aggressive subjects would display greater evidence of extreme family deviance than nonaggressive subjects. In fact, subjects looked relatively similar to each other with respect to combined cohesion and adaptability scores plotted into the Circumplex Model.

The results from the FACES analyses are surprising given other studies reporting significant differences between clinical and nonclinical families (cf. Olson, 1986). As noted however, the majority of families in the present study fell into the midrange classification which means that at least one score on the adaptability or cohesion dimensions was extreme. To explore the possibility that groups might differ on individual scales, the two FACES III scales were examined separately.

The Circumplex Model describes four levels of family adaptability ranging from rigid (low) through structured, flexible, and chaotic (high). The structured and flexible (moderate levels) are hypothesized to be most viable for healthy family functioning and the extreme areas are seen as more problematic for families over time. Table 17 displays subjects' scores on the adaptability dimension falling into each of these ranges by group.

Table 17

Subjects' Scores on the Adaptability Dimension of the Circumplex
Model by Group

	Control	AGG	IO	IO/AGG	
Rigid	1 (3%)	3 (19%)	3 (27%)	7 (22%)	14 (15%)
Structured	10 (30%)	8 (50%)	3 (27%)	10 (31%)	31 (34%)
Flexible	9 (27%)	1 (6%)	2 (18%)	12 (38%)	24 (26%)
Chaotic	13 (39%)	4 (25%)	3 (27%)	3 (9%)	23 (25%)
	33 (36%)	16 (17%)	11 (12%)	32 (35%)	73 (100%)

Table 17 reveals that the majority of families fell into the balanced (structured and flexible) regions. The overall chi square examining the association between group and adaptability regions was significant, $\chi^2(9) = 17.07$, $p < .05$. The control group displayed a greater tendency towards higher levels of adaptability with 66% falling into the flexible and chaotic categories. Conversely, 61% of the combined clinical groups tended towards the lower adaptability regions of structured and rigid. Furthermore, 22% of the clinical groups fell into the rigid category versus only 4% of the Controls. Overall, these results suggest that the families of the behaviour disordered boys were less flexible.

The Circumplex Model describes four levels of family cohesion ranging from disengaged (low) through separated, connected, and enmeshed (high). Again, the separated and connected (moderate levels) are hypothesized to be most viable for healthy family functioning and the extreme areas are seen as more problematic for families over time. Table 18 displays subjects' scores on the adaptability dimension falling into each of these ranges by group.

The analysis of cohesion categories by group was not significant for groups across categories, $\chi^2(9) = 1.08$, $p > .05$. Once again, the majority of subjects fell into the balanced, separated and connected regions of cohesion. Relatively equal

proportions of subjects fell into the more extreme disengaged and enmeshed regions with the exception of the IO/AGG group where 10 (31%) subjects fell into the disengaged category and only 2 (6%) fell into the enmeshed region.

Hypothesis VIa, VIb and VIc. These hypotheses were tested with the CSRRS, a psychiatric self-report rating scale. A one way MANOVA using Pillais' criterion yielded a significant group effect overall, $F(18,267) = 2.82, p < .0001$. The age covariate was not significant. There was however, only one significant univariate effect on a scale pertaining directly to Hypothesis VIa. Group mean scores and standard deviations on each scale are presented in Table 19. Univariate ANOVA tables are available in appendix L.

Table 18

Subjects' Scores on the Cohesion Dimension of the Circumplex
Model by Group

	Control	AGG	IO	IO/AGG	
Disengaged	6 (18%)	3 (19%)	0 (0%)	10 (31%)	19 (21%)
Separated	9 (27%)	8 (50%)	5 (46%)	11 (41%)	33 (36%)
Connected	14 (42%)	3 (19%)	5 (46%)	9 (28%)	31 (34%)
Chaotic	4 (12%)	2 (13%)	1 (9%)	2 (6%)	9 (10%)
	33 (36%)	16 (17%)	11 (12%)	32 (35%)	92 (100%)

Table 19

Group Means and Standard Deviations of Factor Scores on the CSRRO

Variable		Control N=33	AGG N=17	IO N=11	IO/AGG N=35	GP DIFFS
Conduct Problems	<u>M</u> <u>SD</u>	45.48 6.7	57.58 12.7	54.55 14.4	56.48 9.7	A, I, IA > C
Antisocial Permissive	<u>M</u> <u>SD</u>	54.51 9.6	50.71 9.5	50.09 10.0	49.89 11.6	NS
Positive Family	<u>M</u> <u>SD</u>	45.97 7.7	44.06 13.7	45.54 11.6	51.17 11.3	NS
Lie Immaturity	<u>M</u> <u>SD</u>	50.85 10.4	45.47 9.7	47.45 10.4	52.14 11.3	NS
Negative Peer Relations	<u>M</u> <u>SD</u>	48.84 9.0	54.59 7.5	54.54 7.5	53.06 10.1	NS
Positive Self/Peer	<u>M</u> <u>SD</u>	51.88 7.5	50.17 10.0	50.45 9.4	50.48 10.8	NS
Clinical Probability	<u>M</u> <u>SD</u>	0.393 0.22	0.543 0.24	0.518 0.21	0.481 0.21	A > C

There is little support for Hypothesis VIa based on the analyses of group differences on the CSRRS. Only one of the hypothesized three scales produced significant group differences. The Conduct Problems scale is the most applicable to behaviour problems in general and it was this factor that significantly differentiated not only the aggressive groups, but the IO group as well, from controls, $F(3,92) = 8.73, p < .001$. Group differences on the Positive Family, $F(3,92) = 2.30, p < .05$, and Antisocial-Permissive factors failed to produce any significant group differences, $F(3,92) = 1.30, p < .05$.

Although group differences on the Negative-Peer factor of the CSRRS were in the predicted direction of Hypothesis VIb, group differences on this factor were not significant $F(3,92) = 2.17, p > .05$. All clinical group scores on this factor were higher than the controls. There were no significant group differences on the Lie-Immaturity factor, $F(3,92) = 1.79, p > .05$.

Hypothesis VIc which predicted lower group scores for all clinical groups on the Positive-Self Peer factor of the CSRRS was not supported, $F(3,92) = .18, p > .05$.

One scale of the CSRRS which was not included in Hypothesis VI is relevant to the present investigation. The Clinical Probability factor represents the probability that a child's overall responses to the CSRRS are in the clinical range. When

group scores on this factor were compared, the overall F value was not significant, $F(3,92) = 2.26$, $p > .05$. In this case the age covariate was significant.

The DFA used the Conduct Problems, Negative Peers and Positive Family Factors to discriminate groups. The resultant discriminant function was significant, $F(9,219) = 4.17$, $p < .001$, predicting group membership with 49% accuracy. Prediction was 73% correct for Controls, 41% correct for the AGG, 9% correct for the IO, and 43% correct for IO/AGG groups. Tests of differences between pairs of groups were significant for all Control pairs ($p < .01$) only.

When all clinical groups were combined in the analysis, the DFA was significant, $F(4,91) = 9.36$, $p < .0001$, using the same factors as above plus the Clinical Probability factor to predict group membership correctly 77% of the time. Prediction was correct for the Control group in 84% of the cases and 73% correct for the combined clinical groups.

Finally, it should be noted that the power analysis conducted on the separate subscales of the CSRRS revealed that the effect sizes for all of the nonsignificant and marginally significant effects were typically quite low rendering the statistical power (beta) of the tests quite low as well (see Table 20).

Table 20

Power of the Statistical Tests Conducted on the CSRRS

FACTOR	EFFECT SIZE	u	POWER
Positive Self	.09	3	.10
Positive Family	.15	3	.20
Conduct Problems	.29	3	.66
Lie Immaturity	.09	3	.10
Negative Peer	.12	3	.17
Antisocial Permissive	.08	3	.09
Clinical Probability	.12	3	.17

DISCUSSION

This study was undertaken to investigate hypothesized differences between groups of behaviour disordered and nonbehaviour disordered boys on tasks which have been shown to discriminate between hyperactive and nonhyperactive children. The specific approach taken was a factorial one in which subjects were assigned to specific groupings based on parent and teacher reports of behaviour. Given that the correlation between hyperactive and aggressive behaviours is typically quite high (see Hinshaw, 1987), a necessary first step was to ascertain how well the group assignment discriminated between hyperactive and aggressive behaviours. As this factor will have important implications regarding the results of the study, a discussion of the results of the descriptive measures employed in the study is warranted.

Group Assignment

Clinical subjects were first identified from various clinical settings and met the criteria for ADHD, CD or Oppositional Disorder based on the DICA-P interview. Next, subjects were assigned to groups based on recommended research cutoff scores on the IOWA factors. In addition to the commonly studied hyperactive groups (IO and IO/AGG), the present investigation identified a third, aggressive only (AGG) group

because of the hypothesized differences between pure hyperactive and children displaying aggressive behaviours. Many studies have been published recently investigating ADHD with and without coexisting Conduct Disorder. The present investigation differs in that although some subjects in the aggressive groups would qualify for the diagnosis of CD, this was not a necessary criterion for placement into one of the aggressive groups. Therefore, aggression in the present study refers to five specific behaviours from the IOWA Conners. The actual items include quarrelsome, acts "smart", temper outbursts, explosive and unpredictable behaviour, defiant, and uncooperative. The present study represents a relatively new way of conceptualizing hyperactive and behaviour disordered boys (see Milich and Landau, 1989).

The results of the various descriptive measures employed in this study provided some evidence that constructed groups were relatively homogeneous with respect to a number of the behaviours associated with hyperactivity and aggression. For example, the hyperactive groups were described by teachers and parents as displaying significantly higher levels than normal comparison subjects of overactivity, attention problems both at home and at school, and disruptive behaviours in the classroom. However, aggressive-only subjects as a group also scored significantly higher than controls on the ADHD scale of the DICA-P, but not on the inattention and hyperactivity scales of the SNAP. This

latter finding is likely attributable to the fact that all clinical subjects displayed a significantly greater number of impulsive behaviours than controls.

The aggressive groups displayed a greater number of conduct and oppositional behaviours both at home and school, tended to be more aggressive at home, and were described by teachers as having a greater number of peer-related difficulties. Their mothers reported a greater number of problems with temperament and described a greater number of psychosocial stressors in the home.

There was however, considerable overlap between groups on a number of nondefining scales. Impulsivity is one of the core features of ADHD and is generally assessed using items such as "speaking out of turn; trouble waiting in line; acts before thinking, etc". However, both mothers and teachers described all clinical groups as displaying a significantly greater number of impulsive behaviours than did mothers and teachers of controls. In addition, ADHD items on the DICA-P failed to discriminate between the aggressive-only group and the hyperactive groups. Thus, it appears that impulsivity is a pervasive problem in both aggressive and hyperactive groups. The aggressive-only boys, who by definition did not display overactive or inattentive behaviours to the same extent as hyperactive groups (see SNAP results), were nevertheless reported as displaying a large number of ADHD related behaviours as described in DSM III-R. This

finding is in accordance with other investigations suggesting that the ADHD diagnostic category actually includes a rather heterogeneous sample of children who need not actually display attention deficits and/or overactive behaviours (Barkley et al., 1990; Newcorn et al., 1989;). It is possible that impulsivity is not a defining feature of ADHD but may coexist or be central to other externalising disorders.

Discriminant analyses conducted on the three descriptive measures suggest considerable overlap between IO/AGG and AGG groups. Classification was as high as 92% for nonbehaviour disordered and hyperactive-only subjects while aggressive groups typically achieved classification rates just slightly above chance. As expected, classification was always best when clinical groups were combined. These results indicate that the majority of behaviours seen in behaviour disordered boys are quite similar. It appears that the most important factor may be the attention component. In accordance with other investigations, the hyperactive-only child may in fact be quite different from those identified as hyperactive with accompanying aggressive behaviours (see Barkley et al., 1990).

Another important finding concerns the large number of depressive behaviours described by mothers of the aggressive children. In fact, these mothers endorsed on average two to three times the number of depressive items endorsed by those of

hyperactive-only and control group children. As noted, all clinical groups displayed similar evidence of ADHD defined by the DSM III-R. Although subject selection in this study did not allow the inclusion of clinically depressed subjects, other studies have reported up to 30% comorbidity (see McClellan et al, 1990) and that depressed boys display high frequencies of attention and behaviour problems (Kashani et al, 1982; Mitchell et al, 1988). These findings have important implications for the diagnosis and clinical management of ADHD and add further confusion to the heterogeneity problem discussed earlier. It is strongly suggested that future investigations examining hyperactivity and/or aggression consider this important variable when designing studies.

A related finding concerns the greater amount of psychosocial stress reported by mothers in families of aggressive children as compared with hyperactive-only and controls. The items on this scale included fighting, physical abuse, loss, financial problems, police, and separation and divorce. If a good proportion of aggressive children are experiencing familial problems, it is possible that they would be more prone to adjustment difficulties. Acting out behaviours might be used by children in families as distractions or ways of acting out frustrations in relatively safe environments like school. Indeed, a number of studies have reported higher levels of family stress in ADHD children displaying concurrent aggressive

behaviours (e.g. Taylor, et al., 1986) and the aggressive component has been reported to be more related to psychosocial factors and socioeconomic status than actual neurodevelopmental difficulties (Whalen, 1988). It is not clear from this study and others which comes first, family adversity or aggression. It is likely that a reciprocal relationship exists between family adversity and aggressive behaviour in the context of social maladaptation (see Patterson, 1982).

A final point regarding group description concerns the apparent severity of the combined hyperactive/aggressive group. Boys in this group displayed the highest teacher ratings of peer related difficulties, disruptive and oppositional behaviours. These results are in accordance with other investigations examining covariations in the dimensions of aggression and withdrawal (Ledingham, 1981), aggression and peer rejection (Bierman, 1986) aggression and delinquency (Loeber and Schmalting, 1985), and hyperactivity and Conduct Disorder (August, Stewart, and Holmes, 1983). In each case, boys exhibiting problems in both areas are more disordered on each dimension than boys with problems in one area only (Pope, Bierman and Mumma, 1989).

It is evident from the previous discussion that even though some overlap between subject groups exists in the present study, the method of group assignment employed provided a useful distinction between aggressive and pure hyperactive behaviour

disordered boys. However, the distinction between aggressive-only and mixed hyperactive/aggressive boys was not as well defined. On all scales where differences between hyperactive-only and aggressive-only groups occurred, the aggressive-only group obtained similar scores to the hyperactive/aggressive boys (albeit less severe). As discussed, the aggressive-only group received ADHD ratings on the DICA-P which were significantly higher than the controls. This should not have been the case if the aggressive-only group contained boys who were purely aggressive. It must be assumed that the aggressive-only boys in the present sample display some behaviours typical of ADHD.

As the purpose of this investigation was to determine if aggressive and hyperactive boys would differ on measures reported to discriminate clinical groups from nonbehaviour disordered boys, it is to a discussion of the specific hypotheses that we now turn.

Vigilance

Hypothesis Ia proposed that subjects in hyperactive groups would display greater difficulties maintaining attention over a prolonged period of time. To test this hypothesis, subjects' scores were compared on the three measures available from the GDS Vigilance task, a version of the commonly used Continuous Performance Task (CPT).

The results from the Vigilance task are rather disappointing given the lack of significant group differences obtained in this study. No support for hypothesis Ia was obtained on the total number of correct responses, errors of omission or commission. Even though the means were in the expected direction for hyperactive groups, the differences between groups were quite small. However, aggressive-only subjects looked very similar to hyperactive subjects on each measure. In fact, the aggressive-only subjects were the only group to commit a significantly greater number of commissions than control subjects. In addition, a deterioration in the performance of hyperactive subjects across blocks, which are commonly reported in hyperactive samples on objective measures of attention (see Schachar and Logan, 1990), were not observed in this study. The discriminant analysis also failed to identify correct group assignment with any large degree of accuracy. There are a number of implications regarding the GDS Vigilance task from the results of this study and other recent publications.

One difficulty with the GDS Vigilance task concerns the validation of the instrument. The validation sample contained only 1300 boys and girls between the ages of 4 and 16. Although a few studies have reported reliable differences between hyperactive and controls on this task (McClure and Gordon, 1984, Gordon, Mettleman and Irwin, 1990), others question the use of the Vigilance task in the assessment of hyperactivity as it

currently is employed (Aylward et al., 1990; Barkley et al, 1990). For example, the Barkley et al. (1990) study suggests that a longer evaluation period than nine minutes is required. That study also showed that behavioral ratings of off-task behaviour during the GDS Vigilance task is a better predictor of hyperactive behaviour than the total number of correct responses. Further investigation of the validity of the GDS Vigilance task as it pertains to the assessment of hyperactivity seems warranted.

The present investigation also did not provide enough subjects for the examination of differential effects of age on performance on the Vigilance task. A recent study by Seidel and Joschko (1990) reported greater performance decrements in normal boys under 8 years of age. This suggests that within-age-level comparisons between groups of ADHD and controls would be more sensitive than across-age-group comparisons. Although an attempt was made in this study to control for age statistically, future studies would be well advised to include age comparisons in their design. It is quite possible that any group differences that exist between subjects in the present investigation are being masked by the large variability in performance across age groups. Further study of age differences on the CPT is warranted.

In addition to the age factor, it has recently been demonstrated that stimulus presentation rate and display time

have a differential effect on the performance of hyperactive subjects on the CPT (Chee, Logan, Schachar, Lindsay and Wachsmuth, 1989). The CPT is also unable to discriminate between effects that are actually due to deficits in attention versus motivation, and other important components of attention including capacity and selection (Schachar and Logan, 1990).

It is evident that theories regarding the apparent attention deficit in hyperactivity require further elaboration. Chee et al. (1989) provide a very convincing argument that attention deficits seen in pure hyperactive boys are much different than those seen in many hyperactive/aggressive boys. They suggest that the hyperactivity commonly described in this latter group may actually be an "epiphenomenon" of conduct problems and not a function of a cognitive deficit for some children. After reviewing available literature regarding the heterogeneity problem in ADHD, Lillienfeld & Waldman (1990) concur with this supposition. They speculate that the attention deficit, impulsivity and overactivity observed in hyperactive/aggressive boys stems from a motivational deficit related to a boredom proneness which is a direct consequence of over sensitivity to reward and novelty. These newer theories point to the need to develop instruments which will assess the differential effects of inattention and motivation. It is interesting that after 15 years of research with the CPT, investigators are extending the study of the apparent "attention deficit" in much more detail.

These investigations will most certainly add to our understanding of the complexity of the factors involved in behavioral disorders.

Although a number of possible interpretations of the results from the GDS Vigilance data have been proposed, it is evident that this task will require much stronger validation evidence before it can be used reliably as a clinical instrument. In addition to the lack of support for Hypothesis Ia, there were no statistically significant differences between any of the clinical and normal control groups. Although mean differences were in the expected direction, they were very small and would require much larger samples to obtain statistical significance. It is likely that task parameters including total task length and stimulus onset asynchrony need to be carefully reevaluated on the GDS before it will be useful both experimentally and clinically. Supplementary measures including ratings of subjects' on-task behaviour while performing the GDS should be collected in future studies to supplement the traditional errors of omission and commission.

Impulsivity

Hypothesis Ib proposed that hyperactive subjects would display greater levels of impulsivity than aggressive-only and nonbehaviour disordered subjects. It was evaluated with the GDS

Delay task which purports to be an objective measure of impulsivity. In this task, subjects were required to inhibit their responses for an unknown interval of time in order to earn points. The proportion of the total number of correct responses to the total number of responses yields the Efficiency Ratio (ER) - the objective measure of impulsivity.

The ER failed to discriminate groups in the current sample. All groups displayed relative increases in performance across blocks. These findings are not in accordance with lower efficiency ratios reported for hyperactive boys by McClure and Gordon (1984). As discussed above, impulsivity is a core characteristic of ADHD (DSMIII-R) and all clinical groups displayed elevated levels of impulsivity on behavioral rating scales. Interestingly, aggressive-only subjects displayed a difficulty inhibiting responses making a greater number of commissions on the Vigilance Task which is often discussed with reference to impulsivity. These results seriously question the sensitivity of the GDS delay task's Efficiency Ratio in the assessment of impulsivity as it pertains to the diagnosis of ADHD.

As noted by Lam and Beale (1989), the Delay task measures only one aspect of impulsivity - failure to withhold responses for a sufficient amount of time to earn a point. A task analysis reveals that motivation, attention, and the ability to use a

strategy to learn the critical interval are other important factors which could influence performance on this task. As the ER is comprised of two separate scores, it masks other important differences that might be occurring in subjects. In fact, a subject need only make a few correct responses in the absence of incorrect responses to earn a perfect ER. If the subject decides right away that the correct interval is 20 seconds, he would be correct 100% of the time.

In the current sample, the hyperactive-only group produced a significantly lower number of correct responses across blocks and displayed a tendency ($p < .06$) towards committing the fewest number of total responses for all groups. These differences did not influence the ERs of this group. However, they could reflect difficulty paying attention to task, determining the critical interval, or poorer motivation to do well. All three of these influences have been implicated in hyperactive children's difficulties (see Douglas, 1983). It is evident from this discussion that future studies using the GDS Delay task address the numerous demands required by this task when interpreting results.

Although the results of the GDS delay task in the present study do not support Hypothesis Ib, it is clear that further study of impulsivity in behaviour disordered children is required. The present investigation supports those theories

cited above and Schachar and Logan (1990) who propose that at least three mechanisms could be responsible for impulsive behaviours, including a deficiency in inhibitory control, deficient attentional capacity, or a deficit in the social/motivational element of behavioral control. It is recommended that future researchers design tasks to assess theoretically formulated elements of impulsivity (and attention), rather than using tasks which grossly discriminate hyperactive children from others on these tasks.

In the present study, proposed differences between hyperactive and normal comparison groups were not observed. These results are actually in accordance with the lack of group differences reported on the ER of the GDS Delay task in a sample of ADHD, mixed ADHD/CD, CD and normal comparison boys (Daugherty & Quay, 1991). These findings seriously question the validity of the GDS Delay task as a measure of impulsivity in behaviour disordered boys. The study cited above did however also report significantly fewer total responses in boys in the ADHD-only group. This finding was replicated in the current study in IO-only boys. As noted earlier, the total number of correct responses on the GDS Delay task may prove to be sensitive to the attentional/cognitive difficulties specific to ADHD boys without accompanying aggressive behaviours.

Cognition

Hypothesis II proposed that hyperactive groups would display higher-order organizational cognitive deficits in comparison to controls. It was generated from the work by Douglas (1988) who suggests that hyperactive children possess the skills necessary to learn but fail to employ them spontaneously at a time when it would be strategically useful. A sort-recall task (August, 1987) was used to test this hypothesis which purports to tap the spontaneous and subsequent use of semantic clustering strategies to aid in recall. In this task subjects were required to recall a list of words before and after learning how to semantically cluster them.

Spontaneous clustering was not demonstrated to any great extent in any of the groups before training. As predicted, semantic clustering improved dramatically in all groups regardless of age following training. This suggests that all children in the present sample were able to benefit from training as predicted. However, the predicted deficiency in semantic clustering and recall in hyperactive groups before training was not evident. Group ARC scores were relatively low before training with little variation within groups. This result may be due to developmental limitations since older children tend to organize their recall spontaneously according to semantic relationships to a greater extent than younger children (Lange &

Griffith, 1977). The subjects used in the August sample were on average three years older than those studied in the present investigation.

Unlike the August study, the present investigation found that hyperactive-only subjects recalled fewer words following training than all other groups with age differences controlled for statistically. There was evidence that clustering and recall scores are related as a significant correlation was found between ARC and recall scores ($r = .384$, $p < .001$) following training. Although their recall protocols demonstrated evidence of considerable semantic clustering, hyperactive-only subjects failed to benefit in their ability to recall words following training. In accordance with Douglas' predictions, not only do these subjects fail to spontaneously use semantic strategies to aid their recall, they continue to do so when explicitly trained in the strategy. As hyperactive-only children frequently present with learning disabilities, these results support the notion that cognitive processing deficits are present to a greater extent in these boys than those who are both hyperactive and aggressive (August & Garfinkel, 1989; Schachar & Logan, 1990).

This result further supports the notion that the attention deficit in the latter group is actually an "epiphenomenon" produced by deficits in motivation. This is supported by the observation that the sort/recall task involves one to one

interaction using concrete material and subjects are verbally reinforced during sorting. Although it was not objectively evaluated in this study, it is quite possible that the majority of subjects were highly motivated, but the cognitive processing deficits of the hyperactive-only children interfered with their ability to recall as many words as the other groups following training.

The implications of these results are important for future studies in this area. It appears that developmental variables may greatly influence the results obtained in studies using tasks designed to assess higher order cognitive processes or "executive mechanisms". As well, future research would be well advised to examine differences between hyperactive boys with and without aggressive behaviour problems and attempt to control for the motivational aspect. As we have seen, cognitive deficits in these subgroups may be quite different and this fact will have important implications when designing interventions.

Hypothesis II was not supported. The ARC metric did not differentiate groups either before or following training. This result must be interpreted cautiously as the subjects in this study were on average two years younger than those reported in the original August (1987) study. ARC scores were relatively low before training and standard deviations were typically very high. Therefore, developmental variations significantly influenced the

outcome of these results. However, following training, ARC scores did increase and were significantly correlated with total recall. Although hypothesis II was not supported, the results of this study support the notion that hyperactive boys without accompanying aggressive behaviours are most likely to display evidence of cognitive related difficulties.

General Attributions

Hypothesis III proposed that behaviour disordered subjects would display more evidence of external attributions to success and failure experiences than nonbehaviour disordered subjects. It was predicted from previous work that the frequent failures experienced by hyperactive boys lead to the development of beliefs that success and failures are caused by events outside their control creating an attitude of helplessness and lowered self-efficacy (see Reid and Borkowski, 1987). The hypothesis was tested by comparing group responses on the General Personal Causality (GPC) questionnaire which assesses attributions about failure and success experiences in relatively common school situations.

Unlike what was predicted by hypothesis III, all subjects attributed success experiences to internal causes to the same degree. Subjects as a whole were more likely to attribute failure experiences towards external causes.

The present results are in accordance with a recent study reported by Schneider and Leitenberg (1989) who examined causal attributions of success and failure experiences in aggressive, withdrawn and aggressive/withdrawn children. Using a similar attribution task, these authors reported no differences between aggressive and control groups on attributions regarding success and failure experiences. It seems possible that at least some aggressive children do not perceive themselves in a negative light despite the disrupting and socially unacceptable nature of their behaviour. Little research into the self-perceptions of hyperactive and aggressive children has occurred to date. It will be important for future studies to address general attributional styles and how they influence global and situation-specific self-esteem.

It is unclear from this study whether the General Personal Causality Questionnaire is sensitive enough to assess subtle differences in general attributions. It is clear, however, that in the case of failure experiences, age is a factor which requires further exploration. There was a trend for IO-only subjects to attribute causes of their hypothetical experiences to more externally based which is in accordance to what was reported by Reid and Borkowski (1987). However, the lack of a significant number of subjects in the IO-only cell prevented this difference from obtaining statistical significance.

Social Information Processing

Hypothesis IV proposed greater hostile attributional biases in aggressive groups. This was based on work by Dodge (1980), Dodge and Frame (1982) and Milich and Dodge (1984) who have shown aggressive and mixed aggressive/hyperactive boys are more likely to attribute hostile intent, respond aggressively and expect future negative behaviour from peers in the future in response to hypothetical ambiguous provocation. The present study attempted to replicate these results and to determine if the hyperactive-only group would display a similar pattern of results.

The present results are in support of Dodge's original findings that aggressive boys are more likely than nonbehaviour disordered controls to display social information processing biases to aggressive peers. Group differences were evident on items in which the hypothetical peer was identified as aggressive but not neutral. All subjects were more likely to display biases when the identified peer was aggressive. This latter result highlights the importance of a child's "reputation" in determining attributions regarding his behaviour. As noted by Dodge, continued aggressive behaviour contributes to negative attributional biases regarding the aggressive peer, thereby increasing the likelihood of future peer rejection. If aggressive boys attribute hostile intention and respond aggressively to ambiguous situations in actual situations, peer

status will likely suffer, frustration continue, and the cycle will escalate.

Hypothesis IV was not supported. Both aggressive and hyperactive subjects were more likely to attribute hostile intent in both forced and open formats, respond aggressively, prescribe punishment and expect future negative behaviours from aggressive peers in the future than normal controls. These results strongly suggest that social cognitive processing deficits are not specific to aggressive boys, but represent a pervasive problem for all behaviour disordered boys. These results are in accordance with the link between inattention and impulsivity, and social cognitive biases reported by Lilienfeld and Waldman (1990) and the original Milich and Dodge (1984) study. They were also strong effects discriminating behaviour disordered boys from controls 80% of the time.

These present findings are consistent with studies examining peer relationships in hyperactive and aggressive boys. Hyperactive-only boys have been reported to be similar to aggressive-only and mixed groups in terms of decreased popularity and rejection as rated by peers and teachers. Hyperactive-only boys however, have been shown to receive significantly fewer negative interaction nominations, are more likely to display learning disabilities, and to be socially withdrawn (Milich & Landau, 1989). Peer relation difficulties have also been

reported to be consistent over time for hyperactive/aggressive, but not hyperactive-only boys (Johnston & Pelham, 1986). It is possible that the peer relation difficulties of hyperactive children are the most severe when they involve aggressive behaviour, but are not necessary for problems with peers. This interpretation is supported by the fact that both aggressive groups displayed the greatest number of peer interaction difficulties as rated by teachers. The hyperactive-only group had lower mean scores falling between aggressive and control groups. These distinctions might have important implications when designing intervention studies for children with social difficulties. Further research into how social information processing deficiencies in these groups affect peer relations is indicated. For example, one study might evaluate the thesis that the socially withdrawn behaviour of the hyperactive boys may lead to neglected peer status in contrast to the rejected status possibly held by the aggressive groups (see Dodge, Coie & Brakke, 1982).

It is not clear from this study how attributional biases develop in these boys and how they interact with the unique difficulties displayed by each group. Future research should address the role that factors such as cognitive processing deficiencies, modeling, experience, etc. play in the development of social information processing deficits.

Family Functioning

Hypothesis V proposed that aggressive groups would evidence the most extreme levels of dysfunction on the two family communication variables - adaptability and cohesion - proposed by Olson and colleagues (1983). It was based on previous findings in the literature reporting that the hyperactive child who is also aggressive appears to have a more adverse family environment than a hyperactive-only or normal control child.

The data from the FACES III were examined in a number of different ways to test this hypothesis. It was demonstrated in this sample of boys that when cohesion and adaptability were combined, all groups looked relatively the same, with the majority of families falling into the balanced and midrange categories of Olson's Circumplex Model. Furthermore, extreme levels of dysfunction were not demonstrated using the Distance from Centre metric recommended by Olson. Thus, taken together the combined adaptability and cohesion scores failed to discriminate aggressive and nonaggressive groups providing no support for hypothesis V.

When cohesion and adaptability dimensions were examined separately, a greater proportion of families of behaviour disordered children reported lower levels of adaptability (rigid and structured categories). Family adaptability is defined as

"the ability of a family system to change its power structure, role relationships, and relationship rules in response to situational and developmental stress" (Olson et al., 1983). These results suggest that families of behaviour disordered boys are less flexible in their ability to deal with change. This could be the result of the need for greater controls within the family to deal with problematic behaviours. Although extreme scores are generally viewed as evidence of greater family dysfunction, this style of relating may actually be adaptive and necessary to deal with the demands of disciplining a behaviour disordered boy. This seems to be a more plausible explanation than assuming that low adaptability leads to the development of behaviour disorders.

The above explanation is supported from the results of the analysis of family cohesion scores. Family cohesion is defined as "the emotional bonding that family members have towards each other" (Olson et al., 1983). In the present investigation, the majority of all groups fell into the balanced regions of cohesion indicating despite the behavioral problems and the need for stricter controls, the families of preadolescent behaviour disordered boys feel close to each other.

It should be noted that this is the first study to use the FACES III with this population. The majority of the research conducted thus far has been with adult and adolescent

populations. Therefore, its validity and utility with respect to families of younger children remains to be demonstrated. The need for further validation of the instrument is highlighted in a study by Roddick, Henggeler and Hanson (1986) who reported a greater proportion of families of juvenile delinquent adolescents fell into the chaotically enmeshed extreme categories (high adaptability and cohesion) than normal comparisons. If we are to assume that at least some aggressive/hyperactive boys will become adolescent offenders as is reported in the literature, it will be important to investigate if and when family systems change. Without validation of the FACES III with the pre-adolescent population important research like this will not be allowed to progress. Therefore, the results of FACES III in the present study must be interpreted with caution in light of the lack of group differences, the lack of validation evidence with this population, and the differences in psychosocial stress in aggressive groups reported on the DICA-P.

Self-Report

As the use of self-report scales with hyperactive boys has been a relatively neglected area of development, the present investigation used one such measure to investigate the utility of this form of assessment with behaviour disordered boys. The Children's Self-Report Rating Scale (CSRRS), a relatively new instrument, was used in the present investigation to test

hypotheses regarding group differences derived from the description of individual factors.

Hypothesis VIa predicted higher factor scores on the Conduct Problems, Antisocial-Permissive and Positive-Family scales for aggressive groups. The results revealed that all clinical groups rated themselves higher on the Conduct Problems factor than controls. This result is actually in accordance with the description of the factor which purports to assess impulsivity and hostility. In this case, hypothesis VIa was incorrectly stated as the Conduct Problems factor appears to tap behaviours specific to behaviour disordered boys in general. The present investigation supports the use of the Conduct Problems factor in the self-report assessment of behaviour problems.

No group differences were evident on the Antisocial-Permissive factor. Further validation of this factor seems indicated given these results, and the fact that it received only moderate validity in the standardization study (Beitchman et al., 1985).

The results from the Positive-Family factor did not support hypothesis VIa as no group differences were observed in the present sample. This result is however, in accordance with the findings on the FACES III suggesting that majority of families of behaviour disordered boys in this sample function well.

There was no evidence in support of Hypotheses VIb and c which predicted significant group differences between behaviour and nonbehaviour disordered boys on the Lie-Immaturity, Negative-Peer and Positive Self-Peer factors. This is not surprising for either the Lie-Immaturity and Positive Self-Peer factors given that both of these scales evidenced questionable validity in the normative sample. However, the lack of significant group differences on the Negative-Peer factor, which seems to have face validity and displayed good concurrent validity in the normative sample, deserves further consideration.

The Negative-Peer factor contains the following items: "Kids pick on me; boss me around; call me names; laugh at me; want to beat me up". It displayed concurrent validity in the validation study with psychiatrist ratings of aggression to peers, negative peer relations, low self-esteem, and various internalising problems. Significant correlations were not observed between this scale and ratings of hyperactivity, distractibility or behavioral outbursts. It is suggested here that this scale may be more applicable to the difficulties in the peer relations experienced by children who are often teased by peers for a variety of reasons that may not be applicable to behaviour problems in general.

In summary, the present investigation supports the use of the Conduct Problems factor of the CSRRS for use with behaviour

disordered boys. It is not clear from this study whether or not the behaviour disordered boys were denying difficulties in the hypothesized areas of concern or if the scales are invalid for these purposes. The factors of the CSRRS clearly require further study with larger samples before they will be valid for clinical use with this population. It is strongly recommended that these factors be validated from a number of settings using a variety of behavioral and observational measures. Fortunately, this work is presently underway.

Summary

Overall, this study revealed that groups of disordered and nonbehaviour disordered boys could be discriminated on a number of important factors related to ADHD and aggression. The results of various teacher rating scales and parent interviews agree with recent studies in the literature suggesting that inattention and overactivity are two behavioral syndromes which are clearly involved in children described as ADHD. Impulsivity, which has also been hypothesized to be a core characteristic in ADHD, was shown to also be present to a large extent in aggressive boys who did not display concurrent problems with inattention and overactivity to the same extent as hyperactive-only groups. In accordance with other studies, aggressive and aggressive/hyperactive boys displayed a greater number of psychosocial stressors at home and were more likely to be

described as being depressed by parents. In addition, the mixed group of hyperactive/aggressive boys were found to have the most severe ratings on subscales from teacher and parent ratings.

In contrast to other studies in the literature, few differences were found between aggressive-only and hyperactive/aggressive boys. It is not clear from this investigation whether or not this is due to the specific experimental or sampling procedures employed, or to actual similarities between these groups on the variables investigated. Relatively little research has been done in this area to date except in peer relations (see Milich & Landau, 1989 for a review). Future investigations of the sort employed in the present study will help to further ascertain if the pure aggressive distinction is clinically useful.

The hyperactive-only group displayed more evidence of cognitive-related deficits on the GDS Delay and Sort/Recall measures. This group likely resembles the ADD/VO group described by Lahey et al. (1989) and the DSM III taxonomy, and the learning disabled subgrouping recommended by August and Garfinkel (1989).

Taken together, the results support the distinction of ADHD boys based on the presence or absence of significant aggressive behaviours.

In contrast to what was predicted, hyperactive/aggressive boys displayed few common characteristics with hyperactive-only subjects. In fact, this group looked more similar to aggressive-only boys than pure hyperactive boys on the majority of variables where significant group differences emerged. In accordance with recent reports in the literature, hyperactive-only boys displayed more evidence of cognitive dysfunction. This was evident on their poorer recall of words on Trial 2 of the sort-recall task and performance on the GDS Delay task. The importance of designing new tasks to assess impulsivity and sustained attention while holding important social/motivational and age-related factors was stressed. Further research into the validity and utility of the Gordon Diagnostic System as it pertains to the assessment of ADHD is warranted. In addition, the lack of significant group differences on the Beitchman Children's Self-Report Rating Questionnaire necessitates further validation of this instrument for use with the present population. Although predicted group differences did not emerge on items tapping general attributions, further study of this previously neglected area of study with the present population as it relates to self-perception and depression seems warranted.

Although predicted differences between aggressive and control subjects on the FACES III did not emerge, a greater proportion of mothers of behaviour disordered groups described their families as being rigid and structured in their approach to

change. It was suggested that this pattern of family functioning may be more adaptive than dysfunctional in families of behaviour disordered children. Clearly, this is an interesting and important finding which requires replication and further validation with this population.

Perhaps the clearest finding of the present study was with respect to social information processing in behaviour disordered boys. Although it was predicted that aggressive groups would display more evidence of attributional biases than hyperactive-only subjects and controls, this was not the case. All groups of behaviour disordered boys were more likely than controls to attribute hostile intentions, respond aggressively, and predict future negative behaviour in response to ambiguous provocation from aggressive peers. It is unclear from this study what aspects of attention, cognition, motivation and social learning lead to the development of these attributions.

Limitations of the Current Study and Future Directions

This study has a number of limitations that have implications for future investigations in the area of hyperactivity and aggression. The first two issues are related and pertain to subject selection and assignment. The entire clinical sample consisted of boys identified by various professionals involved in clinical services. The sample is

biased in this respect because it is not random and includes only boys who have been identified through various clinics. It does not include boys who might have fit criteria for the study but who have not come to the attention of clinical services. However, it does describe a severely disturbed group of preadolescent boys. Although this does not present a threat to the integrity of the study and is not limited this investigation, it does limit the generalizability of the results. As resources permit, future investigations will screen large populations of children in regular and special classes to identify potential subjects.

A related point concerns the methodology of the study. The method of group assignment and statistical approach chosen in this investigation is a conventional one used in most studies of this nature. The study was designed in this way because it provides an interpretation of the syndrome in context of the literature. It is limited in that it is a categorical approach and does not allow for evaluations of degrees of impairment except by the groupings employed. It also uses only teacher and parent reports to identify and assign subjects to experimental groupings. Future approaches might well be advised to use supplementary measures like behavioral observations and other objective measures to help make groups more homogeneous. It also will be worth designing studies which conceptualize hyperactivity and aggression along dimensions of behavioral disturbance and

employ multiple regression/correlational analyses examining the proportion of variance in behavioral constructs accounted for by variations in these two dimensions.

The current sample also only included boys from the Ottawa region which is a rather homogeneous population in terms of socioeconomic variables. As compared to studies carried out in some of the larger urban centres in the United States, it was very difficult to identify children with pure aggressive features and families of very low SES. Although this reflects the natural order of things in Ottawa and was unavoidable, it likely restricts the variability of the sample. In addition, it was very difficult to identify a great number of hyperactive-only subjects. Again this likely reflects the actual number of these boys that will present at clinics. Although special education samples were recruited from, as suggested in a number of other studies (c.f. August & Garfinkel, 1989) it is likely a greater number of these boys would be found in learning disabled samples.

A final concern relates to the absence of large group differences on some of the measures used in the study. A number of instruments were found to possess poor sensitivity in detecting group differences. In some cases trends which were predicted by the hypotheses were discussed. It was seen that there is a lack of adequate validation evidence with some of these instruments to the current sample. In others, the validity

of the instruments are questionable or the statistical power was quite low. Although the measures and statistical techniques were chosen to help reduce the influence of unequal sample sizes to reduce type II errors, this factor must not be underestimated, especially in the case of the GDS Vigilance and GPC measures. Part of this difficulty lies in the influence of developmental variations in skill acquisition, which is a factor often neglected in the study of behaviour disorders. As noted, the current investigation did not provide a large enough sample for these differences to be properly investigated. Future studies are well advised to use caution in the selection of instruments to help ensure that effects of age are properly controlled.

REFERENCES

- Achenbach, T.M. (1987). Manual for the Youth Self-Report. Burlington VT: Thomas Achenbach.
- Achenbach, T.M., & Edelbrock, C.S. (1983). Manual for the Child Behavior Checklist and Revised Child Behavior Profile. Burlington VT: Thomas Achenbach.
- American Psychiatric Association (1987). Diagnostic and Statistical Manual of Mental Disorders (3rd ed.-rev.). Washington, D.C.: Author.
- Anderson, J.C., Williams, S., McGee, R., & Silva, P.A. (1987). DSM III disorders in preadolescent children: Prevalence in a large sample from the general population. Archives of General Psychiatry, 44, 69-76.
- Andrews, A., & Debus, R. (1978). Persistence and the causal perception of failure: Modifying cognitive attributions. Journal of Educational Psychology, 70, 154-166.
- Atkins, M.S., Pelham, W.E., & Licht, M.H. (1989). The differential validity of teacher ratings of inattention/overactivity and aggression. Journal of Abnormal Child Psychology, 17, (4), 423-435.
- August, G.J. (1980). Input organization as a mediating factor in memory: A comparison of educable mentally retarded and nonretarded individuals. Journal of Experimental Child Psychology, 30, 125-143.
- August, G.J. (1987). Production deficiencies in free recall : A comparison of hyperactive, learning-disabled, and normal children. Journal of Abnormal Child Psychology, 15, 429-440.
- August, G.J., & Stewart, M.A. (1983). Familial subtypes of hyperactivity. The Journal of Nervous and Mental Disease, 171, 362-368.
- August, G.J. Stewart, M.A., & Holmes, C.S. (1983). A four-year follow-up of hyperactive boys with and without conduct disorder. British Journal of Psychiatry, 143, 192-198.
- August, G.J., & Garfinkel, B.D. (1989). Behavioral and cognitive subtypes of ADHD. Journal of the American Academy of Child and Adolescent Psychiatry, 28, (5), 739-748.
- Aylward, G.P., Kelly, D.P., Verhulst, S.J., & Bell, S. (1990). Concordance between ADHD diagnostic measures: Suggestions for improved assessment. ADHD/Hyperactivity Newsletter, 14, New York: Gordon Systems Inc.

- Baker, L. & Brown, A.L. (1984). Metacognitive skills of reading. In J. Flood (Ed.), Handbook on research in reading. New York: Longman.
- Bandura, A. (1977). Social learning theory. Englewood Cliffs, NJ: Prentice Hall
- Barkley, R.A. (1987). Child behaviour rating scales and checklists. In M. Rutter, A. Hussain Tuma & I. S. Lann (Eds.), Assessment and diagnosis in child psychopathology. New York: Guilford.
- Barkley, R.A., DuPaul, G.J., & McMurray, M.B. (1990). Comprehensive evaluation of Attention Deficit Disorder with and without Hyperactivity as defined by research criteria. Journal of Consulting and Clinical Psychology, 58, (6), 775-789.
- Beitchman, J.H., Raman, S., Carlson, J., Clegg, M., & Kruidenier, B. (1985). The development and validation of the Children's Self-Report Psychiatric Rating Scale. Journal of the American Academy of Child Psychiatry, 24, (4), 413-428.
- Beitchman, J.H., Kruidenier, B., & Clegg, M. (1987). The Children's Self-Report Rating Scale; Screening accuracy and predictive power reconsidered. Journal of the American Academy of Child and Adolescent Psychiatry, 26, 49-52.
- Biederman, J., Munir, K., Knee, D., Armentano, M., Autor, S., Waternaux, C., & Tsuang, M. (1987). High rate of affective disorders in probands with attention deficit disorder and in their relatives--A controlled family study. American Journal of Psychiatry, 144, 330-333.
- Bierman, K.L. (1986). The relation between social aggression and peer rejection in middle childhood. In R.J. Prinz (Ed.) Advances in Behavioral Assessment of Children and Families, vol 2, 151-178.
- Blishen, B.R., & McRoberts, J.W. (1976). A revised socioeconomic index for occupations in Canada. Canadian Review of Sociology and Anthropology, 13, 71-79.
- Bugental, D.B., Whalen, C.K., & Henker, B. (1977). Causal attributions of hyperactive children and motivational assumptions of two behaviour change approaches: Interactionist position. Child Development, 48, 874-884.
- Campbell, S.B. (1973). Mother-child interaction in reflective, impulsive, and hyperactive children. Developmental Psychology, 8, 341-359.

- Campbell, S.B., & Paulauskas, S. (1979). Peer relations in hyperactive children. Journal of Child Psychology and Psychiatry, 20, 233-246.
- Campbell, S.B., & Werry, J.S. (1986). Attention deficit disorder (hyperactivity). In H.C. Quay & J.S. Werry (Eds.), Psychopathological disorders of childhood (3rd ed., pp. 111-155). New York: Wiley.
- Cantwell, D.P. (1985). Hyperactive children have grown up. What have we learned about what has happened to them? Archives of General Psychiatry, 42, 1026-1028.
- Carlson, C., Lahey, B.B., & Neeper, R. (1986). Direct assessment of the cognitive correlates of attention deficit disorders with and without hyperactivity. Journal of Psychopathology and Behavioral Assessment, 8, 69-86.
- Chee, P., Logan, G., Schachar, R., Lindsay, P. & Wachsmuth, R. (1989). Journal of Abnormal Child Psychology, 17, (4), 371-391.
- Cohen, J. (1988). Statistical power analysis for the behavioral sciences. New York: Academic Press.
- Conners, C.K. (1969). A teacher rating scale for use in drug studies with children. American Journal of Psychiatry, 126, 884-888.
- Conners, C.K. (1970). Symptom patterns in hyperkinetic, neurotic, and normal children. Child Development, 41, 667-682.
- Conners, C.K. (1973). Rating scales for use in drug studies with children. Psychopharmacology Bulletin: Special Issue, Pharmacotherapy with Children, 24-84.
- Conners, C.K., & Barkley, R.A. (1985). Rating scales and checklists for child psychopharmacology. Psychopharmacology Bulletin, 21, 809-843.
- Cunningham, C.E., & Siegel, L.S. (1987). Peer interactions of normal and attention-deficit-disabled boys during free-play cooperative-task, and simulated classroom situations. Journal of Abnormal Child Psychology, 15, 247-268.
- Daugherty, T.K. & Quay, H.C. (1991). Response perseveration and delayed responding in childhood behavior disorders. Journal of Child Psychology and Psychiatry, 32, (3), 453-461.
- deHaas, P.A. (1986). Attention styles and peer relationships of hyperactive and normal boys and girls. Journal of Abnormal

Child Psychology, 14, 457-467.

- Dodge, K.A. (1980). Social cognition and children's aggressive behavior. Child Development, 51, 162-170.
- Dodge, K.A. (1985). Attributional bias in aggressive children. In P. Kendall (Ed.), Advances in cognitive-behavioral research and therapy (Vol. 4). New York: Academic Press.
- Dodge, K.A. & Newman, (1981). Biased decision making processes in aggressive boys. Journal of Abnormal Child Psychology, 90, 375-379.
- Dodge, K.A., Coie, J.D., & Brakke, N.P. (1982). Behavior patterns of socially rejected and neglected preadolescents: The roles of social approach and aggression. Journal of Abnormal Child Psychology, 10, 389-409.
- Dodge, K.A., & Frame, C.L. (1982). Social cognitive biases and deficits in aggressive boys. Child Development, 53, 620-635.
- Dodge, K.A., & Somberg, D.R. (1987). Hostile attributional biases among aggressive boys are exacerbated under conditions of threat to the self. Child Development, 58, 213-224.
- Douglas, V.I. (1983). Attentional and cognitive problems. In M. Rutter (Ed.), Developmental Neuropsychiatry (pp. 280- 239). New York: Guilford Press.
- Douglas, V.I. (1988). Cognitive deficits in children with attention deficit disorder with hyperactivity. In L.M. Bloomingdale & J. Sergeant, (Eds.) Attention deficit disorder: Diagnostic, cognitive and therapeutic understanding (pp. 147-162). New York: Spectrum.
- Douglas, V.I., & Peters, K.G. (1979). Toward a clearer definition of the attentional deficit of hyperactive children. In G.A. Hale & M. Lewis (Eds.), Attentional and cognitive development (pp. 173-247). New York: Plenum.
- Dweck, C.S. (1975). The role of expectations and attributions in the alleviation of learned helplessness. Journal of Personality and Social Psychology, 31, 674-685.
- Edelbrock, C., Costello, A.J., & Kessler, M.D. (1984). Empirical corroboration of attention deficit disorder. Journal of the American Academy of Child Psychiatry, 23, 285-290.
- Everitt, B.S. (1977). The analysis of contingency tables, London: Chapman and Hall.

- Firestone, P. & Douglas, V.I. (1975). The effects of reward and punishment on reaction times and automatic activity in hyperactive and normal children. Journal of Abnormal Child Psychology, 3, 201-215.
- Flavell, J.H. (1976). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. American Psychologist, 34, 906-911.
- Gittelman, R., Mannuzza, S., Shenker, R., & Bonagura, N. (1985). Hyperactive boys almost grown up. I. Psychiatric status. Archives of General Psychiatry, 42, 937-947.
- Glow, R.A., Glow, P.H., & Rump, E.E. (1982). The stability of child behavior disorders: A one-year test-retest study of Adelaide Versions of the Conners Teacher and Parent Rating Scales. Journal of Abnormal Child Psychology, 10, 33-60.
- Gordon, M. (1982). The Gordon Diagnostic System. DeWitt, N.Y.: Gordon Systems Inc.
- Gordon, M. (1987). How is a computerized attention test used in the diagnosis of attention deficit disorder? In Olber, K. & Trestow, P. (eds.) The young hyperactive child. New York: Haworth Press.
- Gordon, M., & Mettleman, B.B. (1985). Special tables for the Gordon Diagnostic System. unpublished.
- Gordon, M., Mettleman, B.B., & Irwin, M. (1990). The relationship between sustained attention and grade retention. ADHD/Hyperactivity Newsletter, 14, New York: Gordon Systems Inc.
- Goyette, C.H., Conners, C.K. & Ulrich, R.F. (1978). Normative data on revised Conners Parent and Teacher Rating Scales. Journal of Abnormal Child Psychology, 6, 221-236.
- Grenell, M.M., Glass, C.R., & Datz, K.S. (1987). Hyperactive children and peer interaction: Knowledge and performance of social skills. Journal of Abnormal Child Psychology, 15, 1-13.
- Grove, G.A. & Levinson, S. (1980). A re-examination of the validity of the Children's Personality Questionnaire. Journal of Abnormal Child Psychology, 8, 435-439.
- Hamlett, K.W., Pellegrini, D.S., & Conners, K. (1987). An investigation of executive processes in the problem-solving of attention deficit disordered hyperactive children. Journal of Pediatric Psychology, 12, 227-240.

- Herjanic, B. & Campbell, W. (1977). Differentiating psychiatrically disturbed children on the basis of a structured interview. Journal of Abnormal Child Psychology, 3, 41-48.
- Herjanic, B. & Reich, W. (1982). Development of a structured psychiatric interview for children: Agreement between child and parent on individual symptoms. Journal of Abnormal Child Psychology, 10, 307-324.
- Hinshaw, S.P. (1987). On the distinction between attentional deficits/hyperactivity and conduct problems/aggression in child psychopathology. Psychological Bulletin, 101, 443-463.
- Huberty, C.J., & Morris, J.D. (1989). Multivariate analysis versus multiple univariate analyses. Psychological Bulletin, 105, (2), 302-308.
- Jensen, P.S., Xenakis, S.N., Davis, H., & DeGroot, J. (1988). Child Psychopathology rating scales and interrater agreement: II. Child and family characteristics. Journal of the American Academy of Child and Adolescent Psychiatry, 27, 451-461.
- Johnston, C.J., & Pelham, W.E. (1986). Teacher ratings predict peer ratings of aggression at 3-year follow up in boys with attention deficit disorder with hyperactivity. Journal of Consulting and Clinical Psychology, 54, 571-572.
- Johnston, C., Pelham, W.E. & Murphy, H.A. (1985). Peer relationships in ADDH and normal children: A developmental analysis of peer and teacher ratings. Journal of Abnormal Child Psychology, 13, 89-100.
- Kashani, J.H., Cantwell, D.P., Shedin, W.O., & Reid, J.C. (1982). Major depressive disorder in children admitted to an inpatient community mental health centre. American Journal of Psychiatry, 139, 671-672.
- Kaslow, N.J., Tanenbaum, R.L., & Seligman, M.E.P. (1978). The KASTAN: A Children's Attributional Style Questionnaire. Unpublished manuscript, University of Pennsylvania, Philadelphia
- Kaslow, N.J., Rehm, L.P., Pollack, S.L., & Siegel, A.W. (1988). Attributional style and self-control behaviour in depressed and nondepressed children and their parents. Journal of Abnormal Child Psychology, 16, (2), 163-175.
- Kendall, P.C. & Wilcox, L.E. (1980). Cognitive-behavioral treatment for impulsivity: Concrete versus conceptual training of non-self-controlled children. Journal of Consulting and Clinical Psychology, 48, 80-91.

- King, C. & Young, R.D. (1982). Attentional deficits with and without hyperactivity: Teacher and peer perceptions. Journal of Abnormal Child Psychology, 10, 483-495.
- Klien, A.R., & Young, R.D. (1979). Hyperactive boys in their classroom: Assessment of teacher and peer perceptions, interactions, and classroom behaviours. Journal of Abnormal Child Psychology, 7, 425-442.
- Kohlberg, L., LaCross, J., & Ricks, D. (1972). The predictability of adult mental health from childhood behaviour, In B. Wolman (Ed.) Manual of child psychopathology. New York; McGraw-Hill.
- Kovacs, M. (1981). Rating scales to assess depression in school aged children. Acta Paedopsychiatrik, 46, 305-315.
- Lahey, B.B., Green, K.D., & Forehand, R. (1980). On the independence of ratings of hyperactivity, conduct problems, and attention deficits in children: A multiple regression analysis. Journal of Consulting and Clinical Psychology, 48, 566-574.
- Lahey, B.B., Schaughency, E.A., Strauss, C.C., Frame, C.L. (1984). Are attention deficit disorders with and without hyperactivity similar or dissimilar disorders? Journal of the American Academy of Child Psychiatry, 23, 302-309.
- Lahey, B.B., Schaughency, E.A., Strauss, C.C., & Frame, C.L. (1985). Teacher ratings of attention problems in children experimentally classified as exhibiting attention deficit disorders with and without hyperactivity. Journal of the American Academy of Child Psychiatry, 24, 613-616.
- Lahey, B.B., Piacentini, J.C., McBurnett, K., Stone, P., Hartdagen, S., & Hund, G. (1988). Psychopathology and antisocial behaviour in the parents of children with conduct disorder and hyperactivity. Journal of the American Academy of Child and Adolescent Psychiatry, 27, (2), 163-170.
- Lahey, B.B., Pelham, W.E., Schaughency E.A., Atkins, M.S., Murphy, H.A., Hynd, G.W., Russo, M., Hartdagen, S. & Lorys-Vernon, A. (1989). Dimensions and types of attention deficit disorder. Journal of the American Academy of Child and Adolescent Psychiatry, 27, (3), 330-335.
- Lam, C.M., & Beale, I.L. (1989). Relationship between the delay task and rating scale measures of inattention and hyperactivity. Journal of Abnormal Child Psychology, 17, (6), 625-631.

- Landau, S., & Milich, R. (1988). Social communication patterns of attention deficit disordered boys. Journal of Abnormal Child Psychology, 16, (1), 69-81..
- Lange, G., & Griffith, S.B. (1977). The focus of organization failures in children's recall: The effects of training in categorization. Child Development, 48, 1498-1502.
- Ledingham, J.E. (1981). Developmental patterns of aggressive and withdrawn behaviours in childhood: Preliminary findings. Journal of Abnormal Child Psychology, 9, 1-22
- Licht, B.G. (1983). Cognitive-motivational factors that contribute to the achievement of learning disabled children. Journal of Learning Disabilities, 16, 483-490.
- Licht, B.G., Kistner, J.A., Ozkargoz, T., Shapiro, S., & Clausen, L. (1985). Causal attributions of learning disabled children: Individual differences and their implications for persistence. Journal of Educational Psychology, 77, 208-216.
- Lilienfeld, S.O. & Waldman, I.D. (1990). The relation between childhood Attention-Deficit Hyperactivity Disorder and adult antisocial behaviour reexamined: The problem of heterogeneity. Clinical Psychology Review, 10, 699-725.
- Linn, R.T., & Hodge, G.K. (1982). Locus of control in childhood hyperactivity. Journal of Consulting and Clinical Psychology, 50, 592-593.
- Lingston, R.L., Dykman, R.A., & Ackerman, P.T. (1990). The frequency and significance of additional self-reported psychiatric diagnoses in children with Attention Deficit Disorder. Journal of Abnormal Child Psychology, 18, (5), 465-478.
- Loeber, R., & Schmalings, K. (1985). The utility of differentiating between mixed and pure forms of antisocial child behaviour. Journal of Abnormal Child Psychology, 13, 315-336.
- Loeber, R. & Lahey, B.B. (1988). Recommendations for Research on Disruptive Behaviour Disorders of Childhood and Adolescence. Paper submitted for publication.
- Loney, J. (1987). Hyperactivity and aggression in the diagnosis of attention deficit disorder. In B.B. Lahey & A.E. Kazdin (Eds.), Advances in clinical child psychology, (Vol 10, pp. 99-135). New York: Plenum.
- Loney, J., & Milich, R. (1982). Hyperactivity, inattention and aggression in clinical practice. In M. Wolraich & D.K.

- Routh (Eds.), Advances in developmental and behavioural pediatrics (Vol. 3, pp. 113-147). Greenwich, CT: JAI Press.
- McClellan, J.M., Rubert, M.P., Reichler, R.J., & Sylvester, C.E. (1990). Attention Deficit Disorder in children at risk for anxiety and depression. Journal of the American Academy of Child and Adolescent Psychiatry, 29, (4), 534-539.
- McGee, R., Williams, S., & Silva, P.A. (1984). Behavioral and developmental characteristics of aggressive, hyperactive and aggressive hyperactive boys. Journal of the American Academy of Child Psychiatry, 23, 270-279.
- McGee, R., Williams, S., & Silva, P.A. (1985). Factor structure and correlates of ratings of inattention, hyperactivity, and antisocial behaviour in a large sample of 9-year-old children from the general population. Journal of Consulting and Clinical Psychology, 6, 483-491.
- McLure, F.D., & Gordon, M. (1984). The performance of disturbed hyperactive and nonhyperactive children on an objective measure of hyperactivity. Journal of Abnormal Child Psychology, 12, (4), 561-572.
- Milich, R., & Dodge, K.A. (1984). Social information processing in child psychiatric populations. Journal of Abnormal Child Psychology, 12, 471-489.
- Milich, R., & Landau, S. (1982). Socialization and peer relations in hyperactive children. In K.D. Gadow & I. Bialer (Eds.), Advances in learning and behavioural disabilities. (Vol. 1, pp. 283-339). Greenwich, CT: JAI Press.
- Milich, R., & Landau, S. (1988). Teacher ratings of inattention/overactivity and aggression: Cross-validation with classroom observations. Journal of Child Clinical Psychology, 17, (1), 92-97.
- Milich, R., & Landau, S. (1989). The role of social status variables in differentiating subgroups of hyperactive children. In J.M. Swanson & L. Bloomingdale (Eds.), Attention deficit disorders IV: Emerging trends in the treatment of attention in behaviour problems of children. Monograph supplement to the Journal of Child Psychology and Psychiatry.
- Milich, R., Loney, J., & Landau, S. (1982). Independent dimensions of hyperactivity and aggression: A validation with playroom observation data. Journal of Abnormal Psychology, 91, 183-198.

- Miller, (1966). Simultaneous Statistical Inference. New York: McGraw-Hill.
- Mitchell, J., McCauley, E., Burke, P.M., & Moss, S.J. (1988). Phenomenology of depression in children and adolescents. Journal of the American Academy of Child and Adolescent Psychiatry, 27, (1), 12-20.
- Nasby, W., Hayden, B., & dePaulo, B.M. (1979). Attributional bias among aggressive boys to interpret unambiguous social stimuli as displays of hostility. Journal of Abnormal Psychology, 96, 145-148.
- Newcorn, J.H., Halperin, J.M., Healey, J.M., O'Brien, J.D., Pascualvaca, D.M., Wolf, L.E. Morganstein, A., Sharma, V., & Young, G. (1989). Are ADDH and ADHD the same or different? Journal of the American Academy of Child and Adolescent Psychiatry, 28, 734-738.
- Offord, D.R., Boyle, M.H., Szatmari, P., Rae-Grant, N.I., Links, P.S., Cadman, D.T., Byles, J.A., Crawford, J.W., Blum, H.M., Byrne, C., Thomas, H., Woodward, C.A. (1987). Ontario Child Health Study. II. Six-month prevalence of disorder and rates of service utilization. Archives of General Psychiatry, 44, 832-836.
- Olson, D.H., McCubbin, H.I., Barnes, H., Larsen, A., Muxen, M., & Wilson, M. (1985). Family Inventories. St. Paul MN: Family Social Science, University of Minnesota.
- Olson, D.H., Portner, J., & Lavee, Y. (1985). FACES III. St. Paul MN: Family Social Science, University of Minnesota.
- Olson, D.H., Russell, C.S., & Sprenkle, D.H. (1983). Circumplex Model VI: Theoretical update. Family Processes, 22, 69-83.
- Olweus, D. (1979). Stability of aggressive reaction patterns in males: A review. Psychological Bulletin, 86, 852-875.
- Parke, R.D., & Slaby, R.G. (1983). The development of aggression. In E.M. Hetherington (Ed.), Handbook of child psychology: Vol 4. Socialization, personality, and social development. (pp. 547-642). New York: Wiley.
- Parry, P.A., & Douglas, V.I. (1983). Effect of reinforcement on concept identification in hyperactive children. Journal of Abnormal Child Psychology, 11, 327-340.
- Patterson, G.R. (1982). A Social Learning Approach, Vol. 3: Coercive Family Processes. Eugene, Oregon: Castalia Publishing.

- Pedhauzar, E.J. (1982). Multiple Regression in Behavioural Research. New York: CBS Publishing.
- Pelham, W.E., Atkins, M.S., Murphy, H.A., & White, K.S. (1981). Operationalization and validation of Attention Deficit Disorders. Paper presented in W. E. Pelham (Chair). Toward the Objective Diagnosis of Hyperactivity and Attention Deficit Disorders. Symposium presented at the annual meeting of the Association for the Advancement of Behavior Therapy, Toronto.
- Pelham, W.E., Atkins, M.S., & Murphy, H.A. (1981). Attention deficit disorder with and without hyperactivity: definitional issues and correlates. In W.E. Pelham (Ed.) DSM-III Category of Attention Deficit Disorders: Rationale, Operationalization, and Correlates. Los Angeles, California: American Psychological Association.
- Pelham, W.E., & Bender, M.E. (1982). Peer Relationships in hyperactive children: Description and treatment. In K.D. Gadow & I. Bialer (Eds.), Advances in learning and behavioural disabilities: A research annual (Vol. 1, pp. 365-436). Greenwich, CT: JAI Press.
- Pelham, W.E., Atkins, M.S., Murphy, H.A., & Swanson, J.M. (1985). A Rating Scale for the Diagnosis of Attention Deficit Disorder: Teacher Norms, Factor Analyses, and Reliability. Manuscript submitted for publication.
- Pelham, W.E., Milich, R., Murphy, D.A., & Murphy, H.A. (1989). Normative data on the IOWA Conners teacher rating scale. Journal of Child Clinical Psychology, 18, (3), 259-262.
- Piers, E.V. (1969). Manual for the Piers-Harris Children's Self-Concept Scale. Nashville Tenn.: Counselor Recordings and Tests.
- Platten, M.R. & Williams, L.R. (1979). A comparative analysis of the factorial structures of two administrations of the Piers-Harris Children's Self-Concept Scale to one group of elementary school children. Educational Psychology Measurement, 39, 471-478.
- Pope, A.W., Bierman, K.L., & Mumma, G.H. (1989). Relations between hyperactive and aggressive behaviour and peer relations at three elementary grade levels. Journal of Abnormal Child Psychology, 17, (3), 253-267.
- Porter, R.B. & Cattell, R.B. (1972). Children's Personality Questionnaire. Champaign Ill.: Institute for Personality and Ability Testing

- Price, J.M., & Dodge, K.A. (1989). Reactive and proactive aggression in childhood: Relations to peer status and social context dimensions. Journal of Abnormal Child Psychology, 17, (4), 455-471.
- Prior, M. & Sanson, A. (1986). Attention deficit disorder with hyperactivity: A critique. Journal of Child Psychology and Psychiatry, 26, 289-304.
- Quay, H.C. (1986). A critical analysis of DSM-III as a taxonomy of psychopathology in childhood and adolescence. In T. Millon & G.L. Klerman (Eds.), Contemporary directions on psychopathology: Toward the DSM-IV (pp. 151-165). New York: Guilford.
- Rapoport, J.L., & Benoit, M. (1975). The relation of direct home observations to the clinic evaluation of hyperactive school age boys. Journal of Child Psychology and Psychiatry, 16, 141-147.
- Reich, W., Herjanic, B., Weiner, Z., & Gandhi, P.R. (1982). Development of a structured psychiatric interview for children: Agreement on diagnosis comparing parent and child interviews. Journal of Abnormal Child Psychology, 10, 325-336.
- Reid, M. & Borkowski, J. (1987). Causal attributions of hyperactive children: Implications for teaching strategies of self-control. Journal of Educational Psychology, 79, 296-307.
- Reeves, J.C., Werry, J.S., Elkind, G.S., & Zametkin, A. (1987). Attention deficit, conduct, oppositional, and anxiety disorders in children. II. Clinical characteristics. Journal of the American Academy of Child and Adolescent Psychiatry, 26, 144-155.
- Reynolds, C.R. (1980). Concurrent validity of What I Think and Feel: the Revised Children's Manifest Anxiety Scale. Journal of Consulting and Clinical Psychology, 48, 774-775.
- Richard, B.A. & Dodge, K.A. (1982). Social maladjustment and problems solving in school-aged children. Journal of Consulting and Clinical Psychology, 50, 226-233.
- Robins, L.N. (1972). Sturdy childhood predictors of adult antisocial behaviour: Replications from longitudinal studies. Psychological Medicine, 2, 611-622.
- Hoddick, J.D., Henggeler, S.W., & Hanson, C.L. (1986). An evaluation of Family Adaptability and Cohesion Evaluation Scales and the Circumplex model. Journal of Abnormal Child

Psychology, 14, (1), 77-87.

- Sandberg, S.T., Rutter, M., & Taylor, E. (1978). Hyperkinetic disorder in psychiatric clinic attenders. Developmental Medicine and Child Neurology, 20, 279-299.
- Sandberg, S.T., Wieselberg, M., & Shaffer, D. (1980). Hyperkinetic and conduct problem children in a primary school population: Some epidemiological considerations. Journal of Child Psychology and Psychiatry, 2, 293-311.
- Schachar, R., Sandberg, S., & Rutter, M. (1985). Agreement between teacher ratings and direct observations of activity and attention. Journal of Abnormal Child Psychology, 4, 331-345.
- Schachar, R., & Logan, G. (1990). Are hyperactive children deficient in attentional capacity? Journal of Abnormal Child Psychology, 18, (5) 493-513.
- Schneider, M.J. & Leitenberg, H. (1989). A comparison of aggressive and withdrawn children's self-esteem, optimism and pessimism, and causal attributions for success and failure. Journal of Abnormal Child Psychology, 17, (2), 133-144.
- Seidel, W.T., & Joschko, M. (1990). Evidence of difficulties in sustained attention in children with ADHD. Journal of Abnormal Child Psychology, 18, (2), 217-229.
- Seligman, M.E.P., Kaslow, N.J., Alloy, L.B., Peterson, C. Tanenbaum, R.L., & Abramson, L.Y. (1984). Attributional style and depressive symptoms among children. Journal of Abnormal Psychology, 93, (2), 235-238.
- Sergeant, J.A., & Scholten, C.A. (1985). On resource strategy limitations in hyperactivity: Cognitive impulsivity reconsidered. Journal of Child Psychology and Psychiatry, 26, 97-109.
- Stewart, M.A., Cummings, C., Singer, S., & deBlois, C.S. (1981). The overlap between hyperactive and unsocialized aggressive children. Journal of Child Psychology and Psychiatry, 22, 35-45.
- Swanson, J., Nolan, P., & Pelham, (1986). The SNAP Rating Scale. personal communication.
- Sykes, D.H., Douglas, V.I., & Morganstern, G. (1973). Sustained attention in hyperactive children and the effect of methylphenidate (Ritalin). Journal of Child Psychology and Psychiatry, 12, 129-139.

- Tabachnick, B.G., & Fidell, L.S. (1989). Using Multivariate Statistics. Harper & Row: New York.
- Tant, J.L., & Douglas, V.I. (1982). Problem solving in hyperactive, normal and reading-disabled boys. Journal of Abnormal Child Psychology, 10, 285-306.
- Taylor, E. (1986). Subclassification and diagnosis. In E. Taylor (Ed.), The Hyperactive Child. London: MacKeith.
- Taylor, E., & Sandberg, S. (1984). Hyperactive behavior in English school children: a questionnaire survey. Journal of Abnormal Child Psychology, 12, 143-156.
- Taylor, E., Schachar, R., Thorley, G. & Wieselberg, M. (1986). Conduct disorder and hyperactivity: I. Separation of hyperactivity and antisocial conduct in British child psychiatric patients. British Journal of Psychiatry, 17, 760-767.
- Trites, R.L. (1979). Prevalence of hyperactivity in Ottawa, Canada. In R.L. Trites (Ed.), Hyperactivity in children. Etiology, measurement and treatment implications (pp 29-52). Baltimore: University Press.
- Trites, R.L., Blouin, A.G., Ferguson, H.B., & Lynch, G.W. (1981). The Conners Teacher Rating Scale: An epidemiological inter-rater reliability and follow-up investigation. In K.Gadow & J. Loney (Eds.), Psychosocial aspects of drug treatment for hyperactivity. Boulder, CO: Westview Press.
- Vincent, J.P., Williams, B.J., Harris, G.E., & Duvall, G. (1977). Classroom Observations of Hyperactive Children: A Multiple Validation Study. Paper presented at the meeting of the American Psychological Association, San Francisco.
- Weiner, B. (1979). A theory of motivation for some classroom experiences. Journal of Educational Psychology, 71, 3-25.
- Weingartner, H., Rapoport, J.L., Buchsbaum, M.S., Bunney, W.E., Jr., Ebert, M. H., Mikklesen, E.J., & Caine, E.D. (1980). Cognitive processes in normal and hyperactive children and their response to amphetamine treatment. Journal of Abnormal Psychology, 89, 25-37
- Weiss, G. (1985). Hyperactivity: Overview and new directions. Psychiatric Clinics of North America, 8, 737-753.
- Weiss, G. & Hechtman, L.T. (1986). Hyperactive children grown up. New York: Guilford.

- Welner, Z., Reich, W., Herjanic, B. Jung, K.G., & Amando, H. (1987). Reliability, validity and parent-child agreement studies of the Diagnostic Interview for Children and Adolescents (DICA). Journal of the American Academy of Child and Adolescent Psychiatry, 26, 649-653.
- Werry, J.S., Sprague, R.L., & Cohen, M.N. (1975). Conners Teacher Rating Scale for use in drug studies with children - an empirical study. Journal of Abnormal Child Psychology, 3, 217-230.
- Werry, J.S., Elkind, G.S. & Reeves, J.C. (1987a). Attention deficit, conduct, oppositional, and anxiety disorders in children: III. Laboratory differences. Journal of Abnormal Child Psychology, 15, 409-428.
- Werry, J.S., Reeves, J.C., & Elkind, G.S. (1987b). Attention deficit, conduct, oppositional, and anxiety disorders in children: I. A review of research on differentiating characteristics. Journal of the American Academy of Child and Adolescent Psychiatry, 26, 133-143.
- Wong, B. (1985). Metacognition and learning disabilities. In T.G. Waller & D.L. Forrest-Pressley (Eds.), Metacognition, cognition and human performance. New York: Academic Press.
- Whalen, C.K. (1988). Attention Deficit and Hyperactivity Disorders. In T.H. Ollendick, & M. Hersen (Eds.), Handbook of child psychopathology (2nd ed.). New York: Plenum Press.
- Whalen, C.K., Henker, B., Castro, J., & Granger, D. (1987). Peer perceptions of hyperactivity and medication effects. Child Development, 58, 816-828.
- Whalen, C.K. & Henker, B. (1985). The social worlds of hyperactive children. Clinical Psychology Review, 5, 1-32.
- Whalen, C.K., Henker, B., Collins, B.E., McAuliffe, S., & Vaux, A. (1979). Peer interactions in a structured communication task: Comparisons of normal and hyperactive boys of methylphenidate (Ritalin) and placebo effects. Child Development, 52, 1005-1014.
- Willis, J. & Seymour, G. (1978). CPQ validity: the relationship between Children's Personality Questionnaire scores and teacher ratings. Journal of Abnormal Child Psychology, 6, 107-113.

APPENDIX A

Dear Parent:

I would like to inform you of a research project currently being conducted in conjunction with the Children's Hospital of Eastern Ontario and the University of Ottawa. This study is funded by the National Health Research Development Program. The purpose of the study is to examine aspects of development in boys between the ages of 7 and 12.

The children who participate will be individually assessed on carefully developed tasks designed to assess various aspects of intellectual, social and psychological functioning. They typically provide an interesting and, at times, mildly challenging experience for the child. The assessment will take approximately one and a half hours. All testing will be carried out at your child's school by Victoria Williams, a psychometrist at the Children's Hospital.

Parents and teachers will be asked to respond to a few questionnaires so that the children's responses will be studied in light of individuals who are in close and regular contact with the child. If interested, families will receive an information letter at the conclusion of the study.

All information in this study will be held in strict confidence. All test results will be combined with those obtained from other participants for the sole purpose of summarizing the findings. At no time will identifying names or personal characteristics be made available to anyone other than the primary researchers. Please understand that you are in no way obliged to participate and may choose to withdraw your child from the study at any time.

If you feel that you might be interested in helping out in this research project or that you have some unanswered questions, please contact Victoria Williams at 737-2492.

Thank you for your cooperation in this research endeavour.

Sincerely,

Victoria Williams, M.A.
Lewis Leikin, Ph.D.

APPENDIX B

Childhood Behaviour Research Project

PARENTAL CONSENT FORM

I, _____, have read and understood the above description regarding the research project being carried out at the Children's Hospital of Eastern Ontario in conjunction with the University of Ottawa and the Child Study Centre.

I hereby give my permission for my child _____ to participate in the study, and for the researchers to request his teacher, _____, to fill out forms describing my child's behaviour at school. I realize that I may withdraw my child from participating in the study at any time without affecting service at the Children's Hospital and that the result of my child's assessment will be held in strict confidence.

Signed: _____

Date: _____

Witness: _____

Date: _____

Teacher's Name: _____

School: _____

Victoria Williams, M.A.
Lewis Leikin, Ph.D.
737-2492

APPENDIX C

DICA-P INTERVIEW

1. Developmental History:

1. I would like to ask you some questions about your child's birth and early development. Did you (child's mother) have any complications of pregnancy with this child such as spotting or light bleeding? Y / N
 2. Heavy bleeding requiring bedrest or special treatment? Y / N
 3. Excessive nausea/vomiting? Y / N
 4. Weight gain over 25 lbs.? Y / N
 5. Weight loss over 10 lbs.? Y / N
 6. Infection? Y / N
 7. High blood pressure/ excessive fluid Y / N
 8. Convulsions? Y / N
 9. Accidents? Y / N
 10. Other medical problems? Y / N
-
11. Emotional problems such as depression requiring counselling? Y / N
 12. Family problems? Y / N
 13. Did you take any medications during pregnancy? Y / N
 14. Smoke for longer than 3 months? Y / N
 15. Did you drink the equivalent of a beer or more daily or go on binges for at least 3 months? Y / N
 16. Were you taking any other drugs like marijuana or cocaine? Y / N
 17. Any problems with delivery? Y / N
 18. Cesarean? Y / N
 19. Was he in an incubator? Y / N
 20. Less than 5 lbs.? Y / N
-
21. Baby have to stay in hospital after you went home? Y / N
 22. Any surgery after the 1st month? Y / N
 23. Did you notice anything unusual in the first 12 months such as:
fussy eater Y / N
excessive crying Y / N
too quiet Y / N
stiffening or pushing away when held Y / N
floppy or limp Y / N
 24. Was your child slower than expected to:
sit up Y / N
crawl Y / N
use words Y / N
use sentences Y / N
use toilet for urine Y / N
use toilet for stool Y / N
 25. In between 1 and 5 years, did you have any problems with him? Y / N
 26. Any behavioural problems in nursery school or kindergarten?
(IF YES, PLEASE CIRCLE) ran off, excitable, impulsive, Y / N
many temper tantrums passed age 3 1/2, overactive, destruction of toys,
playing with matches, very demanding, biting, scratching, hitting,
clumsiness, other?
 27. Sleep problems 163
(IF YES, PLEASE CIRCLE) waking up, nightmares, less sleep,
difficult to put down, sleep walking? Y / N

28. Night terrors?
(IF YES, PLEASE CIRCLE) rapid pulse, dilated pupils, sweating, confusion? Y / N
29. IF YES: Did he calm down when you tried to comfort him? Y / N
Remember the event the next day? Y / N
30. When did the night terrors begin? _____ End? _____ How many times? _____ Y / N
31. Sleep walking?
(IF YES, PLEASE CIRCLE) difficult to wake up, remember the next day?
Start _____ End _____ Y / N
32. Any problems with stuttering? Y / N
33. Speech problems? Y / N
- II. Psychosocial Stressors:
1. Is there much quarreling or fighting in the family that bothers him a lot? Y / N
2. Have you or any other close relatives separated or divorced since he could remember? Y / N
3. Are there big money worries like not having enough money for food or to pay rent? Y / N
4. Is someone in the family seriously ill, handicapped or crippled so that he worries about it? Y / N
5. Has someone he cared a lot about died? Y / N
-
6. Does anyone drink or cause a lot of disturbances at home that worry him? Y / N
7. Anyone at home have problems with the police? Y / N
8. Is he fearful that someone who lives in or comes to your home might hurt him or someone else? Y / N
9. Has he ever been beaten so badly he had bruises or marks on his body or was hurt in some way? Y / N
10. Has anybody else in the family been beaten up or knocked around by someone else? Y / N
11. Has someone he knew quite well been killed by someone or by accident? Y / N
12. Do any of these things you have answered yes to upset him or stay on his mind a lot? Y / N
- III. Attention Deficit Hyperactivity Disorder:
1. Does he or has he often left things unfinished, like starting a game and then running off? Y / N
2. Does he or has he often started his school work or homework and then not finished it? Y / N
3. Have you or his teachers felt that he was really not listening when you spoke to him? Y / N
4. When there are noises, or people moving around in the room, does or did he have trouble sticking to what he was doing? Y / N
5. Does he or did he often have trouble keeping his mind on something he was doing, such as school work or a project? Y / N
6. What about keeping his mind on something he enjoys, such as reading a story or watching T.V.? Y / N
7. Does he or has he often gotten into trouble, or maybe even hurt, because he rushes into doing things without thinking about the consequences? Y / N
8. Does he or has he often changed from one activity to another, even if he hasn't finished the first one? Y / N
9. Does he often rush through his school assignments, without checking them? Y / N
10. Do you often have to keep after him to complete or do his chores? Y / N

11. At school, have his teachers often had to tell him what he's supposed to do, after the rest of the class has already started doing it? Y / N
12. Does, or has he often got into trouble at school because he spoke out when he was supposed to be quiet? Y / N
13. Does, or has he had trouble waiting his turn when he is playing games or when in line? Y / N
14. Does, or has he run around a lot, even when in the house? Y / N
15. Climb on things not meant for climbing? Y / N
16. Tell him to stop fidgeting? Y / N
17. Tell him to sit still? Y / N
18. Does, or has he often gotten up and left the table before he was through eating, or gotten up and walked around during a t.v. show? Y / N

-
19. Have his teachers complained that he doesn't stay in his seat when he is supposed to? Y / N
 20. Is he a restless sleeper? Y / N
 21. Is he, or has he always been on the go as if driven by a motor? Y / N
 22. Does he, or has he often appeared as if he was daydreaming, or lost in a fog? Y / N
 23. Does he, or has he ever appeared sluggish, like he was lazy and didn't feel like doing anything? Y / N
 24. Is he, or has he often appeared drowsy and tired, doing a lot of yawning? Y / N
 25. IF YES: When did he begin to have these problems? _____ Y / N
Still having them?

IV. Oppositional Disorders:

1. Does he often break the rules at home such as not doing something he has been told to do; going out when told to stay in; or not coming back when he was supposed to? Y / N
 2. Does he usually get upset and show his temper, if things don't go his way? Y / N
 3. Has he ever been in trouble because he talked back to the teacher or principal? Y / N
 4. Does he often argue with you or his teachers about things he is told to do? Y / N
 5. Does he often do something different than he is told, because he doesn't like to be told to do anything? Y / N
 6. Does he insist on doing things his way regardless of what other people around him want to do? Y / N
 7. Does he have some very good friends? Y / N
-
8. Has he ever stayed pretty good friends with someone for longer than six months or more? Y / N
 9. Has he ever belonged to a group or team for a pretty long time (> 6 months)? Y / N
 10. Is he the kind of kid who likes to help out his friends, like doing them a favour, helping them with their chores? Y / N
 11. Would he still do it if he didn't get part of the pay, or if he wasn't thinking about what the friend might do for him in the future? Y / N
 12. When he does something wrong, do you think he feels guilty or bad about it, even if no one finds out? Y / N
 13. When he and the other kids get into trouble, does he usually stick with them and admit he is wrong? Y / N
 14. If one of his friends was very upset, or in some kind of trouble, would he find some way to help him? Y / N

V. Conduct Disorders:

1. Has he even been suspended from school? When _____ Y / N
2. Expelled? Y / N
IF YES: When _____
3. Has he ever stolen anything like money or another friend's toy? Y / N
IF YES: How many times? _____
4. Has he ever played hooky from school? Y / N
IF YES: How many? _____
5. Run away overnight? Y / N
6. Does he often lie or make up stories to get out of trouble? Y / N
7. Have you or his teachers punished him frequently because you thought he was lying? Y / N
8. Besides at home, has he lied to people at school or in the neighborhood? Y / N
9. Does he ever make up lies to get someone else in trouble? Y / N
10. Does he fight a lot? Y / N
11. Does he sometimes start fights? Y / N
12. Ever in trouble for fighting at home? Y / N
13. At school, or on the street? Y / N
14. Has he ever injured someone in a fight? Y / N
15. Has he ever injured or killed a small animal such as a cat or a squirrel for fun? Y / N
16. Has he ever tried to choke or smother another child? Y / N
17. Ever set fires? Y / N
18. If yes to any of the above, how old when he started? _____
19. Last time? _____
20. Has he ever smashed, destroyed or defaced someone else's property? Y / N
21. Broken into a house or building to steal or damage something? Y / N
22. Ever threatened anyone with a knife or gun or other kind of weapon? Y / N
23. Has he ever been in trouble with the police? Y / N
24. Been to court? Y / N
25. Has he ever drunk beer, wine or other alcoholic beverages without your permission? Y / N
26. Does he drink on his own? Y / N
27. IF YES: How much at one sitting? _____
28. Does, or has he ever smoked cigarettes? Y / N
29. Marijuana? Y / N
30. Other illicit drugs? Y / N

VI. Affective Disorders:

1. Has he ever felt really down in the dumps, sad or felt like crying a lot more than usual? Y / N
2. Has there ever been a time when he just couldn't seem to have fun no matter what he did? Y / N

3. Ever been a time when he felt really down on himself, and thought he'd be better off dead? Y / N
4. Ever been a time when he stayed away from his friends or family because he was so sad? Y / N
5. IF YES TO ANY OF THE ABOVE: Does he still feel that way? Y / N
6. When was the last time? _____
7. How long? _____
8. If he feels sad or down, does that feeling sometimes seem to start one day then go away for awhile, but come back the next day? Y / N
9. Have sad feelings like that come and gone for a week? Y / N
10. Two weeks? Y / N
11. Longer? Y / N
12. Has he ever had a time when it took him a lot longer to get to sleep? Y / N
13. Did he ever wake up earlier than usual in the morning and find he couldn't get back to sleep? Y / N

14. Ever sleep at odd times during the day or at school? Y / N
15. Was there ever a time when he was more tired than usual or spent more time sleeping than before? Y / N
16. If he was feeling down or sad, did he eat less, because he was not hungry? Y / N
17. Do you think he has lost any weight now or in the past?
IF YES: How much? _____ Y / N
18. When he feels down or sad does he eat more than usual? Y / N
19. Gain any weight? Y / N
20. During any sad periods, did he stop seeing his friends? Y / N
21. Has he missed any school due to sadness? Y / N
22. Have his grades dropped significantly? Y / N
23. Has he dropped any activities he has enjoyed very much before because of sadness? Y / N

24. Sometimes when people feel very depressed or in a bad mood for several days, they think about things differently than usual. When he was in a bad mood, did he tend to feel that a lot of things were really his fault? Y / N
25. Has he ever felt down on himself, as if he didn't look as nice as usual, or couldn't do things as well as before? Y / N
26. Has he felt angry toward people he usually doesn't feel angry toward? Y / N
27. Did his thoughts ever slow down, so that it took him longer to answer a question or think of something than before? Y / N
28. Has he ever seemed to slow down, so that instead of hurrying or walking fast, he moved more slowly than normal? Y / N
29. When feeling down, did he find it unusually hard to sit still? Y / N
30. Has he sometimes said that life isn't worth living? Y / N
31. Has he ever expressed the thought that the family would be better off without him? Y / N
32. Has he thought that life is hopeless and that there was nothing good for him in the future? Y / N
33. Has he talked a lot about death and dying? Y / N
34. Has he ever said he'd be better off dead? Y / N

35. Has he ever threatened to kill himself? Y / N
36. Has he ever tried to kill himself? Y / N
37. Has he ever felt any of the above ways for no explainable reasons? Y / N
38. How many times has he felt really depressed for as long as a week or more? _____
39. Has he ever been to see a doctor for treatment of his sadness? Y / N
40. ~~40. No?~~ Y / N
41. Has your child ever gone through a period of time when he became unusually excited and talked so fast and so much that the family became worried about it? Y / N
42. Has he ever been through a time when his mood went up and down quickly, he felt very good one part of the day and very cross and irritable another part of the day, for no apparent reason? Y / N
43. Has he taken any alcohol or drugs during these periods? Y / N
-
44. IF YES TO QUESTION 41:
During the high period, did he: Y / N
45. become so active, others were worried? Y / N
46. talk faster than usual? Y / N
47. seem as though thoughts were coming too quickly? Y / N
48. feel he was stronger, smarter, or better than other his age? Y / N
49. sleep a lot less than usual without getting tired? Y / N
50. have a hard time paying attention to anything? Y / N
51. do things he wished later that he hadn't, like give away a lot of things or get into an accident? Y / N
52. Has he ever had to be in hospital because he became so active that the family thought there was something very wrong with him? Y / N
53. Anxiety Disorders
1. When your child is not with you, does he seem to worry a lot about something bad happening to you (like your getting sick or hurt or dying)? Y / N
2. Does he worry a great deal that something bad may happen to him like getting kidnapped or killed, so that he couldn't see you again? Y / N
3. Does he ever refuse to go to school, because he is afraid that something bad may happen to you? Y / N
4. Does he ever have to have you stay close to him so that he can get to sleep at night? Y / N
5. Does it upset him to be left in a room by himself at home? Y / N
6. Has he ever had a chance to go away from home for a few days and refused to go? Y / N
-
7. Does he often have bad dreams about losing you or other loved ones? Y / N
8. When he has to leave home to go to school or some place else, does he get stomach aches or headaches or feel nauseated or vomit? Y / N
9. Does he throw tantrums or cry and beg you to stay home when you have to go somewhere? Y / N
10. Does he feel so sad when you are not around that he doesn't want to play or do homework? Y / N
11. Did he ever have to miss a lot of school because he didn't want to leave you? Y / N
12. IF YES TO ABOVE: How old was he when he first was unable to leave you? _____

13. When did it last happen? _____ Y / N
14. Has he ever been to see a doctor for that problem? _____
- Take medication? _____
15. Is he a worrier? For example, does he worry a lot about things before they happen? Y / N
16. Does he worry a lot about little things that he has done in the past such as something he has said that might have been taken the wrong way, or something he forgot to do? Y / N
17. Does he worry a lot about doing things just right or perfectly? Y / N
18. Does he worry a lot about what you will think if he gets a bad grade? Y / N
19. Does he usually think he can't do something well enough to please you? Y / N
20. Has he ever actually been sick from worry, that is worried so much that his head hurt or his stomach got upset? Y / N
21. Does he get angry and upset if things don't go just exactly the way he thinks they should? Y / N
22. Does he get embarrassed a whole lot over very little things? Y / N
23. When he gets worried over something does he get all up-tight and have trouble letting go of it? _____ Y / N
-
24. Does he feel upset and worried on and off for as long as six months? Y / N
25. Has he ever missed school because of being so worried? Y / N
26. Has he ever had to see a doctor because he was sick with worry or so upset that you thought something was wrong with him? Y / N
27. Does he have a fear of any of the following, that has affected his behaviour in some way: (PLEASE CIRCLE) a) animals or bugs b) going out alone c) high places d) strangers e) crowds f) dark g) being called on by teacher h) standing up and speaking in front of the class i) being in a small place like a closet j) traveling in buses or cars?
28. Do any of his fears keep him from doing anything he would like to do such as sleep, attend school, school work, playing or something else? Y / N
29. Has he ever been troubled by unpleasant or silly thoughts or pictures which keep coming back into his mind, and he can't seem to push them away, or forget about them? Y / N
30. Has he ever had troublesome thoughts that wouldn't go away, even though he knew they didn't make sense, such as thinking that his hands had germs on them, or that he was going to harm someone? Y / N
31. If so, have these troublesome thoughts kept coming back for as long as a month or more? Y / N
32. Did he actually do anything unusual because of those thoughts, like wash his hands a certain way even though they weren't dirty? Y / N
33. IF YES TO QUESTION 32: Does he feel he has to do this even though it seems silly? _____ Y / N
-
34. Did he ever try stopping it but couldn't? Y / N
35. Would he really feel uncomfortable if he didn't do it? Y / N
36. How long did these habits last? _____ Y / N
37. Ever have to see a doctor?

VIII. Eating Disorders:

1. Has he ever lost weight by putting himself on a diet, or eating different foods than the rest of the family? Y / N

2. Have other people in the family ever nagged at him because he wasn't eating enough? Y / N
 3. IF YES TO QUESTION 1: How much weight did he lose because of dieting? _____
 4. Did he think that some of his body parts were still too fat, even though other people thought he was too thin? Y / N
 5. Was he trying to keep his weight below what you or the doctors said it should be? Y / N
 6. Did the doctor find any physical reason for the weight loss? Y / N
 7. How old was he when it happened? _____
 8. How long did it last? _____
 9. Did he ever go on eating binges when he ate much larger amounts of food than usual all at one time? Y / N
-
10. Would he eat as much as a whole box of candy or sweets or a whole chicken or loaf of bread? Y / N
 11. Would he try to hide it from other people? Y / N
 12. Would he have pains in his stomach, so that he made himself vomit from eating too much? Y / N
 13. Would he try to lose weight by strict dieting, or vomiting after an eating binge? Y / N
 14. During an eating binge would he ever say he was afraid he couldn't stop eating? Y / N
 15. Did he ever feel depressed or very mad at himself after the eating binges? Y / N
 16. How long since his last binge? _____
- IX. Somatization:
1. Do you consider him to be a sickly person? Y / N
 2. Does he have headaches? Y / N
 3. Has he ever passed out or fainted? Y / N
 4. Has he ever had a fit or seizures? Y / N
 5. Has anything ever happened to him that he couldn't remember afterwards? Y / N
 6. Has he ever reported seeing double? Y / N
 7. Has he ever had trouble seeing because everything got hazy and blurred? Y / N
 8. Has he ever gone blind suddenly, or thought he was going blind? Y / N
-
9. Has he ever reported buzzing or ringing in his ears? Y / N
 10. Has he ever lost his hearing suddenly, or thought he was going deaf? Y / N
 11. Has he ever been unable to walk or get around? Y / N
 12. Has he ever been unable to move because his muscles became weak or he was paralyzed? Y / N
 13. Has his skin ever gone numb on him in some places and he couldn't feel someone touching him? Y / N
 14. Has he ever had trouble catching his breath when he was just sitting or standing still? Y / N
 15. Does his heart ever pound or beat too fast? Y / N
 16. Does he ever have a tight feeling or pain in his chest? Y / N
 17. Does he ever feel like he is choking or smothering? Y / N

18. Does he ever feel dizzy or light-headed? Y / N
 19. Do his fingers or face ever tingle? Y / N
 20. Has he ever been unable to speak when he wanted to, because the words just wouldn't come? Y / N
 21. Has he ever felt there was a lump in his throat and he couldn't swallow his food or drink, even though he wasn't crying? Y / N
 22. Does he get pains in his stomach very often? Y / N
 23. Does he get sick to his stomach very easily? Y / N
 24. Does he have times when he throws up very often? Y / N
 25. Does his stomach fill up with gas quite easily? Y / N
 26. Are there some foods he can't eat because they make him sick? Y / N
 27. Does he have loose bowels or diarrhea often? Y / N
 28. Does he have any trouble like pain or burning when he passes his urine? Y / N
 29. Has he had pains in the back? Y / N
 30. Has he ever had pains in his arms or legs? Y / N
 31. Has he ever been bothered by burning pains in his mouth, rectum, or private parts? Y / N
 32. Does he have any other pains I haven't mentioned? Y / N
 33. When did the pains first begin, and for how long did he have them? _____
 34. Gone now? Y / N
- X. Enuresis/Encopresis:
1. Does he wet the bed at night? Y / N
 2. IF YES: How often? _____
 3. Did he wet the bed after he was old enough to go to school? Y / N
 4. Did this happen more than once or twice? Y / N
 5. How old was he when he last wet the bed? Y / N
 6. Does he ever wet during the day? Y / N
 7. IF YES: How often? _____
 8. Does he ever have a bowel movement in his pants or someplace besides the toilet? Y / N
 9. IF YES: Did this sometimes happen when he was old enough to go to school? Y / N
 10. Has it happened as often as every day? Y / N
 11. Week? Y / N
 12. Does he still do it? Y / N
- XI. Gender Identity/ Sexual Expression:
1. Does he ever dress up in a girl's clothes to play? Y / N
 2. Does he often wish he was a girl? Y / N
 3. Does he sometimes pretend he is a girl? Y / N
 4. Does he think he might grow up to be a woman? Y / N
 5. Do other children tease him about being like a girl? Y / N
 6. Do you worry about him being like a girl? Y / N
 7. Would he change into a girl if he could? Y / N

8. Has he ever been scolded or punished for playing with his privates, or for playing sexual games with another child? Y / N
9. Has any older person tried to do anything with him sexually- like making him undress, touching him between the legs, making him get in bed with them, making him play with their privates? Y / N

XII. Pervasive Developmental Disorder:

1. Was there ever anything unusual about his use of language like: often repeating words or phrases he had just heard, in place of responding to what was said? Y / N
 2. Or, often using the wrong pronoun to refer to himself or others, or referring to himself in the third person like "he wants a cookie"? Y / N
 3. Or, seldom, start a conversation with someone else, even though he might talk to himself? Y / N
 4. Would you describe him as being an affectionate child? Y / N
 5. Does he usually look at people, talk to them, interact with them the way you would expect? Y / N
 6. Have you ever been told that your child was autistic? Y / N
 7. If so, at what age? _____ Y / N
 8. Did he seem to ignore people around him? Y / N
 9. Tend to avoid looking at others? Y / N
 10. Did you ever wonder if he was deaf because he didn't respond to you? Y / N
-
11. Did he ever get really upset if there were small changes in daily routines or where things were placed in the house? Y / N
 12. Did he have any repetitive and unproductive patterns of behaviour, such as hand movements, clapping or twirling? Y / N
 13. Did he have prolonged attachments to certain objects, either holding them or staring at them? Y / N
 14. Did he surprise you from time to time with unexpected bits of language or knowledge? Y / N
 15. Since he was of school age, did his test results show wide discrepancies and been puzzling to the school and his teachers? Y / N
 16. Since he was of school age were you told that he was untestable? Y / N
 17. When was the very earliest age that you became concerned that your son was different and there might be a problem in his development? _____
 18. Did he also show signs of being anxious or scared to the point of being terror stricken, when there was no obvious reason for it? Y / N
 19. Did he show extreme sudden changes in mood for no apparent reason, or out of proportion to the situation? Y / N
 20. Did he seem to overreact to sound such as covering up his ears for certain sounds which other people tolerated well? Y / N
-
21. Does he have habits of hurting himself, such as biting or hitting himself repeatedly? Y / N
 22. When was the earliest age in which he had any of these problems? _____
 23. Does he still have any of these problems? Y / N
 24. Have you ever thought that he was having hallucinations? Y / N
 25. Has he ever expressed ideas that someone was trying to do away with him or controlling his mind? Y / N
 26. Does he have difficulties being away from his family because he is afraid to meet new people or to be where there are people that he doesn't know? Y / N

27. Does he have a hard time saying anything to people he doesn't know? Y / N
28. Is he friendly and sociable with people at home or whom he knows well? Y / N
29. IF YES TO QUESTIONS 26 OR 27: Has this scared feeling about meeting new people ever prevented him from making friends with other children or kept him from leaving home and going places with others he knows well? Y / N
30. Has this problem he had of meeting new people lasted as long as 6 months or more? Y / N
31. Has he ever been so afraid to be with people outside the family that he missed school or something he really wanted to do? Y / N
32. How old was he the last time that happened? _____

XIII. Stereotyped Movement Disorder:

1. Did your child ever have jerky, repetitive body movements which didn't have any useful purpose? Y / N
2. Did he usually give out some sound at the same time his arms, legs, or body jerked? Y / N
3. When he really tried, could he stop the jerks and noises for 5 minutes or longer? Y / N
4. Occasionally a child gives out repetitive, senseless noises, like barking or grunting without the jerks. Has your child ever done that off and on for as long as a month or more? Y / N
5. Did the jerks or noises come and go over the months? Y / N
6. Did they last all together for over a year? Y / N
7. IF YES TO ABOVE: How old was he when you first noticed the jerky movements or repetitive sounds? _____
8. Has your child ever had a habit such as banging his head repeatedly, rocking his body, or moving his hands or fingers in a repetitive rhythmical way? Y / N

APPENDIX D

Child's Name: _____

LONEY'S (1987) STRUCTURED INTERVIEW FOR PARENTS

Attention Problem Disorder:

1. Have his teachers told you that he often fails to complete his assignments?
Yes/No
2. At home, does he often leave things unfinished? Yes/No
3. Have his teachers told you that he has trouble concentrating in school?
Yes/No
4. Does he have difficulty concentrating on a task that requires attentiveness,
such as reading a book or doing a homework assignment? Yes/No
5. Have his teachers told you that he has difficulty sticking with play
activities at school? Yes/No
6. Have his teachers told you that he shifts from one activity to another;
for instance, does he hurry through his assignments without regard to
whether the answers are correct? Yes/No
7. Have his teachers told you he can't get his things together to get his work
done? For instance, some children are always losing track of their pencils
or books or assignments. Is that typical of him? Yes/No
8. Does he interrupt a lot when other people are talking? Yes/No
9. Does he get up and run around at times when it isn't appropriate, such as
during a meal or during church? Yes/No

Aggressive Behavior Disorder

1. Have you ever thought that he was unusually stubborn or self-willed?
Yes/No
2. Has he often used his temper to try to get his way? Yes/No
3. Does he get into trouble at home or school because he leaves home without
telling you, or leaves the school yard without permission? Yes/No
4. Does he get into trouble at home or school because he argues with you or his
teacher over every little request? Yes/No
5. Does he get into trouble at home or school because he loses his temper
easily and sometimes breaks or throws things? Yes/No
6. Has he ever shoplifted or stolen anything? Yes/No
7. Has he ever played hooky from school? Yes/No
8. Has he ever broken into a building and torn things up? Yes/No
9. Does he have a reputation for starting fights in the neighborhood or at
school in which he has hurt someone badly, like giving them a black eye,
bloody nose, or some other injury? Yes/No

Hyperactive Impulsive Disorder

1. Does he tend to act before thinking? For example do you worry a lot that he would run out into the street without looking, even after he was old enough to realize the danger? Yes/No
2. Have his teachers told you that he acts impulsively at school, i.e., he doesn't think before he acts? Yes/No
3. Does his teacher say that he needs one-to-one supervision, or more than most children in his class? Yes/No
4. Does he talk out in class at school so much that his teachers have complained to you about that? Yes/No
5. Do you think that he runs and climbs on things excessively? Yes/No
6. Have his teachers reported that he is unusually active in school, compared with other children his age? Yes/No
7. Have his teachers reported that he runs around the classroom without permission? Yes/No
8. Would you describe him as always on the go or as if driven without a motor? Yes/No
9. Have his teachers described him in a similar way? Yes/No

APPENDIX E

Name: _____

FACES III

David H. Olson, Joyce Portner, and Yoav Lavee

1	2	3	4	5
ALMOST NEVER	ONCE IN A WHILE	SOMETIMES	FREQUENTLY	ALMOST ALWAYS

DESCRIBE YOUR FAMILY NOW:

- ____ 1. Family members ask each other for help.
- ____ 2. In solving problems, the children's suggestions are followed.
- ____ 3. We approve of each other's friends.
- ____ 4. Children have a say in their discipline.
- ____ 5. We like to do things with just our immediate family.
- ____ 6. Different persons act as leaders in our family.
- ____ 7. Family members feels closer to other family members than to people outside the family.
- ____ 8. Our family changes its way of handling tasks.
- ____ 9. Family members like to spend free time with each other.
- ____ 10. Parent(s) and children discuss punishment together.
- ____ 11. Family members feel very close to each other.
- ____ 12. The children make the decisions in our family.
- ____ 13. When our family gets together for activities, everybody is present.
- ____ 14. Rules change in our family.
- ____ 15. We can easily think of things to do together as a family.
- ____ 16. We shift household responsibilities from person to person.
- ____ 17. Family members consult other family members on their decisions.
- ____ 18. It is hard to identify the leader(s) in our family.
- ____ 19. Family togetherness is very important.
- ____ 20. It is hard to tell who does which household chores.

FAMILY SOCIAL SCIENCE, 290 McNeal Hall, University of Minnesota, St. Paul, MN 55108

APPENDIX F

- 2) Age Relationship
 Name
- 3) Age Relationship
 Name
- 4) Age Relationship
 Name
- 5) Age Relationship
 Name

Please list any handicaps, medical, serious accidents or psychological problems experienced by your child:

.....

Please list any services or programs that your child is or has received or been involved in other than school:

.....

Please describe any problems or difficulties that you may presently be experiencing with your child:

.....

Please list any handicaps, medical or physical problems experienced by you or your spouse:

.....

Please list any medications your child is taking or has taken:

.....

Have any of your other children experienced any similar emotional or behavioural difficulties? If yes who, what and when? Please use back of sheet to list. Yes / No (please circle)

Demographic Questionnaire

Child's Name Sex

Date of Birth Age

Home Address

Phone Number: Home:.....

Business: Father Mother

School (Name and Address):.....

Grade:.....

Failed? Skipped?

Teacher's Name:

Father's Name: Age:.....

Education: Occupation:

Mother's Name: Age:

Education: Occupation:

Family Income (per year):

Parent's Marital Status: married..... common-law....
 separated... divorced

Is your child adopted? No.... Yes.... If yes, at what age?....

Languages spoken most frequently at home.....

Other languages the child can communicate in

Family Household Members by Name, Age, and Relationship to the child:

1)

 Name Age Relationship

APPENDIX G

Child's Name: _____

Medication: On / Off (please circle)

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

Observation	Degree of Activity			
	Not at all	Just a little	Pretty much	Very much
CLASSROOM BEHAVIOR				
1. Constantly fidgeting				
2. Hums and makes other odd noises				
3. Demands must be met immediately-easily frustrated				
4. Coordination poor				
5. Restless or overactive				
6. Excitable, impulsive				
7. Inattentive, easily distracted				
8. Fails to finish things he starts-short attention span				
9. Overly sensitive				
10. Overly serious or sad				
11. Daydreams				
12. Sullen or sulky				
13. Cries often and easily				
14. Disturbs other children				
15. Quarrelsome				
16. Mood changes quickly and drastically				
17. Acts "smart"				
18. Destructive				
19. Steals				
20. Lies				
21. Temper outbursts, explosive and unpredictable behavior				
GROUP PARTICIPATION				
22. Isolates himself from other children				
23. Appears to be unaccepted by group				
24. Appears to be easily led				
25. No sense of fair play				
26. Appears to lack leadership				
27. Does not get along with opposite sex				
28. Does not get along with same sex				
29. Teases other children or interferes with their activities				
ATTITUDE TOWARD AUTHORITY				
30. Submissive				
31. Defiant				
32. Impudent				
33. Shy				
34. Fearful				
35. Excessive demands for teacher's attention				
36. Stubborn				
37. Overly anxious to please				
38. Uncooperative				
39. Attendance problem				

IOWA CONNERS TEACHER RATING SCALE

NAME: _____

AGE: _____

DATE: _____

INATTENTION/OVERACTIVITY

1 _____

2 _____

6 _____

7 _____

8 _____

_____ TOTAL

AGGRESSION

15 _____

17 _____

21 _____

31 _____

38 _____

_____ TOTAL

GROUP MEMBERSHIP

AGE

I/O Score

(a) 7 - 8 Years		(b) 9 + Years	
A Score		A Score	
< 9	≥ 9	< 6	≥ 6
(a) 11 < 9 Control 1	2 AGG	1 Control	2 AGG
(a) 11 ≥ 9 ADHD 3	ADHD/ AGG 4	3 ADHD	ADHD/ AGG 4

APPENDIX H

7:11

Name of Principal: _____

Date _____

DSM III R Extension to the (SNAP) Checklist				
Observation	Not at all	Just a little	Pretty Much	Very Much
E.				
(1) Blurts out answers to questions before they have been completed.				
(2) Has difficulty playing quietly.				
(3) Talks excessively.				
(4) Loses things necessary for tasks or activities at school or at home e.g., toys, pencils, books, assignments.				
(5) Engages in physically dangerous activities without considering possible consequences (not for the purpose of thrill seeking.				
F.				
(1) Argues with adults.				
(2) Actively defies or refuses adult requests or rules.				
(3) Deliberately does things that annoy other people.				
(4) Blames others for his or her own mistakes.				
(5) Is often touchy or easily annoyed by others.				
(6) Is angry and resentful.				
(7) Is spiteful or vindictive.				
(8) Swears or uses obscene language.				

APPENDIX I

General Personal Causality Questionnaire

Subject #: _____

Date: ____/____/____

Instructions to Subject:

Now I'm going to be asking you to imagine yourself in a number of different situations. Each time I will tell you what the situation is, then I want you to rate on this barometer how much each reason would be true for you. You see, the barometer is marked 0 to 3. The zero means that the reason is not true for you at all, the one means sort of true, the two means somewhat true, and the three means completely true. Each time, I want you to point to where you fall on the barometer. Do you understand?

O.K. let's try this one.

Practice Question

You were playing a softball game. The score was tied in the last inning. You hit a homerun to win the game. Why did this happen?

1. I had help. _____
2. I was lucky. _____
3. I tried hard. _____
4. It was easy. _____

(Enter child's response here)

Ensure that the child completely understands the task and proceed to the test questions.

Test Questions

1. You got all the words right on the weekly spelling test. Why did this happen?

The teacher helped me	_____	I tried hard	_____
It was easy	_____	I was lucky	_____

2. Your class had a spelling B and you missed the very first word that you were asked to spell. Why did this happen?

It was hard	_____	The teacher didn't help me	_____
I was unlucky	_____	I didn't try	_____

3. The teacher asked you to read a paragraph aloud to the class. You read it clearly without missing a word. Why did this happen?

I tried hard	_____	I was lucky	_____
It was easy	_____	The teacher helped me	_____

General Personal Causality Questionnaire
Page 2

4. The class had a matching test in geography. You had to match provinces with their capital cities. You got most of them wrong. Why did this happen?

I was unlucky _____

I didn't try _____

The teacher didn't help me _____

It was hard _____

5. The first day of school the teacher asked everyone to write about what he or she did last summer. When you got it back, your teacher had written "excellent" on the top. Why did this happen?

It was easy _____

The teacher helped me _____

I was lucky _____

I tried hard _____

6. You got so many problem wrong on your math sheet that the teacher asked you to do it over again. Why did you get so many wrong?

The teacher didn't help me _____

It was hard _____

I didn't try _____

I was unlucky _____

7. You did a crossword puzzle on new words you learned and you got it all correct. Why did this happen?

I was lucky _____

I tried hard _____

The teacher helped me _____

It was easy _____

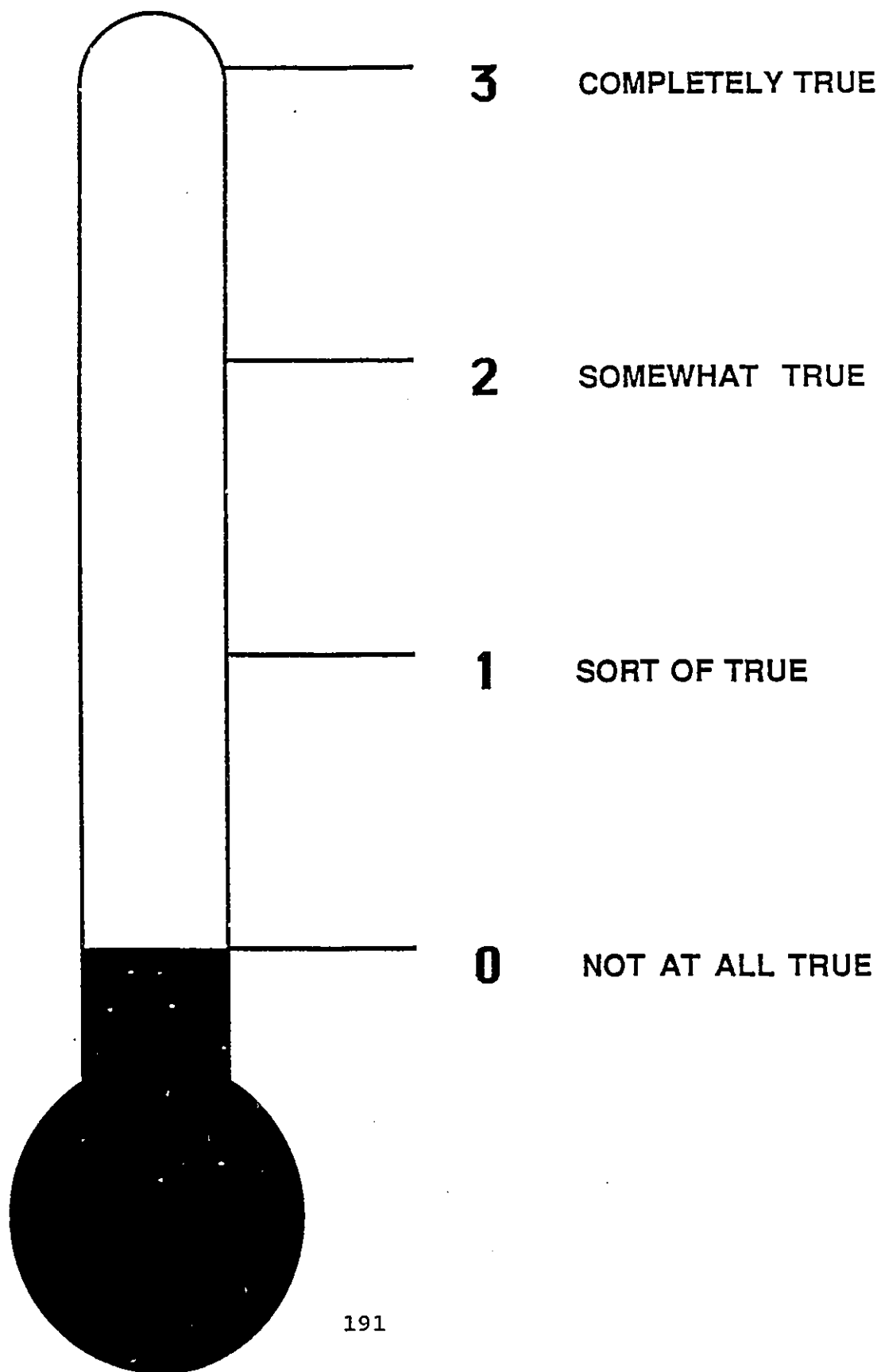
8. The teacher asked you to stay after school to redo an assignment. Why did you have to do this?

The teacher didn't help me _____

I was unlucky _____

I didn't try _____

It was hard _____



APPENDIX J

Attribution of Intention Task (Dodge & Frame, 1962)

Instructions to Subject:

Now I am going to read some make believe situations that I want you to imagine that you are involved in. Each story will include two children - you and somebody you know. To help me, I would like you to tell me the name of someone in your class who is nice and liked by the other kids. (Record name _____). Good.

Now I would like you to tell me the name of someone in your class who is not so nice. Someone who is mean to other kids. You know, someone who bosses them around and sometimes gets into trouble from the teacher for it. Who is like this? (Record name: _____). Good.

After I have read you each story, I will ask you some questions about what might have happened.

Got any questions? (answer any, making sure child understands task and is at ease)

Ok, lets start.

1. Imagine that you are standing on the playground, playing catch with a number of other boys. You throw the ball to another boy and he catches it. You turn around, and the next thing you realize is that he has thrown the ball and hit you in the middle of the back. The ball hits you hard and it hurts a lot.

Now imagine that (acc/neutral peer) was the other boy in the story.

1. Why did (peer) hit you in the back?
2. Do you think that (peer) hit you on purpose, or hit you by accident?
3. What would you do next after (peer) hit you?
4. Do you think (peer) should be punished a lot, or not at all?
5. Do you think (peer) is likely to do something like that to you again?
6. Do you think that (peer) is likely to be nice to you in the future?

2. Imagine that you are sitting at the lunch table at school, eating lunch. You look up and see another boy coming over to your table, with a carton of milk in his hands. You turn around to eat your lunch, and the next thing that happens is that the other boy spills milk all over your back. The milk gets your shirt all wet.

Now imagine that (peer) was the other boy in the story.

1. Why did (peer) get milk all over your back?
2. Do you think that (peer) tried to pour milk on you on purpose or by accident?
3. What would you do next after (peer) poured milk all over you?
4. Do you think (peer) should be punished a lot, or not at all?
5. Do you think (peer) is likely to do something like that to you again?
6. Do you think that (peer) is likely to be nice to you in the future?

3. Imagine that you and a friend are riding your bikes to the store. You park your bikes outside the store and go inside to buy something cold to drink. When you come outside, you see your bike knocked on the ground in a mud puddle. Another boy is leaning over your bike. Your friend says he saw the boy knock your bike to the ground.

Now imagine that (peer) was the other boy in the story.

1. Why did (peer) knock over your bike?
2. Do you think that (peer) knocked your bike over on purpose or by accident?
3. What would you do next after (peer) knocked your bike over?
4. Do you think (peer) should be punished a lot, or not at all?
5. Do you think (peer) is likely to do something like that to you again?
6. Do you think that (peer) is likely to be nice to you in the future?

4. Imagine that you are riding your bike down a quiet street. You ride past a car parked on the side of the road. Another boy is sitting in the car. After you ride past him, he honks the horn of the car. It startles you and you fall off the bike and skin your hands and knees.

Now imagine that (peer) was the other boy in the story.

1. Why did (peer) honk the horn and startle you?
2. Do you think that (peer) startled you on purpose or or by accident?

3. What would you do next after (peer) honked the horn?
4. Do you think (peer) should be punished a lot, or not at all?
5. Do you think (peer) is likely to do something like that to you again?
6. Do you think that (peer) is likely to be nice to you in the future?

5. Imagine that you brought you new Star Wars spaceship to school today. You saved up your allowance to buy the spaceship and you want to show it to the other kids at school. You let one of the boys play with it for a few minutes while you go get a drink of water. When you get back you realize that he has broken your brand new spaceship.

Now imagine that (peer) was the other boy in the story:

1. Why did (peer) break your spaceship?
2. Do you think that (peer) broke your spaceship on purpose or by accident?
3. What would you do next after (peer) broke your spaceship?
4. Do you think (peer) should be punished a lot, or not at all?
5. Do you think (peer) is likely to do something like that to you again?
6. Do you think that (peer) is likely to be nice to you in the future?

6. Imagine that you are walking to school and you're wearing your new tennis shoes. You really like your new shoes and this is the first day that you have worn them. Suddenly, you are bumped from behind by another boy. You stumble and fall into a mud puddle and your new shoes get muddy.

Now imagine that (peer) was the other boy in the story.

1. Why did (peer) bump you from behind?
2. Do you think that (peer) bumped you on purpose or bumped you by accident?
3. What would you do next after (peer) bumped you?
4. Do you think (peer) should be punished a lot, or not at all?
5. Do you think (peer) is likely to do something like that to you again?
6. Do you think that (peer) is likely to be nice to you in the future?

Imagine that you have just finished an art project for school. You've worked on it a long time and you're really proud of it. Another boy comes over to look at your project. He's holding a jar of paint in his hand. You turn away for a minute and when you look back the other boy has spilled paint on your art project. You've worked on the project for a long time and now it's ruined.

Now imagine that (peer) was the other boy in the story.

1. Why did (peer) spill paint on your project?
 2. Do you think that (peer) spilled the paint on purpose or by accident?
 3. What would you do next after (peer) spilled the paint on your project?
 4. Do you think (peer) should be punished a lot, or not at all?
 5. Do you think (peer) is likely to do something like that to you again?
 6. Do you think that (peer) is likely to be nice to you in the future?
8. Imagine that you are in your classroom at school. You're standing next to the gerbil cage, watching the gerbils. You see another boy running toward you. You turn back to look at the gerbils and the next thing you realize is that the other boy has bumped in to you. You fall down and knock over the gerbil cage. You feel really bad because the gerbils look really scared and the teacher is not happy with you.

Now imagine that (peer) was the other boy in the story.

1. Why did (peer) bump into you?
2. Do you think that (peer) bumped into you on purpose or by accident?
3. What would you do next after (peer) bumped into you?
4. Do you think (peer) should be punished a lot, or not at all?
5. Do you think (peer) is likely to do something like that to you again?
6. Do you think that (peer) is likely to be nice to you in the future?

Imagine that you are walking down the hallway in school. You're carrying your books in your arm and talking to a friend. Suddenly, another boy bumps you from behind. You stumble and fall and your books go flying across the floor. The other kids in the hall start laughing.

Now imagine that (peer) was the other boy in the story.

1. Why did (peer) bump into you, making you fall?
2. Do you think that (peer) made you fall on purpose or by accident?
3. What would you do next after (peer) made you fall?
4. Do you think (peer) should be punished a lot, or not at all?
5. Do you think (peer) is likely to do something like that to you again?
6. Do you think that (peer) is likely to be nice to you in the future?

10. Imagine that you and your class went on a field trip to the zoo. You have stopped at a refreshment stand to get a coke. Suddenly, someone bumps your arm, spilling your coke all over your shirt. The coke is cold, and your shirt is all wet.

Now imagine that (peer) was the other boy in the story.

1. Why did (peer) spill your coke on you?
2. Do you think that (peer) spilled you coke on purpose or by accident?
3. What would you do next after (peer) spilled you coke on you?
4. Do you think (peer) should be punished a lot, or not at all?
5. Do you think (peer) is likely to do something like that to you again?
6. Do you think that (peer) is likely to be nice to you in the future?

Comments:

APPENDIX K

All responses are to be written down verbatim on the response sheet provided.

- 7) The sort-recall test is probably the most complicated to administer. Once you have it down, its a sinch. Materials involve the actual stimulus cards (24 in all), practice cards for the sort task, and the sort board. The following is what is said to the child.

First, take out the stimulus cards and say:

I have some words that I want you to read for me. When you are finished reading them I will ask you to tell me as many as you can remember in any order.

Present the cards one at a time at a 3 second rate per card. Count to yourself 1000, 2000, 3000, then the next card.

Ask child to tell you all the words they can remember. Record their responses on the sheet provided. When they say that they can not tell you any more, ask them to try hard to remember some more. After about ten seconds or the child indicates that this is impossible, say ok.

Next, place the sort board in front of the child and say the following:

That sure was a lot of words to remember all at once. You did a really good job. Can you think of any of the things you could do to help you to remember more of the words?

One way to help is to remember words that go together. Let me show you what I mean. This is a practice list and we will work on this list together. What we will do is turn over each card one at a time and put them into piles on this board. We will put the cards which we think go together in the same piles. For instance, the first card is cow. there is nothing to put it with, so lets put it here. The next card is cold. Do you think that it goes with cow? No it really goes not, so we'll put it here.....

Continue this until you have finished the practice list and collect them. Next, say:

Now, I would like you to take this list again and sort them into piles the way that I showed you. Remember to put the words into piles that you think go together in some way. There are 8 boxes which you may use to sort the words. You can use as many as you wish. You do not have to use all eight. It just depends on how you think the words go together. When you are finished putting the words into piles, I will collect them and then ask you to tell me as many words as you can remember. So keep in mind by sorting the words into piles, you will be improving your memory.

Let the child sort the words. When finished, cover the piles with some file covers or something that the child can not see through then ask them to tell you all the words they can remember. Prompt at the end as in Trial 1. Record the responses verbatim on the sheet provided.

Then remove the cardboard and ask the child to read to you each pile. Ensure that they stop after each pile. Record the sorted piles on the response sheet, separating each pile with a line.

That's it!!!!

APPENDIX L

CHILDREN'S SELF-REPORT SCALE

DATE	AGE	NAME OF SCHOOL
BOY OR GIRL	GRADE	NAME

INSTRUCTIONS

This is a list of questions that tell how children feel. Your answers will help us understand more about children.

Please read these questions one at a time. Fill in the circle under the YES or the NO to mark your answer. Do not fill in a circle under the YES and the NO for the same question. Remember, this is not a test and there are no right or wrong answers.

Try this example:

I LIKE WINTER	YES ☐	NO ☐
---------------	------------------------------	-----------------------------

The circle under the YES should be blackened in if you like winter.
The circle under the NO should be blackened in if you do not like winter.

	YES	NO
1. IT'S OK FOR KIDS TO BITE THEIR FINGERNAILS	☐	☐
2. KIDS LAUGH AT ME	☐	☐
3. IT'S OK TO GET ANGRY	☐	☐
4. I HAVE MANY FRIENDS	☐	☐
5. MY FAMILY IS PROUD OF ME	☐	☐
6. I OFTEN GET ANGRY AT MY PARENTS	☐	☐
7. WHEN I NEED HELP MY PARENTS HELP ME	☐	☐
8. I'LL TRY ANYTHING	☐	☐
9. I FEEL SOMEONE WILL TELL ME I AM DOING THINGS WRONG	☐	☐
10. MY PARENTS UNDERSTAND ME	☐	☐
11. I AM ALWAYS HAPPY	☐	☐
12. KIDS PICK ON ME	☐	☐
13. THINGS ARE ALL MIXED UP IN MY LIFE	☐	☐
14. I LIKE EVERYONE I KNOW	☐	☐
15. IT'S OK TO TELL LITTLE LIES	☐	☐
16. I AM IMPORTANT TO MY FAMILY	☐	☐
17. IT'S OK TO YELL AT YOUR PARENTS SOMETIMES	☐	☐
18. MOST KIDS I KNOW LIKE ME	☐	☐
19. I WORRY ABOUT WHAT OTHER PEOPLE WILL THINK ABOUT ME	☐	☐
20. SCAREY STORIES BOTHER ME	☐	☐
21. I AM PRETTY SURE OF MYSELF	☐	☐
22. SOMETIMES I THINK OTHER KIDS WANT TO BEAT ME UP	☐	☐
23. I WORRY ABOUT WHAT MY PARENTS WILL SAY TO ME	☐	☐
24. I AM JUST AS GOOD AS THE NEXT KID	☐	☐
25. I WORRY ABOUT WHAT IS GOING TO HAPPEN	☐	☐
26. I AM FUN TO BE WITH	☐	☐
27. I AM A NERVOUS PERSON	☐	☐
28. I GET TOO MANY PUNISHMENTS	☐	☐

	YES	NO
29. I HAVE A BAD TEMPER	☐	☐
30. I AM ALWAYS GOOD	☐	☐
31. KIDS CALL ME NAMES	☐	☐
32. IT'S OK TO MAKE A MESS	☐	☐
33. I THINK I AM A PRETTY NICE PERSON	☐	☐
34. I CAUSE TROUBLE TO MY FAMILY	☐	☐
35. SOMETIMES EVEN LITTLE THINGS GET ME MAD	☐	☐
36. I ALWAYS TELL THE TRUTH	☐	☐
37. I OFTEN GET INTO TROUBLE	☐	☐
38. I AM ALWAYS NICE TO EVERYONE	☐	☐
39. I OFTEN HAVE FIGHTS WITH KIDS	☐	☐
40. I GET NERVOUS WHEN THE TEACHER CALLS ON ME	☐	☐
41. IT IS HARD FOR ME TO WAIT MY TURN	☐	☐
42. IT'S HARD FOR ME TO KEEP MY MIND ON ANYTHING	☐	☐
43. WHEN I GO TO BED AT NIGHT I WORRY	☐	☐
44. I DO MANY BAD THINGS	☐	☐
45. IT'S OK TO SHOW-OFF	☐	☐
46. I ALWAYS DO THE RIGHT THING	☐	☐
47. SOMETIMES EVEN LITTLE THINGS MAKE ME CRY	☐	☐
48. OTHER KIDS BOSS ME AROUND	☐	☐
49. IF I GOT LOST I COULD GET BACK HOME	☐	☐
50. MY PARENTS EXPECT TOO MUCH FROM ME	☐	☐
51. I AM AFRAID OF THE DARK	☐	☐
52. I HAVE BAD DREAMS	☐	☐
53. I ALWAYS KNOW WHAT TO SAY TO PEOPLE	☐	☐
54. SOMETIMES I GET MAD AT MYSELF	☐	☐
55. I AM PRETTY GOOD AT MOST THINGS I DO	☐	☐

APPENDIX M

Appendix M

Analysis of Variance Examining the Relationship between Groups and Background Variables

Source	<u>SS</u>	AGE df	<u>MS</u>	<u>F</u>	<u>p</u>
Group	1279.24	3	226.4	1.50	ns
Residual	26135.25	89	284.8	-	-
Total	27414.49	92	-	-	-

Source	<u>SS</u>	PPVT-R df	<u>MS</u>	<u>F</u>	<u>p</u>
Group	906.02	3	302.0	1.24	ns
Residual	21688.45	89	243.69	-	-
Total	22594.47	92	-	-	-

Source	<u>SS</u>	Blishen Index df	<u>MS</u>	<u>F</u>	<u>p</u>
Group	74.07	3	24.7	0.043	ns
Residual	45539.65	89	494.9	-	-
Total	45613.72	92	-	-	-

Source	<u>SS</u>	Family Income df	<u>MS</u>	<u>F</u>	<u>p</u>
Group	19.78 10 ⁹	3	65.9 10 ⁹	5.33	.002
Residual	97.68 10 ⁹	79	12.4 10 ⁹	-	-
Total	1.17 10 ¹¹	82	-	-	-

Analysis of Variance Examining the Relationship between Groups and Developmental and Clinical Scales from the DICA-P

Source	<u>SS</u>	Prenatal History df	<u>MS</u>	<u>F</u>	<u>p</u>
Group	6.41	3	2.14	.606	ns
Residual	311.86	88	3.54	-	-
Total	318.27	91	-	-	-

Appendix M Continued

Delivery History					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	6.83	3	2.27	2.29	ns
Residual	87.37	88	0.99	-	-
Total	94.10	91	-	-	-
Temperament and Milestones					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	54.16	3	18.05	4.62	.005
Residual	343.53	88	3.09	-	-
Total	397.69	91	-	-	-
Behaviour Problems in First Five Years					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	158.88	3	52.96	7.11	.001
Residual	654.97	88	7.44	-	-
Total	813.85	91	-	-	-
Psychosocial Stress					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	93.29	3	31.10	8.40	.000
Residual	324.36	88	3.69	-	-
Total	417.65	91	-	-	-
ADHD					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	2108.19	3	702.73	30.56	.000
Residual	2023.67	88	22.91	-	-
Total	4131.86	91	-	-	-
Oppositional Disorders					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	454.37	3	151.46	24.83	.000
Residual	536.87	88	6.10	-	-
Total	1091.24	91	-	-	-

Appendix M Continued

Depression					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	850.94	3	283.64	5.23	.002
Residual	4721.36	88	53.65	-	-
Total	5572.30	91	-	-	-

Mania					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	107.39	3	35.79	6.44	.001
Residual	488.83	88	5.56	-	-
Total	596.22	91	-	-	-

Generalized Anxiety					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	62.57	3	20.86	2.96	.037
Residual	520.59	88	7.05	-	-
Total	583.16	91	-	-	-

Analysis of Variance Examining Group Scores on SNAP Teacher Rating Scale

Hyperactivity					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	1279.78	3	426.60	36.03	.000
Residual	1041.89	88	11.84	-	-
Total	2321.67	92	-	-	-

Inattention					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	1400.60	3	466.87	46.67	.000
Residual	880.23	88	10.00	-	-
Total	2280.83	92	-	-	-

Impulsivity					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	2419.39	3	806.46	77.05	.000
Residual	921.04	88	10.46	-	-
Total	3340.43	92	-	-	-

Appendix M Continued

Peer Interaction					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	2291.43	3	763.81	52.21	.000
Residual	1287.52	88	14.63	-	-
Total	3578.95	92	-	-	-

Disruptive Behaviours					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	719.96	3	239.99	25.93	.000
Residual	814.59	88	9.26	-	-
Total	1534.55	92	-	-	-

Oppositional Behaviours					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	4412.42	3	1470.81	67.18	.000
Residual	1926.57	88	21.89	-	-
Total	6338.99	92	-	-	-

Analysis of Variance Examining Group Scores on Loney DCIBD

Attention Problems					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	367.10	3	122.37	21.73	.000
Residual	506.87	90	5.63	-	-
Total	873.97	93	-	-	-

Aggressive Behaviours					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	235.67	3	78.56	18.14	.000
Residual	389.65	90	4.33	-	-
Total	625.32	93	-	-	-

Hyperactive/Impulsive Behaviours					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	524.62	3	174.87	34.01	.000
Residual	462.78	90	5.14	-	-
Total	987.40	93	-	-	-

Appendix M Continued

Univariate Analyses of Variance Examining the Relationship between Groups and Vigilance Task Measures across Blocks

Total Correct					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	53.41	3	17.80	1.31	ns
Residual	1235.23	91	13.57	-	-
Total	1288.64	94	-	-	-
Block	13.25	2	6.62	2.54	.08
Group X Block	22.98	6	3.83	1.40	ns
Residual	475.57	182	2.61	-	-
Total	378.32	200	-	-	-
Total Errors of Omission					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	36.43	3	12.14	1.0	ns
Residual	1091.21	91	11.91	-	-
Total	1097.64	94	-	-	-
Block	11.64	2	5.82	2.11	0.70
Group X Block	17.65	6	2.94	1.39	ns
Residual	383.32	182	1.86	-	-
Total	412.61	200	-	-	-
Total Errors of Commission					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	1079.33	3	359.78	3.35	.022
Residual	9773.24	91	107.40	-	-
Total	10752.57	94	-	-	-
Block	3.45	2	1.72	0.15	ns
Group X Block	80.34	6	13.39	1.18	ns
Residual	2060.84	182	11.32	-	-
Total	2144.63	200	-	-	-

Appendix M Continued

Univariate Analyses of Variance Examining the Relationship between Groups and Delay Task Measures across Blocks

Total Correct					
Source	SS	df	MS	F	p
Group	308.34	3	102.78	4.80	.004
Residual	1956.28	92	21.37	-	-
Total		95	-	-	-
Block	207.31	3	69.71	15.00	.000
Group X Block	34.71	9	4.60	0.84	ns
Residual	1251.96	273	4.57	-	-
Total	1493.98	285	-	-	-
Total Number of Responses					
Source	SS	df	MS	F	p
Group	429.40	3	143.13	2.69	.051
Residual	4836.82	92	53.15	-	-
Total	5266.22	95	-	-	-
Block	27.01	3	9.00	0.89	ns
Group X Block	48.58	9	5.40	1.54	ns
Residual	2751.96	273	10.08	-	-
Total	2827.55	285	-	-	-
Efficiency Ratio					
Source	SS	df	MS	F	p
Group	0.6000	3	0.0900	2.00	.093
Residual	8.3100	92	0.2000	-	-
Total	8.9100	95	-	-	-
Block	0.5400	3	0.1800	8.42	.000
Group X Block	0.0900	9	0.0100	0.49	ns
Residual	5.8500	273	0.0200	-	-
Total	6.4800	285	-	-	-

Appendix M Continued

Univariate Analyses of Variance Examining the Relationship between Groups and Sort Task Variables before and after Training

Mean Number of Items Recalled					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	54.82	3	18.27	1.34	ns
Residual	1227.73	90	13.64	-	-
Total	1282.55	93	-	-	-
Trial	856.05	1	856.05	177.40	.000
Group X Trial	40.99	3	13.66	2.83	.043
Residual	434.29	90	4.83	-	-
Total	1213.40	93	-	-	-
Mean ARC Scores					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	0.410	3	0.140	0.54	ns
Residual	23.380	90	0.250	-	-
Total	23.790	93	-	-	-
Trial	2.570	1	2.57	14.94	.000
Group X Trial	0.340	3	0.11	0.66	ns
Residual	15.810	94	0.17	-	-
Total	8.76236	94	-	-	-

Univariate Analysis of Variance Examining the Relationship between Groups and GPC Task

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	6.32	3	2.11	2.01	ns
Residual	96.49	92	1.05	-	-
Total	90.03	95	-	-	-
Question	74.11	1	74.11	76.40	.000
Group X Question	0.25	3	0.08	0.09	ns
Residual	89.50	92	0.97	-	-
Total	163.86	96	-	-	-

Appendix M Continued

Univariate Analyses of Variance Examining the Relationship between Groups and CSRRS Scales

Conduct Problems					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	2663.16	3	887.82	8.73	.000
Residual	9353.83	92	101.67	-	-
Total	12016.99	95	-	-	-

Antisocial-Permissive					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	421.73	3	140.58	1.30	ns
Residual	9932.22	92	107.96	-	-
Total	10359.96	95	-	-	-

Positive Family					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	792.35	3	264.12	2.30	.08
Residual	10567.61	92	114.87	-	-
Total	10961.96	95	-	-	-

Lie-Immaturity					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	604.47	3	200.49	1.79	ns
Residual	10257.49	92	112.48	-	-
Total	10961.96	95	-	-	-

Negative Peer					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	538.94	3	177.98	2.17	.09
Residual	7544.06	92	82.00	-	-
Total	8078.00	95	-	-	-

Positive Self-Peer					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	48.70	3	16.23	0.18	ns
Residual	8257.46	92	89.75	-	-
Total	8306.16	95	-	-	-

Clinical Probability					
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	0.3449	3	0.1050	2.26	.09
Residual	4.2772	92	0.0465	-	-
Total	4.5921	95	-	-	-