CANADIAN THESES

THÈSES CANADIENNES

NOTICE

The quality of this microfiche 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.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

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

AVIS

La qualité de cette microfiche 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.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, examens publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de ce microfilm est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30.

THIS DISSERTATION HAS BEEN MICROFILMED EXACTLY AS RECEIVED

LA THÈSE A ÉTÉ MICROFILMÉE TELLE QUE NOUS L'AVONS REÇUE

Adolescents at Risk for Schizophrenia : A Multidimensional Investigation

Freedom Leung

A Thesis

in

The Department

of

Psychology

Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Arts at
Concordia University
Montréal, Québec, Canada

November, 1986

ISBN 0-315-35571-9

ABSTRACT

Adolescents at Risk for Schizophrenia: A Multidimensional Investigation

Freedom Leung

The present study examined the utility of a multidimensional risk index for schizophrenia which combined three risk markers : deviant behavioral patterns, inharmonious peer relationships, and attentional impairment. As a constellation, these three markers have consistently been reported as premorbid characteristics of schizophrenics. It was hypothesized that "outliers" characterized by multiple deviance of these risk markers are at greater risk for schizophrenia than "contrasts" characterized by deviance in social behavior only. Subjects of this study (N=505) were originally selected using only a behavioral risk marker (peer rated aggressive, withdrawn, aggressive-withdrawn, and normative control behavioral patterns by means of the Pupil Evaluation Inventory). Inharmonious peer relationship was measured by peer ratings of likability in the school setting. Attentional impairment was measured using the Span of Apprehension task in the laboratory. In order to assess the usefulness of this three-dimensional risk index, three validational measures (neuromotor performance as measured by the Lincoln-Oseretsky Neuromotor Development Scale, intelligence as measured by the Revised Wechsler Intelligence

Scale, social competence as measured by the Achenbach Child Behavior Checklist) and intermediate psychiatric outcome data of outliers (n=51) and their contrasted counterparts (n=116) were compared. The aggressive group was excluded from the group-difference analyses because of the extremely small number of aggressive outliers found (n=2). Group comparisons revealed that the withdrawn, aggressive-withdrawn, and control outliers were deficient in neuromotor performance and intelligence relative to both the withdrawn and control contrasts. Outliers in all groups were also lower in social competence than the control contrasts. The withdrawn contrasts were not different from the control contrasts on all validational measures. The aggressive-withdrawn contrasts tended to perform as poorly as the aggressive-withdrawn outliers. Regression analyses revealed that the three-dimensional risk index accounted for significantly more variance in the validational measures than the unidimensional behavioral risk index alone. Medical data indicated that overall, there were more outliers than contrasts showing psychiatric problems. The methodological and theoretical implications of these findings were discussed.

ACKNOWLEDGEMENTS

The completion of this thesis was made possible through the help of many individuals. Foremost among those to whom I am indebted is my thesis advisor, Dr. Alex Schwartzman, for his guidance, suggestions, and support throughout all phases of this study.

I also wish to express my appreciation to Drs. June Chaikelson, Michael Conway, Claude Gagnon, and Donna White, my thesis committe members, and Debbie Moskowitz for their helpful comments and suggestions.

Special thanks are due to Punam Bhargava and Claude Senneville. Without their technical assistance, I am probably still at lost in the jungle of modern computer technology.

Finally, sincere thanks are expressed to Luce Boisvert, my ex-girlfriend, roomate, and wife, who suffered quite often from the spill over pressure but not the pleasure of this scientific investigation.

Table of Contents

List of Tables

Adolescents at Risk for Schizophrenia: A Multidimensional Investigation

During the past thirty years, research efforts focusing on individuals with a heightened probability of becoming schizophrenic in adult life have greatly increased. There are at least three major reasons for this development. First, there is increasing evidence showing that biological, social and emotional deviance does occur some years prior to the onset of psychosis (Bleuler, 1978; Garmezy & Streitman, 1974; Slater & Roth, 1969). This evidence has become the basic impetus for extensive research efforts aimed at determining the childhood precursors of schizophrenia. Second, early intervention and prevention, rather than later costly treatment and remediation have become the chief concern of the mental health community. High risk research on schizophrenia serves as an important means for preventive intervention, because such research addresses two basic questions that must be answered before intervention is possible -- who is at risk, and which premorbid characteristics indicate vulnerability to subsequent episodes. Third, research in schizophrenia has long been plagued by major methodological problems. Although countless studies have demonstrated differences between normal and schizophrenic individuals, it has not been possible to determine unequivocally whether these differences are the cause or the result of schizophrenia. This criticism can be levelled at any study of the already diagnosed schizophrenic, whatever the research approach. Thus, methodological issues,

as well as the need to develop preventive intervention, have led to the current interest in identifying and following persons who are at relatively high risk for later development of schizophrenia.

Unidimensional Risk Models

A number of strategies for the selection of individuals at increased risk for schizophrenia have been used by different researchers. These can be generally classified into three categories: (1) selection based on characteristics of the individual's parents (Mednick & Schulsinger, 1968); (2) selection based on characteristics of the individual's familial environment (Goldstein et al., 1968); and (3) selection based on biological traits (Schulsinger et al., 1975; Buchsbaum et al., 1976) or behavioral characteristics (Chapman et al., 1976; Ledingham, 1981) of the individual.

These risk models, however, are bound by narrow sampling characteristics that are dictated by the investigator's assumptions about the etiology or development of schizophrenia. They can be classified as "unidimensional risk models" because each is based on a single risk dimension. Despite the different methods of sample selection, three major problems can be found which are common to all unidimensional risk models.

Lack of sensitivity. The first problem is that, regardless of the selection criterion adopted, only a small number of the high risk samples identified by each model will eventually become schizophrenic. As Garmezy (1975) has pointed out,

whatever etiological model for schizophrenia one espouses, more children, if followed into adulthood, are likely to escape our dire predictions than will fall victim to them. In other words, using any unidimensional risk index alone will inevitably result in a considerably high number of "false positives". As a result, comparisons between the risk group and the control group will be "diluted" (Glish, Erlenmeyer-Kimling, Watt, 1982) because not all of the high risk subjects will be actually undergoing the etiological process. The bias in such comparisons would be conservative, that is, tending to conceal differences rather than to expose them. This problem is faced by all unidimensional risk models. There is growing consensus among investigators (Cornblatt & Marcuse, 1986; Hanson, et al., 1976; Iacono, 1985; Masten & Garmezy, 1985; Nuechterlein & Dawson, 1984a; Watt, et al., 1984) that a more fruitful research strategy would be to search for "outliers", that is, the more extreme individuals who show deviance consistently on different domains of functioning and therefore are most likely to become schizophrenic. This appreciable swing in high risk studies during the last decade from linear analyses of group differences to more diversified searches for outliers reflects not only frustration in seeking monolithic risk markers, but also the increasing sophistication and appropriate disillusionment with simplistic conceptions about this complex disorder.

Lack of specificity. The second major problem inherent in unidimensional risk models for schizophrenia concerns the

issue of marker-specificity. A risk index, to achieve optimal predictability, should differentiate high risk children not only from normal children but also from those who may develop major psychopathology other than schizophrenia. All unidimensional risk models, however, are framed so broadly that in Zubin and Spring's (1977) analogy "entire schools of psychopathology can pass through its portals without even rubbing shoulders" (p.108). For example, it has been found that the offspring of schizophrenics, who are at risk for schizophrenia according to the genetic risk model (Mednick & Schulsinger, 1968), did not differ from children of depressed parents on a number of measures (Neale et al., 1984; Weintraub & Neale, 1984). Communication deviance and negative affective style of parents, risk indices of the familial risk model (Goldstein et al., 1978), have been found in families of normal children (Doane et al., 1981) and in families of hyperactive children (Cohen et al., 1983). Psychophysiological labiiity, the risk indicator of the psychophysiological risk model (Schulsinger et al., 1975), has been found in neurotics and people suffering from anxiety disorder (Lader, 1975). Low MAO level, the risk marker of the biochemical risk model (Buchsbaum et al., 1976), has been found to be associated with affective disorders (Biederman et al., 1984) and alcoholism (Alexopoulos et al., 1983). Deviant behavioral styles such as aggression, withdrawal, or the combined pattern of aggression and withdrawal, the risk indices of the behavioral risk model (Ledingham, 1981), have been found to be associated with

different types of psychiatric disorders (Glish et al., 1982; Kolberg et al., 1972; Robins, 1966; Woerner et al., 1972; Weintraub & Neale, 1984). In sum, on their own, none of these unidimensional risk indices have been shown to be related exclusively to schizophrenia.

Neglecting causal complexity. The third problem is that, if there is a single factor that predisposes certain individuals to schizophrenia, it is surprising that the large amount of time, effort, talent, and money expended on the finding of a marker has yielded no consistent positive finding. A common view holds that the inconsistency of research findings indicates that there is no single common marker for schizophrenia. Strauss & Carpenter (1981) have noted that in considering precursors of schizophrenia, we are dealing with complex processes involving many important independent or semi-autonomous factors. Understanding these factors and these processes in their complexity, therefore, is essential for dealing most effectively with issues of etiology. Labouvie (1986) has also pointed out that the development of psychopathology emerges within a complex matrix of behavioral and ecological events, and that it is the relationship among such multiple variables that must be examined. Each unidimensional risk model, however, is not sufficient to explain the many factors that are implicated as important constituents and determinants of onset, development and course of the disorder. This is especially the case when rivalry among different unidimensional risk models turns into

theoretical parochialism. Borrowing an analogy from Watt et al. (1979), our situtation in this respect is similar to the six blind men of Indostan who went to see the elephant. " Each found a different part of the animal : the side, tusk, trunk, knee, ear, and tail. And each reached a different conclusion about what it was like : a wall, spear, snake, tree, fan, and rope. And so these men of Indostan disputed long and long, each in his own opinion exceeding stiff and strong, though each was partly in the right and all were in the wrong" (p.207).

The need for a Multidimensional Risk Model

Zubin (1980) has pointed out that the vulnerable individual may bear a combination of certain etiotypes. Other investigators (Cornblatt & Marcuse, 1986; Hans et al., 1984; Iacono, 1985; Labouvie, 1986) have also indicated that there is a need to examine simultaneously several risk markers in a given individual. Any single marker may be an imperfect predictor when used in isolation. However, certain "constellations of deviance" or risk markers from different domains of functioning may be much better predictors of schizophrenia than unidimensional risk markers. As Labouvie (1986) has pointed out, this strategy will yield predictions and outcomes that will be significantly more robust and reliable than could be obtained through a focus on a single biological or behavioral antecedent.

The multidimensional risk index can also contribute to our understanding of schizophrenia in several important ways.

First, a much broader range of cause-effect relationships related to vulnerability can be examined. Any successful set of predictors may provide information concerning the various developmental paths which lead to schizophrenia. The multidimensional risk model enables us to build into our conceptualization and study of risk the rich intricacies that a complete theory of schizophrenia clearly requires.

Second, selecting subjects for the presence of certain combinations of markers not only will enable investigators to identify "outliers" who may have the highest probability of being affected, but will also permit comparisons among different combinations of risk markers. This procedure potentially can identify the particular combination of markers that define the specific multidimensional matrix of schizophrenic dysfunction. This strategy may also help to distinguish the behavior of preschizophrenics from that of children destined for other psychiatric problems and thus help clarify the issue of marker-specificity in schizophrenia.

Third, the multidimensional risk model allows researchers to refine the classification of risk subjects in two ways: (1) they can tap different domains of functioning; and (2) they can assess the effects of varying the cutoff scores for deviance. This strategy allows the researcher greater flexibility in refining definitions of risk and in increasing the discriminative efficiency of the risk index.

Finally, the past three decades have seen a flurry of research publications advocating various individual

characteristics as potential markers of schizophrenia. However, there has been very little progress in the development of conceptual frameworks that tie together the separate strands of evidence in this literature. Little is known about the functional interrelationships of these markers and the potential links among the variables remain to be explored. Examining simultaneously the risk markers of the multidimensional risk model should facilitate conceptual integration.

Which Variables should be Included as "Core" Markers in the Multidimentional Risk Index

To select "core" risk markers for the inclusion in a multidimensional risk index, three major guidelines should be taken into consideration. First, large scale risk research is expensive, and assessment time is usually limited. Therefore, top priority should be given to risk markers that are relatively easy to measure, economical, and convenient to implement for initial large-scale screening purposes. Second, in order to make early remedial intervention possible prior to the time when psychotic symptoms become manifest, it would be most desirable to identify risk subjects who are deviant with respect to certain behaviors (e.g. social behavior) or psychological processes (e.g. attentional, cognitive), but who do not exhibit specific clinical symptoms. Therefore, behavioral and/or psychological process risk markers that can screen young children before the onset of any psychopathological clinical symptoms appear preferable. Third,

as Moffit et al. (1983) have noted, one of the serious problems of longitudinal research is that the variables and theories that are important at the inception of the project may become outdated later. Therefore, it is important that researchers beginning a longitudinal risk project avoid strong theoretical biases and etiological parochialism, select variables that are theoretically eclectic, and refrain from postulating causal hegemony. Accordingly, the present study adopts a strategy which Zubin and Spring (1977) picturesquely described as "squeezing the juice out of all models into a goblet and see what the elixir consists of" (p.109). Put in another way, the present study tried to pool the findings from previous schizophrenia research to extract a combination of risk markers that can best guide research. Based on past research on schizophrenia and current findings from different longitudinal studies, two risk markers associated with interpersonal functioning and one associated with the information-processing domain appear to be of particular significance: deviant interpersonal behavioral patterns such as aggression, withdrawal or the combination of both, inharmonious peer relationships, and attentional impairment. It is important to note that the major focus of this study was intended to be a pilot study to test the feasibility and usefulness of the multidimensional risk approach, rather than arguing for the superiority of a specific combination of risk markers over other combinations. The decision to include these three variables in the multidimensional risk index was based

mainly on practical rather than theoretical considerations.

Premorbid interpersonal functioning

Interpersonal functioning is an important domain in which high risk researchers have looked for reliable risk markers that characterize the early behavior of the preschizophrenic. Within the past 20 years, retrospective, follow-up, follow-back, and longitudinal high risk studies have yielded important data regarding specific disturbances in the interpersonal functioning of preschizophrenics. Although the literature on premorbid behavioral characteristics is methodologically diverse, consistent findings do emerge from this research. In particular, deviant behavioral patterns such as being aggressive, withdrawn or both aggressive and withdrawn, and inharmonious peer relationships such as disliked or rejected by peers have repeatedly been found among preschizophrenics.

Studies based on child guidance clinic records

Friedlander (1945) followed up 27 patients seen at the Institute for Juvenile Research who were subsequently hospitalized; 16 were diagnosed schizophrenic. During childhood seven of these children were primarily aggressive and eight withdrawn. Similarly, Frazee (1953) reported on 23 children seen at the Institute for Juvenile Research in Illinois, who were later admitted to a mental hospital, and compared them to 23 children also seen at the Institute who were not later hospitalized. Both groups were characterized by a good deal of aggressive, delinquent behavior. The

preschizophrenics, however, showed more withdrawal than the controls; 12 were described as having no friends, and none was regarded as having normal peer relations.

Michael et al. (1957) followed 606 boys seen at the Dallas Clinic. Subjects were divided into three groups: predominantly shy children (introverts); aggressive, behavior-disordered children (extroverts); and a group with both types of problems (ambiverts). The results revealed 10 cases of schizophrenia - an overall incidence figure of 1.5%. One (0.6%) case of schizophrenia was found among the introverts, three cases (1.1%) were found among the extroverts, and six (3.4%) among the ambiverts. This findings is consistent with that of Bellak and Parcell (1946) who found that out of their 100 schizophrenics, the antecedent personalities of 28% were introverts, 35% extroverts, and 37% ambivert.

Robins (1966) found somewhat similar results in a 30-year followup of 524 children at St. Louis Municipal Child Guidance Center. She revealed that "the potential schizophrenic....was a boy referred for antisocial behavior. But to this picture was added his alienation from his contemporaries and overdependence on his mother. In addition to his antisocial behavior, he had somatic complaints, appeared worried and brooding." (p.258) The quote from Robins (1966) indicates that the antisocial preschizophrenic often has some symptoms not typical of the other antisocial children - social isolation, overdependency, somatic complaints, worry, and brooding. O'Neal and Robins (1957) divided the antisocial boys into

those with delinquency (having been brought before the courts) and those whose antisocial acts were more minor or who tended to direct these actions toward family members. It was actually this latter group that had the preponderance of prepsychotic children. Robins (1979), therefore, concluded that a high degree of both antisocial and nonantisocial (or neurotic) symptoms together produced a higher proportion of schizophrenics (11%) than did any one type of symptom alone.

Another follow-up study (Fleming & Ricks, 1970; Ricks & Berry, 1970) analysed therapists' notes from the files of Boston's Judge Baker Guidance Clinic. The files of 30 later chronic schizophrenics (those who were continuously in the hospital during the course of study), 38 later released schizophrenic patients (those whose hospitalizations had been terminated by return to some degree of participation in community life), and 37 individuals who were seen at the clinic when they were children and who had achieved satisfactory work and social adjustment as adults, were compared. The childhood records of the chronic schizophrenic fell into two major patterns, labeled "withdrawn" and "delinquent". Children with the withdrawn pattern suffered from poor social adjustment and exhibited a variety of serious psychiatric symptoms. Adjustment in school and in the community was very poor, and friendships were rare. Acting-out behavior at home, such as defiance of parents, tantrums, and disorganized destructive activity was frequent, although acting out in the community was rare. In addition, frequent

mention was made in the records of symptoms suggestive of neurological impairment (hyperactivity, poor coordination, impaired attention span,etc.). In contrast, the delinquent pattern among these later chronic patients was characterized by extensive acting out (stealing, lying truancy, and destructive activity) in the community as well as at home. This group also had few childhood and adolescent friendships. The released schizophrenic group showed three major patterns of childhood and adolescent adjustment. One large group showed no unusual difficulties to distinguish them from the control children. A second group showed a withdrawal pattern similar to that seen in the chronic group. The third group showed an acting-out pattern similar to that seen in the delinquent chronic schizophrenic sample, including aggressive behavior toward peers. The chief factor that distinguished chronic from released cases in this study was the presence of signs of neurological impairment in the former group. Morover, Fleming and Ricks (1970) indicated that about 90% of preschizophrenic adolescents felt friendless, unliked, and insignificant.

In another study of child guidance clinic files, Roff et al, (1976) conducted a factor analysis for a sample of 45 schizophrenic males. They found that 80% of the sample whose premorbid behavioral profile had been characterized as schizoid (socially withdrawn with flat affect) later developed chronic schizophrenia, compared to morbidity rates of 27% for unsocialized aggressive, 0% for neurotic only, and 75% for neurotic-low IQ behavioral types. When the schizoid factor

scores of all 45 subjects were partitioned into High, Medium, and Low categories, 71% of those in the High Schizoid group were schizophrenic in adulthood, compared to 31% of the Medium and 16% of the Low Schizoid subjects.Furthermore, they found that schizoid symptoms were related to poor outcome, whereas aggressive and antisocial symptoms were associated with good outcome.

Studies based on school records

Based on a review of previous retrospective studies concerning the personality antecedents of schizophrenics, Bower et al. (1960) concluded that socially introverted or shut-in personality was the most common personality type found in preschizophrenics. The "stormy" personality who alternated between periods of rage and attack and periods of passivity and calmness was also often associated with preschizophrenic functioning. Bower and colleagues also presented data gathered from retrospective teacher ratings of 44 adult male schizophrenics' earlier classroom behavior. Results indicated that, compared to controls, the index subjects were perceived by school staff as significantly more passive toward others and toward the environment, apathetic, careless, dependent, irresponsible, depressed and submissive. They tended to have limited interest in girls, group activities, and sports. In addition, they were also perceived as more overtly anxious and were less liked than others by their peers.

Warnken and Seiss (1965) compared teacher comments for 116 male schizophrenics and 116 normal controls. Normals were

described primarily in positive terms, whereas the reverse was the case for preschizophrenics. Preschizophrenics were considered dependent, dreaming, feeling inferior, peculiar, and not well balanced. Behaviorally they were described as both disruptive and withdrawn, using such adjectives as quick-tempered, restless, and uncooperative or quiet, shy, and lacking initiative. When rated by the investigators on a 5-point aggressiveness-passivity scale, preschizophrenics were rated as more passive during primary, junior high, and high school periods.

Woerner et al. (1972) looked at teacher comments and participation in school activities for 33 schizophrenics and 45 personality disorder patients as compared to their same sex siblings. Results indicated that schizophrenic patients, as a group were rated as significantly more irritable, shy, dependent, and nonaffectionate in childhood than their siblings. They had significantly more conduct problems, neurotic traits and more difficulties in peer relationships and were rated poorer on overall childhood adjustment. However, similiar differences were found when patients with diagnoses of personality trait disturbance were compared with their siblings. These findings suggest that disturbances in interpersonal functioning may be associated with general disturbance or psychopathology in adulthood, rather than being specific to schizophrenia.

In a series of studies, Watt and his colleagues (e.g. Watt, 1978; Watt et al., 1979) examined teachers' ad lib

comments in the cumulative school records of 54 children who were hospitalized for schizophrenia as adults and 143 matched control children. The preschizophrenic boys were described as negativistic, egocentric, unpleasant, and anti-social, while preschizophrenic girls were primarily quiet, and introverted, though also egocentric. Both sexes were seen as emotionally unstable and less liked by their peers. A longitudinal analysis (Watt et al., 1979) of the data revealed that preschizophrenics were hardly distinguishable behaviorally from their classmates in the elementary grades (kindergarten through grade six), but in the adolescent school years (grades seven through 12) behavioral differences emerged rather clearly. Preschizophrenic boys became more irritable, aggressive, negativistic, and defiant of authority, but not more introverted. Comparisons among the girls showed strong trends toward increasing shyness and introversion in those destined to become schizophrenic. Watt (1978) suggested that the longitudinal changes of premorbid behavioral patterns represented primarily increments in degree of deviation rather than fundamental changes in modes of adjustment.

High-risk studies with outcome data

Similar findings have also been found by the preliminary followup analyses of different high-risk studies. In the Danish study, Schulsinger (1976) revealed that 15 risk children who later developed schizophrenia had been perceived by teachers as significantly more aggressive, domineering, easily angered, and violent than both normals and risk

children who did not develop the disorder. In another recent analysis of teacher reports, John et al. (1982) indicated that male preschizophrenics (n=9) were generally described as "easily excited or irritated", "often disturbs the class with inappropriate behavior", and "lonely and rejected by others"; female preschizophrenics (n=7) were described as "nervous", "lonely and rejected by others". Moreover, the males later diagnosed as borderline (n=30) were seen by teachers as isolated, lonely, and rejected, whereas the female borderline schizophrenics (n=22) were described as shy, reserved, and silent.

In the UCLA family project (Rodnick et al., 1984), 17 subjects were classified in the extended schizophrenia-spectrum outcome group in young adulthood. Five of them had been characterized as aggressive-antisocial, another five had active family conflict, only one had been described as passive negative, and six were withdrawn and socially isolated. When a more conservative definition of schizophrenic outcome (definite borderline or schizophrenic outcome) was adopted, eight subjects were found. Out of this eight, two were aggressive-antisocial, three had active family conflict, one was passive negative and two were withdrawn and socially isolated.

Recent findings from the New York High Risk Project (Glish et al., 1982) revealed that six children (five high risk and one normal control) had been hospitalized and diagnosed as having some form of schizophrenia. As a group

they were more emotionally unstable, significantly more unpleasant, unpopular, and had less harmonious relations at school. Earlier parental assessment of the social (aggressive or withdrawn behavior) adaptation of these children indicated that three of them were withdrawn while the other three were both aggressive and withdrawn during middle childhood.

In the Israeli study (Hans et al., 1985), nine of the offspring of schizophrenics received a diagnosis within DSM-III's schizophrenia-spectrum disorders (six were clear cases of schizophrenic psychosis and three were schizoid personality disorders). Eight out of these nine individuals showed school age problems in interpersonal functioning. Among them, three showed behavior problems in the area of social withdrawal, one was extremely aggressive, and the other three showed problems in both areas. Moreover, all breakdown subjects showed problems in peer relationships and were rejected by their peers.

Table 1 sums up the findings reviewed above concerning interpersonal disturbances of preschizophrenics. Despite marked differences in investigative method and in the selection of subject samples, the combined data of these studies suggest three major modes of adaptation in which the preschizophrenic individual attempts to adjust to his or her personal difficulties: (1) the aggressive pattern (marked by disruptive, acting-out and antisocial behaviors); (2) the withdrawn pattern (marked by social isolation, passivity and oversensitivity); (3) the aggressive-withdrawn pattern (marked

Table 1

Summary of studies on disturbances in interpersonal functioning of preschizophrenics

	Aggressive	Withdrawn	Aggressive-Withdrawn	Peer Problems
Clinic studies:				
Parcell(1946)	yes	yes	yes	
Friedlander (1945)	yes	yes		yes
Frazee(1953)	yes	yes		yes
Michael et al. (1957)	yes	yes	yes	
Robin(1966)			yes	yes
Fleming & Ricks (1970)	yes	yes	yes	yes
Roff et al.(1976)	yes	yes		
School studies:				
Bower et al.(1960)		yes	yes	yes
Warnken & Seiss (1965)	yes	yes		
Woerner et al. (1972)	yes	yes		yes
Watt et al.(1979)	yes	yes		yes
High-risk studies with breakdown cases:				
Mednick et al. (1984)	yes	yes		yes
Goldstein et al. (1984)	yes	yes		yes
Glish et al.(1982)	yes	yes	yes	yes
Han et al.(1984)	yes	yes	yes	yes

by the co-occurence of both). These behavioral patterns have shown considerable communality across studies of the premorbid maladaptive behavior of schizophrenics. Perhaps, then, there are multiple behavioral pathways to schizophrenia.

The most consistent finding concerning disturbances in interpersonal functioning, however, is the preschizophrenic's inharmonious peer relationships. Of the 15 studies reviewed above, there are 11 which provide information concerning premorbid peer relationships. All 11 studies noted that preschizophrenic individuals, regardless of behavioral style, tended to be friendless, unpleasant, unpopular, rejected, and disliked by peers. This finding is consistent with that of Cowen et al. (1973) who reported that peer ratings were the best childhood predictor of adult mental health in their study. A child's ability to initiate and maintain harmonious relationships with others is an essential component of socialization. Its absence may retard the normal course of social and emotional development. The unpopular child is locked in a vicious cycle where he/she lacks the skills to establish and maintain harmonious relations with peers, and, in turn, to benefit from these relations. This process can actively exacerbate early difficulties and increase the probability later on of more serious psychiatric problems.

Attentional impairment

Reports of attentional and information-processing deficits have also been prominent among studies of schizophrenics as well as recent studies of high risk

populations. Attentional impairment has consistently been found in actively symptomatic and remitted schizophrenic patients (Nuechterlein & Dawson, 1984b); children of schizophrenic parents and their siblings (Cornblatt & Erlenmeyer-Kimling, 1984; Cornblatt & Marcuse, 1986; Nuechterlein, 1983; Parnas et al., 1982; Sohlberg & Yan, 1985; Steffy et al., 1984; Weintraub & Neale, 1984); persons without schizophrenia but who have some schizotypal features based on personality questionnaire data (Asarnow et al., 1983); individuals who have biochemical characteristics which have been postulated to be associated with schizophrenic symptomatology (Buchsbaum et al., 1978); and individuals who show deviant behavioral patterns which have been found to be characteristics of preschizophrenics (McGuire, 1983). The consistency of this finding across studies is impressive considering the differences in the attentional task employed and in the characteristics of the samples. This evidence suggests that certain forms of impaired information processing may be markers of vulnerability to schizophrenia.

Based on the fact that a great variety of tasks and measures on which attentional performance deficits have been found across the at-risk, actively symptomatic, and relatively remitted populations, Nuechterlein & Dawson (1984b) have suggested that a malfunction affecting a variety of elementary information processing operations, rather than a single deficient elementary process, may be involved. Moreover, their frequent observation that tasks with high as opposed to low

momentary processing load elicit deficits in populations at risk for schizophrenia and in remitted schizophrenic patients, has led them to conclude that a reduced amount of processing capacity available for task-relevant cognitive operations may underlie a variety of deficits on different attentional measures in persons at risk or already manifesting a schizophrenic disorder.

Among the different attentional measures, the forced-choice Span-of-apprehension task (SOA: Neale et al., 1969) has had a long and fruitful history in the experimental study of cognitive processes in schizophrenia. Using the span of apprehension (SOA) task, Neale et al.(1969) and Neale (1971) demonstrated that the identification of the target letter in tachistoscopic presentations was impaired among symptomatic schizophrenic patients, as compared to nonpsychotic psychiatric patients and normal subjects, as the array size increased in the SOA procedure. Asarnow and MacCrimmon (1978) also showed that tachistoscopic identification of the target letter became significantly deficient as compared to normal performance, among both relatively remitted and acutely disturbed schizophrenic patients as the size of the letter array increased. Furthermore, the remitted and acutely disturbed patients did not differ significantly from each other. Asarnow and MacCrimmon (1981) extended this finding by showing that outpatient schizophrenic patients who were free from major clinical symptoms and had maintained a stable community adjustment for at least a year were more impaired in

SOA performance than manic-depressive patients who met the same stability criteria. In order to examine the stability of SOA performance over changes in clinical state more directly, Asarnow and MacCrimmon (1982) examined a small number of schizophrenic patients one week after hospitalization and 12 weeks later as outpatients. Compared to normal subjects tested at comparable intervals, the schizophrenic patients showed significantly poorer target detection across both sessions in the condition with the largest letter array (nine letters in their study). Initial SOA performance was stable over time (r=.74). This study extends the previous findings by demonstrating that schizophrenic patients do have stable deficits on this task across a change in overall clinical state.

The SOA procedure has also been applied to screen risk samples. Asarnow et al. (1977) found that foster children born to schizophrenic mothers, especially a deviant subgroup, identified significantly fewer target stimuli than foster children with nonpsychiatric biological parents or nonfoster normal comparison children as the number of irrelevant letters in the array increased. Recognition accuracy did not differ for arrays in which the target simulus was presented without distractor stimuli. They also pointed out that the pattern and level of impairment on this task was strikingly similar among this subgroup of high risk children and among acutely disturbed schizophrenic patients.

In examining attentional functioning in disturbed

adolescents who had been defined as individuals at risk for schizophrenia on the basis of possessing both aggressive and withdrawal tendencies simultaneously, McGuire (1983) found that high aggression-withdrawal scores were positively associated with more errors at the highest distraction condition (11 letters in this study) of the SOA task. Aggression scores alone, however, were negatively correlated with SOA errors across distraction conditions. Higher levels of aggression were in fact associated with superior performance, particularly on the most difficult distraction arrays. Withdrawal scores alone were not correlated with SOA errors on the most difficult arrays.

In a study of subjects drawn from temporary employment agencies, Asarnow, Nuechterlein, and Marder (1983) also showed that young adults without a history of psychiatric disorder who had deviantly low scores on a large-array (14 letters in this study) SOA task were characterized by significantly higher scores on the MMPI Schizophrenia scale, the Schizoidia scale(Golden & Meehl, 1979), the Schizophrenism scale (Nielsen & Petersen, 1976) and the Magical Ideation scale (Eckblad & Chapman, 1983) than the rest of the subjects.

In short, the large-array SOA task has repeatedly detected a deficit in risk samples defined by genetic criteria (Asarnow et al., 1977), by deviant behavioral patterns (McGuire, 1983) or by personality test data (Asarnow et al., 1983); in symptomatic inpatients (Neale et al., 1969; Neale, 1971; Asarnow and MacCrimmon, 1978); and in relatively

remitted outpatients (Asarnow and MacCrimmon, 1978, 1981). This suggests that the SOA procedure, which requires a high momentary processing load, is a sensitive measure of attentional deficit in schizophrenia.

In concluding this section on the risk markers to be considered for inclusion in the multidimensional risk index, it is important, however, to note that deviant behavioral styles, inharmonious peer relationships, and attentional impairment, on their own, have not been found to be specifically related to schizophrenia. Each has been associated with other types of psychopathology (Neale et al., 1984; Weintraub & Neale, 1984; Woerner et al., 1972). When considered as a constellation, however, these three risk markers have repeatedly been reported as "core" characteristics of preschizophrenic functioning (Erlenmeyer-Kimling et al., 1984; Fleming & Ricks, 1970; Hans et al., 1985; Mednick et al., 1984; Offord & Cross, 1969; Steffy et al., 1984; Weintraub & Neale, 1984). Moreover, these three risk markers also satisfy the guidelines mentioned at the beginning of this section. That is, (1) they are relatively economical and convenient to assess for initial large-scale screening purposes; (2) they constitute early signs or precursors of psychiatric difficulty; and (3) they are theoretically eclectic in that they have been reported as preschizophrenic characteristics across different risk models. Thus, the inclusion of these three risk markers to comprise a multidimensional risk index for schizophrenia appears to be

strongly indicated.

Validational Measures

The ultimate utility of this multidimensional risk index in the prediction of schizophrenia may take as long as 40 years to determine (Asarnow, 1983). This is obviously too long a time to test its predictive power. One approach in dealing with this problem, as suggested by Moffit et al. (1983), is to examine certain areas of functioning that have also been reported to be useful in differentiating schizophrenic from normal individuals as well as high risk from low risk individuals. Three different domains: neuromotor functioning, intellectual functioning, and social competence have shown differentiating power in previous studies. Previous findings on these three variables may not be as consistent as the three predictor variables. There is, however, still enough evidence to substantiate their discriminative utility.

Neuromotor functioning

Neurological impairments of one kind or another have been included in descriptions of schizophrenia since Kraepelin (1919) first defined Dementia Praecox. A neurointegrative defect is widely believed to be at the base of the disorder (Marcus et al., 1984). A general assumption held by many researchers (Erlenmeyer et al., 1982; Fish, 1984; Meehl, 1972) is that : (1) in most cases, schizophrenia occurs in persons with a specific neurological predisposition (be it inherited or acquired), in interaction with nonspecific environmental stresses; (2) the neurological predisposition is mediated by

disturbances in neuroregulatory systems; and (3) these disturbances are expressed phenotypically as neuromotor, neurophysiological, and attentional-informational processing deviations that appear long before psychosocial and clinical disruptions emerge.

A number of studies (Cox & Ludwig, 1979; Hertzig & Birch, 1968; Mosher et al., 1971; Quitkin, et al., 1976; Rochford et al., 1970; Torrey, 1980) reported a higher incidence of what are variously called "neuromotor abnormalities", "neurologic soft signs", "neurobiological impairments" or "neurological deviations" in schizophrenics. They all refer to minor motoric or sensory abnormalities, without localizing value, detected during neurological examination. For example, Rochford et al. (1970) reported that half of their 26 schizophrenic subjects had either one hard neurological sign or at least two soft signs, compared with 41% of 27 cases of personality disorder. Torrey (1980) reported one (9%) of 11 acute, nine (24%) of 37 subacute and 19 (53%) of 36 chronic schizophrenics had at least one soft sign. Cox and Ludwig (1979) also indicated that schizophrenics differed significantly from other psychiatric populations (alcoholism, unipolar depression, bipolar illness and mixed character and neurotic disorder) in degree of neurological impairment. The noted impairments were mostly accounted for by soft signs related to the frontal and parietal lobes.

Another set of studies is directed at children at risk for developing schizophrenia. In a recent review, Erylenmeyer-

Kimling et al. (1982) indicated that out of the eight separate samples of high-risk infants for which neurological and developmental data were obtained, four (Fish, 1977; Marcus et al., 1981; Mednick et al., 1971; Ragins et al., 1975) provided evidence of neurological abnormalities and delays in neuromotor development, three (Hanson et al., 1976; Marcuse & Cornblatt, 1986; Ragins et al., 1975) did not, and one (McNeil & Kaig, 1984) was inconclusive. However, all studies examining neurological and motor functioning of high-risk children and young adolescencts have shown some areas of dysfunction (Erylenmeyer-Kimling et al., 1982; Walker & Emory, 1983). For example, Fish & Hagin (1973) reported perceptual disabilities, poor fine-motor coordination, and specific reading disabilities in her high-risk subjects at age 10. The same soft neurological signs, as well as deficient left-right orientation and poor auditory-visual integration, were seen in high-risk children in the Israeli high-risk project (Marcus, 1974). In the New York high-risk project, high-risk subjects in each of the two independent samples showed deficiencies in gross and fine motor abilities, especially in the latter, and in perceptual abilities and left-right orientation (Erlenmeyer-Kimling et al., 1984). Difficulties in motor abilities among the children of schizophrenic parents were also seen in each of the three studies that used data from the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS) Collaborative Perinatal Project (Hanson et al., 1976; Marcuse & Cornblatt, 1986; Rieder & Nichols, 1979).

Hanson et al.(1976), using a motor abilities score that combined both gross and fine-motor items in their examinations, noted poor motor skills at age four in 30% of the high-risk subjects; but, more importantly, 17% of the high-risk subjects had poor motor skills, large intra-individual variability on psychological tests, and schizoid behavior -- a pattern of deviance that was seen in none of the normal controls or in children of parents with other psychiatric disorders. Poor fine-motor abilities among the high-risk children were also reported by Rieder and Nichols (1979), and by Marcuse and Cornblatt (1986).

Although the findings reported for high-risk infants are mixed, the previous studies of young adolescents consistently show that something is amiss in the neuromotor functioning of high-risk subjects. Impairment of fine motor coordination was the single neuropsychological sign reported by all investigators. Delay in motor development was noted as well (Erlenmeyer-Kimling et al., 1982).

Preliminary followup findings from three high-risk studies also point to the same conclusion. Fish (1984) reported that six of her 12 high-risk subjects were diagnosed as having severe schizophrenia spectrum disorders. All six subjects had exhibited Pandymaturation (PDM) - a lag in physical growth and a lag in gross motor and/or visual motor development - in infancy and childhood. In the Israeli High-risk Study, seven subjects who have shown psychiatric breakdown in adolescence also had signs of neuropsychological

dysmaturation during childhood (Marcus et al., 1984). The dysmaturation included disturbances in the perceptual-sensory domain, motor coordination, right-left orientation, balance, and motor control. In the New York High-risk Study, five high-risk subjects, two psychiatric control subjects, and one control were hospitalized for psychiatric disorders, most of them with schizophrenic-spectrum diagnoses (Erylenmeyer-Kimling et al., 1984). Fifteen had been in psychiatric treatment. The treated subjects included ten children of schizophrenic parents, four children of depressed parents, and one child of normal parents. The hospitalized and treated high-risk subjects, compared to the remaining high-risk subjects or the groups of subjects with depressed or normal parents, showed a pattern of lower intelligence, a deficit in verbal intelligence, and relatively poor performance on the Bender-Gestalt Test, on a neurological examination, on the Lincoln-Oseretsky Test of Motor Impairment, and on attentional indices at a younger age (7 to 12 years). Subjects from the latter two groups who had subsequently been hospitalized or were in treatment did not show this pattern of performance deviations.

Taken all together, the studies of neuromotor functioning in children at risk for schizophrenia suggest that various kinds of neuromotor disruptions occur in these groups of subjects long before they show any psychiatric problems.

Intellectual functioning

Intelligence reflects cognitive maturity of a person. It

is concurrently correlated with social maturity and every measure of success or status in childhood and adulthood (Kohlberg et al., 1972). Due to its reliable predictive power of adult adjustment, and also the fact that pervasive cognitive deficits have been frequently associated with a diagnosis of schizophrenia, a great deal of research has been devoted to determining whether a relationship exists between intelligence and schizophrenia.

Most of the early studies of intelligence in schizophrenia research were conducted to determine whether persons suffering from the disorder manifested intellectual deficits. Early investigations using the Stanford-Binet and the Wechsler tests suggested that schizophrenic patients perform at least slightly below average on tests of intelligence (Lehman, Chelune, & Heaton, 1979; Payne, 1960; Pollack, Woerner, & Klein, 1970; Winder, 1960).

Recent investigations sought to determine whether lower intelligence occurs as a precursor to schizophrenia, or occurs only concomitantly with the overt expression of the illness. Most of these are retrospective studies which compare premorbid intelligence of schizophrenic patients with intelligence levels of their peers, schoolmates, or siblings. Studies based on army intelligence tests (Mason, 1956; Miner & Anderson, 1958) or child guidance clinic records (Frazee, 1953; Roff et al., 1976) pointed to the same conclusion that preschizophrenics as a group scored significantly lower than the controls. Similar findings have also been reported by

other investigations based on school records (Albee et al., 1964; Bower, Schellhamer, & Daily, 1960; Lane & Albee, 1964, 1965; Pollack, Woerner, & Klein, 1970; Offord & Cross, 1971; Schaffner et al., 1967; Watt & Lubensky, 1976). Aylward, Walker, and Bettes (1984) conducted a meta-analysis of the results reported in these studies of preschizophrenic intelligence. Their analyses indicated that although results were mixed in comparisons of preschizophrenic children and their siblings, there was strong evidence of lower intelligence in preschizophrenics when compared to their peers. They argued that while some studies showed the preschizophrenics to have lower childhood intelligence than their siblings, and other studies showed no preschizophrenic - sibling differences, none of the studies found evidence for higher intelligence among preschizophrenic individuals. This observation, along with strong evidence for preschizophrenic-control differences, suggests that low childhood intelligence is associated with risk for schizophrenia.

Aylward, Walker, & Bettes (1984) also conducted a meta-analysis on data reported in six high-risk studies (all defined risk in terms of maternal diagnosis). Their findings indicated that the offspring of schizophrenic mothers obtained lower intelligence scores than children of normal mothers, although differences were not as large as those yielded by comparisons of preschizophrenic children with siblings and peer controls.

The psychiatric outcome data from the New York High-risk

Project also revealed significantly lower intelligence in schizophrenic high-risk subjects than the nonschizophrenic high-risk subjects (Erylenmeyer-Kimling et al., 1984). Moreover, they also found a relative deficit in verbal intelligence when compared to non-verbal intelligence in the schizophrenic high-risk subjects. Thus, they suggested that low intelligence (especially verbal) may be an early marker for clinical breakdown in schizophrenia. Mednick et al. (1984), however, reported that the schizophrenic high-risk subjects in the Danish Project did not differ significantly in full scale intelligence from same-sex nonschizophrenic high-risk subjects. A possible explanation for their findings might be that all high-risk subjects in their project have low intelligence to begin with. This explanation is reasonable considering the fact that all high-risk subjects in their study are the offspring of severe chronic schizophrenic mothers.

In summary, previous findings show that there is strong evidence that diagnosed schizophrenic patients score lower on standardized measures of intelligence than normal controls. Moreover, premorbid scores of schizophrenic patients, obtained during childhood, adolescence, and early adulthood, are lower than the scores of their siblings and peers with similar social class origins. Thus, intellectual deficits appear to be associated with schizophrenia across the lifespan of the index cases.

Social competence

Social competence is a multidimensional construct which encompasses a wide variety of age-related behaviors that are required for healthy social adaptation. It refers to a person's ability to respond effectively to those societal expectations that confront him/her according to his/her sex and age (Philips, 1968). Although there is no unanimity among researchers as to the particular characteristics comprising competent behavior, social competence in general is thought to be reflected in the degree to which one works, plays, and loves well (Garmezy et al. 1979). But in concrete terms, it is reflected in successful school or occupational performance, effective social skills development, participation in social activities, and good interpersonal relationships (Achenbach & Edelbrock, 1983; Asher & Hymel, 1981; Fisher, 1980). Early social competence is important in that incompetent individuals are likely to continue to have problems because of the accumulative effects of incompetent behavior. Task failure leads to social rejection, and tends to lock the child into a pattern of continuing failure and rejection (Kohlberg et al., 1972).

The relevance of competence to schizophrenia is indicated both by the schizophrenic's social incompetence (Deutsch, I942; Sullivan, 1931), and by the fact that measures of competence have proven to be the most powerful predictors of course and outcome in adult schizophrenia (Strauss & Carpenter, 1981). Research on the role of premorbid competence

in relation to course and outcome of schizophrenia has also revealed that premorbid competence is a partial inoculant against mental disorders of various kinds. A history of social competence serves as a favourable prognostic sign in assessing psychiatrically disturbed individuals (Strauss & Carpenter, 1974; Phillips, 1968; Wiener, 1958).

Based on a review of retrospective case studies, White (1965) has pointed out that " weak action on the environment has very great generality in schizophrenic behavior. Poor direction of attention and action, poor mastery of cognitive experience, weak assertiveness in interpersonal relations, low feelings of efficacy and competence, a restricted sense of agency in leading one's life - all these crop out in almost every aspect of the schizophrenic disorder.....this ineffectiveness in action is central not only in the picture of the schizophrenic's ultimately disordered behavior but also through his whole development - that from the start it is the future schizophrenic's major liability. It characterizes his behavior from an early point in life, and it leads to a precarious development in all the spheres " (p.202).

Based on a review of previous studies on premorbid adjustment of schizophrenics, Garmezy et al. (1979) have also concluded that a significant proportion of preschizophrenics are typically poorly integrated in personality, characterized by social maturational lags, by inadequacy in social and sexual attachments, by an inability to be economically productive at work, and by ineffectiveness at play.

In a longitudinal follow-back analysis, Watt et al. (1979) reported that there was no difference between preschizophrenics and normals in social competence during childhood. During adolescence, however, preschizophrenic adolescents were rated as significantly less harmonious, more emotionally unstable, and less scholastically motivated than normals. In a recent follow-up investigation, Hartmann et al. (1984) also reported that psychosocial indicators of vulnerability such as difficulty in interpersonal relationships (having little or no peer group relations), lack of competency (delays in developmental milestones; poor schoolwork; poor sense of competence), poor academic ambition, poor vocational ambition, negative attitude toward school, and poor group activity involvement during adolescence were found to be significantly related to schizophrenic outcome. These findings are highly consistent with those of an earlier retrospective study by Bower et al. (1960) who found that preschizophrenic adolescents tended to have limited interest in groups activities and athletics. They showed poor leadership skills, and were submissive, anxious, dependent and careless. They were less well liked than others by their peers and teachers and did less well in school.

Follow-up findings from longitudinal high-risk research also provide some support for this position. For example, the schizophrenic high-risk subjects in the Danish Project were reported as isolated, socially inept, behaving inappropriately in school and as constituting a disciplinary problem for the

teacher (John et al., 1982). In the New York Project, schizophrenic high-risk subjects were also described as presenting greater disharmony, less scholastic motivation and more emotional instability at school (Cornblatt & Marcuse, 1986; Watt et al., 1984). In the McMaster-Waterloo high-risk project, Asarnow (1983) identified a subgroup of the high-risk subjects showing profound deficits in attention, and therefore considered at highest risk for schizophrenia. They were found to be socially inept, and reported as having scholastic difficulty and poor interpersonal relationships. In the Israeli Study, schizophrenic high-risk subjects were also characterized by premorbid incompetence. They were found to have lower peer-rated social status and were less likable. They failed to enjoy social activities, lacked social initiative and were less motivated in school (Hans et al., 1985). Similar findings were repeatedly reported by other high-risk projects (Fisher et al., 1984; Garmezy & Devine, 1984; Weintraub & Neale, 1984). It would appear then that social incompetence, especially during adolescence, is a significant component of preschizophrenic functioning.

Rationale of the Present Study

The purpose of the present study was to determine the usefulness of a multidimensional risk index developed on the basis of the foregoing research findings. The subjects used in the present investigation participated in the Concordia Longitudinal High-Risk Project (Ledingham, 1981; Schwartzman et al., 1985). The investigators of this project hypothesized

that the co-occurrence of highly aggressive and withdrawn behavior places the person with these features at particular risk for adult schizophrenia. Deviant social behavior, on its own, however, may not be sufficiently specific as a risk criterion. The present investigation utilized deviant behavior patterns, inharmonious peer relationships and attentional impairment to comprise a multidimensional risk index. The aim was to identify "outliers" (defined as those who show multiple deviance in the present study), who may be at greatest risk for schizophrenia in adulthood.

Deviant social behavior patterns and inharmonious peer relationships were assessed in a school setting using the Pupil Evaluation Inventory, a peer nominations procedure developed by Pekarik and his colleagues (1976). Peer evaluations were used because: (1) they are based on the rich, nontest context of the child's real-life environment and are derived from observations made over extended periods of time by multiple observers whose varying perspectives stem from diverse personal relationships with the child (Smith, 1967); (2) peer ratings are stable over time , across sex of raters, and over a wide age range (Minturn & Lewis, 1968), and they are minimally influenced by social desirability variance (Norman, 1963); (3) peer ratings predict adult maladjustment (Roff & Sells, 1968; Cowen et al., 1973; Rolf, 1972). Attentional impairment was measured using the Span of Apprehension task (Neale et al., 1969). This task was chosen because of its sensitivity to attentional deficit in

schizophrenia research (Nuechterlein & Dawson, 1984b). Table 2 sums up the criteria for subject selection for the present study. The present design was expected to identify the most extreme subgroup within each socially deviant group, and an especially healthy group of control subjects.

In order to assess the discriminatory utility of this multidimensional risk index, three different domains were examined in the present study: neuromotor functioning, intellectual functioning and social competence. Neuromotor functioning was measured using the Lincoln-Oseretsky Test of Motor Impairment (Sloan, 1955). This test was used because it has been shown to be one of the best childhood measures in predicting later schizophrenic outcome in the New York High-risk Study (Erylenmeyer-Kimling et al., 1984). Intellectual functioning was assessed using the revised Wechsler Intelligence Scale for Children (WISC-R) and the revised Wechsler Adult Intelligence Scale (WAIS-R). This test was chosen because it is the most widely used intelligence test among high-risk researchers and it has also shown reliable differentiating power in schizophrenia research (Aylward et al., 1984). The Social Competence Scale of the Achenbach Child Behavior Checklist (CBCL): Parent Report Form (Achenbach & Edelbrock, 1981) was selected to measure competence. This scale is useful because it covers several diverse areas of functioning such as academic adjustment, interpersonal relationships, and social activities, thus providing a comprehensive index of competence. The parent report form of

Table 2

Multiple criteria for selection of at-risk outliers and contrasts

Outliers				Contrasts			
Subjects who scored within the top 25 % of the SOA error scores and the bottom 25 % of the likability scores				Subjects who scored within the lower 50 % of the SOA error scores and the upper 50 % of the likability scores			
Aggr	Withd	Agg-with	Contr	Aggr	Withd	Agg-with	Contr

this measure was chosen because parents are among the most universally available informants and the most knowledgeable concerning their child's behavior across time and situations (Achenbach & Edelbrock, 1983). Problems arising in interactions with parents are likely to be relevant for children's long term adaptation. Moreover, the information collected from the social competence scale of the CBCL : Parent Report Form can provide a means to validate information obtained several years earlier from peer ratings of interpersonal competence.

Subjects in the Concordia High Risk Project were first seen between the ages of 7 to 13 years in 1977-1978. The mean age of this sample is now approximately 18.5 years, and most of the subjects have thus entered the risk period for schizophrenia. Many previous studies (Ricks & Berry, 1970; Robin, 1966; Roff, 1976) indicated that preschizophrenics had a higher number of psychiatric problems during adolescence. Although we cannot expect to draw conclusions about the final clinical outcome until this sample has passed through a much larger proportion of the risk years, it is still of interest to examine whether there are subjects who have already manifested some type of psychiatric problem up to this point. Therefore, medical information on the contrasts and outliers was also obtained from the Regie De L'Assurance Madadie Du Quebec (RAMQ) to provide an independent source of data to evaluate the utility of the multidimensional risk approach.

To summarize, the objectives of the present research

were:

(1) to identify extreme subgroups of socially deviant subjects using two additional risk markers, namely, inharmonious peer relationships and attentional impairment. Assuming these two additional risk indicators are independent (this assumption is reasonable because they share less than 2% common variance: r= -.13), it is possible to use the sample base rates of each peer-rated group to calculate the percentage of outliers (defined as those who show deviance on both interpersonal relationships and attentional performance) within each group by chance alone. It was expected that the obtained rate of outliers would be higher than the predicted rate within the aggressive, withdrawn, and aggressive-withdrawn groups.It was also expected that proportionally, more outliers would be found among the peer-rated behaviorally deviant groups than their control counterparts.

(2) to assess the discriminatory power of the multidimensional risk index by examining the performance of outliers (defined as those showing multiple deviance) and their contrast counterparts (defined as those showing deviance on social behavior only) on neuromotor functioning, intelligence, and social competence. Intermediate psychiatric outcome data were also obtained for the outliers and contrasts to provide an independent source of information for evaluating the utility of the multidimensional risk approach. If outliers are at greater risk for schizophrenia, it was expected that they would perform more poorly than contrasts in neuromotor,

intellectual functionings and social competence. It was also expected that outliers would show more psychiatric problems than contrasts.

(3) to examine whether the additional risk markers, namely, inharmonious peer relationships and attentional impairment add significant variance beyond that of the behavioral risk marker in predicting performance on the validational measures. It was expected that the three-dimensional risk index would account for significantly more variance than the deviant behavior risk index alone.

Method

Subjects

The subjects of the present study were 505 adolescents who eight years earlier were rated by classmates using the Pupil Evaluation Inventory (Pekarik, et al., 1976) as part of the Concordia High-risk Project (Schwartzman et al., 1985) and were identified as aggressive, withdrawn, aggressive-withdrawn, or normative control. A breakdown of these subjects by Pupil Evaluation Inventory classification, sex, and grade is given in Table 3. All children, ranging in age from seven to 13 years at the time of selection, were selected from a pool of 4107 Francophone children in regular classes of Montreal schools under the jurisdiction of the Montreal Catholic School Commission Board.

The Pupil Evaluation Inventory (see Appendix A) contains 35 items, which load on three factors : aggression (items such as "those who always get into trouble" and "those who are mean and cruel to other children"), withdrawal (items such as "those who are too shy to make friends easily" and "those who often don't want to play"), and likability (items such as "those whom everybody likes"). Children in each class were asked to nominate up to four boys and four girls in the class who best fit the description of each item on the questionnaire. Boys and girls were rated separately by the children in different administrations. The total number of nominations received for each child was calculated separately for items loading on the aggression factor, the withdrawal

Table 3

Distribution of the 505 subjects by PEI classification, sex, and grade

		PEI Classification			
		Aggr	Withd	Aggr-withd	Contr
	Grade				
	1	9	12	17	65
Boys	4	13	16	12	47
	7	5	12	5	24
	Subtotal	27	40	34	136
	Grade				
	1	9	9	28	79
Girls	4	15	12	15	56
	7	8	10	1	26
	Subtotal	32	31	44	161
	Total	59	71	78	297

factor, and the likability factor. Total nomination scores for each factor were subjected to a square root transformation to reduce skew, and converted to Z scores for each sex within each class to remove the effects of age, sex differences in baseline rates of aggression and withdrawal, and differences in class size on total scores.

Deviant social behavioral patterns

Subjects were classified as aggressive if their Z scores for peer-rated aggression exceeded the 95th percentile for same-sex classmates and if their withdrawal Z score fell below the 75th percentile. Withdrawn subjects were those whose withdrawal scores exceeded the 95th percentile and aggression scores below the 75th percentile. Aggressive-withdrawn subjects were those whose scores exceeded the 75th percentile on both dimensions of aggression and withdrawal. Control subjects were those whose scores fell below the 75th percentile on both dimensions. A more complete description of the peer nomination procedure is given by Ledingham (1981).

Inharmonious peer relationships

Z scores on the PEI likability factor were used to determine harmony of peer interpersonal relationships. Subjects with a Z score on the likability factor equal to or lower than -.68 (the bottom quartile cutoff in the Z distribution) were defined as showing inharmonious peer relationships. Subjects with a likability Z score equal to or exceeding .00 (the upper 50th percentile in the Z distribution), on the other hand, were defined as having

normative peer relationships.

Attentional impairment

Attentional functioning was assessed using the Span of Apprehension task (SOA: Neale et al., 1969). This task requires subjects to report the presence of a tachistoscopically presented target stimulus which can be either the letter T or F. The complexity of the stimulus array in which the target letter embedded was manipulated by systematically increasing the number of distractors from 0, to 2, to 4, or to 9. The stimulus arrays were divided by an imaginary 4 X 4 matrix into 16 spatial positions. Target and distractor letters were randomly dispersed across these positions. The apparatus consisted of a Kodak S-2 carousel slide projector with an attached synchro electronic tachistoscopic shutter and a 24 X 24 inch projection screen on which a black dot was printed in the centre to serve as a fixation point.

Testing was performed in a dimly lit, moderately soundproof room. The subject was seated six feet from the screen with the experimenter to the side, out of direct view. The detailed instructions given to subjects appear in Appendix B. There were 12 practice trials (four for each of the distraction array sizes) and 148 test trials (37 for each of the distraction array sizes) These trials were evenly divided into two testing periods with a 2-minute break in between. Each distraction array size was randomly distributed within the 148 test trials. The subject's error score consisted of

the number of incorrect detections of the target stimulus in each distraction condition.

As discussed earlier, many researchers (Asarnow et al., 1983; Nuechterlein & Dawson, 1984b) have noted that among all arrays of the SOA task, only the largest array can detect attentional deficit in preschizophrenics or schizophrenics. In view of this, only performance on the most difficult condition of the SOA task (where the target stimulus was embedded in nine distractor letters) was used to assess attentional impairment. Subjects who made nine or more errors in the 9-distractor condition (the top quartile of the error score distribution) were defined as attention-impaired. Subjects who made seven or less errors (the bottom half of the error score distribution) were defined as "normative contrast" in their attentional performance.

Validational measures

Neuromotor functioning

Neuromotor functioning was assessed using the Lincoln-Oseretsky Motor Development Scale (Sloan, 1955). This scale is designed to test the motor ability of children between the ages of six to 14 years. It is an individually administered scale consisting of 36 items involving a wide variety of motor skills such as finger dexterity, eye-hand coordination, and gross activity of the hands, arms, legs, and trunk (see Appendix C). Both unilateral and bilateral motor tasks are used. Split-half reliability of this scale for each sex at each age level is reported to range from .59 to .93. The

odd-even split-half reliability for all ages for males was .96 and for females .97 (Sloan, 1955).

— All items were scored on a three-point system with some items receiving a different point score depending upon the subject's performance (see Sloan (1955) for detailed description of the scoring procedure). The number of points earned for each of the 36 items was then summed to yield the total score. A high total score reflects high neuromotor ability.

Intellectual functioning

Intellectual functioning was measured using the French version of the Wechsler Intelligence Scale for Children - Revised (WISC-R : Wechsler, 1974) if the subject's age was 16 or below, or the Wechsler Adult Intelligence Scale - Revised (WAIS-R: Wechsler, 1981) if the subject's age was 17 or above at the time of testing. Four verbal (information, similarities, vocabulary, comprehension) and two non-verbal (picture arrangement, block design) subtests were administered. Scaled scores were computed on the basis of norms provided by Chevrier (1967) for Quebec Francophone children. The total intelligence score used in the present study was the sum of these six scaled scores.

Social Competence

A French translation of the Child Behavioral Checklist: Parent Report Form (CBCL: Achenbach & Edelbrock, 1981) was used to assess social competence of subjects. Parents who agreed to participate were administered the scale during the

family interview. The CBCL is designed to record in a standardized format the competencies and behavior problems of children, as reported by parents or caretakers who know the child well. In the present study, only the Social Competence Scale (see Appendix D) was used.

The items of the Social Competence Scale reflect broad categories of social competence which have been reported to be immune to the influence of variations in neighborhood, family background, location, and type of activity (Achenbach, 1979). Psychometric information on the scale has been provided by Achenbach and Edelbrock (1981). Test-retest reliability of the Social Competence Scale completed by mothers of non-referred children was reported as .996 for a 1-week interval (N=72) and and .974 for a 3-month interval (N=12). Interparent reliability for 168 parents of referred children was .978. Referred children obtained significantly lower scores than non-referred children on the total Social Competence Scale score as well as on its three subscales. This was true for all age groups.

In the present study, scores were computed for each subscale according to guidelines provided by Achenbach and Edelbrock (1981). All items were scored on a three-point scale (absence, moderate, frequent). The Activities score was computed as the sum of the ratings attributed to engagement in sports and non-sport activities, to degree of participation and skill in these activities, and to number and quality of jobs held. The Social score was computed as the sum of the

ratings for number of friends, for frequency of contacts with friends, for quality of relationships with others, and for self reliance. The School score was computed as the sum of the ratings for academic performance and for academic status (e.g., special class, grade repeat, and other school problems, which are scored in the positive direction if absent). Finally, a Total Social Competence score was obtained for each subject by summing the three subscale scores.

Intermediate Psychiatric Outcome

Individual medical records were obtained from the Regie De L'Assurance Maladie Du Quebec (RAMQ) for the outliers and contrasts of this study. The medical records cover the period from 1981 to 1984 and contain types of medical assessment as well as types of medical intervention received. Medical assessments performed by medical practictioners of Quebec are classified according to the Diagnostics Selectionnes De La Classification Internationale Des Maladies (CIM-9: Regie De L'Assurance Maladie Du Quebec, 1979). The psychiatric classifications form a section of the CIM-9 and are related to the DSM-III categories. The treatment code is based on the classification guide of medical interventions as established by the RAMQ. This medical guide includes a separate category for psychiatric treatments. The types of psychiatric classification were obtained from the psychiatric assessment records and were grouped into four categories: (1) no psychiatric record; (2) psychotic disorders (e.g. schizophrenia, affective psychosis); (3) neurotic disorders

(e.g. anxiety, neurotic depression); and (4) other disorders (e.g. substance abuse, maladaptive reactions such as acute stress reaction).

Results

Distribution of outliers and contrasts

Based on the multidimensional risk criterion of the present study, 51 outliers and 116 contrasts were selected for further analyses. A breakdown of the outliers and contrasts by PEI classification, sex, and grade is given in Table 4. The variables of grade and sex were collapsed for further comparisons because of the relatively small sample size.

The predicted bottom quartile hit rate for each of the additional two risk markers is 25% for each of the four peer-classified groups. Assuming that inharmonious peer relationships and attentional impairment are independent (this assumption is reasonable because they share less than 2% common variance: see Appendix E), the joint probability of falling in the bottom 25% for likability and in the top 25% for SOA error score is the product of these probabilities, or 0.0625. We thus expected to identify approximately 6% of outliers within each peer-classified group.

Table 5 presents the expected and obtained frequencies and percentages of subjects with inharmonious peer relationships, attentional impairment, and the combination of both risk markers for each peer-classified group. Considering inharmonious peer relationships alone, the obtained hit rates were: 19% for the aggressive, 48% for the withdrawn, 42% for the aggressive-withdrawn, and 23% for the control group. Both the withdrawn and the aggressive-withdrawn groups obtained significantly higher hit rates on this marker than expected

Table 4

Number of contrasts and outliers by PEI classification, sex, and grade

		PEI classification			
	Grade	Aggr	Withd	Aggr-withd	Contr
Contrasts					
	1	1	3	4	14
Boys	4	2	4	0	8
	7	2	2	0	7
	Subtotal	5	9	4	29
	1	1	1	8	24
Girls	4	4	1	1	16
	7	2	1	1	9
	Subtotal	7	3	10	49
	Total	12	12	14	78
Outliers					
	1	1	1	5	5
Boys	4	0	4	3	7
	7	0	0	1	2
	Subtotal	1	5	9	14
	1	1	2	1	6
Girls	4	0	3	4	3
	7	0	2	0	0
	Subtotal	1	7	5	9
	Total	2	12	14	23

Table 5

The expected and obtained frequencies and percentages of subjects with inharmonious peer relationships, attentional impairment, and the combination of both risk markers for each of the four peer-classified groups

	Aggr (n=59)	Withd (n=71)	Aggr-withd (n=78)	Contr (n=297)
Inharmonious Peer Relationships				
Expected freq. (percents)	15 (25)	18 (25)	19 (25)	74 (25)
Obtained freq. (percents)	11 (19)	34 (48)	33 (42)	68 (23)
Attentional Impairment				
Expected freq. (percents)	15 (25)	18 (25)	19 (25)	74 (25)
Obtained freq. (percents)	15 (25)	37 (38)	29 (37)	106 (36)
Hits on both markers				
Expected freq. (percents)	4 (6.25)	5 (6.25)	5 (6.25)	19 (6.25)
Obtained freq. (percents)	12 (3)	12 (17)	14 (18)	23 (7)

(X^2 = 19.83, df=1, p<0.001; X^2 = 12.46, df=1, p<0.001). Moreover, the differences among these independent proportions across the four peer-classified groups were also found to be significant (X^2 = 27.49, df=3, p<0.005). Scheffe post hoc comparisons extended to Chi-square (Marascuilo, 1971) revealed that proportionally, there were significantly more withdrawn and aggressive-withdrawn subjects than aggressive and control subjects showing inharmonious peer relationships (p<0.05). In other words, more withdrawn and aggressive-withdrawn subjects than aggressive and control subjects were rated by their peers as least likable.

Taking attentional impairment alone, the obtained hit rates were: 25% for the aggressive, 38% for the withdrawn, 37% for the aggressive-withdrawn, and 36% for the control group. Except for the aggressive group, all other groups obtained significantly higher hit rates on this marker than expected (X^2 = 6.43, df=1, p<0.05; X^2 = 6.17, df=1, p<0.05; X^2 = 18.1, df=1, p<0.01). Differences among these independent proportions across the peer-classified groups, however, were not significant (X^2 = 2.90, df=3, p>0.1).

When considering both risk markers together, the obtained percentages of outliers (those who showed deviance on both measures) were: 3% in the aggressive, 17% in the withdrawn, 18% in the aggressive-withdrawn, and 7% in the control groups. The obtained frequencies of outliers in both the withdrawn and the aggressive-withdrawn groups were significantly higher than the expected (X^2 = 13.74, df=1, p<0.001; X^2 = 18.72, df=1,

$p<0.001$). The obtained frequency of aggressive-outliers was relatively low in the present study. The proportion of outliers across the peer-classified groups was also found to be significantly different ($X^2 = 13.45$, $df=3$, $p<0.005$). Scheffe post hoc comparisons revealed that proportionally, there were significantly more outliers in the withdrawn and aggressive-withdrawn groups than in the aggressive group ($p<0.05$). The proportion of outliers in the aggressive-withdrawn group was also marginally higher than in the control group ($p<0.10$).

Summary. Analyses in this section revealed that: (1) there were more withdrawn and aggressive-withdrawn subjects rated as least likable by their peers than aggressive and control subjects; (2) there were significantly more outliers in the withdrawn and the aggressive-withdrawn groups than chance alone would have predicted; (3) there were relatively few aggressive subjects meeting the combined multiple risk criterion; (4) there were significantly more outliers in the withdrawn and the aggressive-withdrawn groups than in the aggressive group. There were also marginally more outliers in the aggressive-withdrawn group than in the control group.

Analyses on the Validational Measures

Group means comparisons

Owing to the fact that very few aggressive adolescents in the present study met the combined multiple risk criterion ($n=2$), the aggressive subjects were excluded from subsequent analyses. In order to determine whether the remaining groups

classified on the basis of the multidimensional risk criterion differed from one another, a one-way multivariate analysis of variance by multidimensional risk status was computed on neuromotor performance, intelligence, and global social competence. SPSS MANOVA was used for the analyses with hierarchical adjustment for unequal cell size (nonorthogonality). As a preliminary check for robustness, sample variance for each of the three validational measures in each of the groups was examined. No validational measure showed the ratio of the largest to smallest within cell variance approaching 20:1, the criterion for initial evaluation of the assumption of homogeneity of variance (Tabachnick & Fidell, 1983). With the minimal differences in variance and the use of two-tailed tests, the discrepancy in cell size did not invalidate use of MANOVA. Moreover, a test for homogeneity of covariance matrices performed through SPSS Box's M test produced $F(36,3681) = 0.94$, $p>0.10$, indicating no violation of the assumption of homogeneity of covariance matrices.

Pillai's criterion, instead of the most commonly used Wilks' criterion, was chosen in evaluating the significance level of the MANOVA test because it has been reported to improve the robustness of the test for significance when sample sizes are small and unequal (Olson, 1979). With the use of Pillai's criterion, the combined dependent variable (DV) was significantly affected by multidimensional risk status, $F(15,345)=4.11$, $p<0.0007$. Table 6 presents the pooled within-

Table 6

(a) Pooled within-cell correlations of the validational measures, and (b) the Roy-Bargmann Stepdown Analysis

	Neuromotor	Intelligence	Competence
Neuromotor			
Intelligence	0.25		
Competence	0.20	0.18	

Variable	Stepdown F	DF	P
Neuromotor	4.97	5,147	0.0003
Intelligence	2.57	5,147	0.01
Competence	4.88	5,147	0.004

cell correlations among the three DVs and the Roy-Bargmann Stepdown analysis. Bartlett-Box F (3)=12.83, $p<0.005$, indicated that the three DVs were significantly correlated. To investigate the effects of the multidimensional risk status on each of the individual DVs, a Stepdown analysis was performed, on the basis of an a priori ordering of the DVs: neuromotor, intelligence, and social competence. Thus, each DV was analyzed, in turn, with higher-priority DVs treated as covariates and with the highest-priority DV tested in a univariate ANOVA. The Stepdown analysis revealed that each of the DVs made unique contributions to the composite DV in the multivariate analysis which demonstrated significant differentiation of the groups.

Neuromotor Functioning

Table 7 presents the means, standard deviations, and the means adjusted for age for the six groups on the Lincoln-Oseretsky Neuromotor Development Scale. Because this measure is correlated with age (Sloan, 1955), age was used as covariate in the univariate analysis. Cochran's C test for homogeneity of variance, $C(21,7)=0.26$, $p>0.05$, indicated that the data fulfilled the homogeneity assumption. The univariate analysis of covariance performed on the six groups was highly significant, $F(5,147)=4.97$, $p<0.0003$.

Scheffe post hoc pairwise comparisons revealed that all outlier groups obtained significantly lower neuromotor performance mean scores than the withdrawn and the control contrasts ($p<0.05$). The differences between the aggressive-

Table 7

The Lincoln-Oseretsky Neuromotor Development Scale by outlier-contrast status and by peer classification: means, standard deviations, and means adjusted for age

	Outliers			Contrasts		
	M	SD	Adj M	M	SD	Adj M
Withr	109.83	13.53	108.75	122	14.14	120.84
Agg-with	110.83	21.54	110.22	116.86	17.11	117.23
Contr	110.52	18.87	110.75	123.74	13.56	123.94

withdrawn outliers and their contrasts, however, was not significant ($p>0.10$). There were also no significant differences across peer-classified groups among both the contrasts and the outliers.

In summary, with respect to the Lincoln-Oseretsky Neuromotor Development Scale, the multidimensional risk index differentiated outliers from contrasts within the withdrawn and the control groups. Both the withdrawn and the control outliers obtained significantly lower scores on the Lincoln-Oseretsky Neuromotor Development Scale than their contrasts. The aggressive-withdrawn outliers also performed more poorly on this measure than the withdrawn and the control contrasts. However, they were not significantly different from the aggressive-withdrawn contrasts.

Intellectual Functioning

Table 8 presents the means and standard deviations of the six groups on the Wechsler Intelligence scores. The data fulfilled the assumption of homogeneity of variance as indicated by Cochran's C test, $C(22,7)=0.20$, $p>0.10$. The univariate analysis of variance conducted on the six groups was highly significant, $F(5,147)=6.19$, $p<0.00004$.

Scheffe post hoc pairwise comparisons revealed that all outlier groups were significantly lower in intelligence score than the withdrawn and the control contrasts ($p<0.05$). Similar to the findings on neuromotor functioning, the aggressive-withdrawn outliers were not significantly different from their contrasts in intelligence score ($p>0.10$). There were also no

Table 8

The Wechsler Intelligence Scale by outlier-contrast status and by peer classification: means and standard deviations

	Outliers		Contrasts	
	M	SD	M	SD
Withr	58.58	13.77	69.20	13.20
Agg-with	57.21	11.44	61.00	9.62
Contr	56.68	11.54	67.26	9.63

significant differences across peer-classified groups among the contrasts nor among the outliers.

In sum, the multidimensional risk index differentiated outliers from contrasts within the withdrawn and the control groups on intelligence score. Both the withdrawn and the control outliers were significantly lower in intelligence score than the withdrawn and the control contrasts. The aggressive-withdrawn outliers were also significantly lower than the withdrawn and the control contrasts on the measure of intelligence. However, they were not significantly different from their own contrasts in this respect.

Social Competence

Table 9 presents the means, standard deviations, and mean adjusted for intelligence for the six groups on the global social competence scale. Intelligence was used as the covariate in the univariate analysis of social competence because social competence and intelligence shared about 10% of the common variance in this study (see Appendix E). Cochran's C test for homogeneity of variance, $C(17,7)=0.27$, $p>0.05$, indicated that the data fulfilled the homogeneity assumption. The analysis of covariance performed on the six groups was significant, $F(5,147)=5.41$, $p<0.0002$.

Scheffe post hoc pairwise comparisons revealed that after partialling out the effect of differences in intelligence, the withdrawn and the aggressive-withdrawn outliers still obtained significantly lower mean scores in social competence than the control contrasts ($p<0.05$). They were not, however,

Table 9

The Achenbach Global Social Competence Scale by outlier-contrast status and by peer classification: means, standard deviations, and means adjusted for intelligence

	Outliers			Contrasts		
	M	SD	Adj M	M	SD	Adj M
Withr	33.60	6.80	33.75	38.20	7.84	38.95
Agg-with	33.60	9.34	33.32	33.00	10.07	32.00
Contr	36.50	6.50	37.40	43.20	7.74	42.11

significantly different from their own contrast groups. Differences between the control outliers and their contrasts were not significant ($p>0.10$). The aggressive-withdrawn contrasts were also significantly lower than the control contrasts in social competence ($p<0.05$). No other differences across peer-classifed groups among the contrasts or outliers approached significance.

Since the global social competence scale is composed of three components: the school, social, and activities subscales, further information was obtained by examining each of these subscales. A one-way MANCOVA by multidimensional risk status was computed on the school, social and activities subscales, with intelligence as covariate. Box's M-test, $F(36,4642)=28.10$, $p>0.10$, indicated that the data fulfilled the homogeneity of covariance matrices assumption. With the use of Pillai's criterion, the combined DV were significantly affected by multidimensional risk status, $F(15,345)=3.34$, $p<0.00003$.

Table 10 presents the means, standard deviations, and means adjusted for intelligence for the six groups on each of these subscales. Univariate F-tests revealed that there was a main effect of multidimensional risk status for the School subscale, $F(5,147)=5.58$, $p<0.0001$; the Social subscale, $F(5,147)=4.38$, $p<0.001$; but not for the Activities subscale, $F(5,147)=1.86$, $p>0.05$.

Scheffe post hoc pairwise comparisons revealed that, after partialling out the effect of intelligence, both the

Table 10

The School, Social, and Activities Subscales of the Achenbach Social Competence Scale by outlier-contrast status and by peer classification: means, standard deviations, and means adjusted for intelligence

	Outliers			Contrasts		
	M	SD	Adj. M	M	SD	Adj. M
School						
Withr	40.25	14.14	40.20	50.40	17.06	47.60
Agg-with	33.00	13.30	34.60	37.60	13.03	37.40
Contr	37.21	13.09	39.29	54.09	13.35	51.64
Social						
Withr	37.25	11.10	34.46	35.40	11.72	37.24
Agg-with	33.83	11.34	34.22	36.90	12.36	36.83
Contr	40.80	9.20	41.62	45.53	8.95	44.70
Activities						
Withr	40.00	6.85	39.99	42.75	10.28	41.61
Agg-with	38.92	9.64	39.41	36.40	8.99	36.32
Contr	41.05	9.67	42.08	45.78	9.79	44.74

aggressive-withdrawn and the control outlier groups were still significantly lower in scores on parent's rating of school performance than were the withdrawn and the control contrast groups ($p<0.05$). The differences between the withdrawn outliers and the control contrasts also approached significance ($p<0.10$). However, there was no significant difference between the withdrawn outliers, the aggressive-withdrawn outliers and their contrasts. The aggressive-withdrawn contrasts also performed more poorly in school than the control contrasts ($p<0.05$). No other differences across peer-classified groups among the contrasts or outliers approached significance.

With respect to the parent's rating of interpersonal relationships, post hoc comparisons revealed that both the withdrawn and the aggressive-withdrawn outliers obtained significantly lower ratings than the control contrasts ($p<0.05$), but did not differ from their own contrasts. No other comparisons approached significance.

In sum, analyses on social competence revealed that the withdrawn outliers were not different from their contrasts on the global social competence scale nor on any of the competence subscales. The withdrawn outliers, however, were significantly lower than the control contrasts in score on the global social competence scale, and on the school and the social subscales. The aggressive-withdrawn outliers also did not differ from their contrasts on any of these measures. Both the aggressive-withdrawn outliers and their contrasts were

lower in social competence and school performance than the control contrasts. The aggressive-withdrawn outliers were also lower in scores than the control contrasts on the social subscale. The control outliers were not different from their contrasts in global social competence. They were, however, poorer in school performance than their contrasts.

The major findings of this section were as follows:

(1). Outliers vs Contrasts within peer-classified groups

(a) The withdrawn outliers obtained significantly lower scores than the withdrawn contrasts on the measures of neuromotor functioning and intelligence. (b) The aggressive-withdrawn outliers did not differ from their contrasts on any of the validational measures. (c) The control outliers obtained significantly lower scores than the control contrasts on the measures of neuromotor functioning, intelligence, and on the school subscale of social competence.

(2). Outliers vs Contrasts across peer-classified groups

(a) The withdrawn outliers obtained significantly lower scores than the control contrasts on the measures of neuromotor functioning, intelligence, and social competence. (b) The aggressive-withdrawn outliers obtained significantly lower scores on the measures of neuromotor functioning and intelligence than the withdrawn and the control contrasts. They were also lower in global social competence than the control contrasts. (c) The control outliers performed more poorly than the withdrawn contrasts on the measures of neuromotor functioning and intelligence.

Deviant responders analyses

Another way to evaluate differences among groups, as suggested by Asarnow (1983), is to identify subjects scoring in the negative extreme on each of the dependent measures. He argued that this procedure made it possible to detect the most deviant responders within each group who might merit particular attention. The following analyses were conducted to identify subjects within each multidimensional risk group who were particularly impaired on the validational measures. Consistent with the cutoff criterion applied to the likability and attentional measures, the bottom quartile cutoff point was used for all validational measures. Table 11 presents the bottom quartile hit rates on each validational measure as well as the bottom quartile hit rates on all three measures simultaneously for the six groups.

In neuromotor performance, 58% of the withdrawn outliers, 35% of the aggressive-withdrawn outliers, and 43% of the control outliers were in the bottom quartile of this measure, compared to 8% of the withdrawn contrast, 14% of the aggressive-withdrawn contrasts, and 12% of the control contrasts. Chi-square likelihood ratio tests (log-linear model) revealed that proportionally, there were significantly more withdrawn and control outliers than their contrasts scoring in the bottom quartile of this measure ($X^2 = 4.28$, $df=1$, $p<0.05$; $X^2 = 12.4$, $df=1$, $p<0.01$). The differences between the aggressive-withdrawn outliers and their contrasts, however, were not significant ($X^2 = 1.56$, $df=1$, $p>0.1$). There

Table 11

The frequencies and percentages of the bottom quartile hit rates of neuromotor performance, intelligence, and global social competence for the six groups as defined by the multidimensional risk criterion

	Withr	Agg-With	Contr
Neuromotor			
Outliers	7(58%)	5(35%)	10(43%)
Contrasts	1(8%)	2(14%)	9(12%)
Intelligence			
Outliers	4(33%)	4(29%)	8(34%)
Contrasts	1(8%)	2(14%)	4(5%)
Competence			
Outliers	6(50%)	7(50%)	6(26%)
Contrasts	4(33%)	7(50%)	5(6%)
All validational measures			
Outliers	3(25%)	3(21%)	5(6%)
Contrasts	0	2(14%)	0

was also no significant difference in the hit rates across peer-classified groups among the outliers (X^2 =1.36, df=4, p>0.10) nor among the contrasts (X^2 = 0.21, df=4, p>0.10).

In intellectual functioning, the bottom quartile hit rates were: 33% for the withdrawn outliers, 29% for the aggressive-withdrawn outliers, and 34% for the control outliers, compared to 8% for withdrawn contrasts, 14% for the aggressive-withdrawn contrasts, and 5% for the control contrasts. Chi-square likelihood ratio tests revealed that there were significantly more control outliers than control contrasts scoring in the bottom quartile of the Wechsler Intelligence Scale (X^2 = 13.4, df=1, p<0.01). The difference in frequency between the withdrawn outliers and their contrasts also approached significance (X^2 = 3.08, df=1, p<0.1). No difference was found between the aggressive-withdrawn outliers and their contrasts (X^2 = 1.01, df=1, p>0.1). There were also no significant differences in the hit rates across peer-classified groups among the outliers (X^2 =0.15, df=4, p>0.10) nor among the contrasts (X^2 =1.64, df=4, p>0.10).

With respect to social competence, the bottom quartile hit rates were: 50% for the withdrawn outliers, 50% for the aggressive-withdrawn outliers, and 26% for the control outliers, compared to 33% for the withdrawn contrasts, 50% for the aggressive-withdrawn outliers, and 6% for the control contrasts. Chi-square likelihood ratio tests revealed that there were significantly more control outliers than their

contrasts scoring in the bottom quartile of this measure (X^2 = 7.08, df=1, $p<0.05$). Differences between outliers and contrasts among the withdrawn and the aggressive-withdrawn subjects were not significant (X^2 = 1.85, df=1, $p>0.10$; X^2 = 0.00, df=1, $p>0.10$). There were also no significant differences in the hit rates across peer-classified groups among the outliers (X^2 = 2.92, df=4, $p>0.10$). The differences in the hit rates across peer-classified groups among the contrasts were significant (X^2 =20.72, df=4, $p<0.005$). Post hoc comparisons revealed that there were significantly more withdrawn and aggressive-withdrawn contrasts than control contrasts scoring in the bottom quartile of social competence ($p<0.05$).

When considering all three validational measures simultaneously, the hit rates were: 25% for the withdrawn outliers, 21% for the aggressive-withdrawn outliers, and 6% for the control outliers, compared to 0% for the withdrawn contrasts, 14% for the aggressive-withdrawn contrasts, and 0% for the control contrasts. Due to the fact there were empty cells in the contingency table, the frequencies across the peer-classified groups were collapsed for further comparison. Chi-square test revealed that on the whole, there were significantly more outliers than contrasts scoring simultaneously in the bottom quartile of all three validational measures (X^2 = 18.55, df=1, $p<0.005$).

Summary. Parallell to the group means comparisons, results of this section revealed that: (1) there were

significantly more withdrawn outliers than withdrawn contrasts scoring in the bottom quartiles of the neuromotor and intelligence tests; (2) there were no differences between the aggressive-withdrawn outliers and the aggressive-withdrawn contrasts in bottom quartile hit rates on all three validational measures; (3) there were significantly more control outliers than control contrasts scoring in the bottom quartile of each of the three validational measures; (4) overall, there were significantly more outliers than contrasts scoring simultaneously in the bottom quartiles of the three validational measures.

Hierarchical Multiple Regression Analyses

In order to determine whether the additional risk markers added significant variance beyond that of the behavioral risk marker in predicting performance on the validational measures, a hierarchical multiple regression analysis was conducted on each of the validational measures.

The contribution of age, peer classification, and outlier-contrast status (a new variable defined on the basis of peer relationships and attentional performance) to neuromotor performance is presented in Table 12. Age was entered at Step 1 as a control variable, and then the predictors of interest were entered at subsequent steps to assess their contributions. The extent to which these predictors contributed shared or independent variance to the dependent variable was assessed by systematically altering the order of entry. Peer classification at Step 2 contributed

Table 12

Hierarchical regression of age, peer classification, and outlier-contrast status on the Lincoln-Oseretsky Neuromotor Development Scale

		Multi R	R^2	R^2 inc.	P
Step 1	Age	0.20	0.04	0.04	0.01
Step 2	Pclass	0.30	0.09	0.06	0.02
Step 3	Outlier-contrast status	0.45	0.21	0.11	0.001
Step 2	Outlier-contrast status	0.43	0.18	0.15	0.001
Step 3	Pclass	0.45	0.21	0.02	N.S.

significant variance to neuromotor performance (R^2 increase=6%, $p<0.02$). Outlier-contrast status at Step 3 accounted for a highly significant increase in the amount of variance above that predicted by age and peer classification (R^2 increase=11%, $p<0.001$). When the order of entry was reversed, peer classification did not add significant unique variance to the neuromotor performance.

Table 13 presents the contribution of peer classification and outlier-contrast status to intelligence. Peer classification at Step 1 accounted for a significant 6% of the variance in intelligence ($P<0.01$). Outlier-contrast status at Step 2 accounted for a highly significant increase in the amount of variance above that predicted by peer classification (R^2 increase=12%, $p<0.001$). Reversing the order of entry did not change the amount of variance accounted for by these predictors. In other words, peer classification and outlier-contrast status both contributed independent variance to intelligence (6% from peer classification and 12% from outlier-contrast status).

The contribution of intelligence, peer classification, and outlier-contrast status to social competence is presented in Table 14. Intelligence was entered at Step 1 as a control variable. After controlling for the contribution of intelligence, peer classification at Step 2 accounted for a significant 12% of the variance in global social competence ($p<0.001$), 8% of the variance for the school subscale ($p<0.004$), and 13% of the variance for the social subscale

Table 13

Hierarchical regression of peer classification and outlier-contrast status on the Wechsler Intelligence Scale

		Multi R	R^2	R^2 inc.	P
Step 1	Pclass	0.24	0.06	0.06	0.01
Step 2	Outlier-contrasts status	0.42	0.18	0.12	0.001
Step 1	Outlier-contrasts status	0.34	0.12	0.12	0.001
Step 2	Pclass	0.42	0.18	0.06	0.01

Table 14

Hierarchical regression of intelligence, peer classification and outlier-contrast status on the Achenbach Global Social Competence Scale, the School, Social, and Activities Subscales

	Scomp		Sch		Soc		Act	
	R	R^2 inc.	R	R^2 inc.	R	R^2 inc.	R	R^2 inc.
Step 1 (IQ)	0.34	0.11 (p<.001)	0.46	0.21 (p<.001)	0.22	0.05 (p<.01)	0.25	0.06 (p<.003)
Step 2 (Pclass)	0.49	0.12 (p<.001)	0.54	0.08 (p<.004)	0.42	0.13 (p<.001)	0.34	0.05 (N.S.)
Step 3 (Outlier-contrast status)	0.50	0.02 (N.S.)	0.59	0.06 (p<0.006)	0.43	0.01 (N.S.)	0.34	0.00 (N.S.)
Step 2 (Outlier-contrast status)	0.40	0.04 (p<.02)	0.53	0.08 (p<.001)	0.27	0.02 (N.S.)	0.27	0.01 (N.S.)
Step 3 (Pclass)	0.50	0.10 (p<.001)	0.59	0.06 (p<.01)	0.43	0.12 (p<.001)	0.34	0.04 (N.S.)

($P<0.001$). Outlier-contrast status at Step 3 accounted for a significant increase in the amount of variance above that predicted by intelligence and peer classification only on the school subscale (R^2 increase=6%, $p<0.002$). But outlier-contrast status did contribute significant variance to global social competence (R^2 increase = 4%, $p<0.02$), and the school subscale (R^2 increase = 8%, $p<0.001$) when entered at Step 2.

In sum, hierarchical analyses revealed that: (1) the outlier-contrast status (the additional variable defined on the basis of peer relationships and attentional performance) accounted for a highly significant increase in the amount of variance in neuromotor performance and intelligence above that predicted by peer classification; (2) with respect to social competence, outlier-contrast status added significant variance only to the school subscale. When this variable entered before peer classification, however, it accounted for significant variance in both social competence and the the school subscale.

Intermediate psychiatric outcomes

Table 15 presents the intermediate psychiatric outcome data by multidimensional risk status. 17% (2) of the withdrawn outliers, 21% (3) of the aggressive-withdrawn outliers, 13% (3) of the control outliers, compared to 0% of the withdrawn contrasts, 21% (3) of the aggressive-withdrawn contrasts, and 4% (3) of the control contrasts had received psychiatric treatment and all were diagnosed as suffering from neurotic

Table 15

Frequencies and percentages of Outliers and Contrasts receiving psychiatric treatment by peer classification

	Withd	Agg-with	Contr
Outliers	2(17%)	3(21%)	3(13%)
Contrasts	0	3(21%)	3(4%)

disorders. Extremely small within cell frequencies precluded fine-grain comparison between outliers and contrasts within each peer classified group. However, Chi-square analysis performed on the frequencies collapsed across peer-classified groups revealed that overall, there were significantly more outliers than contrasts receiving psychiatric treatment for neurotic disorders (X^2 =4.03, df=1, $p<0.05$).

Discussion

The findings of the present study attest to the usefulness of the multidimensional risk approach. Individuals who displayed several preschizophrenic characteristics (outliers) showed a pattern of intellectual and neuromotor deficit. A higher incidence of psychiatric problems was also found among outliers than among contrasts.

The first aim of the study was to identify outliers who were deviant with respect to peer relationships and attentional functioning within each peer-classified group. Results revealed that among the behaviorally deviant groups, there were significantly more withdrawn and aggressive-withdrawn outliers than would have been expected by chance. The number of aggressive outliers, however, was surprisingly low. There were only two aggressive adolescents meeting the combined deviance criteria. Examination of the data leads to two possibly complementary explanations for this finding.

First, in comparison to the withdrawn and the aggressive-withdrawn groups, there were proportionally fewer aggressive and control adolescents manifesting difficulties in peer relationships. The proportion of aggressive subjects showing problems in peer relationships did not differ from that of the controls. In fact, the aggressive group showed the lowest hit rate for inharmonious peer relationships among all groups. These findings parellel those of two recent studies (Feltham et al., 1985; Milich & Landau, 1984) using the PEI classification. Milich and Landau (1984) reported that while

the aggressive-withdrawn youngsters were both highly rejected and unpopular, the same pattern did not hold for the aggressive children. Some aggressive children were rejected by their peers, but many others were very popular among their peers. Feltham et al. (1985) also found that the aggressive youngsters had a similar number of friends and enjoyed the same level of popularity as did the controls, and both groups reported more friendships and were more popular than the aggressive-withdrawn children. They attributed these findings to the possibility that certain items of the PEI reflected more controlled forms of aggressive behaviors and a higher level of social skill involving such qualities as leadership (e.g., the item "Those who tell other children what to do", "Those who play the clown and get others to laugh", and "Those who want to show off in front of the class"). As a result, some aggressive children as defined by the PEI may be impulsive or hostile in their behavior, but others may possess the social skills required for the prosocial interactions which promote good peer relationships. While the explanation for these findings can only be tentative, the foregoing evidence suggests that many aggressive children and adolescents as defined by the PEI tend to have relatively normative peer relationships.

Results of the present study also indicated that significantly more withdrawn, aggressive-withdrawn, and control adolescents manifested attentional impairment than would have been expected by chance alone. This was not the

case for aggressive adolescents. This finding is consistent with results reported by McGuire (1983) who found that aggressive subjects as defined by the PEI were relatively normal in SOA performance. In fact, he found a low but reliable positive associaton between aggression and Span of Apprehension performance.

In sum, the evidence of these studies indicates that many aggressive adolescents as defined by the PEI are normal with respect to peer relationships and attentional performance. These findings may account for the relatively small number of aggressive adolescents who qualified as outliers in the present study.

There is, however, another possible explanation for the rarity of aggressive outliers. While many aggressive adolescents as defined by the PEI are normal with respect to peer relationships and attentional functioning, it is possible that aggressive adolescents who manifest problems both in peer relationships and attentional functioning are very disturbed individuals. Because of their maladaptive behaviors, they may have left a normal school setting early . It is noteworthy that the two aggressive outliers of the present sample were both from the youngest cohort of the Concordia High Risk Project. They were deficient in neuromotor performance, and particularly low in intelligence (see Appendix F). Data on their social competence were not available because their parents declined to be interviewed. Thus, it is possible that many aggressive outliers were not a part of the subject pool

located for follow-up assessment in the Concordia Project.

It is important to note that the two explanations discussed above may not be mutually exclusive. They may well work in a complementary manner in accounting for the rarity of aggressive outliers. In other words, aggressive outliers may actually begin with a relatively low base rate, and their possible high drop-out rate from school may further decrease their number in the present sample pool.

Another major focus of this study was to examine whether the additional risk markers differentiated outliers from their contrasts in each of the peer-classified groups on the validational measures. Both group mean comparisons and deviant responders analyses revealed that the additional risk criteria distinguished the outliers from contrasts in the withdrawn and control groups, but not in the aggressive-withdrawn groups.

Specifically, the withdrawn contrasts were found to be superior in neuromotor performance and intelligence, relative to the withdrawn outliers. The withdrawn outliers were also lower in social competence when compared to the control contrasts. There was no significant difference in social competence between the withdrawn contrasts and the control contrasts. These data suggest that the withdrawn contrasts are essentially well-functioning individuals. This interpretation is supported by the intermediate psychiatric outcome data which indicated that none of the withdrawn contrasts were seen for psychiatric problems. These findings are also consistent with follow-up studies (Kohlberg et al., 1972; Morris, et al.,

1956) which found little evidence of later psychopathology in withdrawn, introverted, or shy children. Previous reports on the prediction of adult mental health from childhood withdrawn behavior, however, are not consistent (c.f. Kohlberg et al., 1972; McGuire, 1983; Offord & Cross, 1969). The mixed evidence may be attributable to global definitions of withdrawal as a construct. The withdrawn contrasts and the withdrawn outliers of the present study may represent two separate types of withdrawn individuals. This view is consistent with that of Asher and Hymel (1981) who distinguished between withdrawal in children prompted by a preference for solitary play and withdrawal or isolation resulting from peer rejection. In the present study, the withdrawn contrasts may be considered as nonpathologically shy or introverted, whereas the withdrawn outliers may be avoidant, rejected, and isolated individuals. This distinction appears important in that each type of withdrawal predicts different outcomes and different remediational needs.

It may be noted that the aggressive-withdrawn outliers obtained lower scores in neuromotor performance and intelligence than the withdrawn and the control contrasts. They were also less socially competent than the control contrasts. Perhaps the most compelling finding, however, was that the aggressive-withdrawn contrasts did not differ from their outlier counterparts on all the validational measures. The aggressive-withdrawn contrasts tended to perform as poorly as the aggressive-withdrawn outliers on neuromotor

functioning, intelligence, and social competence. This finding was also consistent with the intermediate psychiatric outcome data which did not differentiate these groups with regard to the percentage of persons receiving psychiatric treatment. These data suggest that the co-occurrence of frequent aggression and frequent withdrawal is in itself a highly deviant phenomenon. There is evidence (Kohlberg et al., 1972; Michael et al., 1957; Robins, 1966) which indicates that a withdrawn pattern of adjustment in combination with acting-out behavior problems predicts psychosis more accurately than either dimension separately. These findings highlight the unique nature of the aggressive-withdrawn behavioral pattern and support Ledingham's (1981) conceptualization of the distinctions among peer-identified aggressive, withdrawn, and aggressive-withdrawn youngsters. This evidence also provides further credence to the use of aggression and withdrawal in combination rather than separately as a behavioral risk marker for schizophrenia (Ledingham, 1981; Schwartzman et al., 1985).

The present study also revealed that the control outliers were inferior in neuromotor performance, intelligence, global social competence, and academic achievement when compared to their contrasted counterparts. In addition, more control outliers (13%) than control contrasts (3%) received psychiatric treatment and were diagnosed as suffering from neurotic disorders. These findings highlight another common problem of the unidimensional risk models -- the large number of false negatives. With a unidimensional risk index alone,

one may find a relatively high percentage of normative children developing psychiatric problems. A recent report from the Concordia High Risk Project (Schwartzman et al., 1986), for example, indicated that 10.8% of their control subjects as defined by the unidimensional behavioral risk index had psychiatric problems, compared to 14.6% of the aggressive, 14% of the withdrawn, and 10.7% of the aggressive-withdrawn groups. Winters et al. (1981) also reported that in the Stony Brook High Risk Project (risk defined according to the genetic criterion), a relatively high percentage of normal control subjects (children of parents without schizophrenic diagnoses) showed multiple deviance on the different domains of functioning examined. The problem of high false negatives, in combination with the problem of high false positives referred to in the introduction section, will certainly obscure actual differences between a risk group and its healthy counterpart when a unidimensional criterion of risk is used. The multidimensional risk approach enables researchers to identify the most extreme subgroup within a unidimensional risk group and also to identify a particular healthy group as a normative contrasts sample.

Results of the hierachical regression analyses also point to the utility of the multidimensional risk index. Specifically, the dimension of inharmonious peer relationships and attentional impairment as an added variable significantly increased the amount of explained variance in neuromotor functioning and intelligence over and above that

predicted by peer classification alone. The additional risk criteria also remained predictive of the adolescents' parent-rated school performance even when the effects of intelligence and peer classification were controlled. Moreover, inharmonious peer relationships in combination with attentional impairment was a much stronger predictor of neuromotor functioning and intelligence than peer classification. Peer classification, on the other hand, predicted social competence more accurately than the additional risk variables. These results indicate that the multidimensional risk strategy reflects the interactive complexity of individual risk factors in real life situations. The multidimensional risk approach is consistent with the view (Labouvie, 1986; Strauss & Carpenter, 1981) that psychopathology emerges within a complex matrix of bio-psycho-social factors. In considering precursors of schizophrenia, we are dealing with complex processes involving many important semi-autonomous factors. It is therefore difficult to rely on a single risk marker from one domain of functioning to predict functioning of different other domains. The multidimensional risk approach permits adherence to the principle of multiple causation. Such an approach, as Labouvie (1986) has argued, yields predictions of outcome that are significantly more reliable than those based on a single biological or behavioral antecedent.

While the ultimate utility of the multidimensional risk approach cannot be determined without an extended longitudinal

follow-up of outliers and contrasts, the intermediate psychiatric outcome data lend preliminary support to the predictive validity of the multidimensional risk approach. In general, there were significantly more outliers than contrasts manifesting psychiatric problems. Due to the relatively small sample size -- a common "reality in risk research of schizophrenia" (Garmezy & Phipps-Yonas, 1984, p.10), caution should be exercised when generalizing from these findings. However, as long as we keep in mind both the tentative nature of the results of these analyses, and the need for replication and cross-validation, such findings can still serve, even with small samples, as valuable information in the understanding of the complex nexus of schizophrenia. Based on the findings of the present study, can we tie together these strands of evidence to speculate on a conceptual framework which addresses the etiological processes of this complex disorder ?

As mentioned earlier, a common belief among most investigators is that a neurointegrative disorder or "schizophrenogenic brain abnormality" (SBA: Mirsky & Duncan, 1986, p.311), be it inherited, acquired, or the interaction of both, is the underlying biological base of schizophrenia. The early manifestations (during infancy and early childhood) of SBA, as suggested by Fish (1984), is the "Pandysmaturation" (PDM) which affects many systems under the control of the central nervous system, including physical growth, homeostasis, gross-motor, visual-motor, psychophysiological, and cognitive functioning. The later signs of SBA comprise

deficient sensori-motor, attentional and intellectual capacities (Mirsky & Duncan, 1986). The data of the present study which are particularly relevant to CNS functioning are consistent with these assumptions. Neuromotor development, intelligence, and attentional performance were significantly intercorrelated (see Appendix E). Adolescents poor in neuromotor performance also tended to be of lower intelligence ($r = 0.35$) and showed increased attentional impairment ($r = -0.22$). Attentional performance was also negatively associated with intelligence ($r = -0.24$). The relatively low but significant correlations among these variables suggest that these variables are semi-autonomous epiphenomena reflecting subtle, diffuse abnormalities of the central nervous system. These abnormalities may increase the level and frequency of developmental stresses for the individual in ways which vary as a function of age.

In early childhood, neurobiological developmental retardation may be expressed by unstable sleep, mood, eating, and elimination cycles. This irregularity and unpredictability of the child's behavior will present unusually stressful demands on the parents, resulting in a difficult parent-child relationship. The difficult parent-child relationship, in turn, may result in stressful family interaction patterns, including high degrees of expressed negative emotion and a punitive, affective style of child rearing, both of which have been associated with schizophrenic breakdown (Rodnick, et al. 1984).

The deficiency in physical, sensorimotor, attentional, and cognitive capacities may also lead to poor peer relationships. For example, Feltham et al. (1985) reported that motor activity of children was positively correlated with peer involvement in playground situations and popularity. Neuromotor performance was positively correlated with likability in the present study ($r = 0.26$). Steffy et al. (1984) suggested that successful interpersonal functioning required intact attentional functioning. Therefore, attentional dysfunction may be responsible in part for interpersonal difficulties. In the present study, a low but significant correlation was found between attentional impairment and likability ($r = -0.12$). Crider (1979) suggested that normal cognitive capacity is important for normal peer interactions. Rejection by peers may result from an inability to understand, care for, or empathize with peers. In the present study, intelligence was positively correlated with likability ($r = 0.29$).

Lags in physical, intellectual, social, and emotional maturity relative to peers also lead to more frequent adaptive failures and an increasing sense of incompetence. The preschizophrenic child is caught in an upward spiralling of psychological incompetence with increasing age. If age-appropriate skills are not fully acquired, further developmental challenges will be poorly met and resolved. As a result, normal developmental tasks will become increasingly stressful over time as the preschizophrenic child advances in

age. This assumption is consistent with a study by Fleming and Ricks (1970) which reported that 90% of preschizophrenics felt helplessly inadequate and defenseless in a world they saw as hostile, rejecting and stressful. Pollin and Stabenau (1968) also noted that when compared to their nonschizophrenic co-twins, schizophrenic monozygotic twins viewed the world as more stressful and less predictable. They also viewed themselves as less competent in coping with its demands.

In order to deal with a world they experience as highly stressful, the preschizophrenic individual will resort to aggression, withdrawal, or alternating periods of aggression and withdrawal. Psychiatric breakdown will occur when the individual's meager adaptive resources can no longer cope with the increasing amount of stress. Previous reports (Nameche et al., 1964; Knight & Roff, 1983; Roff et al., 1976) have indicated that each mode of behavioral adaptation may be associated with a particular subtype of schizophrenia.

In sum, the foregoing theoretical framework holds that a subtle, neurointegrative disorder is a primary factor leading to schizophrenia. This neurobiological inefficiency leads to adaptive failures in different bio-psycho-social areas and creates a higher level and frequency of developmental stresses throughout childhood and adolescence. The increasing stress of these adaptive failures, in interaction with the neurobiological predisposition, will increase the likelihood of schizophrenic breakdown.

References

Achenbach, T.M. (1979). The child behavioral profiles: An empirically based system for assessing children's behavioral problems and competencies. International Journal of Mental Health, 7, 24-42.

Achenbach, T.M. & Edelbrock, C. (1983). Manual for the Child Behavior Checklist and Revised Child Behavior Profile. Vermont: Queen City Printers.

Achenbach, T.M. & Edelbrock, C. (1981). Behavioral problems and competencies reported by parents of normal and disturbed children aged 4 through 16. Monographs of the Society for Research in Child Development, 46, (Serial No. 188).

Albee, G., Lane, E. & Reuter, J. (1964). Childhood intelligence of future schizophrenics and neighborhood peers. Journal of Psychology, 58, 141-144.

Alexopoulos, G.S., Lieberman, K.W. & Frances, R.J. (1983). Platelet MAO activity in alcoholic patients and their first degree relatives. American Journal of Psychiatry, 140, 1501-1504.

Asarnow, R.F. (1983). Schizophrenia. In R.E. Tarter (ed.), The Child at Psychiatric Risk. N.Y.: Offord University Press.

Asarnow, R.F. & MacCrimmon, D.J. (1978). Residual performance deficit in clinically remitted schizophrenics: A marker of schizophrenia. Journal of Abnormal Psychology, 87, 597-608.

Asarnow, R.F. & MacCrimmon, D.J. (1981). Span of apprehension deficits during postpsychotic stages of schizophrenia. Archives of General Psychiatry, 38, 1006-1011.

Asarnow, R.F. & MacCrimmon, D.J. (1982). Attention/information processing, neuropsychological functioning, and thought disorder during the acute and partial recovery phases of schizophrenia: a longitudinal study. Psychiatry Research, 7, 309-319.

Asarnow, R.F., Nuechterlein, K.H. & Marder, S.R. (1983). Span of apprehension performance, neuropsychological functioning, and indices of psychosis-proneness. Journal of Nervous and Mental Disease, 171, 662-669.

Asarnow, R.F., Steffy, R.A., MacCrimmon, D.J. & Cleghorn, J.M. (1977). An attentional assessment of foster children at risk for schizophrenia. Journal of Abnormal Psychology, 86, 267-275.

Asher, S.R. & Hymel, S. (1981). Children's social competence in peer relations: sociometric and behavioral assessment.

In J.D. Wine & M.D. Snye (Eds.), Social Competence. N.Y.: Guilford Press.

Ayalon, M. & Merom, H. (1985). The Israeli high-risk study: The teacher interview. Schizophrenia Bulletin, 11, 117-120.

Aylward, E., Walker, E. & Bettes, B. (1984). Intelligence in schizophrenia: Meta-analysis of the research. Schizophrenia Bulletin, 10, 430-459.

Bellak, L. & Parcell, B. (1946). The pre-psychotic personality in Dementia Praecox, Psychiatric Quarterly, 20, 627-637.

Biederman, J., Rivinus, T.M., Herzog, D.B., Ferber, R.A., Harper, G.P., Orsulak, P.J., Harmatz, J.S. & Schildkraut, J.J. (1984). Platelet MAO activity in anorexia nervosa patients with and without a major depressive disorder. American Journal of Psychiatry, 141, 1244-1247.

Bleuler, M. (1978). The Schizophrenic Disorders: Long-term Patients and Family Studies. New Haven: Yale University Press.

Bowers, E.M., Shellhammer, T.A. & Daily, J.M. (1960). School characteristics of male adolescents who later became schizophrenic. American Journal of Orthopsychiatry, 30, 712-729.

Buchsbaum, M.S., Coursey, R.D. & Murphy, D.L. (1976). The biochemical high-risk paradigm: Behavioral and familial correlates of low platelet monoamine oxidase activity. Science, 194, 339-341.

Buchsbaum, M.S., Murphy, D.L., Coursey, R.D., Lake, C.R. & Ziegler, M.G. (1978). Platelet monoamine oxidase, plasma dopamine-beta-hydroxylase, and attention in a biochemical high risk sample. Journal of Psychiatric Research, 14 215-224.

Chapman, L.J., Chapman, J.P. & Raulin, M.L. (1976). Scales for physical and social anhedonia, Journal of Abnormal Psychology, 85, 374-382.

Chevrier, J.M. (1967). Echelle d'intelligence de Weschler pour enfants. Montreal: Institut de Recherches Psychologiques Inc.

Cohen, N.J., Sullivan, J., Minde, K., Novak, C. & Keens, S. (1983). Mother-child interaction in hyperactive and normal kindergarten-aged children and the effects of treatment. Child Psychiatry and Human Development, 13, 213-224.

Cornblatt, B. & Erlenmeyer-Kimling, L. (1984). Early attentional predictors of adolescent behavioral disturbances

in children at risk for schizophrenia. In N.F. Watt, E.J. Anthony, L.C. Wynne & J.E. Rolf (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Cornblatt, B. & Marcuse, Y. (1986). Children at high risk for schizophrenia: Prediction from childhood to adolescence. In L. Erlenmeyer-Kimling & N.E. Miller (eds.). Life-span Research on the Prediction of Psychopathology. New Jersey: LEA.

Cowen, E.L., Pederson, A., Babigian, H., Izzo, L. & Trost, M.A. (1973). Long-term follow-up of early detected vulnexrable children. Journal of Consulting and Clinical Psychology, 41, 438-446.

Cox, S.M. & Ludwig, A.M. (1979). Neurological soft signs and psychopathology. Part I: Findings in schizophrenia. Journal of Nervous and Mental Disease, 167, 161-165.

Crider, A. (1979). Schizophrenia: A Biopsychological Perspective. N.J.: LEA.

Deutsch, H. (1942). Some forms of emotional disturbance and their relationship to schizophrenia. Psychoanalytic Quarterly, 11, 301-321.

Doane, J.A., West, K.L., Goldstein, M.J., Rodnick, E.H. & Jones, J.E. (1981). Parental communication deviance and affective style: Predictors of subsequent schizophrenia-spectrum disorders in vulnerable adolescents. Archieve of General Psychiatry, 38, 679-685.

Eckblad, M. & Chapman, L.J. (1983). Magical ideation as an indicator of schizoptypy. Journal of Abnormal Psychology, 51, 215-225.

Erylenmeyer-Kimling, L., Cornblatt, B., Friedman, D., Marcuse, Y., Rutschmann, J., Simmens, S. & Devi, S. (1982). Neurological, electrophysiological, and attentional deviations in children at risk for schizophrenia. In F.A. Henn & H.A. Nasrallah (Eds.), Schizophrenia as a Brain Disease. N.Y.: Oxford University Press.

Erylenmeyer-Kimling, L., Kestenbaum, C., Bird, H. & Hilldoff, U. (1984). Assessment of the New York high-risk project subjects in sample A who are now clinically deviant. In N.F. Watt, E.J. Anthony, L.C. Wynne & J.E. Rolf (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Feltham, R.F., Doyle, A. B., Schwartzman, A.E., Serbin, L.A., & Ledingham, J.E. (1985). Friendship in normal and socially deviant children. Journal of Early Adolescence, 5, 371-382.

Fish, B. (1977) Neurobiologic antecedents of schizophrenia in children: Evidence for an inherited, congenital neurointegrative defect. Archives of General Psychiatry, 34, 1297-1313.

Fish, B. (1984). Characteristics and sequelae of the neurointegrative disorder in infants at risk for schizophrenia: 1952-1982. In N.F. Watt, E.J. Anthony, L.C. Wynne & J.E. Rolf (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Fish, B. & Hagin, R. (1973). Visual-motor disorders in infants at risk for schizophrenia. Archives of General Psychiatry, 28, 900-904.

Fisher, L. (1980). Child competence and psychiatric risk. Part I: Model and method. Journal of Nervous and Mental Disease, 168, 323-331.

Fisher, L., Schwartzman, P., Harder, D. & Kokes, R.F. (1984). A strategy and methodology for assessing school competence in high-risk children. In N.F. Watt, E.J. Anthony, L.C. Wynne & J.E. Rolf (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Fleming, P. & Ricks, D.F. (1970). Emotions of children before schizophrenia and before character disorder. In M. Roff & D. Ricks (Eds.), Life History Research in Psychopathology. Minneapolis: University of Minnesota Press.

Frazee, H.E. (1953) Children who later became schizophrenic. Smith College Studies in Social Work, 23 125-149.

Friedlander, D. (1945). Personality development of twenty-seven children who later became psychotic. Journal of Abnormal and Social Psychology, 40, 330-335.

Garmezy, N. (1974). Children at risk: The search for the antecedents of schizophrenia. Part 2: Ongoing research programs, issues and intervention. Schizophrenia Bulletin, 9, 55-125.

Garmezy, N. (1975). The study of competence in children at risk for severe psychopathology. In E.J. Anthony & C. Koupernik (eds.). The Child in his Family: Children at Psychiatric Risk (vol.3). N.Y.: Wiley.

Garmezy, N. & Devine, V. (1984). Project competence: The Minnesota studies of children vulnerable to psychopathology. In N.F. Watt, E.J. Anthony, L.C. Wynne & J.E. Rolf (Eds.), Children at Risk for Schizophrenia: A Longitudinal

Perspective. N.Y.: Cambridge University Press.

Garmezy, N., Masten, A., Nordstrom, L. & Ferrarese, M. (1979). The nature of competence in normal and deviant children. In M.W. Kent & J.E. Rolf (Eds.), Social Competence in Children. Vermont: University Press of New England.

Garmezy, N. & Phipps-Yonas, S. (1984). An early crossroad in research on risk for schizophrenia: The Dorado Beach Conference. In N.F. Watt, E.J. Anthony, L.C. Wynne & J.E. Rolf (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Garmezy, N. & Streitman, S. (1974). Children at risk: The search for the antecedents of schizophrenia. Part I: Conceptual models and research methods. Schizophrenia Bulletin, 8, 14-90.

Glish, M.A., Erlenmeyer-Kimling, L. & Watt, N.F. (1982). Parental assessment of the social and emotional adaptation of children at high risk for schizophrenia. In B.B. Lahey, & A.E. Kazdin, (Eds.), Advances in Clinical Child Psychology (Vol. 5). N.Y.: Plenum Press.

Golden, R.R. & Meehl, P.E. (1979). Detection of the schizoid taxon with MMPI indicators. Journal of Abnormal Psychology, 88, 217-233.

Goldstein, M.J., Judd, L.L., Rodnick, E.H., Alkire, A.A. & Gould, E. (1968). A method for the study of social influence and coping patterns in the families of disturbed adolescents. Journal of Nervous and Mental Disease, 147, 233-251.

Goldstein, M.J., Rodnick, E.H., Jones, J.E., McPherson, S.R. & West, K.L. (1978). Familial precursors of schizophrenia spectrum disorders. In L.C. Wynne, R.L. Cromwell, & S. Matthysse (Eds.), The Nature of Schizophrenia: New Approaches to Research and Treatment. N.Y.: Wiley.

Gottesman, I.I. & Shields, J. (1982). Schizophrenia: The Epigenetic Puzzle. N.Y.: Wiley & Son.

Hans, S. & Marcus, J. (1984). A process model for the development of schizophrenia. Paper presented at the meetings of the Society for Life History Research in Psychopathology, Baltimore, Maryland.

Hans, S., Marcus, J., Henson, L., Nagler, S., Mirsky, A. (1985). Interpersonal behavior of children at risk for schizophrenia. Unpublished manuscript.

Hanson, D., Gottesman, I. & Meehl, P. (1976). Some possible childhood indicators of adult schizophrenia inferred from

children of schizophrenics. British Journal of Psychiatry, 129, 142-154.

Hartmann, E., Milofsky, E., Vaillant, G., Oldfield, M., Falke, R. & Ducey, C. (1984). Vulnerability to schizophrenia. Archives of General Psychiatry, 41, 1050-1056.

Hertzig, M. & Birch, H. (1968). Neurologic organization in psychiatrically disturbed adolescents: A comparative consideration of sex differences. Archives of General Psychiatry, 19, 528-537.

Iacono, W.G. (1985). Psychophysiologic markers of psychopathology: A review. Canadian Psychology, 26, 96-112.

John, R.S., Mednick, S.A. & Schulsinger, F. (1982). Teacher reports as a predictor of schizophrenia and borderline schizophrenia: A Bayesian decision analysis. Journal of Abnormal Psychology, 91, 399-413.

Knight, R.A., & Roff, J.D. (1983). Childhood and yound adult predictors of schizophrenic outcome. In D.F. Ricks & B.S. Dohrenwend (Eds.), Origins of Psychopathology: Problems in Research and Public Policy. N.Y.: Cambridge University Press.

Kohlberg, L., LaCrosse, J. & Rick, D.F. (1972). The adult mental health from childhood behavior. In B. Wolman (Ed.), Manual of Child Psychopathology. N.Y.: McGraw-Hill.

Kraepelin, E. (1919). In Dementia Praecox (R.M. Barclay, trans.). Edinburgh: Livingston.

Labourvie, E.W. (1986). Methodological issues in the prediction of psychopathology: A life-span perspective. In L. Erylenmeyer-Kimling & N.E. Miller (Eds.). Life-span Research on the Prediction of Psychopathology. New Jersey: LEA.

Lader, M. (1975). The Psychophysiology of Mental Illness. London: Routledge & Kegan Paul.

Lane, E. & Albee, G. (1964). Early childhood intellectual differences between schizophrenic adults and their siblings. Journal of Abnormal and Social Psychology, 68, 193-195.

Lane, E. & Albee, G. (1965). Childhood intellectual differences between schizophrenic adults and their siblings. American Journal of Orthopsychiatry, 35, 747-753.

Ledingham, J.E. (1981). Developmental patterns of aggressive and withdrawn behavior in childhood: A possible method for identifying preschizophrenics. Journal of Abnormal Child

Psychology, 9, 1-22.

Lehman, R., Chelune, G. & Heaton, R. (1979). Level and variability of performance on neuropsychological tests. Journal of Clinical Psychology, 35, 358-363.

Marascuilo, L.A. (1971). Statistical Methods for Behavioral Science Research. N.Y.: McGill Hill.

Marcus, J. (1974). Cerebral functioning in offspring of schizophrenics: A possible genetic factor. International Journal of Mental Health, 3, 57-73.

Marcus, J., Auerbach, J., Wilkinson, L. & Burack, C. (1981). Infants at risk for schizophrenia: The Jerusalem infant development study. Archives of General Psychiatry, 38, 703-713.

Marcus, J., Auerbach, J., Wilkinson, L. & Burack, C.M. (1984). Infants at risk for schizophrenia : The Jerusalem infant development study. In N.F. Watt, E.J. Anthony, L.C. Wynne & J.E. Rolf (Eds.), Children at Risk for Schizophrenia : A Longitudinal Perspective. N.Y. : Cambridge University Press.

Marcus, J., Han, S., Lewow, E., Wilkinson, L. & Burack, C. (1985). Neurological findings in high risk children: Children assessment and 5-year followup. Schizophrenia Bulletin, 11, 85-100.

Marcuse, Y. & Cornblatt, B. (1986). Children at high risk for schizophrenia: Predictions from infancy to childhood functioning. In L. Erlenmeyer-Kimling, & N. Miller (Eds.), Life Span Research on the Prediction of Psychopathology. New Jersey: LEA.

Mason, C. (1956). Pre-illness intelligence of mental hospital patients. Journal of Consulting Psychology, 20, 297- 300.

Masten, A.S. & Garmezy, N. (1985). Risk, vulnerability, and protective factors in developmental psychopathology. In B.B. Lahey & A. E. Kazdin (Eds.), Advances in Clinical Child Psychology (Vol.8). N.Y.: Plenum Press.

McGuire, M.D. (1983). Attentional functions and information processing in adolescents at behavioral risk for schizophrenia. Unpublished doctoral thesis, Cornell University.

McNeil, T.F. & Kaij, L. (1984). Offspring of women with nonorganic psychoses: Progress report. In N.F. Watt, E.J. Anthony, L.C. Wynne & J.E. Rolf (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Mednick, S.A., Mura, E., Schulsinger, F. & Mednick, B. (1971). Perinatal conditions and infant development in children with schizophrenic parents. Social Biology, 18, S103-S113.

Mednick, S. & Schulsinger, F. (1968). Some premorbid characteristics related to breakdown in children with schizophrenic mothers. Journal of Psychiatric Research, 6, 354-362.

Mednick, S.A., Cudeck, R., Griffith, J.J., Talovic, S.A. & Schulsinger, F. (1984). The Danish high-risk project: Recent methods and findings. In N.F. Watt, E.J. Anthony, L.C. Wynne & J.E. Rolf (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Meehl, P.E. (1972). Specific genetic etiology, psychodynamics and therapeutic nihilism. International Journal of Mental Health, 1, 10-27.

Michael, C.M., Morris, D.P. & Soroker, E. (1957). Follow-up studies of shy, withdrawn children: II. Relative incidence of schizophrenia. American Journal of Orthopsychiatry, 27, 331-337.

Milich, R. & Landau, S. (1984). A comparison of the social status and social behavior of aggressive/withdrawn boys. Journal of Abnormal Child Psychology, 12, 277-288.

Miner, J. & Anderson, J. (1958). Intelligence and emotional disturbance: Evidence from army and veterans administration records. Journal of Abnormal and Social Psychology, 56, 75-81.

Minturn, M. & Lewis, M. (1968). Age differences in peer ratings of socially desirable and socially undesirable behavior. Psychology Reports, 23, 783-791.

Mirsky, A. F. & Duncan, C.C. (1986). Etiology and expression of schizophrenia: Neurobiological and psychosocial factors. Annual Review of Psychology, 37, 291-319.

Moffitt, T.E., Mednick, S.A. & Cudeck, R. (1983). Methodology of high risk research: Longitudinal approaches. In R. Tarter (Ed.) The Children at Psychiatric Risk. N.Y.: Offord University Press.

Morris, H.H.Jr., Escoll, P.J., & Wexler, R. (1956). Aggressive behavior disorders of childhood: A follow-up study. American Journal of Psychiatry, 112, 991-997.

Mosher, L., Pollin, W. & Stabenau, J. (1971). Identical twins discordant for schizophrenia: Neurologic findings. Archives of General Psychiatry, 22, 422-430.

Nameche, G., Waring, M. & Ricks, D. (1964). Early indicators of outcome in schizophrenia. Journal of Nervous & Mental Disease, 139, 232-240.

Neale, J.M. (1971). Perceptual span in schizophrenia. Journal of Abnormal Psychology, 77, 196-204.

Neale, J.M., McIntyre, C.W., Fox, R. & Cromwell, R.L. (1969). Span of apprehension in acute schizophrenics. Journal of Abnormal Psychology, 74, 593-596.

Neale, J.M., Winters, K.C. & Weintraub, S. (1984). Information processing deficits in children at high risk for schizophrenia. In N.F. Watt, E.J. Anthony, Wynne, L.C. & Rolf, J.E. (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Nielsen, T.C. & Peterson, K.E. (1976). Electrodermal correlates of extraversion, trait anxiety and schizophrenism. Scandinavian Journal of Pscyhology, 17, 73-80.

Norman, W.T. (1963) Toward an adequate taxonomy of personality attributes: Replicated factor structure in peer nomination personality ratings. Journal of Abnormal and Social Psychology, 66, 574-583.

Nuechterlein, K.H. (1983). Signal detection in vigilance tasks and behavioral attributes among offspring of schizophrenic mothers and among hyperactive children. Journal of Abnormal Psychology, 92, 4-28.

Nuechterlein, K.H. & Dawson, M.E. (1984a). A heuristic vulnerability/stress model of schizophrenic episodes. Schizophrenia Bulletin, 10, 2, 300-312.

Nuechterlein, K.H. & Dawson, M.E. (1984b). Information processing and attentional functioning in the developmental course of schizophrenic disorders, Schizophrenia Bulletin, 10, 160-203.

Offord, D. & Cross, L. (1969). Behavioral antecedents of adult schizophrenia. Archives of General Psychiatry, 21, 267-283.

Offord, D.R. & Cross, L.A. (1971). Adult schizophrenia with scholastic failure or low IQ in childhood. Archives of General Psychiatry, 125, 12-19.

Olson, C.L. (1979). Practical considerations in choosing a MANOVA test statistic: A rejoinder to Stevens. Psychological Bulletin, 86, 1350-1352.

O'Neal, P. & Robins, L. (1957). The relation of childhood behavior problems to adult psychiatric status: A 30-year

follow-up study of 150 subjects. American Journal of Psychiatry, 114, 961-969.

Parnas, J., Schulsinger, F., Schulsinger, H., Mednick, S.A. & Teasdale, T.W. (1982). Behavioral precursors of schizophrenia spectrum. Archives of General Psychiatry, 39, 658-664.

Payne, R. (1960). Cognitive abnormalities. In H. Eysenck (Ed.), Handbook of Abnormal Psychology. London: Pitman Medical Publishing Co., Ltd.

Pekarik, E.G., Prinz, R.J., Leibert, D.E., Weintraub, S. & Neale, J.M. (1976). The Pupil Evaluation Inventory: A sociometric technique for assessing children's social behavior. Journal of Abnormal Child Psychology, 4, 83-97.

Philips, L. (1968). Human Adaptation and its Failures. N.Y.: Academic Press.

Pollack, M., Woerner, M. & Klein, D.F. (1970). A comparison of childhood characteristics of schizophrenics, personality disorders, and their siblings. In M. Roff & D. Ricks (Eds.), Life History Research in Psychopathology. Minneapolis: University of Minnesota Press.

Pollin, W. & Stabenau, J.R. (1968). Biological, psychological, and historical differences in a series of monozygotic twins discordant for schizophrenia. In D. Rosenthal & S. Kety (Eds.), The Transmission of Schizophrenia. London: Pergamon Press.

Quitkin, F., Rifkin, A. & Klein, D.F. (1976). Neurologic soft signs in Schizophrenia and character disorders, Archives of General Psychiatry, 33, 845-853.

Ragins, N., Schachter, J., Elmer, E., Preisman, R., Bowes, A.E. & Harway, V. (1975). Infants and children at risk for schizophrenia. Journal of Child Psychiatry, 14, 150-177.

Regie de l'Assurance Maladie du Quebec (1979). Repertoire des ~~Diagnostics~~ (lere edition). Depot Legal: Bibliotheque Nationale du Quebec.

Ricks, D.F. & Berry, J.C. (1970). Family and symptom patterns that precede schizophrenia. In M. Roff & D. Ricks (Eds.), Life History Research in Psychopathology. Minneapolis: University of Minnesota Press.

Rieder, R. & Nichols, P. (1979). Offsprings of schizophrenics. Part III: Hyperactivity and neurological soft signs. Archives of General Psychiatry, 36, 665-674.

Robin, L.N. (1966). Deviant Children Grown Up. Baltimore: Williams & Wilkins.

Robin, L. (1979). Follow-up studies, In H.C. Quay & J.S. Werry (Eds.), Psychopathological Disorders of Children (2nd ed.). N.Y.: Wiley.

Rochford, J. Detre, T., Tucker, G. & Harrow, J. (1970). Neuropsychological impairments in functional psychiatric disease. Archives of General Psychiatry, 22, 114-119.

Rodnick, E.H., Goldstein, M.J., Lewis,J.M. & Doane, J.A. (1984). Parental communication style, affect, and role as precursors of offspring schizophrenia-spectrum disorders. In N.F. Watt, E.J. Anthony, L.C. Wynne & J.E. Rolf (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Roff, J.D., Knight, R. & Wertheim, E. (1976). A factor analytic study of childhood sysmptoms antecedent to schizophrenia. Journal of Abnormal Psychology, 85, 543-549.

Roff, M. & Sells, S. (1968). Juvenile delinquency in relation to peer acceptance-rejection and socioeconomic status. Psychology in the Schools, 5, 3-18.

Rolf, J.E. (1972). The social and academic competence of children vulnerable to schizophrenia and other behavior pathologies. Journal of Abnormal Psychology, 80, 225-243.

Schaffner, A., Lane, E. & Albee, G. (1967). Intellectual differences between suburban preschizophrenic children and their siblings. Journal of Consulting Psychology, 31, 326-367.

Schulsinger, H. (1976). A ten year follow-up of children of schizophrenic mothers: Clinical assessment. Acta Psychiatrica Scandinavica, 53, 371-386.

Schulsinger, F., Mednick, S., Venables, P. Ramon, A. & Bell, B. (1975). Early detection and prevention of mental illness: The Mauritius Project. Neuropsychobiology, 1, 166-179.

Schwartzman, A.E., Ledingham, J.E. & Serbin, L.A. (1985). Identification of children at risk for adult schizophrenia: A longitudinal study. International Reivew of Applied Psychology, 34, 363-380.

Schwartzman, A., Beltempo, J., Senneville, C., & Moskowitz, D. (1986). The link between peer-identified deviance and intermediate psychiatric outcome. Poster presented at the 47th Annual meeting of the Canadian Psychological Association, Toronto.

Shotten, J.H. (1985). The Israeli high-risk study: The family interview. Schizophrenia Bulletin, 11, 112-116.

Slater, E. & Roth, M. (1969). Mayer-Gross, Slater and Roth's Clinical Psychiatry, (3rd ed.), London: Baillers.

Sloan, W. (1955). The Lincoln-Oseretsky motor development scale, Genetic Psychology Monographs, 51, 183-252.

Smith, G. (1967). Usefulness of peer ratings of personality in education research. Education and Psychological Measurement, 24, 967-984.

Sohlberg, S.C. & Yaniv, S. (1985). Social adjustment and cognitive performance of high-risk children. Schizophrenia Bulletin, 11, 61-65.

Steffy, R.A., Asarnow, R.F., MacCrimmon, D.J. & Cleghorn, J.M. (1984). The McMaster-Waterloo high-risk project: multifaceted strategy for high-risk research. In N.F. Watt, E.J. Anthony, L.C. Wynne & J.E. Rolf (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Strauss, J. & Carpenter, W. (1974). The prediction of outcome in schizophrenia. Archives of General Psychiatry, 31, 37-47.

Strauss, J.S. & Carpenter, W.T. (1981). Schizophrenia. N.Y.: Plenum Medical Book Company.

Sullivan, H. (1931). Research in schizophrenia. American Journal of Psychiatry, 11, 519-540.

Tabachnick, B.G. & Fidell, L.S. (1983). Using Multivariate Statistics. N.Y.: Harper & Row.

Torrey, E.F. (1980). Neurological abnormalities in schizophrenic patients. Biological Psychiatry, 15, 381-388.

Walker, E. & Emory, E. (1983). Infants at risk for psychopathology: Offspring of schizophrenic parents. Child Development, 54, 1269-1285.

Warnken, R.G. & Siess, T.F. (1965). The use of the cumulative record in the prediction of behavior. Journal of Personnel Guidance, 31, 231-237.

Watt, N.F. (1978). Patterns of childhood social development in adult schizophrenics. Archives of General Psychiatry, 35, 160-165.

Watt, N.F. (1984). In a nutshell: the first two decades of high-risk research in schizophrenia. In N. Watt, E. Anthony,

L. Wynne & J. Rolf (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Watt, N.F., Anthony, E.J., Wynne, L.C. & Rolf, J.E. (1984). Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

Watt, N.F., Fryer, J.H., Lewine, R.R.J. & Prentky, R.A. (1979). Toward longitudinal conceptions of psychiatric disorder. In B.A. Maher (Ed.), Progress in Experimental Personality Research (vol.9). N.Y.: Academic Press.

Watt, N.F. & Lubensky, A. (1976). Childhood roots of schizophrenia. Journal of Consulting and Clinical Psychology, 44, 363-375.

Wechsler, D. (1974). Manual for the Wechsler Intelligence Scale for Children - Revised. N.Y.: The Psychological Corporation.

Wechsler, D. (1981). Manual for the Wechsler Adult Intelligence Scale - Revised. N.Y.: The Psychological Corporation.

Weintraub, S. & Neale, J.M. (1984). Social behavior of children at risk for schizophrenia. In N.F. Watt, E.J. Anthony, L.C. Wynne, & J.E. Roff (Eds.), Children at Risk for Schizophrenia: A Longitudinal Perspective. N.Y.: Cambridge University Press.

White, R.W. (1965). The experience of efficacy in schizophrenia. Psychiatry, 28, 199-211.

Wiener, H. (1958). Diagnosis and symptomatology. In L. Bellak (Ed.), Schizophrenia: A Review of the Syndrome. N.Y.: Logos Press.

Winder, C. (1960). Some psychological studies of schizophrenics. In D. Jackson (Ed.), The Etiology of Schizophrenia. N.Y.: Basic Books.

Winters, K.C., Stone, A.A., Weintraub, S. & Neale, J.M. (1981). Cognitive and attentional deficits in children vulnerable to psychopathology. Journal of Abnormal Child Psychology, 9, 435-453.

Woerner, M.G., Pollack, M., Rogalski, C., Pollack, Y. & Klein, D.F. (1972). A comparison of the school records of personality disorders, schizophrenics and their sibs. In M. Roff & D.F. Ricks (Eds.), Life History Research in Psychopathology, (Vol. 2). Minneapolis: University of Minnesota Press.

Zubin, J. & Spring, B. (1977) Vulnerability - A new view of schizophrenia. Journal of Abnormal Psychology, 86, 103-126.

Zubin, J. (1980). Chronic schizophrenia from the standpoint of vulnerability. In C. Baxter & T. Melnechuk (Eds.), Perspectives in Schizophrenia Research. N.Y. : Raven Press.

Appendix A

Pupil Evaluation Inventory (Pekarik et al., 1976)

		Factor
VOTRE NOM:	VOTRE NUMÉRO	
1. Ceux qui sont plus grands que les autres		Sample Item
2. Ceux qui aident les autres		Likeability
3. Ceux qui ne sont pas capables de rester assis tranquilles		Aggression
4. Ceux qui essaient de mettre les autres dans le trouble		Aggression
5. Ceux qui sont trop timides pour se faire des amis facilement		Withdrawal
6. Ceux qui s sentent trop facilement blessés		Withdrawal
7. Ceux qui prennent des airs supérieurs et qui pensent qu'ils valent mieux que tout le monde		Aggression
8. Ceux qui font les clowns et font rire les autres		Aggression
9. Ceux qui commencent la chicane à propos de rien		Aggression
10. Ceux qui ne semblent jamais s'amuser		Withdrawal

Note - The column at the right that indicates the factor each item belongs to was not included in the version of this form administered to the children.

					Factor
11. Ceux qui sont bouleversés quand ils ont à répondre aux questions en classe					Withdrawal
12. Ceux qui disent aux autres enfants quoi faire					Aggression
13. Ceux qui sont d'habitude les derniérs choisis pour participer à des activités de groupe					Withdrawal
14. Ceux que tout le monde aime					Likeability
15. Ceux qui s'empêtrent tou le temps et se mettent en difficultés					Aggression
16. Ceux qui rient des gens					Aggression
17. Ceux qui ont très peu d'amis					Withdrawal
18. Ceux qui font des choses bizarres					Aggression
19. Ceux qui sont vos meilleurs amis					Likeability
20. Ceux qui annuient les gens qui essaient de travailler					Aggression
21. Ceux qui se mettent en colère quand ça ne marche pas comme ils veulent					Aggression
22. Ceux qui ne portent pas attention au professeur					AGgression

		Factor
23.	Ceux qui sont impolis avec le professeur	Aggression
24.	Ceux qui sont malheureux ou tristes	Withdrawal
25.	Ceux qui sont particulièrement gentils	Likeability
26.	Ceux qui se comportent comme des bébés	Aggression
27.	Ceux qui sont méchants et cruels avec les autres enfants	Aggression
28.	Ceux qui souvent ne veulent pas jouer	Withdrawal
29.	Ceux qui vous regardent de travers	Aggression
30.	Ceux qui veulent faire les fins devant la classe	Aggression
31.	Ceux qui disent qu'ils peuvent battre tout le monde	Aggression
32.	Ceux que l'on ne remarque pas beaucoup	Withdrawal
33.	Ceux qui exagèrent et racontent des histoires	Aggression
34.	Ceux qui se plaignent toujours et qui ne sont jamais contents	Aggression
35.	Ceux qui semblent toujours comprendre ce qui se passe	Likeability

Appendix B

French instructions for the Span of Apprehnsion Task

"Ceci est un test pour voir si tu peux identifier des lettres qui sont présentées très brièvement. Lorsque tu regarderas à travers la visée, des cartes vont être présentées qui contiennent soit la lettre T, soit la lettre F. Aucune des cartes ne contient à la fois un T et un F.

"Si tu n'as pas pu identifier la lettre correctement, prend une chance et devines.

"Certaine cartes contiennent d'autres lettres en plus du T ou du F. Ces lettres-là sont sans importance. Ignore- les. Essaie seulement de voir s'il y a un T ou un F.

"Entre chaque carte, et au tout début, tu dois fixer le point noir qui apparait au centre de l'écran.

"Maintenant, appuie tonfront et ton nez bien comme il faut sur la visière, et fixe le point noir . Avant de faire apparaître les lettres, je te donnerai un avertissement."

Appendix C

Lincoln-Oseretsky Motor Devlopment Scale (Sloan, 1955)

CAT. #37018-R RECORD BLANK

LINCOLN-OSERETSKY MOTOR DEVELOPMENT SCALE

Name_____ Birth Date_____ Age____ Sex____

Education_____ Physical Defects_____

Percentile Rank_____ Score_____ Examined at_____

Examiner_____ Date_____

ITEM	DESCRIPTION	R/L	Trs	Pts	NOTES
1	Walking backwards, 6 ft.		2		
2	Crouching on tiptoe		2		
3	Standing on one foot	R/L	2/2	/	
4	Touching nose		1		
5	Touching fingertips	R/L	2/2	/	
6	Tapping rhythmically with feet and fingers		1		
7	Jumping over a rope		1		
8	Finger movement		3		
9	Standing heel to toe		2		
10	Close and open hands alternately		3		
11	Making dots		2		
12	Catching a ball	R/L	5/5	/	
13	Making a ball	R/L	2/2	/	
14	Winding thread	R/L	1/1	/	
15	Balancing a rod crosswise	R/L	3/3	/	
16	Describing circles in the air		1		
17	Tapping (15")	R/L	2/2	/	
18	Placing coins and matchsticks		1		
19	Jump and turn about		1		
20	Putting matchsticks in a box		1		
21	Winding thread while walking	R/L	1/1	/	
22	Throwing a ball	R/L	5/5	/	
23	Sorting matchsticks	R/L	1/1	/	
24	Drawing lines	R/L	2/2	/	
25	Cutting a circle	R/L	1/1	/	
26	Putting coins in box (15")	R/L	1/1	/	
27	Tracing mazes	R/L	1/1	/	
28	Balancing on tiptoe		1		

29	Tapping with feet and fingers		1	
30	Jump, touch heels		1	
31	Tap feet and describe circles		1	
32	Stand on one foot	R/L	1/1	/
33	Jumping and clapping		1	
34	Balancing on tiptoe	R/L	1/1	/
35	Opening and closing hands		1	
36	Balancing on rod vertically	R/L	3/3	/

STOELTING COMPANY - 1350 S. KOSTNER AVE - CHICAGO, ILLINOIS 6062
(Area Code 312) 522-4500 Printed in U.S.A.

Appendix D

French Translation of the Social Competence Scale (Achenbach & Edelbrock, 1981)

INVENTAIRE DU JEUNE

Date (aujourd'hui): _____

Sexe du jeune: Garçon _____ Fille _____

Niveau scolaire actuel du jeune: _____

Inventaire rempli par le Père _____ Mère _____

Occupation du père: _____

Occupation de la mère: _____

Est ce que ce jeune habite avec ses parents:

Oui _____ Non _____ (Décrire) _____

1. Veuillez indiquer les sports auxquels votre enfant préfère participer: ex., la nage, le patinage, la bicyclette, etc.

   Aucun _____

   a) _____

   b) _____

   c) _____

   Comparé(e) à d'autres personnes de son âge, à peu près combien de temps y passe-t'il/elle?

	Moins que la moyenne:	Comme la moyenne:	Plus que la moyenne:
a)	_____	_____	_____
b)	_____	_____	_____
c)	_____	_____	_____

   Comparé(e) à d'autres personnes de son âge, avec quelle habileté pratique-t'il/elle chacun de ses sports?

	Moins que la moyenne:	Comme la moyenne:	Mieux que la moyenne:
a)	_____	_____	_____
b)	_____	_____	_____
c)	_____	_____	_____

2. Veuillez indiquer les passe-temps, activités et jeux favoris, de votre enfant, autres que les sports: ex., collections, livres, instrument de musique, etc.

   Aucun _____

   a) _____

   b) _____

   c) _____

2. Cont'

Comparé(e) à d'autres personnes de son âge, à peu près combien de temps y passe-t'il/elle?

	Moins que la moyenne:	Comme la moyenne:	Plus que la moyenne:
a)	_____	_____	_____
b)	_____	_____	_____
c)	_____	_____	_____

Comparé(e) à d'autres personnes de son âge, comment se classe t'il/elle dans chacune de ces activités?

	Moins que la moyenne:	Comme la moyenne:	Mieux que la moyenne:
a)	_____	_____	_____
b)	_____	_____	_____
c)	_____	_____	_____

3. Veuillez énumérer les organisations, clubs, équipes ou groupes auxquels votre enfant appartient.

Aucun _____

a) _____

b) _____

c) _____

Comparé(e) à d'autres personnes de son âge, jusqu'à quel point participe-t'il/elle à ces groupes?

	Moins activement:	Comme la moyenne:	Plus activement:
a)	_____	_____	_____
b)	_____	_____	_____
c)	_____	_____	_____

4. Veuillez indiquer les emplois ou tâches domestiques que votre enfant fait: ex. livraison de journaux, garde d'enfants, faire le lit, faire le ménage, etc.

Aucun _____

a) _____

b) _____

c) _____

Comparé(e) à d'autres personnes de son âge, comment exécute-t'il/elle ces tâches?

	Pire que la moyenne:	Comme la moyenne:	Mieux que la moyenne:
a)	_____	_____	_____
b)	_____	_____	_____
c)	_____	_____	_____

5) a) A peu près combien de bons amis ou bonnes amies a votre enfant?

_____ Aucun / _____ 1 / _____ 2 ou 3 / _____ 4 ou plus

b) A peu près combine de fois par semaine font-ils/elles de choses ensemble?

_____ moins de 1 / _____ 1 ou 2 / _____ 3 ou plus

6) Comparé(e) à d'autre personnes de son âge, comment:

	Pire:	Comme la moyenne:	Mieux:
a) s'entend-il/elle avec ses frères et soeurs?	____	____	____
b) s'entend-il/elle avec les autres en générale?	____	____	____
c) Se comporte-il/elle avec ses parents?	____	____	____
d) S'occupe-t'il/elle et travaille-t'il/elle seul(e)?	____	____	____

7) Rendement scolaire actuel:

Ne vais pas à l'école _____

	Echec	En-dessous de la moyenne:	Comme la moyenne:	Au-dessus de la moyenne:
a) français	____	____	____	____
b) maths	____	____	____	____

Autres matières: (ex., histoire, sciences, langues étrangères, etc.)

c) _____	____	____	____	____
d) _____	____	____	____	____
e) _____	____	____	____	____
f) _____	____	____	____	____
g) _____	____	____	____	____

Est-ce que votre enfant a déjà été dans une classe spéciale?

Non _____ Oui _____ Quel genre? _____

Est-ce que votre enfant a déjà doublé une année?

Non _____ Oui _____

Quelle année et pour quelle raison? _____

Veuillez décrire tout problème académique ou autre que votre enfant a à l'école.

Aucun _____

_____

_____

_____

8) Vous trouverez ci-dessous une liste d'items qui s'appliquent aux jeunes de son âge. Veuillez encercler le numéro 2 pour chaque item qui est vrai ou souvent vrai pour votre enfant à present ou qui l'a été dans les 12 derniers mois. Encerclez le numéro 1 si l'item est quelques fois ou à peu près vrai. Encerclez le 0 si l'item ne s'applique pas à votre enfant.

0 1 2 1. Se comporte de façon trop jeune pour son âge.

0 1 2 2. A une allergie (decrire): _____

0 1 2 3. Se dispute beaucoup.

0 1 2 4. Fait de l'asthme.

0 1 2 5. Se comporte comme une personne du sexe opposé.

0 1 2 6. Aime les animaux.

0 1 2 7. Se vante.

0 1 2 8. Ne peut concentrer son attention pour longtemps.

0 1 2 9. Ne peut s'empêcher de penser à certaines choses (décrire):

_____

_____

_____

0 1 2 10. A de la difficulté à rester assis(e) tranquille.

0 1 2 11. Dépend trop des adultes.

0 1 2 12. Se plaint de se sentir seul(e).

0 1 2 13. Se sent confus(e), dans le brouillard.

0 1 2 14. Pleure beaucoup.

0 1 2 15. Cruel envers les animaux.

0 1 2 16. Cruel ou méchant(e) envers les autres.

0 1 2 17. Se perd en rêveries ou dans ses pensées.

0 1 2 18. Se fait mal exprès ou essaie de se suicider.

0 1 2 19. Essaie d'obtenir beaucoup d'attention.

0 1 2 20. Détruit ses propres choses.

0 1 2 21. Détruit des choses appartenant à d'autres personnes.

0 1 2 22. Désobéissant(e) à la maison.

0 1 2 23. Désobéissant(e) à l'école.

0 1 2 24. N'a pas bon appétit.

0 1 2 25. Ne s'entend pas avec les autres.

0 1 2 26. Ne se sent pas coupable après s'être mal comporté(e).

0 1 2 27. Jalous(se) les autres.

0 1 2 28. Mange ou boit autre chose que de la nourriture.

0 1 2 29. A peur de certains animaux, certains endroits ou situations autre que l'école (décrire): _____

_____

_____

0 1 2 30. A peur d'aller à l'école.

0 1 2 31. A peur d'avoir des mauvaises pensées ou de faire quelque chose de mal.

0 1 2 32. Pense qu'il/elle doit être parfait(e).

0 1 2 33. A l'impression que personne ne l'aime.

0 1 2 34. A l'impression qu'on le/la persécute.

0 1 2 35. Se croit bon(ne) à rien ou inférieur(e).

0 1 2 36. Se fait souvent mal accidentellement.

0 1 2 37. Se bagarre souvent.

0 1 2 38. Se fait taquiner beaucoup.

0 1 2 39. Fréquente des jeunes qui s'attirent des ennuis.

0 1 2 40. Entend des choses que personne d'autre ne semble entendre (décrire): _____

_____

_____

0 1 2 41. Agit sans s'arrêter pour réfléchir, impulsif(ve).

0 1 2 42. Aime être seul(e).

0 1 2 43. Ment ou triche.

0 1 2 44. Ronge ses ongles.

0 1 2 45. Nerveux(se) ou tendu(e).

0 1 2 46. A des mouvements nerveux ou des contractions involontaires (décrire): _____

_____

_____

0 1 2 47. Fait des cauchemars.

0 1 2 48. Pas aimé(e) des autres.

0 1 2 49. Constipé, ne vas pas à la selle.

0 1 2 50. Trop peureux(se) ou anxieux(se).

0 1 2 51. A des étourdissements.

0 1 2 52. Se sent trop coupable.

0 1 2 53. Mange trop.

0 1 2 54. Excessivement fatigué(e).

0 1 2 55. Pèse plus que la moyenne.

56. Problèmes physique sans cause médicale connue:

0 1 2 a) des douleurs ou des maux,

0 1 2 b) maux de tête,

0 1 2 c) problèmes avec les yeux (décrire): _____

_____

0 1 2 d) nausée, se sent mal,

0 1 2 e) éruptions ou autres problèmes de la peau,

0 1 2 f) maux d'estomac ou crampes,

0 1 2 g) vomissements,

0 1 2 h) autres (décrire): _____

_____

_____

0 1 2 57. Attaque les gens physiquement.

0 1 2 58. Se gratte la peau ou certaines parties de son corps (décrire):

_____

_____

0 1 2 59. Joue avec ses parties sexuelles en public.

0 1 2 60. Joue trop avec ses parties sexuelles.

0 1 2 61. A de la difficulté à l'école.

0 1 2 62. Manque de coordination, maladroit(e).

0 1 2 63. Préfère la compagnie de jeunes plus âgés.

0 1 2 64. Préfère la compagnie d'enfants plus jeunes.

0 1 2 65. Refuse de parler.

0 1 2 66. Répète sans cesse certains actes (décrire): _____

_____

_____

0 1 2 67. Se sauve de la maison.

0 1 2 68. Crie beaucoup.

0 1 2 69. Renfermé(e), garde les choses pour soi-même.

0 1 2 70. Voit des choses que personne d'autre ne semble voir (décrire):

_____

_____

_____

0 1 2 71. Facilement embarrassé(e) ou gêné(e).

0 1 2 72. Allume des feux.

0 1 2 73. A des problèmes sexuels (décrire): _____

_____

_____

0 1 2 74. Fait le fin (la fine) ou le clown.

0 1 2 75. Timide.

0 1 2 76. Dort moins que la plupart des jeunes de son âge.

0 1 2 77. Dort plus que la plupart des jeunes de son âge pendant le jour et/ou la nuit (décrire): _____

_____

_____

0 1 2 78. A beaucoup d'imagination.

0 1 2 79. A des problèmes d'élocutions (expression orale) (décrire):

_____

_____

0 1 2 80. A le regard vague.

0 1 2 81. Vole des choses à la maison.

0 1 2 82. Vole en dehors de la maison.

0 1 2 83. Amasse des choses dont il/elle n'a pas besoin (décrire):

_____

_____

0 1 2 84. Fait des choses que certains trouvent étranges, a un comportement étrange (décrire): _____

_____

_____

0 1 2 85. A des pensées ou des idées que certains trouveraient étranges (décrire): _____

_____

0 1 2 86. Entêté(e).

0 1 2 87. A des sautes d'humeur ou de sentiment.

0 1 2 88. Boude beaucoup.

0 1 2 89. Méfiant.

0 1 2 90. Sacre ou utilise de mots obscènes.

0 1 2 91. Parle de se tuer.

0 1 2 92. Parle dans son sommeil, est somnambule (décrire): _____

_____

_____

0 1 2 93. Parle trop.

0 1 2 94. Taquine beaucoup les autres.

0 1 2 95. S'emporte facilement.

0 1 2 96. Pense trop au sexe.

0 1 2 97. Menace les gens.

0 1 2 98. Suce le pouce.

0 1 2 99. Trop préoccupé(e) d'ordre ou de propreté.

0 1 2 100. A de la difficulté à dormir (décrire): _____

_____

_____

0 1 2 101. Manque ses cours.

0 1 2 102. Manque d'énergie.

0 1 2 103. Malheureux(se), triste, ou déprimé.

0 1 2 104. Plus bruyant(e) que les autres.

0 1 2 105. Fait usage de drogues ou d'alcool pour des raisons autres que médicales (décrire): _____

_____

_____

0 1 2 106. Vandalisme.

0 1 2 107. A le sens de l'humour.

0 1 2 108. Plutôt sérieux(se).

0 1 2 109. Pleurniche.

0 1 2 110. Voudrait appartenir au sexe opposé.

0 1 2 111. Evite de s'impliquer avec les autres.

0 1 2 112. Se fait beaucoup de soucis.

113. Utilisez le reste de l'espace pour ajouter autre chose qui peut décrire les sentiments, comportements, et intérêts de ce jeune.
Si vous n'avez rien à ajouter, S.V.P. cochez: Rien à ajouter _____

Appendix E

Intercorrelations among Major Variables in this Study (N=351)

Intercorrelations among major variables (N=351)

	PWITH	PAN	PLIKE	SPAN	IQ	LINC	SCOMP	SCH	SOC	ACT	AGE
PPAGG	-0.01 (p=.40)	0.47 (p=.001)	-0.13 (p=.002)	0.04 (p=.2)	-0.28 (p=.001)	-0.09 (p=.03)	-0.18 (p=.001)	-0.35 (p=.001)	-0.13 (p=.007)	-0.08 (p=.06)	-0.09 (p=.02)
PWITH		0.21 (p=.001)	-0.22 (p=.001)	-0.09 (p=.07)	-0.06 (p=.01)	-0.17 (p=.001)	-0.17 (p=.001)	-0.17 (p=.001)	-0.19 (p=.001)	-0.09 (p=.04)	-0.02 (p=.02)
PAN			-0.09 (p=.02)	0.1 (p=.01)	-0.17 (p=.001)	-0.17 (p=.001)	-0.03 (p=.30)	-0.17 (p=.001)	-0.09 (p=.03)	-0.03 (p=.30)	-0.25 (p=.001)
PLIKE				-0.12 (p=.004)	0.30 (p=.001)	0.26 (p=.001)	0.20 (p=.001)	0.30 (p=.001)	0.13 (p=.008)	0.17 (p=.001)	-0.02 (p=.30)
SPAN					-0.24 (p=.001)	-0.22 (p=.001)	0.09 (p=.04)	-0.23 (p=.001)	-0.09 (p=.05)	-0.04 (p=.20)	-0.1 (p=.01)
IQ						0.35 (p=.001)	0.29 (p=.001)	0.47 (p=.001)	0.20 (p=.001)	0.17 (p=.001)	-0.13 (p=.001)
LINC							0.17 (p=.001)	0.28 (p=.001)	0.15 (p=.004)	0.05 (p=.20)	0.20 (p=.001)
SCOMP								0.48 (p=.001)	0.56 (p=.001)	0.56 (p=.001)	-0.09 (p=.03)
SCH									0.26 (p=.001)	0.25 (p=.001)	-0.07 (p=.07)
SOC										0.25 (p=.001)	-0.02 (p=.30)
ACT											-0.09 (p=.03)
AGE											

Appendix F

Information of the Aggressive Group on Neuromotor Performance, Intelligence, Social Competence and Intermediate Psychiatric Outcome.

Information of the Aggressive Outliers and Contrasts on the Validational Measures and Psychiatric Outcome

	Aggressive Outliers			Aggressive Contrasts		
	$\bar{X}$	SD	Adj $\bar{X}$	$\bar{X}$	SD	Adj $\bar{X}$
Neuromotor performance (adjusted for age)	114	5.66	114.74	133.36	11.22	131.91
Intelligence	52	1.41		57.50	10.78	
Social Competence (adjusted for intelligence)	No Data			36.70	12.06	37.48
School	No Data			38.86	12.89	40.58
Social	No Data			38.25	13.41	38.87
Activities	No Data			42.75	14.32	43.54

	Aggressive Outliers	Aggressive Contrasts
Psychiatric Treatment	No Data	1 (8%)