

SELECTIVE ATTENTION AND SOCIAL COMPETENCE  
IN COLLEGE STUDENTS AT RISK FOR SCHIZOPHRENIA

Jean-René Duhamel

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## ABSTRACT

### Selective attention and social competence in college students at risk for schizophrenia

Jean-René Duhamel

Schizophrenia-prone students were identified on the basis of two questionnaires: the Perceptual Aberration (PA) and the Anhedonia (AH) scales. Measures of social competence and selective attention were administered to high scorers on the PA scale, high scorers on the AH scale, moderately high scorers on both scales, and a control group of low scorers on both scales. AH and mixed PA/AH students obtained lower scores than control students on the Achenbach Social Competence scale. This was not the case for PA students. However, unlike the other groups, PA students reported a history of school failure and remedial class placement. There were no differences in scores among the four groups on the forced-choice Span of Apprehension task and on the distraction condition of the Digit Span task, two measures which had previously been reported to discriminate between schizophrenic and non-schizophrenic patients, and between children of schizophrenic and children of normal mothers. Unlike the control students however, the deviant groups manifested an unexpected absence of recency effect for serial position in the analysis of the Digit Span data. Finally, mixed PA/AH students obtained higher scores than AH and control students on a separate measure of schizoid functioning, while PA students did not differ significantly from any of the groups on this measure. Results were evaluated in terms of their relevance to the assessment of schizophrenia-proneness and the identification of precursors of schizophrenia.

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"O, that way madness lies; let me shun that"

- King Lear

## INTRODUCTION

Research on the etiology of psychological disorders has benefited in the past twenty years from the increasing number of longitudinal studies of individuals hypothesized to be at risk for psychopathology. The approach was pioneered by Mednick and Schulsinger (1968) and was later adopted by other researchers in the area of schizophrenia (e.g. Neale and Weintraub, 1975; Asarnow, Steffy, MacCrimmon & Cleghorn, 1978; Anthony, 1972), and in the area of manic-depressive disorders (e.g., Buchsbaum, Coursey, & Murphy, 1976; Depue, Slater, Wolfstetter-Kausch, Klein, Goplerud, & Farr, 1981). The arguments in favor of the high risk methodology derive from the problems which face traditional research in psychopathology, and are well summarized by Mednick and Schulsinger (1968). Of individuals who have lived the process of becoming schizophrenic, they wrote: " (their) behavior (...) may be markedly altered in response to correlates of the illness such as educational, economic, and social failure, prehospital, hospital, and post-hospital drug regimens, bachelorhood, long term institutionalization, chronic illness, and sheer misery (...) If researchers used control groups which were

equated with their schizophrenic groups for all of the correlates of schizophrenia, then any observed differences could be reasonably ascribed to schizophrenia. But such control groups are apparently not readily available. Consequently in comparisons of normals and schizophrenics, it is often difficult to judge what portion of the reported differences have unique relevance to schizophrenia (p.267)." The study of schizophrenics prior to the onset of their illness can help disentangle many of these confounding variables. In addition, by allowing investigators to observe the development of a disorder as it unfolds, it offers the advantage of circumventing the reliability and validity problems encountered in retrospective, or follow-back research which makes use of clinic or school records and recollections by parents and relatives (Weintraub, Prinz, & Neale, 1978).

The initial step of high risk research involves the definition of what constitutes a predisposition. In a recent monograph, Depue et al (1981) distinguished between three approaches to the identification of a high risk pool: (1) the genetic paradigm, i.e., the study of the offspring of a biological parent "having the disorder; (2) the endophenotypic paradigm, which uses an endogenous index, e.g., a biochemical substance (Buchsbaum et al., 1976, who measured monoamine oxidase blood levels to

identify individuals at risk for bipolar disorders); and (3) the exophenotypic or behavioral paradigm.

High risk research in schizophrenia has most often adopted the first paradigm. It has been reported that 10 to 15 percent of children born to one schizophrenic parent will eventually become schizophrenic themselves (M. Bleuler, 1973; Heston, 1970). In other words, this population suffers an incidence of schizophrenia 10 to 15 times greater than the 1% incidence found in the general population. Such data argued strongly in favor of the genetic paradigm. It offered the double advantage of a clear and simple risk criterion and substantial predictive power. However, the usefulness of the genetic approach is limited by the unrepresentativeness of the risk sample obtained: 90% of schizophrenics do not have a family history of schizophrenia (M. Bleuler, 1973). Furthermore, those who do have a family history of schizophrenia tend to belong to the severely chronic, non-paranoid patient subgroup (Kety, Rosenthal, Wender, Schulsinger, & Jacobsen, 1978).

The two remaining strategies involve the use of risk indices, which can separate high and low risk individuals on the basis of some "phenotypic" variable, i.e., an overt manifestation of the underlying predisposition. The absence of any known endogenous substance specifically

related to schizophrenia precludes the use of the endophenotypic paradigm at this time. On the other hand, the exophenotypic model seems more promising. This approach was called forth by Meehl (1962) in his theory of schizophrenia. He postulated that an underlying genetic predisposition to schizophrenia is expressed in latent schizophrenics in a number of behavioral manifestations or facets of a "schizotype". From the standpoint of research methodology, whether or not schizotypal signs have a genetic basis is largely irrelevant. The essential property of a behavioral index must be its power to predict later schizophrenia.

The Concordia High Risk Project (Ledingham, 1980) selected high risk school children on the basis of a behavioral pattern of both aggression and withdrawal, assessed through peer evaluations. The available literature on the characteristics of preschizophrenics supports the hypothesis that children who are both highly aggressive (e.g., acting-out, disruptive, antisocial, etc.) and highly withdrawn (e.g., isolated, over-sensitive, apathetic, etc.) are at risk for schizophrenia. The salience of these characteristics during the childhood of schizophrenic patients is attested in retrospective examinations of teachers' comments (Bower, Shellhammer, & Daily, 1960; Watt and Lubensky, 1976), in follow-up

studies of clients (Nameche, Waring, & Ricks, 1964; Robins, 1979), as well as in early reports from the Danish high risk study of Mednick and Schulsinger (1970).

The predictive validity of the aggression-withdrawal pattern will only be known at the completion of the Concordia study. At this point, however, one may raise an issue of importance in high risk research, which concerns the specificity of the risk factor to the predicted outcome. Oltmanns and Neale (1980) have pointed out that many of the deviant social behaviors of schizophrenics as children were also found in children who later became sociopaths. Early results from the Concordia Project (Schwartzman and Ledingham, note 1) indicated that many children who had been classified as aggressive-withdrawn when in a regular classroom, had since repeated a grade, or had been placed in a special class or a special setting. It must be noted however that poor academic achievement is associated with various behavioral problems of childhood, adolescence, and adulthood, particularly with delinquency and other conduct disorders (Robins, 1979). Therefore, rather than being too narrow, the behavioral pattern of aggression and withdrawal, may prove to be too broad a risk criterion.

Depue et al (1981) argued that an index of high specificity must be based on signs that are present in the

full syndrome of a disorder. In a recent review of schizotypy indicators, Groves (1982) adopted the same position as Depue et al, and suggested that the best indicators should relate to the clinical signs and symptoms of schizophrenia. The psychiatric literature is replete with cases of well-functioning individuals who experienced attenuated forms of psychotic symptoms, such as mild delusions and brief hallucinations, and who were in fact latent schizophrenics (E. Bleuler, 1911/1950; Meehl, 1962; Spitzer, Endicott, & Gibbon, 1978). The Diagnostic and Statistical Manual of Mental Disorders (Third Edition) or DSM III (American Psychiatric Association, 1980) introduced the labels "borderline", "schizoid", and "schizotypal" personalities to describe such individuals presenting in clinical settings.

In an attempt to detect these high risk individuals prior to their first contact with the clinicians, two indices based on overt signs of psychopathology were developed at the University of Wisconsin under the direction of Loren Chapman. These are self-report inventories designed to measure "anhedonia" and "perceptual aberration" (Chapman, Chapman, & Raulin, 1976, 1978), two distinctive symptom profiles in schizophrenia. The scales have been used by Chapman, Edell, & Chapman (1980) for the purpose of identifying psychosis-prone

individuals in a college student population. For purpose of consistency, the term "schizophrenia-prone", rather than "psychosis-prone", is used in the present study. Although it is recognized that the symptoms themselves may be observed in other psychotic disorders, the research associated with these measures is primarily pertinent to schizophrenia. This research is examined in the next section.

#### Anhedonia and Perceptual Aberration

Anhedonia has been defined as a lifelong characterological inability to experience pleasure (Chapman, Chapman, and Raulin, 1976). Clinical observations have attested to the high frequency of loss of drive, blunted affect and social withdrawal in chronic schizophrenic patients hospitalized in psychiatric institutions (Bleuler, 1911/1950; Kraepelin, 1913/1919; Freedman, Kaplan, Sadock, 1972). A pleasureless demeanor has also been observed in a study of young "first break" schizophrenics (Grinker, and Holzman, 1973). The DSM-III which lists inappropriate emotion or affect and detachment from the external world among the defining symptoms of schizophrenia, also includes anhedonia as an associated feature.

Rado (1956) presented a theory of schizophrenia in



which anhedonia plays a central role. Anhedonia here is viewed as a genetic defect which weakens the motivating power of pleasurable emotions. The flat affect and apathy of schizophrenics are the ultimate consequences of this predisposing trait. Meehl (1962), and later Wise and Stein (1973) linked the construct of anhedonia to faulty mechanisms of reinforcement in the brain. While Meehl's neuropsychological theory of schizophrenia incorporated anhedonia as the etiological factor "explaining" the affective and reality testing disturbances which characterized the disorder, Wise and Stein developed a biochemical model of schizophrenia in which anhedonia is the behavioral sequel of disturbed catecholamine biosynthesis in the diencephalon. An empirical test of the presence of anhedonia in schizophrenic patients was performed by Kayton and Koh (1975) using a word list recall task. It was found that the schizophrenics recalled significantly fewer pleasant words than normals, although their recall of unpleasant words was comparable to that of normals.

In developing their scales, Chapman et al (1976) used items that reflected interpersonal and physical pleasures. Typical items for physical anhedonia are: "I seldom cared to sing in the shower" (True), "Trying new foods is something I've always enjoyed" (False), "I have always

loved having my back massaged" (False). Typical items for interpersonal or social anhedonia are: "I have often enjoyed long discussions with other people" (False), "Writing letters to friends is more trouble than it's worth)" (True). The items were tested on a college student sample and the scales were then standardized on samples of normal and schizophrenic individuals. Since the test developers found that the measure of physical anhedonia was more reliable and discriminated schizophrenics from non-schizophrenics better than did the measure of social anhedonia, only the scale for Physical Anhedonia was used in subsequent research.

The rationale for the development of a scale for Perceptual Aberration (Chapman, Chapman, Raulin, 1978) lies in the well-documented accounts of disturbed perception in psychotic states (Bleuler, 1911/1950; Lehman, 1981). Some of the sensory disturbances frequently experienced by schizophrenics are: hypersensitivity to light, changes in perception of other people's faces and figures, misperception of movement, hypersensitivity to sounds, smells or tastes. Lehman (1981) reported the case of a schizophrenic who stated that he saw objects and people changing dimensions, outlines, and brightness from minute to minute before his eyes. Arieti (1974) has focused on the body image

distortions reported by schizophrenics. This author distinguished three levels of body image: (1) The body schema or the so-called neurological engram; (2) the body image as percept or the experience of one's body ; (3) the body image as the concept of self, i.e., of social and sexual identity. Disturbances can occur at all three levels in schizophrenics. According to Arieti, body schema distortion is more likely to occur as a result of focal neurological damage or dysfunction. He also contended that body image distortions which take the form of hallucinations and delusional ideation, are examples of level two and level three disturbances, respectively, and are the ones most commonly experienced by schizophrenics. These experiences can also be accompanied by kinesthetic delusions. Lukianowicz (1967) observed that the body experiences of schizophrenics are often metaphors for what they think of themselves, and not infrequently, lead patients to request unnecessary plastic surgery. The same author also reported that schizophrenics sometimes experience their body as a "disarticulated structure with unclear boundaries". This is one manifestation of the common symptom labelled depersonalisation, which can also be related to the loss of identity and disturbed "ego boundaries" described by Blatt and Wild (1976). All the above signs of disturbed perception are considered of

sufficient diagnostic value to warrant their inclusion on Axis I of the DSM-III (1980) criteria for Schizophrenic Disorders.

The scale for Perceptual Aberration of Chapman et al. (1978) was devised in much the same manner as the scale for Physical Anhedonia. Most of the items assess body image distortions while the remaining items tap for hypersensibility of different sense modalities and other perceptual disturbances. The scale was standardized on a non-psychiatric sample and on psychiatric patients. Items such as the following deal with abnormal body experiences: "Sometimes, I have had the experience that I am united to an object near me" (True), "I have sometimes had the feeling that my body is decaying from inside" (True). Examples of other items found on this scale are: "Sometimes, when I look at things like tables and chairs, they seem strange" (True), "My hearing is sometimes so sensitive that ordinary sounds become uncomfortable" (True).

The University of Wisconsin research team investigated several variables in relation to anhedonia and perceptual aberration by selecting college students who obtained deviant scores of at least two standard deviations above the mean for the screening sample on either scale, and by comparing them to students who scored

no more than half a standard deviation above the mean on both scales. Edell and Chapman (1979) reported that high scorers on the Perceptual Aberration Scale and on the Anhedonia Scale showed more signs of thought disorder than low scorers on the Rorschach projective test, as measured by the Kataguchi (1959) Delta Index, and the Piotrowski and Berg (1955) Alpha Index.

Simons (1981, 1982) examined the psychophysiological reactions of high and low scorers on the Anhedonia scale. In a first study (Simons, 1981), heart rate and skin conductance were recorded while a standard orienting task procedure developed by Gruzelier and Venables (1975) was administered. During this task, anhedonic students showed significantly less activity on the two indices when compared to control students, a pattern similar to that found in a group of hyporesponsive schizophrenics identified by Gruzelier and Venables (1975). In a second study, Simons (1982) recorded auditory event-related potentials (ERP's) under simple orienting (non-signal) and signalled reaction-time (signal) conditions. The ERP's of anhedonic students under the non-signal condition were indistinguishable from those of control students. In the signal condition, however, a significant difference emerged in the late positive component (P300) of the ERP. Anhedonic students showed markedly reduced P300 activity,

a finding which closely parallels the pattern observed in the schizophrenic patients examined by Levitt, Sutton, and Zubin (1973).

Chapman, Edell, and Chapman (1980) reported the results of a study which indicated that anhedonic and perceptually deviant students also manifest other symptoms characteristic of schizophrenia-proneness or schizotypy. In this study, 50 high scorers on the Anhedonia scale, 65 high scorers on the Perceptual Aberration scale, and 66 low scorers on both scales received in interview format the Schedule of Affective Disorders and Schizophrenia - Lifetime Version (SADS-L) (Spitzer and Endicott, 1977). The SADS is the research procedure which generated the DSM-III (1980) update of the classification of schizophrenic and affective disorders. The psychotic symptoms of the SADS-L include four of Schneider's (1959) first rank symptoms: (1) delusions of thought transmission, (2) experience of having one's thoughts, feelings and actions controlled or imposed from outside, (3) auditory hallucinations that comment on the patient's behavior, (4) experience of one's thoughts being snatched away by another being. Additional symptoms in the SADS-L are: (5) bizarre delusional beliefs (which must be related to oneself), and (6) visual hallucinations.

The Research Diagnostic Criteria defined by Spitzer

and Endicott (1977) are based on a dichotomous scoring of the symptoms: present or absent. For instance, a subject who reports hearing voices but who attributes their source to her/himself receives an "absent" rating for this symptom since the criterion specifies that it must be an "external voice". Chapman and Chapman (1980) and other writers such as Meehl (1973) and Strauss (1969) have argued that schizophrenic-like or schizotypal symptoms which may not reach the proportions seen in borderline, latent, and remitted schizophrenics are important in evaluating the individual's schizophrenia proneness. This perspective implied that psychotic and psychotic-like experiences are ordered on a continuum of severity. Chapman and Chapman (1980) have developed a scoring system which takes into account the degree of deviance of symptoms. Each of the six SADS-L symptoms are rated on an eleven point scale, with the highest score representing greatest degree of severity. Factors which reduce the ratings are the degree of subcultural support for the experience, the attribution of its origin to an external source, and the level of insight into its plausibility. Drug experiences are not rated. An example from the first symptom category will illustrate the scoring system. A score of 10 is given if a subject "reports that occasionally he feels thoughts flying out of his head and

other people hear them". A score of 5 is given if a subject "reports that he can by thought transmission, influence what a lecturer will say". However, an occasional extra-sensory perceptual experience, as when a subject "reports that he asked his roommate to guess what he was concentrating on and that the roommate guessed correctly", would be considered normal and receives a score of 1.

The results of the interviews of college students in the Chapman et al (1980) study were presented as frequencies of psychotic (ratings of 6 to 10) and psychotic-like (ratings of 2 to 5) experiences. When all symptoms were combined, 69 percent of the perceptual aberration, 32 percent of the anhedonic, and 23 percent of control students reported psychotic or psychotic-like experiences of any type. Experiences of psychotic intensity were reported by 17 percent of the perceptual aberration, 2 percent of the anhedonic, and 2 percent of the control students. Voice experiences were the most frequently reported by all subjects, with more than half (58 percent) of the perceptual aberration, 16 percent of the anhedonic, and 15 percent of the control subjects reporting such experiences. Perceptual aberration subjects had significantly higher frequencies in most of the other classes of symptoms also. A number of other



schizotypal symptoms were rated according to the SADS-L. Perceptual aberration subjects exceeded controls in feelings of depersonalization, ideas of reference, out of body experiences, complaints of concentration difficulty and of speech being mixed up, deviant vocalization (as perceived by themselves) and odd communication (as perceived by the observer). Anhedonic subjects did not differ from controls on any of these symptoms.

Both perceptual aberration and anhedonic subjects were different from control subjects on social withdrawal and on the ability to meet new people. Anhedonic but not perceptual aberration subjects were rated as poorer than control subjects on heterosexual adjustment. An elevated composite score for schizotypal features on the SADS-L which assigns specific weights to the different symptoms described above, differentiated both anhedonic and perceptual aberration subjects from controls. The symptoms included in this composite score form the basis of the DSM-III (1980) diagnosis of "schizotypal personality disorder", a severe personality disturbance which does not, however, meet the stringent criteria of "schizophrenic disorder". Finally, it can be added that more perceptual aberration subjects than control subjects met the SADS-L criteria for "major depressive disorders" and for hypomanic episodes.

In summary, the Perceptual Aberration scale identified individuals who manifested primarily psychotic and psychotic-like symptoms, as well as depressive symptoms. In contrast, the Anhedonia scale identified individuals who were primarily socially isolated and who manifested few of the more florid signs of schizotypy. Groves' (1982) assessment of Chapman's work led him to conclude that "the Perceptual Aberration scale (...) seems quite capable of isolating a group of subjects at high risk for schizophrenia", but that the "(...) Physical Anhedonia scale is not powerful as a schizotypy indicator" (p.35).

This is not to say, however, that the latter scale will not prove to be an indicator of psychosis-proneness. Groves was interested in predictors of schizotypy from the genetic viewpoint which stresses the diathesis of schizophrenia, as defined in the restrictive context of the DSM-III (1980). Chapman et al. (1980) did not attempt to predict the diagnostic label which might eventually be assigned to future psychiatric cases in their high risk sample. Indeed, their use of the term "psychosis-proneness" was deliberately vague in order to follow a strategy which assumes that the nosology of psychotic disorders is constantly evolving, and that further modifications of the current diagnostic system are to be

expected. If, however, perceptual aberration and anhedonia are valid criteria of risk for schizophrenic breakdown, it would be reasonable to expect certain behavioral deficits which have been reported to characterize pre-schizophrenic and schizophrenic functioning to be manifested as well.

Two important features of schizophrenia which have been recognized in the clinical literature since the days of Kraepelin (1913/1919) and E. Bleuler (1911/1950), merit examination in schizophrenia-prone individuals. The first is impoverished social competence, often manifested long before the first hospitalization in the form of marked social withdrawal and difficult interpersonal relationships. The second is attentional dysfunction, an area which has generated much research in the past two decades. It is these two aspects which constitute the focus of the present study.

#### Social Competence

Social competence is a multi-dimensional construct which encompasses a wide variety of behaviors that are required for participation in society. It has been defined in terms of "productive social interactions" (O'Malley, 1977) and "attainment of social goals" (Ford, 1981), and it is thought to be reflected in harmonious

peer relationships, successful school adjustment, participation in group activities, effective social skills and social problem solving (Baumrind, 1975; Green, Forehand, Beck, and Vosk, 1980; Asher and Hymel, 1981). Adulthood social competence includes other dimensions such as occupational and sexual adjustment (Zigler and Phillips, 1962).

The relevance of social competence, or perhaps more appropriately, social incompetence, to schizophrenia has long been noted. E. Bleuler (1911/1950) described the development of schizophrenia as involving increasing indifference and withdrawal from social interaction. Other writers, using, as Bleuler did, case history data, have reported that from early adolescence, schizophrenic patients tended to be poorly adjusted and to have serious interpersonal difficulties (Deutsch, 1942; Sullivan, 1931). Premorbid adjustment, a term often used interchangeably with social competence in the schizophrenia literature, has traditionally been measured by indices of occupational and sexual adjustment such as the Phillips Scale (Phillips, 1953). Becker (1956), and later Zigler and Phillips (1962), came to distinguish between two schizophrenic subtypes, process and reactive, mainly on the basis of early adulthood social competence. Process schizophrenics were characterized by poor

premorbid social adequacy, insidious onset with no precise precipitating pattern, and poor prognosis. On the other hand, reactive schizophrenics were characterized by good premorbid social adequacy, sudden onset often preceded by an identifiable precipitating event, and good prognosis. In a prospective study of the course of schizophrenia, Strauss and Carpenter (1974) found that poor premorbid adjustment, and a history of previous hospitalization predicted poor outcome more reliably than overt symptomatology. Prentky, Watt, and Fryer (1979) found that poor premorbid social competence in schizophrenics, as measured by the Zigler and Phillips (1962) index, was associated with a cluster of withdrawal symptoms such as verbal unresponsiveness, apathy, flat affect, and introversion. In the new multiaxial diagnostic system of DSM-III (1980), the presence of "Schizotypal" or "Schizoid Personality Disorder" on Axis II is emphasized in the diagnosis of schizophrenia, because of its prognostic significance. Descriptions of these personality types include few close friendships, indifference to others, emotional aloofness, and impairments in social and occupational functioning.

It thus seems fairly widely accepted that social incompetence describes a significant proportion of schizophrenics. It is also evident that social competence

in schizophrenics is construed in terms of a developmental process in which the disturbances in social functioning are present prior to the psychotic breakdown. Longitudinal research provides some support for this position. As mentioned in the previous discussion of risk criteria, certain patterns of disturbed social behavior during childhood have been related to later psychopathology. The results of Watt's (1972, 1978) studies of the school records of children of schizophrenics, showed that these individuals differed in many ways from matched control children selected from among their former classmates. Preschizophrenic boys were rated as underachieving, emotionally unstable, negativistic and antisocial, while preschizophrenic girls were rated as more nervous, immature, quiet and egocentric than control girls. However, as Oltmanns and Neale (1980) have noted, poor social competence may not be a specific predictor of schizophrenia. Weintraub, Neale, and Liebert (1975) found that although they were different from children of normal mothers, children of schizophrenic mothers and children of depressed mothers were not different from each other on various dimensions of social behavior as measured by teacher ratings. Similar results were obtained with a peer evaluation measure (Weintraub, Prinz, and Neale, 1978). Oltmanns and Neale (1980) have argued that since

children of depressives are themselves at risk for adult unipolar or bipolar depressive illnesses, poor social competence may be a behavioral antecedent of both schizophrenia and major affective disorders.

In their follow-back study of early schizophrenics, Prentky et al. (1979) found that level of social competence in early adulthood was a stronger correlate of schizophrenic withdrawal than level of social competence derived from school records. This is presumably the result of a developmental trend toward greater stability of behavior patterns with increasing age. When comparisons were restricted to the older age group (grades 6 to 9), Weintraub et al. (1978) found that daughters of schizophrenic mothers were rated as significantly more deviant than daughters of depressed mothers on 13 of the 16 items of the peer nomination measure. One may thus hypothesize that persistence of social incompetence into adolescence and early adulthood may be a distinctive feature of preschizophrenics, and may increase the risk of later schizophrenic breakdown. This is compatible with the current view that schizoid personality in late adolescence may represent the "prodromal" phase of schizophrenia (DSM-III, 1980).

The social skills of high risk young adults were studied by the Chapman group. In a first study, Haberman,

Chapman, Numbers, and McFall (1979) used male college students selected for high or low scores on the Perceptual Aberration and Anhedonia Scales. The students were requested to role-play responses to simulated problematic social situations previously identified by participants in a social skills training program (Goldsmith and McFall, 1975). The results indicated that high scorers on the Anhedonia scale were rated as less competent than control students. This was not the case for high scorers on the Perceptual Aberration scale. Numbers and Chapman (1982) subsequently reported that neither female anhedonic nor female perceptual aberration students differed from control students when they used the same task employed by Haberman et al., (1979). However, in this more recent study of college women, Numbers and Chapman also used a modified role-playing task which distinguished between various facets of interpersonal competence, on the assumption that preschizophrenics may be deviant in more specific ways than a global skills level. Each role-played response was rated for the presence of three a priori characteristics with high interjudge reliability. These characteristics were avoidance-withdrawal, hostility, and oddness. No difference was found between groups on overall skills ratings. However, students in high risk groups differed from the control students in the



specific qualities of their responses: anhedonic students were more avoidant and more odd than control students and perceptual aberration students were more odd as well as more hostile than control students. Although the results have not been replicated as yet on a sample of male students, it is reasonable to conclude that the studies of Haberman et al. (1978) and Numbers and Chapman (1982) have demonstrated that schizophrenia-prone students are different from other students in their ways of dealing with difficult social situations.

#### Selective attention

In his work with dementia praecox patients, Kraepelin (1913/1919) observed among other symptoms that these individuals had disturbances of attention. Jung (1954) ascribed formal thought disorder and other schizophrenic symptoms to a diminution of attention and apperception. Personal accounts by patients point to the importance of attentional disturbances in schizophrenia. Two British psychologists, Andrew McGhie and James Chapman (1961), presented a collection of interview excerpts from early schizophrenic patients in a classic article in which the authors postulated that a central attentional defect was at the core of schizophrenia. More specifically, they interpreted many facets of cognitive and affective disturbances, as well as changes in motility and bodily

awareness, in terms of a failure of the selective and inhibitory function of attention which serves to screen out the irrelevant from the relevant. Unfortunately, McGhie and Chapman did not have any control group nor did they have strict scoring criteria for the interview data. Therefore, more than ten years later, Barbara Freedman and Loren Chapman (1973) challenged the specificity and universality of the selective attention deficit. They studied the subjective experiences of 20 early schizophrenic and 20 matched non-schizophrenic patients using a standard interview which dealt with various cognitive and perceptual changes as well as specific phenomena central to the McGhie and Chapman theory. Reports by schizophrenics of heightened distractibility, scattered attention, and interference due to competing stimuli provided some support for a selective attention deficit. One patient specifically reported:

"My mind was so confused, I couldn't focus on one thing. I had an idea I was wondering whether I should press charges, and then all of a sudden my mind went to something pleasant, and then it went back to my work, and I couldn't keep it orderly." (Freedman and Chapman, 1973, p.50). The authors pointed out that despite significant differences, a sizable proportion of control subjects reported similar difficulties (18 schizophrenics vs. 12

non-schizophrenics), and that only half of the schizophrenics could actually fit the composite picture painted by McGhie and Chapman. This composite picture was not found to be associated with premorbid adjustment nor was it related to any of the other subjective changes reported by the patients. However, it is noteworthy that schizophrenics and non-schizophrenics differed significantly in their attributions of changes in concentration. While non-schizophrenics tended to refer to preoccupations with their problems as the source of their lack of concentration, schizophrenics were more likely to mention "mental fatigue", a "sense of confusion or feeling dazed", "the mind going blank". This suggests a different cause, perhaps a more central role, for attentional disturbances in schizophrenia than in other behavior disorders. Thus, the hypothesis that difficulties with selective attention is of primary importance at least for a subgroup of schizophrenics remains viable.

McReynolds (1960) attributed certain symptoms of schizophrenics to their idiosyncratic selection of stimuli. Acute anxiety in schizophrenics is said to occur because the patients are flooded by unassimilable percepts. It was postulated that in the early phase, schizophrenics are overly attentive to too many or all

stimuli, and later exclude, reduce, or avoid stimuli through defenses such as apathy and withdrawal. The "hypersensibility" hypothesis has been adopted by various authors (Lehmann, 1980; Kahnemann, 1973; Venables, 1977) who have implicated central nervous system arousal dysfunction as an etiological factor.

In his extensive studies of reaction time in schizophrenics, Shakow (1963) concluded that these patients are distracted by irrelevant contextual aspects of a stimulus and, as a result, their ability to focus on and attend to relevant stimuli is impaired. Although Shakow did not implicate specific physiological or neural etiological factors, his explanatory concept involves the inability to maintain a state of readiness to respond to an incoming stimulus.

Lehmann's (1981) position incorporates many elements. He postulated the existence of a genetic hypersensibility to sensory and emotional stimulation which leaves the schizophrenic patient vulnerable to an onslaught of stimuli from without and from within. Moreover, such a sensitive receptor apparatus, if not matched by a CNS with above average ability to process the mass of information coming in, will result in a failure of selective inhibition (in the McGhie and Chapman sense) compounded by the resultant overload of stimulus input.

All the above models have a certain intuitive appeal, in that they represent attempts to link attentional constructs to the phenomenology of schizophrenia. However, they are formulated in very general, inferential, and often metaphorical terms. Certain researchers have used experimental paradigms in an attempt to demonstrate the presence of a differential attentional deficit on tasks involving neutral and distracting conditions.

McGhie and Chapman (1965) studied the schizophrenic's ability to remember a list of tape recorded digits with and without the intrusion of a competing voice reciting other digits. They found that while schizophrenics recalled fewer digits than normals under both conditions, their recall was significantly poorer when a distractor was present. These results were replicated by Lawson, McGhie, and Chapman (1967), and by Rappaport (1968).

Chapman and Chapman (1973) have argued that for a true differential deficit to be demonstrated in schizophrenics, the experimental and control tasks must first be matched in normal subjects on variables which influence their discriminating power, i.e., reliability, mean, and variance of item difficulty. Such precautions were not taken by the early investigators. More recently, Oltmanns and Neale (1975) used the same paradigm as Lawson et al. (1967) but first calibrated the neutral and

distractor conditions on normal subjects in line with the Chapmans' (1973) stipulations. The task consisted of pairs of neutral and distractor digit span subtests (5, 6, 7, or 8 digit strings). Relevant items were read by a female voice at a rate of one digit every 2 seconds. The effect of distraction was obtained by filling the time gaps between two digits by a male voice reciting irrelevant digits, which the subjects were instructed to ignore. At the end of each presentation subjects wrote down as many correctly ordered relevant digits as they could remember. Comparisons were made between neutral (no-distraction) and distractor tests. Schizophrenics performed significantly more poorly than normals under the distraction than under the neutral condition. Similar results were obtained by Oltmanns (1978). The question of the diagnostic specificity of this kind of attentional impairment has been addressed by comparing schizophrenics, manics, and normals, using both a digit-span and word span task (Oltmanns, 1978). Both psychiatric groups were found to be more "distractible" than normals, but did not differ from each other. Oltmanns observed that the most distractible subjects on those tasks, irrespective of diagnosis, were those patients who showed severe thought disorder. He speculated that this symptom, rather than diagnostic category might be the major factor in poor

performance on the task.

Another widely used task with schizophrenic individuals is the forced-choice span of apprehension test (Neale, MacIntyre, Fox, & Cromwell, 1969). An array of letters is presented tachistoscopically to a subject who must identify which one of two predetermined target letters is present. The number, spatial arrangement, and formal similarity of letters can be varied independently to increase the amount of information processing required by the task.

To summarize across the different experiments performed by Neale and his associates (Neale et al, 1969; Neale, 1971; Davidson and Neale, 1974), it can be stated that while no between-group differences were found when only one irrelevant letter was presented, schizophrenics, whether good or poor premorbid, paranoid or non-paranoid, made fewer correct recognitions than normal and non-schizophrenic psychiatric patients when the displays contained 3, 7, or 11 irrelevant letters. Moreover, Asarnow and McCrimmon (1978) found that remitted schizophrenics were still poorer than non-schizophrenic patients in making accurate recognitions.

This last study shows that the schizophrenics' poor performance was not the result of acute confusion, high dosage of medication or chronicity. However, the

specificity of this attentional deficit to schizophrenia has yet to be demonstrated, since the only non-schizophrenic psychiatric patients in this series of studies were alcoholics.

The span of apprehension task and the digit span task differ in many respects (e.g., sense modality, duration of exposure to stimuli, amount of active encoding, role of short term memory). It is therefore likely that the two tasks involve different sets of information processing variables. As Neisser (1976) has pointed out, selective attention is an over-inclusive term, which refers to or subsumes a variety of related processes, and thus, the notion of a single and separate mechanism of attention appears simplistic. However, in a broad descriptive sense, this term can be useful. The span of apprehension and the digit span tasks both call for attending to relevant information while ignoring irrelevant or distracting information in order to select an appropriate response. In order to do this, the former task requires rapid scanning of a visual array, while the latter task requires maintenance of a set to attend only to the sex of the voice reciting the digits.

Although the correlation between different information processing tasks is not a well-explored area (Finkelstein, note 5) it is tempting to draw parallels



between those simple information processing failures and some of the subjective changes experienced by schizophrenics reported by Freedman and Chapman (1973). These include difficulties in understanding and producing speech sequences, hypersensitivity to multiple auditory inputs, misidentification of people, and disturbances in quality and speed of thinking.

Given that some kind of attentional deficit is a major feature of schizophrenia, it remains to be established whether it is a consequence of deterioration or whether it reflects a specific vulnerability to schizophrenic psychopathology. The hypothesis that attentional impairment measured by simple tasks can be "markers" of schizophrenia received support from Orzak and Kornetsky's (1971) finding that distractibility in schizophrenics was positively associated with frequency of psychiatric disorders among their biological relatives.

Furthermore, Asarnow, Steffy, McCrimmon and Cleghorn (1978) found that foster children of schizophrenic biological mothers had more attentional difficulties than foster children of normal parents and children of normal parents who lived at home. The forced-choice span of apprehension task was among the most discriminating tasks of their attentional battery. Recent work by Harvey, Winters, Weintraub, and Neale (1981), as part the Stony

Brook High Risk Project, indicated that children of schizophrenic and of unipolar depressive parents performed more poorly than children of normal parents under the distraction condition of Oltmanns and Neale's (1975) Digit Span task. Children of schizophrenics also showed poorer recall of the items presented early in the sequence (primacy effect), a pattern similar to one found in adult schizophrenics (Oltmanns, 1978).

The above studies suggest that attentional dysfunctions may be precursors of schizophrenia, and perhaps of major depressive illness as well. Unfortunately, the generality of these findings is, at the present time, limited to an atypical high-risk subgroup: the offspring of psychiatrically ill mothers.

#### Rationale of the present study

As noted earlier, it is difficult to tease out in studies of schizophrenics the effects of predisposing factors that may have contributed to the breakdown, from the consequences of the breakdown itself. Through the study of individuals at risk for schizophrenia, it becomes possible to clarify the long term clinical significance of potential precursors of schizophrenia. However, as was also noted earlier, high risk investigations may yield results of limited generality if the criterion of risk is

too restrictive, as exemplified by studies of the offspring of schizophrenics. The present study undertook to test the hypothesis that poor social competence and attentional disturbances typical of schizophrenics are salient characteristics of schizophrenia-prone individuals whose vulnerability is defined by psychosis-linked experiences regardless of family background.

The scales developed by Chapman and his co-workers (1976, 1978) offer a promising alternative to the genetic criterion for the identification of high risk individuals. The subjects used in the present study were selected on the basis of their scores on the Perceptual Aberration and the Anhedonia scales in the same manner as in the Chapman et al (1980) study. However, in addition to the groups of high scorers on the Perceptual Aberration scale and of high scorers on the Anhedonia scale, a third group of high scorers on both scales was studied. The rationale for inclusion of such a group lies in a suggestion made by Meehl (1962), who advocated the use of multiple sign patterns to identify schizotypic individuals. Extremely deviant scorers on both the Perceptual Aberration and the Anhedonia scales have rarely been found in college students' (Chapman et al., 1980). Chapman, Chapman, and Miller (1982) suggested that, perhaps as a result of early impoverished functioning,

individuals who possess both of the traits measured by these scales seldom reach college. One might thus hypothesize that even moderate elevations on these two scales in college students constitute a factor of risk.

The two studies of Haberman et al. (1978) and Numbers and Chapman (1982) provided evidence of inappropriate interpersonal skills in schizophrenia-prone college students. The role-playing procedure used by these researchers yielded direct samples of verbal social behavior. However, these behaviors were limited to a restricted range of standard stressful situations. Global measures of social competence such as the Phillips scale (1953) tap a broad array of relevant social dimensions. Unfortunately such measures are not suitable for use with college students due to their heavy reliance on occupational and marital adjustment. A more age-appropriate instrument, which was adopted in the present investigation, is the Social Competence scale of the Achenbach Youth Self-Report (Achenbach, note 2). This measure is a self-report version of the Child Behavior Checklist (Achenbach, 1979) and was developed for use with adolescents aged 11 to 18 years. The Social Competence scale covers the areas of academic adjustment, relationships and activities. Scores are based on quantitative aspects (e.g., frequency of contacts with

friends, time spent on hobby) as well as on qualitative aspects (e.g., "how well do you get along with your parent?"). This scale is therefore a measure of self-perceived social competence. Additional information can also be obtained from the Behavior Problems scale, which constitutes the second part of the Youth Self-Report. This scale consists of a list of well-circumscribed problem behaviors empirically found to discriminate between clinically referred and normal children (Achenbach, 1979).

Investigations of attentional functioning in high risk individuals have been limited to children of schizophrenic mothers. As noted earlier, two studies have demonstrated the presence of a deficit in selective attention in these children, using two different tasks: the Span of Apprehension task (Asarnow et al., 1978) and the Digit Span test under distraction and neutral conditions (Harvey et al., 1981). These two tasks were used in the present study in order to clarify the role of attentional variables in those vulnerable to schizophrenia.

The general hypothesis of the present study concerned the direction of results. It was expected that all three high risk groups, i.e., the perceptual aberration, the anhedonia and the mixed perceptual aberration and

anhedonia groups, would differ from the control group on all dependent measures. Specific predictions were also made for each high risk group, by postulating relations between perceptual aberration and disturbances of selective attention on the one hand, and between anhedonia and poor social competence on the other. It was predicted that (1) high scorers on the Perceptual Aberration scale would be primarily characterized by poor performance on the attentional tasks; that (2) high scorers on the Anhedonia scale would be primarily characterized by poor social competence; and that (3) high scorers on both the Perceptual Aberration and the Anhedonia scales would be characterized by poor performance on the attentional tasks and by poor social competence.

In order to control for systematic sampling bias, the groups were also compared on a number of variables. Since mild to moderate depression is frequent among college students (Becker, 1974) and is associated with reduced performance on cognitive, and perceptual tasks (Miller, 1975), as well as with restricted social activity (Ferster 1973), a brief inventory of depression was administered. The possibility that group differences might also be confounded by differences in socio-economic status and intelligence factors was also examined by assessing the occupational status of the subjects'

parents, the subjects' vocabulary level (as an index of verbal I.Q.), and the subjects' performance on the Block Design and Picture Arrangement I.Q. subtests (as indices of non-verbal I.Q.).

The results of the present investigation are reported in two separate sections. A short preliminary study which was designed in order to validate French translations of the Perceptual Aberration and Anhedonia scales is presented first, and is followed by results of the main study of social competence and selective attention in schizophrenia-prone college students.

## PRELIMINARY STUDY

Psychometric properties of French translations of the Perceptual Aberration and Physical Anhedonia scales.

### METHOD

#### Subjects

The validation sample consisted of 375 students (204 females and 171 males) enrolled in French or Philosophy courses at two private and two public French-language CEGEPs in Montreal. Since French and Philosophy courses are compulsory at the CEGEP level, it was assumed that students in these courses were representative of the general CEGEP student population. The mean age of the sample was 19.3 years with a standard deviation of 1.1 and a range of 17-27 years.

#### Materials

The Revised Physical Anhedonia scale (Chapman & Chapman, note 2) contains 61 true-false items scored in the positive direction for anhedonia. Alpha coefficients of internal consistency were found to be .78 and .79 for female and male college students respectively (Chapman et al., 1980). Test-retest reliability coefficients were .79 and .78 for females and males respectively. Means and standard deviations were 8.96 and 5.2 for females, and



12.93 and 6.2 for males. No information was provided by these authors for the correlation between social desirability and this version of the Physical Anhedonia scale. An earlier version of the scale, however, was found to correlate negatively with Jackson's (1974) Desirability scale, and the respective Pearson correlation coefficients for normal females and males were  $-.25$  and  $-.23$  (Chapman et al., 1976).

The Perceptual Aberration scale (Chapman et al., 1978) contains 35 items, 28 of which deal with distortions of body image. The remaining 7 items represent various unusual auditory and visual experiences. The items are also answered in a true-false format and are scored in the positive direction for perceptual aberration. The coefficients alpha as reported by Chapman et al. (1980) were respectively  $.91$  and  $.89$  for female and male students. Test-retest reliability coefficients were  $.76$  for females and  $.75$  for males. Means and standard deviations were  $7.35$  and  $6.0$ , and  $5.96$  and  $5.8$  for females and males respectively. Pearson correlation coefficients between social desirability, as measured by the Crowne-Marlowe (1964) scale, and the Perceptual Aberration scale were found to be  $-.21$  and  $-.15$  respectively, for females and males (Chapman et al., 1978). Pearson correlation coefficients between the Physical Anhedonia and the

Perceptual Aberration scales were  $-.09$  for females and  $-.19$  for males (Chapman et al., 1980).

The two scales were translated by the author and are presented in their French versions in Appendix A. The items from these scales were intermixed with items from the Minnesota Multiphasic Personality Inventory (French Edition, Chevrier, 1981) L and K validity scales. These items were used to diversify the content of the questionnaire. The K- and L- scale scores were also considered in the subject selection procedure in order to screen out individuals with a tendency to falsify self-report.

The 31-item Crowne-Marlowe (1964) Social Desirability scale accompanied the questionnaires in approximately one-third of the total sample. This scale was used because it is considered a good measure of social desirability response style (Wiggins, 1973), and, because it had been used previously in the study of Chapman et al. (1978).

#### Procedure

The questionnaire was group administered in classrooms to volunteer students. The study was presented as a survey of the frequency of certain perceptions, experiences, and attitudes in college students. On the last page of the questionnaire students were asked to volunteer their names, address and phone number.

Assurance of confidentiality was given, and students were informed that they might be contacted later to request their participation in an interview at the University.

## RESULTS and DISCUSSION

Comparisons of the psychometric properties of the original and the translated version of the two Chapman scales are presented in Table 1. As can readily be observed the two versions are similar in many respects. On the French form of the Physical Anhedonia scale, the alpha coefficients were found to be .82 and .79 in males and females respectively. The means and standard deviations were 11.03 and 6.6 in females, and 12.29 and 6.4 in males. Test-retest reliability was not assessed. Alpha coefficients on the French forms of the Perceptual Aberration scale were .87 in females and .88 in males. Means and standard deviations were 11.08 and 6.5 in females, and 11.29 and 6.9 in males.

Table 2 shows the intercorrelations between the two Chapman scales. The Pearson correlation coefficients for the French versions were -.11 and -.19 respectively, in females and males. Only the latter correlation was significant ( $p < .02$ ). Pearson correlation coefficients were also computed between each scale and the Crowne-Marlowe Social Desirability scale. The correlations between Physical Anhedonia and Social Desirability were -.22 in females and .23 in males. Neither of these correlations was significant. The correlation between Perceptual Aberration and Social Desirability was .10 in

TABLE 1

Means, standard deviations, coefficients alpha, and test-retest reliability coefficients on the Physical Anhedonia and Perceptual Aberration scales, original and French versions, for female and male college students.

		<u>Original version</u> <sup>1</sup>	<u>French version</u>
<u>Physical Anhedonia</u>			
Females	N	1367	204
	<u>mean, s.d.</u>	<u>8.96, 5.2</u>	<u>11.03, 6.6</u>
	alpha	.78	.82
	test-retest	.79	-
Males	N	1209	171
	<u>mean, s.d.</u>	<u>12.93, 6.2</u>	<u>12.29, 6.4</u>
	alpha	.79	.79
	test-retest	.78	-
<u>Perceptual Aberration</u>			
Females	N	1367	204
	<u>mean, s.d.</u>	<u>7.35, 6.0</u>	<u>11.08, 6.5</u>
	alpha	.91	.87
	test-retest	.76	-
Males	N	1209	171
	<u>mean, s.d.</u>	<u>5.96, 5.8</u>	<u>11.29, 6.9</u>
	alpha	.89	.88
	test-retest	.75	-

<sup>1</sup> Chapman, Edell, & Chapman, 1980

females and  $-.34$  in males. The latter correlation was significant ( $p < .02$ ).

The correspondance between the translated and the original versions of the two Chapman scales is remarkable in view of the differences in sample size and cultural background of the population studied. The major discrepancy was a mean difference, present in both sexes, between the English and French versions of the Perceptual Aberration scale. It is unlikely that the higher means obtained in the present study's sample were the result of a greater acquiescence bias in this population than in the population studied by Chapman et al. (1980) since one would expect such a bias to inflate the means on the Physical Anhedonia scale as well. This was not the case. A more plausible explanation might be that the connotations of behavioral deviance associated with a small number of items (3 to 5) were reduced in translation and resulted in more frequent endorsements. However, if this were so, the construct validity of the French version should have been minimally affected. Moreover, psychosis-prone individuals selected for the present study were chosen on the basis of deviation from the mean of the francophone reference group. Consequently, high scorers on the French version of the Perceptual Aberration scale can be considered as "deviant" as high scorers on the

TABLE 2

Intercorrelations between the Physical Anhedonia, Perceptual Aberration, and Crowne-Marlowe Social Desirability scales in female and male college students.

	<u>Original version</u>	<u>French version</u>
<u>Correlation Coefficients</u>		
Anhedonia X Social Desirability		
Females	not available	-.22 (N=63)
Males	not available	.23 (N=48)
Perceptual Aberration X		
Social Desirability		
Females	-.21 (N=718) <sup>1</sup>	.10 (N=63)
Males	-.15 (N=631)	-.34* (N=48)
Anhedonia X Perceptual Aberration		
Females	-.09 (N=1367) <sup>2</sup>	-.11 (N=204)
Males	-.19 (N=1209)	-.19* (N=176)

\*  $p < .02$

<sup>1</sup> Chapman, Chapman & Raulin, 1978

<sup>2</sup> Chapman, Edell & Chapman, 1980

original version, relative to their own normative criteria. The alpha coefficients and standard deviations obtained in the study of Chapman et al. (1980) and in the present study are almost identical for both of Chapman's scales and in both sexes. This indicates that the French versions possess the same high internal consistency as the original versions, and that the scores of Francophone students are dispersed in the same manner as the scores of their American counterparts. Unfortunately, no test-retest information could be obtained for the present study's sample.

The pattern of correlations indicates that only modest relations exist between the French translations and social desirability, except for males on the Perceptual Aberration measure. The moderate negative correlation between these variables indicates that male francophone college students are more reluctant to admit having deviant perceptual experiences than are female students. Unfortunately, no direct comparisons can be made with the correlation coefficients obtained in the Chapman et al. (1978) study since levels of significance were not reported by these researchers. An additional note of caution should be made concerning the French form of the Crowne-Marlowe scale. This version has not been compared with the original form on basic psychometric properties;



therefore, the extent to which they are psychometrically equivalent is unknown. Finally, the correlation coefficients between the Perceptual Aberration and the Physical Anhedonia scale obtained in the present investigation in both sexes closely parallel those obtained by Chapman et al. (1980). This finding provides additional support for the assumption that the French translations of the Physical Anhedonia and Perceptual Aberration scales are psychometrically equivalent to the original versions.

## MAIN STUDY

Social competence and selective attention in  
schizophrenia-prone college students.

### METHOD

#### Subjects

Subjects were selected from the student sample described in the validation study. Four groups were defined according to the following criteria: Group 1, high perceptual aberration (PA), scores at least two standard deviations above the mean on the Perceptual Aberration Scale and no more than half a standard deviation above the means on the Physical Anhedonia Scale; Group 2, high anhedonia (AH), scores at least two standard deviations above the mean on the Physical Anhedonia Scale and no more than half a standard deviation above the mean on the Perceptual Aberration Scale; Group 3, mixed (PA/AH), scores at least one and a half standard deviations above the mean on both scales; Group 4, control (CO), scores no more than half a standard deviation above the mean on both scales. Female and male subjects were selected according to the means and standard deviations of their own gender group. Candidate participants were additionally screened for the presence of test-taking bias

as displayed by extreme scores on the MMPI L and K Scales. The L scale consists of mildly undesirable items that are usually answered as true by most people (e.g., "I do not always tell the truth"). A high number of "false" answers on this scale usually indicates carelessness, pathological confusion or exaggerated test-defensiveness. The K scale was empirically designed so that deliberate attempts to create an unfavorable impression yield low K-scores (Dahlstrom and Welsh, 1960), and therefore permit the exclusion of individuals whose response style would make them appear deviant on any measure that assesses pathological traits, regardless of the specific content of items. Cut-off scores of two standard deviations above the mean of the screening sample on the L-scale and of two standard deviations below the mean on the K-scale were used in the present study; but in practice, no student had to be disqualified on this basis.

Forty volunteers who met selection criteria for membership in one of the four groups were tested. Difficulties in subject recruitment precluded groups of equal size and number of females and males. There were 11 subjects (6 females, 5 males) in the perceptual aberration group, 9 subjects (4 females, 5 males) in the anhedonia group, 9 subjects (4 females, 5 males) in the mixed group, and 11 subjects (6 females, 5 males) in the

control group. Respective mean ages in years and standard deviations for the four groups were 19.3 and 1.0; 19.6 and 1.8, 19.6 and 1.6; 18.8 and 0.9. Means and standard deviations of the four groups on the Perceptual Aberration and Anhedonia Scales are presented in Appendix B.

Parental socioeconomic status was estimated using a single-factor 6-point scale of occupational class (Blishen, 1967). Socioeconomic status was defined by the occupational class of the parent with the higher rating whenever both parents were reported as employed. Control for verbal ability entailed administration of the Echelle de Vocabulaire (Dayhaw, 1941). This is the 32-item vocabulary subtest of the French form of the Stanford-Binet Intelligence Scale (Terman and Merrill, 1960). Word definitions were rated according to the instructions of the manual. Since the scoring system only yields a developmental level index, the individual's vocabulary score was computed as number of words correctly defined. In order to control for non-verbal ability, participants received two subtests from the Epreuve Individuelle d'Intelligence Generale (Barbeau and Pinard, 1963) a French-Canadian adaptation of the Wechsler Adult Intelligence Scale. The subtests "Dessins avec blocs" (Block Design) and "Histoire en images" (Picture Arrangement) were administered because their scores are

strongly correlated with non-verbal I.Q. Responses on each subtest were scored according to the norms provided by the manual. Psychometric descriptions of the three I.Q. subtests are presented in Appendix C.

An abbreviated version of the Beck Depression Inventory (1972) translated into French (see Appendix D) was administered to subjects in order to control for differences in subjective feelings of depression as distinct from the dimension of anhedonia. Each item consisted of four statements describing varying degrees of depressive feelings. The total depression score was computed as the sum of the ratings for all the items. The short form of the BDI contains 13 items and was found to correlate .93 with the full, 21-item BDI, for a sample of 163 individuals enrolled in a methadone-maintenance program (Reynolds and Gould, 1981). These authors also found a coefficient alpha of .83 for the short form, compared to .85 for the full BDI.

Group differences for socioeconomic status, vocabulary, block design, picture arrangement and depression were tested using univariate one way analyses of variance. Means and standard deviation for each group and ANOVA source tables are presented in Table 3. No significant group differences were found on any of the variables.

TABLE 3

Group means and standard deviations and ANOVA source tables for scores on Socio-economic status, Depression, Vocabulary, Block Design, and Picture Arrangement.

Group (n)	SES		Depression		Vocabulary		Block Design		Picture Arrangement	
	mean,	s.d.	mean,	s.d.	mean,	s.d.	mean,	s.d.	mean,	s.d.
Perceptual Aberration (11)	3.27,	1.8	4.36,	3.0	22.8,	2.6	33.4,	5.3	18.1,	4.2
Anhedonia (9)	2.33,	1.2	4.13,	5.8	22.6,	1.9	27.4,	7.1	17.0,	5.6
Mixed PA/AH (9)	2.63,	1.4	7.00,	5.5	22.8,	2.3	31.0,	7.4	18.3,	6.2
Control (11)	2.82,	1.7	3.70,	4.0	21.9,	2.0	31.9,	9.5	20.3,	5.6

Variable	Hypothesis MS	Error MS	F	P
SES	1.56	2.45	.64	.60
Depression	20.45	21.10	.97	.42
Vocabulary	1.90	5.03	.38	.77
Block Design	61.30	56.62	1.08	.37
Picture Arrangement	19.05	28.76	.66	.58

Note: DF = 3, 36

## Materials

Social Competence. A French translation of the Achenbach Youth Self-Report (note 3) was prepared (see Appendix E) in order to assess separately behavior competencies and behavior problems of subjects. The Youth Self-Report was adapted by Achenbach from the Child Behavior Checklist (CBCL), completed by parents, (Achenbach and Edelbrock, 1981). The CBCL was originally developed by examining psychiatric case histories of children referred to mental health services, and was subsequently standardized on large samples of normal and referred children ranging in age from 4 to 16 years (Achenbach, 1978; Achenbach and Edelbrock, 1979). The self-report form is scored in the same way as the checklist completed by parents. Agreement between the profiles obtained by these two methods is reported as satisfactory (Achenbach, personal communication). Unfortunately, no norms have been reported to date for individuals above the age 16, and, since behavioral norms can be expected to change beyond that age, the participants' raw scores rather than standardized scores were used in the present study.

The Social Competence scale contains the items identified by Roman numerals I to VII on the Youth Self-Report. The items reflect broad categories of social

competence and 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 for CBCC completed by mothers of non-referred children was reported as .996 for a 1-week interval (N=72) 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 the three subscales. This was true for all age groups. The foregoing psychometric properties apply only to the parents' form. Although of limited value for assessing the self-report version, the reliability data suggest nonetheless that the items themselves are relatively unambiguous.

In the present study, composite scores were computed for each subscale according to guidelines provided by Achenbach (Note 4). The Activities score (items I, II, and IV) was computed as the sum of the ratings attributed to number of sports and number of non-sport activities, to participation and skill in these activities, to number of jobs, and to quality of jobs. In the present study, the



scoring of item IV was modified in order to increase the importance of outside jobs since this is likely to be particularly relevant for older subjects. This item was therefore subdivided into "household chores" and "outside jobs". The average of the ratings for number and quality in both categories was entered into the sum of the activities score. In addition, subjects living permanently on their own received maximum ratings on this item. The Social score (items III, V, and VI) 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 (item VIII) 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 were scored in the positive direction if absent). Finally, a Total Social Competence score was obtained for each subject by summing the three subscale scores.

The Behavior Problems Scale is made up of 118 behavior descriptions (item VIII of the Youth Self-Report) which discriminate clinical and non-clinical samples (Achenbach and Edelbrock, 1981). Seventeen items of the parent form were deleted from the self-report and replaced by filler items in order to preserve the scale's

length. The deleted items were either age-inappropriate or unsuitable for a self-report format (e.g., item 59: "Plays with own sex parts in public"). The French form was a direct translation of the self-report. Behavior problem items are rated by the respondent on a 3-point scale, with 0 indicating that the item is not true of the subject, 1 indicating that the item is somewhat or sometimes true of the subject, and 2 indicating that the item is very or often true of the subject.

A Total Behavior Problems score was computed as the sum of all the ratings on this scale. Broad and narrow-band behavior problem scales have been derived by Achenbach (1979) and by Achenbach and Edelbrock (1979) separately for females and males of each age group through factor analysis of the CBCLs completed by parents. Substantial overlap of items on the broad-band factors was found for boys and girls in the oldest age group: 70 percent of the items (36 items) which loaded on the males' Internalizing factor were found on the corresponding female factor, and 80 percent (34 items which loaded on the males' Externalizing factor were present on the corresponding female factor. Total scores obtained by subjects on these two groups of items constituted their respective Internalizing and Externalizing scores, since the small sample sizes in the present study precluded

separate analyses for each sex. The remaining 30 items were summed and analysed as the Unclassified items score. The factor structures of the narrow-band scales are sex-specific, and scales sharing the same labels on boys' and girls' profiles are made up of very different items. Consequently these factors were not considered in the present study.

Selective Attention: In order to test the hypothesis that psychosis-prone college students manifest attentional deficits, the forced-choice Span of Apprehension and Digit Span tasks were administered. These two measures are described below.

The Span of Apprehension task was constructed and administered according to guidelines provided by Neale et al. (1969). The stimulus arrays consisted of letters printed on 3 X 5 white index cards. Each card was divided by an imaginary 4 X 4 matrix into 16 spatial positions. Target and irrelevant letters were randomly dispersed across these positions. Four sets of cards were used. The first set contained five cards with one target letter (an F or a T) and no irrelevant letters. The set was used for practice trials in order to familiarize the subject with the task. Three other 30-item sets contained 2, 4, or 9 irrelevant letters in addition to the target letter which was an F on half of the cards and a T on the other

half. These three sets were presented in a fixed order, beginning with items containing the smallest number of irrelevant letters and proceeding to those with the largest number of irrelevant letters.

The apparatus was a two-channel Cambridge PCT-137 tachistoscope equipped with a remote switch. One field, the constantly illuminated fixation field, contained a white index card with a black dot printed in the centre. The stimulus displays were inserted in the second field of the tachistoscope and flashed for a duration of 30 milliseconds. The detailed instructions given to subjects appear in Appendix F. Subjects were asked to identify whether the target letter on the display was a T or a F. Testing was performed in a dimly lit, moderately soundproof room. The examiner recorded the subject's responses manually and performance was scored as percentage correct target letter identification for each of the different sized sets of displays. A total percentage correct detections score was computed as the mean of the performance on the three experimental sets of items.

The Digit Span task used in the present study was adapted from Oltmann's and Neale's (1975) differential deficit paradigm, in which subjects' short term memory for lists of digits was tested under control and experimental

conditions. The control task consisted of lists of digits spoken by a male voice at a rate of one digit every two seconds. In the experimental subtest, lists of digits were spoken by a male voice, while irrelevant digits were spoken by a female voice in the one second space between each pair of digits spoken by the male voice. Subjects were instructed to ignore the female voice and to try and remember only male-spoken digits. The standard instructions which were given orally to subjects are presented in Appendix G. The test procedure began with a volume check. The instructions were repeated at the beginning of the recording and were followed by one practice trial for each of the two conditions. Success on the practice items was required before testing could proceed. The randomly ordered control and distraction digit lists were recorded on a magnetic tape with a UHER 4400 Report Stereo IC tape recorder and played back binaurally through Lenline Dynamic 260 headphones. Each list began with a female voice saying "Attention" and ended when a tone was heard. At the end of each list, subjects wrote down on a prepared answer sheet as many digits as they remembered, during the twenty-five second pause between each list. There was a two minute pause between the first and second halves of the digit lists. Subjects' responses were scored in the following manner:

In each list, a point was subtracted from the total number of digits presented for every error of omission, addition, or sequence. Performance on the neutral and distractor sets of lists was computed as percentages by dividing the sum of correctly recalled digits in the neutral and distraction sets by the total number of digits within the respective sets.

The sets of items used were those developed by Finkelstein (1979, note 5) for a study of distractibility in hospitalized schizophrenic patients. Prior to their experimental use, Finkelstein matched the sets of neutral and distractor items for means and standard deviations on a standardization sample composed mainly of college students and nursing assistants in order to create two sets that were equally difficult for normal individuals. This was achieved by manipulating the length of the digit lists. The distractor set was composed of seven lists of six and seven digits, while the neutral set was composed of nine lists of seven, eight, and nine digits. The mean percentages of correctly recalled digits and standard deviation were reported by Finkelstein as .77 and .22 for the distractor set and .76 and .19 for the neutral set. The sets of neutral and distractor digit lists appear in Appendix H in the order presented to subjects.

In addition to the overall distraction effect, serial

position effects were also investigated by computing percentage correct recall scores for primacy and recency components. Primacy was defined as the first two digits of each list and recency was defined as the last two.

### Procedure

Students who had volunteered their names on the pre-screening questionnaire were initially contacted by letter (see Appendix I). The students were subsequently invited by phone to participate as subjects in the study, and upon agreement, an appointment time was set. Subjects who missed their appointment were phoned and given a second appointment, after which no further attempt was made to recontact them. Upon arrival at the Centre for Research in Human Development, subjects were given an overview of the procedures. Testing was conducted in a quiet area of the Centre and the session was divided in three blocks, each lasting twenty-five to thirty-five minutes. Block A consisted of the paper and pencil questionnaires, i.e., the Achenbach Youth Self-Report and the Beck Depression Inventory. Block B consisted of the I.Q. subtests in the following fixed order: Picture Arrangement; Vocabulary, Block Design. Block C consisted of the Span of Apprehension task followed by the Digit Span task. Block A was always administered first. In order to test two subjects at a time, a trained undergraduate research

assistant administered the tasks of Block C. Whenever two subjects were scheduled for testing at the same time, Block B was administered by the author in one room while Block C was administered by the research assistant in another. The block sequence was counterbalanced within groups, such that approximately half of the subjects in each group were administered Block B before Block C, and vice-versa for the remaining half.

A brief post-test interview was conducted by the author with each participant following completion of the test procedures. Subjects were encouraged to ask questions and to comment on any aspect of the session. The experimenter explained the purpose and rationale of the study without reference to the concept of "risk", and avoided the use of terms with pathological connotations. Individual differences in attentional skills were discussed in terms of personal and cognitive styles. Subjects who reported unusual perceptual experiences (on the screening questionnaire, the Youth Self-Report, or in conversation) were requested to elaborate on these experiences. The purpose of this inquiry was to screen out those reporting drug-induced deviant experiences from the high risk groups. However, no subject was disqualified for this reason. Finally, this interview was also carried out in order to refer to clinical services



those requesting help. This occurred in one instance, where a member of the mixed group sought professional consultation.

## RESULTS

Correlations between control and dependent variables

Pearson correlation coefficients were computed in order to examine covariations between control variables (SES, Vocabulary, Block Design, Picture Arrangement, Beck Depression Inventory) and dependent variables (Social Competence total score, Behavior Problems total score, Span of Apprehension, Digit Span), as well as covariations among dependent variables. The resulting 9 X 9 matrix is shown in Table 4. Missing scores for one subject in group 2 on the Span of Apprehension task were treated by a listwise deletion procedure. As a result, the correlation coefficients are reported for 39 subjects. Significant positive correlations were found between SES and Behavior Problems,  $r = .43$ ,  $p < .01$ , and between Beck Depression and Behavior Problems,  $r = .60$ ,  $p < .001$ . Social Competence correlated negatively with Beck Depression,  $r = -.40$ ,  $p < .01$ , and positively with Digit Span,  $r = .32$ ,  $p < .05$ . The "multistage" Bonferroni procedure proposed by Mulaik and Larzelere (1977) was applied to this correlation matrix in order to control for experiment-wise error. Alpha was initially set at .10 divided by  $k$  non-redundant correlations, i.e.,  $.10/36$  or  $.003$ . Only the correlation between Beck Depression and Behavior Problems remained significant.

TABLE 4

Pearson product-moment, correlation coefficients matrix of control and dependent variables (N = 39).

	1.	2.	3.	4.	5.	6.	7.	8.
1. <u>Blishen Socio-economic Index</u>								
2. <u>Beck Depression Inventory</u>	.20							
3. <u>Vocabulary</u>	-.02	-.31						
4. <u>Block Design</u>	.03	-.30	.19					
5. <u>Picture Arrangement</u>	.06	-.26	.08	.25				
6. <u>Total Social Competence Scale</u>	-.23	-.40**	-.01	.03	.29			
7. <u>Total Behavior Problems Scale</u>	.43**	.62***	-.02	.02	-.10	-.23		
8. <u>Total Span of Apprehension scores</u>	.07	.02	-.04	.27	.01	.20	.05	
9. <u>Total Digit Span scores</u>	.01	-.21	.23	.16	.09	.32*	.00	.15

\* p &lt; .05

\*\* p &lt; .01

\*\*\* p &lt; .001

The general pattern of low intercorrelations between the dependent variables argued for a univariate rather than multivariate approach to data analysis. Since group sizes were small and unequal, the assumption of homogeneity of population-error variance was verified in all subsequent analyses. This was done in order to guard against alpha inflation in significance tests.

#### Social Competence Scale

Table 5 shows the means and standard deviations of the four groups on the Achenbach Social Competence scale. Total Social Competence scores were examined using a one-way analysis of variance. Cochran's C test for homogeneity of variances was not significant,  $C(3,9) = .36$ ,  $p > .05$ , indicating that the data fulfilled the homogeneity assumption. The analysis of variance was significant,  $F(3,36) = 5.15$ ,  $p < .005$  (see Table 5). Post-hoc comparisons of group means using the Neuman-Keuls procedure, revealed that the mixed PA/AH group obtained a significantly lower mean than the control group,  $p < .01$ , and the PA group,  $p < .05$ . The AH group also obtained a significantly lower mean than the control group,  $p < .05$ .

More detailed information was obtained by examining the three Social Competence subscales. Intercorrelations between the Activities, Social, and School subscales were very low (see Appendix J), thus indicating that each

TABLE 5

Group means and standard deviations for the Total Social Competence scale, and ANOVA source tables for the Total scale and the Activities, Social, and School subscales.

<u>Group (n)</u>	<u>Mean</u>	<u>S.d.</u>
Perceptual Aberration (11)	19.4	1.7
Anhedonia (9)	18.5	2.7
Mixed PA/AH (9)	17.6	2.5
Control (11)	21.0	2.0

<u>Variable</u>	<u>Hypothesis MS</u>	<u>Error MS</u>	<u>F</u>	<u>P</u>
Total scale	28.20	5.48	5.15	.0046 *
Activities	4.73	1.78	2.66	.063
Social	8.29	3.21	2.58	.068
School	2.59	.71	3.66	.021 *

Note : Df = 3,36

subscale contributed independently to the variance in Total Social Competences scores. Consequently, each of the three dimensions was examined by means of a univariate one way analysis of variance. The data fulfilled the assumption of homogeneity of variance as indicated by Cochran's test for the Activities subscale,  $\chi^2(3,10) = .40$ ,  $p > .05$ , the Social subscale,  $\chi^2(3,10) = .33$ ,  $p > .05$ , and the School subscale,  $\chi^2(3,10) = .44$ ,  $p > .05$ . F-ratios were marginally significant on the Activities subscale,  $F(3,39) = 2.68$ ,  $p < .07$ , and on the Social subscale,  $F(3,39) = 2.58$ ,  $p < .07$ . However, the ANOVA performed on the School subscale was significant,  $F(3,39) = 3.66$ ,  $p < .02$ . Group means, expressed as percent of maximum possible score on each subscale in order to facilitate comparisons, are shown in Figure 1, and ANOVA source tables for these three variables are presented in Table 5. Using the Neuman-Keuls procedure, comparisons of group means on the School subscale revealed a different ordering of means from that which was found on the total Social Competence scale. The lowest mean was that of the PA group, which differed significantly from the AH ( $p < .05$ ) and Control ( $p < .05$ ) group means. This pattern of results indicates that while anhedonia and mixed perceptual aberration and anhedonia students appeared less socially competent than control

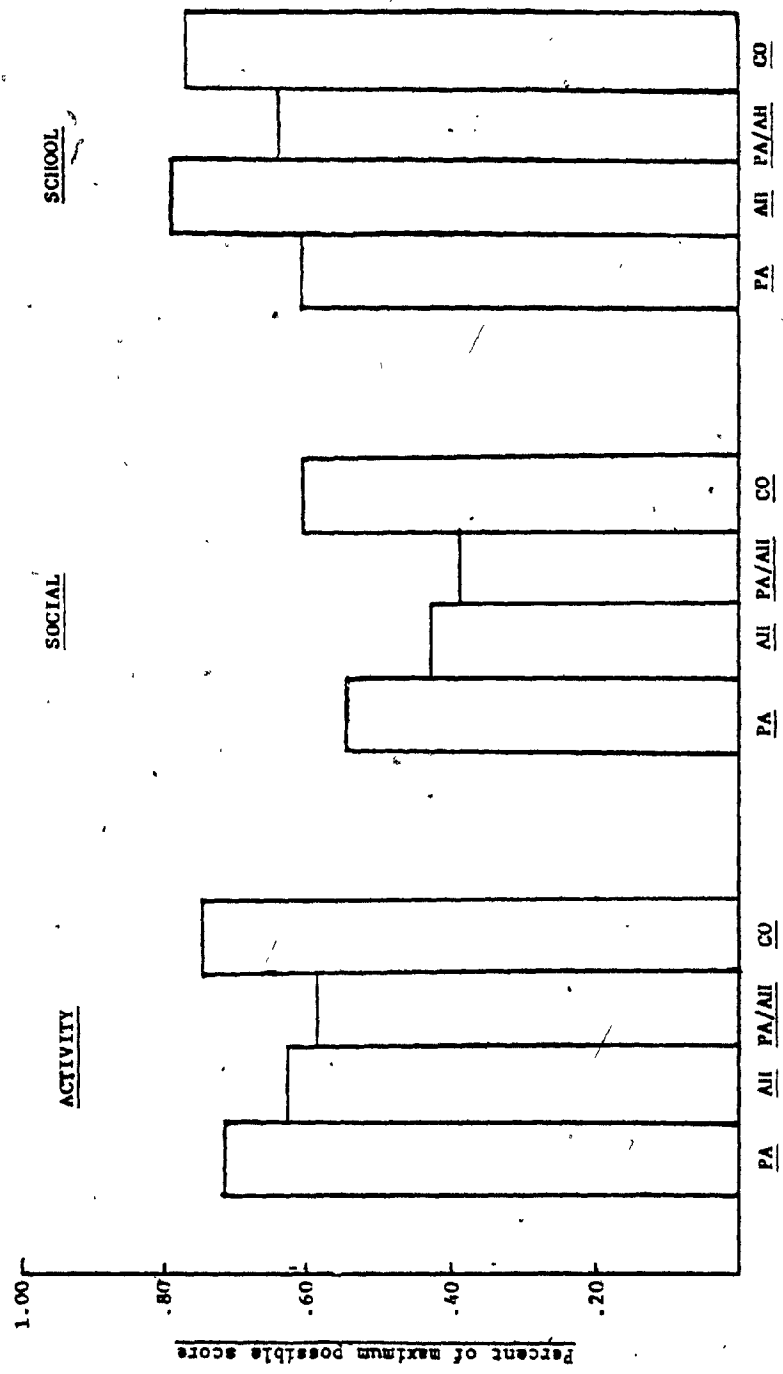


Figure 1. Mean group scores of the perceptual aberration (PA), anhedonia (AH), mixed perceptual aberration and anhedonia (PA/AH), and control (CO) students, expressed as percent of maximum possible scores on the Activity, Social, and School subscales of the Achenbach Social Competence scale.

students when using a global index, perceptual aberration students were poorer than other students on specific academic variables. The items on the school subscale which best discriminated the Perceptual Aberration group from the other groups were not those which self-rated academic achievement but rather were those describing specific school problems. For instance, 54.4 percent of the PA, 0.0 of the AH, 0.0 percent of the PA/AH, and 9.1 percent of the control student had repeated a grade and/or had been in a remedial class. A chi-square test of independence between the proportion of students who reported either or both these categories of school history in each group was significant,  $\chi^2(3) = 10.94$ ,  $p < .05$ . It is interesting to note that PA students attributed their scholastic difficulty to "dyslexia". It may also be noted that the School subscale was related to only one other variable, the Block Design subtest, a measure of visuo-spatial organization, with which it was negatively correlated ( $r = -.46$ ).

#### Behavior Problems scale

Despite a higher mean for the perceptual aberration group on Total Behavior Problems, as can be seen in Table 6, no significant group differences were found on this measure,  $F(3,36) = .769$ . This was also the case for scores on the dimensions of the Internalizing,  $F(3,36) =$



TABLE 6

Group means and standard deviations for the Total Behavior Problems scale, and ANOVA source tables for the Total scale and the Internalizing, Externalizing and Unclassified subscales.

<u>Group (n)</u>	<u>Mean</u>	<u>S.d.</u>
Perceptual Aberration (11)	56.3	21.4
Anhedonia (9)	43.0	23.4
Mixed PA/AH (9)	46.9	20.3
Control (11)	47.6	17.4

<u>Variable</u>	<u>Hypothesis MS</u>	<u>Error MS</u>	<u>F</u>	<u>P</u>
Total scale	320.49	419.43	.76	.5219
Internalizing	126.50	89.56	1.42	.255
Externalizing	25.68	49.02	.52	.669
Unclassified	38.24	91.16	.42	.740

Note : Df = 3,36

.255; Externalizing,  $F(3,36) = .419$ , and Unclassified items,  $F(3,36) = .419$ . ANOVA source tables for these data are presented in Table 6. Since Behavior Problems correlated highly with the Beck Depression Inventory ( $r = .61$ ), the latter variable was used as a covariate in a oneway analysis of covariance. The F-ratio was not significant,  $F(3,35) = .979$ . The variance of scores on Total Behavior Problems as large, even in the control group. Indeed, the scores ranged from 18 to 93 for the entire sample, and from 22 to 79 for the control group alone. Such high intersubject variability suggests that the measure is not particularly discriminating.

A supplementary analysis was performed in order to verify whether a specific cluster of Behavior Problems items might discriminate the groups. The ratio of number of subjects to number of variables precluded such methods as discriminant or multiple regression analysis. Consequently, a rational approach (Wiggins, 1974) was adopted. Five advanced clinical psychology graduate students were provided with brief descriptions of the following personality disorders drawn from DSM-III Training Guide (Webb, DiClemento, Johnstone, Sanders, & Perley, 1981): Paranoid, Schizoid, Schizotypal, Borderline, and Narcissitic (see Appendix K). The students were requested to select from the Behavior

Problems scale items that corresponded to the above personality descriptions. Items with interjudge agreement of .60 or better were retained. Very few items met the criterion for the Paranoid and Narcissistic personalities; these categories were thus dropped. Since substantial overlap was found between items selected for Schizoid, Schizotypal, and Borderline, these three categories were combined and a 14-item ad-hoc scale with an average interjudge agreement of .75 was obtained. The items were:

I'm too dependent on adults

I feel lonely

I feel confused or in a fog

I daydream a lot

I hear things that nobody else seems able to hear  
(describe) \_\_\_\_\_

I like to be alone

I am not liked by other kids

I refuse to talk

I see things things that nobody else seems able to  
see (describe) \_\_\_\_\_

I am shy

I do , things other people think are strange  
(describe) \_\_\_\_\_

I have thoughts that other people would, think are  
strange (describe) \_\_\_\_\_

I don't have much energy

I wish I were of the opposite sex

Individual composite scores were analysed using a one way analysis of variance; means and standard deviations, and the ANOVA source table are presented in Table 7. This measure had a very low positive correlation with Depression ( $r = .23$ ), and near-zero correlations with the I.Q. subtests. The data fulfilled the assumption of homogeneity of variance since Cochran's test was not significant,  $Q(3,9) = .49$ . The analysis of variance was significant,  $F(3,36) = 4.19, p < .02$ , and the Neuman-Keuls post-hoc tests revealed that the PA/AH group obtained significantly higher composite scores for Schizoid, Schizotypal and Borderline features than the AH ( $p < .05$ ) and the control groups ( $p < .05$ ). However, the differences between the PA, AH and Control groups were not significant.

#### Selective Attention

Scores on the three sets of displays of the Span of Apprehension test were analysed by means of a 4 x 3 group by display size, repeated measures analysis of variance. The group means and standard deviations and the ANOVA source table are presented in Table 8. Box's M test for equality of variance-covariance matrix was not significant,  $F(30,2575) = .95$ , indicating no

TABLE 7

Means and standard deviations and ANOVA source table for scores on a composite scale of schizoid, schizotypal, and borderline personality features.

<u>Group</u>	<u>Mean</u>	<u>S.d.</u>
Perceptual Aberration	9.82	3.1
Anhedonia	6.33	2.9
Mixed PA/AH	11.11	5.3
Control	6.27	3.4

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<u>Hypothesis MS</u>	<u>Error MS</u>	<u>F</u>	<u>P</u>	<u>Df</u>
30.00	7.15	4.195	.0121	3,36

TABLE 8

Group means and standard deviations expressed as percent correct target letter recognitions for the 3-, 5-, and 10-letter conditions and associated ANOVA source table for the Span of Apprehension task.

<u>Group (n)</u>	<u>3 letters</u>	<u>5 letters</u>	<u>10 letters</u>
	<u>mean,</u> <u>s.d.</u>	<u>mean,</u> <u>s.d.</u>	<u>mean,</u> <u>s.d.</u>
Perceptual Aberration (11)	<u>99.1,</u> <u>3.0</u>	<u>94.6,</u> <u>5.5</u>	<u>77.3,</u> <u>8.9</u>
Anhedonia (8)	<u>97.6,</u> <u>3.4</u>	<u>94.6,</u> <u>6.9</u>	<u>77.1,</u> <u>9.8</u>
Mixed PA/AH (9)	<u>99.3,</u> <u>1.3</u>	<u>94.1,</u> <u>3.7</u>	<u>79.6,</u> <u>10.8</u>
Control (11)	<u>98.8,</u> <u>2.2</u>	<u>97.6,</u> <u>3.4</u>	<u>84.0,</u> <u>9.5</u>

<u>Source</u>	<u>Hypothesis MS</u>	<u>Error MS</u>	<u>F</u>	<u>Df</u>	<u>P</u>
Group	81.75	56.44	1.45	3,35	.2454
Display size	4021.35	34.71	115.84	2,70	.0001 *
Group X Display size	28.63	34.71	.82	6,70	.5547

heterogeneity of variance-covariance matrix. The display size main effect was significant,  $F(2,70) = 115.81$ ,  $p < .0001$ . However, no group main effect,  $F(3,35) = 1.45$ , nor group X display size interaction effect,  $F(6,70) = .82$ , was found. The four groups did not differ in overall performance on this task, nor on any of the three display size conditions.

Performance on the Digit Span task was examined using two separate repeated measures analyses of variance. A 4 x 2 group by distraction analysis was performed first to compare the groups' total neutral and distraction scores. Box's M test did not indicate heterogeneity of variance-covariance matrix,  $F(18,4169) = 1.18$ . As Table 9 shows, no group X distraction effect,  $F(3,36) = 1.54$ , nor group main effect,  $F(3,36) = 1.99$ , was found, despite the apparently lower means for the PA and the PA/AH groups in the neutral condition and for the three high risk groups in the distraction condition.

A 4 x 2 x 2 group by distraction by serial position analysis was then performed. Since Box's M test indicated significant heterogeneity of variance-covariance matrix,  $F(30,3270) = 1.83$ ,  $p < .01$ , the conservative F-test proposed by Geisser and Greenhouse (1958) with adjustments for degrees of freedom was used. There was no significant three-way interaction effect,  $F(3,36) = .18$ , and no group

TABLE 9

Group means and standard deviations expressed as percent correctly recalled digits under neutral and distraction conditions, and associated ANOVA source table for the Digit Span task.

<u>Group (n)</u>	<u>Neutral</u>	<u>Distraction</u>
	<u>mean,</u> <u>s.d.</u>	<u>mean,</u> <u>s.d.</u>
Perceptual Aberration (11)	<u>62.0,</u> <u>14.0</u>	<u>65.6,</u> <u>12.9</u>
Anhedonia (9)	<u>75.4,</u> <u>16.3</u>	<u>70.0,</u> <u>12.5</u>
Mixed PA/AH (9)	<u>69.8,</u> <u>12.2</u>	<u>62.8,</u> <u>14.6</u>
Control (11)	<u>74.3,</u> <u>18.2</u>	<u>77.0,</u> <u>13.7</u>

<u>Source</u>	<u>Hypothesis MS</u>	<u>Error MS</u>	<u>F</u>	<u>Df</u>	<u>P</u>
Group	646.57	347.47	1.99	3,36	.1325
Distraction	45.11	95.12	.47	1,36	.4955
Group X distraction	146.66	85.12	1.54	3,36	.2204



TABLE 10

Group means and standard deviations expressed as percent correctly recalled digits for primacy and recency effects under neutral and distraction conditions, and associated ANOVA source table for the Digit Span task.

Group (n)	First two digits			Last two digits		
	Neutral mean, s.d.	Distraction mean, s.d.	Total mean, s.d.	Neutral mean, s.d.	Distraction mean, s.d.	Total mean, s.d.
Perceptual Aberration	86.3, 14.3	82.4, 11.7	84.4, 13.0	66.2, 14.2	61.7, 13.7	64.0, 14.0
Anhedonia	95.7, 5.4	88.9, 8.1	92.3, 6.7	69.7, 21.5	59.7, 17.1	64.6, 19.3
Mixed PA/AH	90.7, 4.8	80.9, 11.8	85.8, 8.4	64.8, 10.8	53.2, 24.5	59.0, 17.7
Control	85.8, 13.7	83.9, 11.1	84.9, 12.5	79.6, 15.0	80.6, 7.8	80.1, 11.4

Source	Hypothesis MS	Error MS	F	DF	P
Group	840.62	380.62	2.21	1,36	.1039
Distraction	1413.57	132.50	10.67	1,36	.0024 *
Serial Position	15531.59	137.82	114.15	1,36	.0001 *
Group X Distraction	206.61	132.50	1.56	3,36	.2161
Group X Serial Position	1164.61	137.82	8.45	3,36	.0002 *
Distraction X Serial Position	5.27	103.62	.05	3,36	.8229
Group X Distraction X Serial Position	19.05	103.62	.18	3,36	.9067

X distraction two-way interaction effect,  $F(3,36) = 1.56$ . However, a significant distraction main effect,  $F(1, 36) = 10.67$ ,  $p < .005$ , a significant serial position main effect,  $F(1,36) = 114.15$ ,  $p < .000$ , and most importantly a significant group X serial position two-way interaction effect,  $F(3,36) = 8.45$ ,  $p < .001$ , were found. This last finding indicated that groups performed differently on the primacy and recency portions of the digit lists (see Table 10). Simple main effects of primacy and recency were tested following Kirk's computation guidelines (1968, p. 305). The F-test for primacy was not significant,  $F(3,36) = 1.06$ , but the F-test for recency was,  $F(3,36) = 6.45$ ,  $p < .01$ . Comparisons of group means for the recency effect, using the Neuman-Keuls procedure, revealed that the PA, AH, and PA/AH group means were significantly lower ( $p < .01$ ) than the control group mean.

Serial position curves for the four groups under neutral and distraction conditions are presented in Figure 2. The digit lists varied in length. Consequently, for purpose of clarity, the middle portion (the digits falling between the first and last two digits) of the 7-, 8-, and 9-digit lists were reduced by averaging (see Appendix L), and uniform sets of 6-digit lists were obtained. Since the three-way group X distraction X serial position

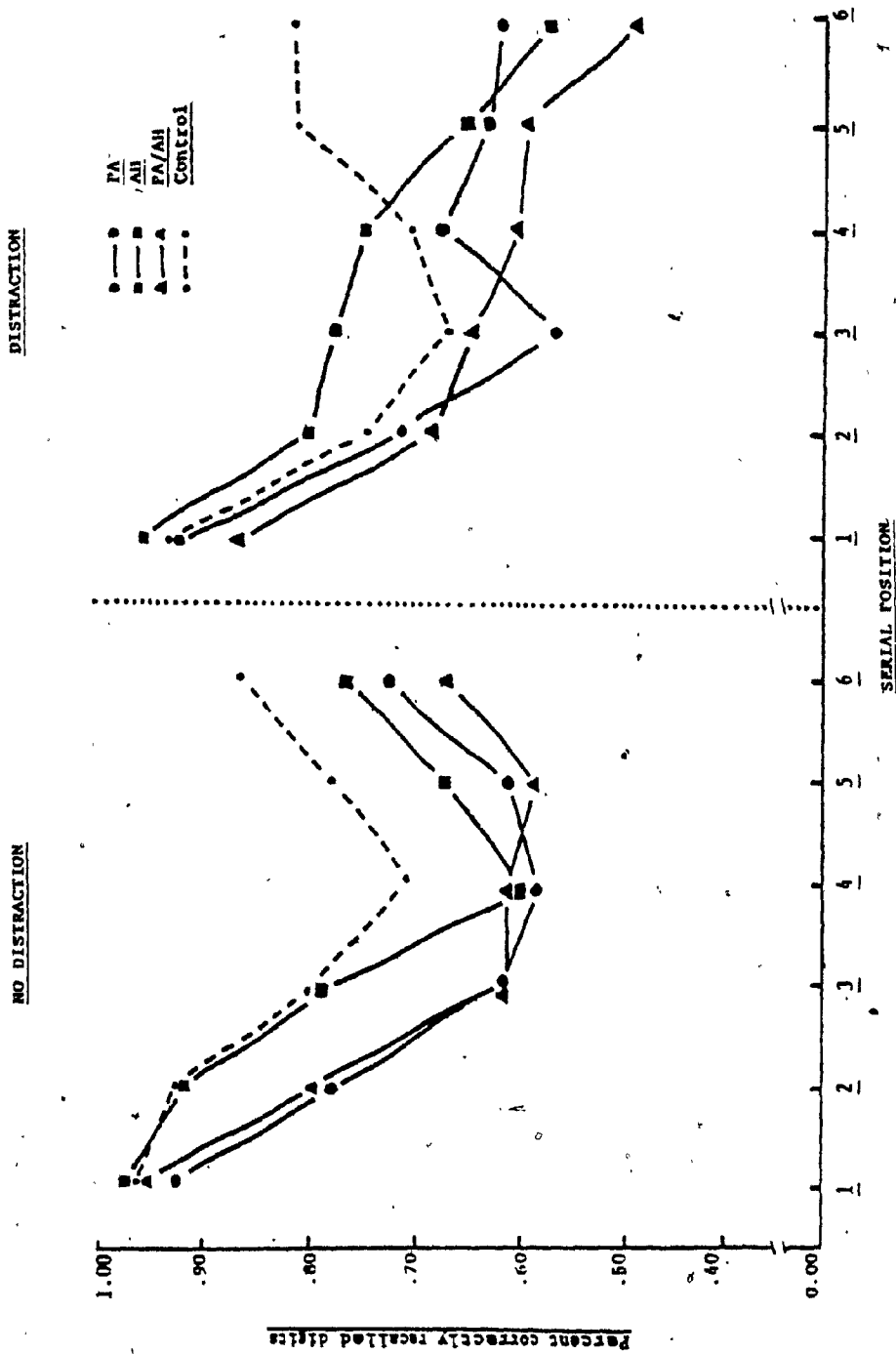


Figure 2. Serial position curves of perceptual aberration (PA), anhedonia (AH), mixed perceptual aberration and anhedonia (PA/AH), and control students, under neutral (no distraction) and distraction conditions of the Digit Span task.

interaction was not significant, tests for simple-simple main effects were not applied. However, visual inspection of the curves clearly suggests differences in the recall patterns of all three high risk groups under neutral and distraction conditions. While the performance of the high-risk groups in the neutral condition was poorer than that of the control group in the latter portion of the digit lists, all the curves are parallel indicating that the high-risk groups did show the usual recency effect. However, this was not the case in the distraction condition. While it remained present in the control group, the recency effect disappeared in the PA, AH, and PA/AH groups.

## DISCUSSION

### Social Competence

The results indicated that high scorers on measures of schizophrenia-proneness differed in many respects from low scorers. Anhedonia students and students with elevations on both the Anhedonia and the Perceptual Aberration scales obtained lower scores than control students on a global social competence index of social, academic and extracurricular functioning. Assuming that the Achenbach Social Competence Scale is a college level analogue of the Phillips (1953) scale for use with adults, these findings suggest that anhedonia, either by itself or in combination with another factor of risk for schizophrenia, is associated with the poor premorbid adjustment pattern described by Becker (1956) and by Zigler and Phillips (1962). It is important to note that the Anhedonia scale measures a lack of physical, rather than interpersonal sources of pleasurable experience. Therefore, this scale and the Social Competence scale cannot be said to overlap in content areas. It is thus particularly interesting that the Anhedonia scale was able to identify individuals who not only lacked interest in food and music, taking walks, smelling flowers, or watching a sunset, but who also had few friends, did not get involved in group activities, had few hobbies and few

jobs, and who did not consider themselves particularly competent in anything. One therefore seems to be in the presence of individuals who describe themselves as withdrawn, and "uninvolved"

The question arises as to what factors underly such an attitude. Chapman et al (1976) found that high scorers on physical anhedonia were also high scorers on social anhedonia. Dagher (note 6) found that anhedonic individuals tended to score low on the Zuckerman (1979) Sensation Seeking scale, indicating that they had little interest in novel experiences, and manifested high boredom tolerance. These data seem to support a motivational deficit approach, in line with Rado's (1956) theory of schizophrenia, and with Wise and Stein's (1973) biochemical hypothesis. However, a direct test of such a model would involve demonstrating that the behavior of anhedonic individuals failed to conform to predictions based on an incentive theory of motivation (Bindra, 1976). Even if one empirically showed that these individuals lack the capacity to respond to physical and social incentives, it might still be argued that this is the result not of a genetically based dysfunction in the neurosubstrate of reinforcement, but rather of a long term generalized avoidance strategy. This idea has already been put forth in Mednick's (1958) learning theory of schizophrenia,

which made use of the concepts of avoidance learning and stimulus generalization in order to explain the gradual withdrawal from social intercourse and, eventually, the total retreat to an inner fantasy world. Meehl's (1962) theory incorporated both the Bindra and Mednick positions by suggesting that a defective limbic system coupled with a particular social learning regime (including having a "schizophrenogenic" mother) may lead to ambivalence, interpersonal aversiveness and anhedonia. At this point, however, there is no firm evidence arguing for or against any of these viewpoints, although currently the interactional model is the most favoured (Neale and Oltmanns, 1980).

While perceptual aberration students did not appear socially incompetent, it was noted that they reported a history of previous school failure and special class placement, but no current academic difficulty. This finding, which was specific to this group, was anecdotally associated with "dyslexia" by some perceptual aberration students as the source of their earlier school difficulties. Although such indirect evidence is far from conclusive, one might postulate a common origin for certain learning disabilities and susceptibility to peculiar perceptual experiences. Follow-back studies of schizophrenic patients did not reveal any particular signs

of learning difficulties (Robins, 1979), and little is known about later adjustment in children with learning disabilities, although an association has been found, in a follow-up study, between reading retardation and later conduct disorders (Rutter, Tizard, & Whitmore, 1970). However, this tended to occur as part of a more general deterioration of academic and social functioning, a pattern very dissimilar to that found in the perceptual aberration group.

The Behavior Problems scale as such did not discriminate the four groups. This appears at first to be inconsistent with the results obtained by Chapman et al. (1980) with the SADS-L interview procedure. One might argue that individuals who are at risk but not as yet clinically disturbed should not score deviantly high on a general inventory of behavior problems such as Achenbach's measure. However, it seems that the lack of sensitivity of the Behavior Problems scale, as evidenced by its high intersubject variability in the present study, may have obscured possible group differences. The size of standard deviations implies that several control students scored in the disturbed range according to Achenbach's norms (note 1). Since the Achenbach (1979) Child Behavior Checklist was originally developed to maximize distance between clinic referred and non-referred populations, and



consequently to yield scores as low as possible for normal individuals, one may question the equivalence between the original and self-report versions of the Behavior Problems scale. Three main reasons may be suggested to explain the lack of correspondance between the two forms. Firstly, it is possible that respondents cannot perceive their own problems as accurately and reliably as would observers. It is also possible that the change in phrasing from the third to the first person altered the meaning of certain behavioral descriptions. Consider for instance the connotations of an item phrased as "(my child) thinks about sex too much", and "I think about sex too much". It is quite likely that the interpretation given to, and the "evidence" used to answer this item will differ for oneself and for a significant other. Finally, it is possible that too many items of the scale were age-inappropriate, since the present study's population was older than the oldest age cohort of Achenbach's (1979) standardization sample. Moreover, as Achenbach has noted behavioral norms tend to become more fluid in late adolescence and early adulthood.

Despite these weaknesses, it was possible to discriminate the groups on the basis of a small cluster of items selected by a consensus method, and which reflected schizoid, schizotypal, and borderline personalities as

depicted in the DSM-III Training Guide (Webb et al., 1981). The items reflected schizoid aloofness, confusion and withdrawal, as well as hallucinatory experiences, bizarre thoughts and behavior. This index clearly tapped a different content area than the Anhedonia scale. It did not overlap with the Perceptual Aberration scale either, since the items on this scale reflected a specific category of unusual perception, namely, body image distortions, and described subjective proprioceptive and visual experiences. None of the items on the "schizoidia" index tapped proprioceptive experiences, and while visual hallucinations were included, these were not scored for body image experiences.

The results obtained with this schizoidia index can only be considered tentative, as these are based on post hoc analysis of the data. Nevertheless, the fact that the mixed perceptual aberration and anhedonia sample was the only group to score significantly higher than the control group on this index, highlights the importance of considering patterns of subclinical signs in identifying high risk individuals. It seems paradoxical that anhedonic students, who were rated as low in social competence, did not appear high on schizoid characteristics. Anhedonics did not report unusual sensory experiences, in agreement with the findings of Chapman et

al. (1980). However, their low scores on the schizoidia index suggest that they did not perceive themselves as particularly lonely, shy, withdrawn or dependent, and this, despite the fact that they reported having few jobs, activities, and social contacts. One is tempted to conclude that anhedonic individuals can report facts indicating that they are socially isolated but cannot report feeling socially isolated. This interpretation concurs with Chapman et al's (1980) tentative explanation of the conspicuous absence of depression in anhedonic students. These authors argued that while depressed individuals are in a more or less transient state of anhedonia, individuals who are "characterologically" anhedonic do not show awareness of deviance.

The Achenbach Social Competence and Behavior Problems scale did not appear sensitive to differences between control and perceptual aberration students. On a purely impressionistic basis, however, students in the perceptual aberration group seemed to be clearly distinguishable from other students. For instance, only perceptual aberration students answered positively the item: "I hear things that nobody else seems able to hear" (this item was not scored if the subject's description merely implied hyperacuity of hearing). During the post-test interview one perceptual aberration student reported having been

troubled by voices coming from a particular direction, and having later discovered that nobody was there. The same subject also reported experiencing frequent out-of-body sensations. Other members of this group reported having had experiences such as hearing their names being called, the telephone or the doorbell ringing, only to realize later that these things had not happened. Such anecdotal evidence is consistent with the findings of Chapman et al. (1980) of high frequency of psychotic-like experiences in high scorers on the Perceptual Aberration scale relative to low scorers and to anhedonics:

#### Selective attention

No compelling support was found for a general deficit in selective attention in college students who scored highly on either or both the Perceptual Aberration and the Anhedonia scales.

The four groups did not differ significantly on the difficult items of the Span of Apprehension task. These results suggest that psychosis-proneness, as measured by the Chapman scales, is not characterized by the limited perceptual span observed in schizophrenics. This is inconsistent with the data reported by Asarnow et al. (1978) on the perceptual span of foster children of schizophrenic mothers. Comparisons of the results of the Asarnow et al. research with those of the present study

were attempted since the two studies were similar with respect to group size and letter displays. Foster children of normal mothers in the Asarnow et al. study differed from control children only on the 10-letter display. This was also the case in the present study with respect to the difference between the control group and both the perceptual aberration and the anhedonia groups. Moreover, the magnitude of the difference between high and low risk groups was nearly equal in the two studies. However, the lack of a significant effect in the present study seems to be attributable to larger standard deviations than those reported in the Asarnow et al. study, thereby implying more homogenous group performances in foster children. This might be accounted for by the fact that control subjects in the Asarnow et al. were closely matched on sex, age, and grade in school. Other methodological differences, such as method of letter display presentation (slide projector versus tachistoscope) and mean sample age (16 versus 19 years), may also have played a role. It is important to note, however, that despite the statistical significance of Asarnow et al's findings, the magnitude of the difference between high and low risk children was small, and it appeared only at the highest level of task difficulty. Consequently, the etiological significance of this

finding, taken in isolation, perhaps received too much emphasis.

Results on the Digit Span task did not confirm the expectation that psychosis-prone college students would be more distractible than control students when learning lists of digits. This is inconsistent with the results obtained by Harvey et al. (1981) using the same task in a study of children of schizophrenic and of manic-depressive mothers. However, psychosis-prone students in the present study recalled fewer digits on the last part of the lists, regardless of the distraction manipulation. This finding was surprising since the serial position effect which was found in groups of schizophrenics, and in groups of children of schizophrenics was characterized by poorer recall of the first items, but not of the last items, and it was present only under distraction (Harvey et al., 1981; Oltmanns, 1978). Oltmanns explained the results obtained with schizophrenics in terms of Craik and Lockhart's (1978) "levels of processing" model. Reasoning that memory for the first few items in a list is dependent on active operations such as rote rehearsal and coding, and that recall of the last few digits is dependent on passive operations, i.e., sensory or "echoic" storage, Oltmanns argued that, in the presence of extraneous stimuli, schizophrenics are impaired in their ability to

perform active operations, and rely mostly on passive operations. Obviously, these arguments cannot be used in reverse to explain the performance of schizophrenia-prone students in the present study, since intact sensory storage is a prerequisite for the deeper recall of the first items.

However, the value of this interpretation notwithstanding, it must be recognized that several factors can alter the shape of the serial position curves, as earlier human learning theorists (Hull, 1943; McGeogh and Irion, 1952) have shown. For instance, by varying instructions for direction of effort on particular portions of the list, or for order of item recall, it is possible to enhance or attenuate any segment of the serial position curve. The findings indicate that methodological differences affect recall patterns differentially; but it also seems plausible that individual differences in recall or rehearsal strategies could have similar effects. One might hypothesize, for instance, that inefficient or inflexible recall strategies caused the recency deficit found in schizophrenia-prone students. Hovland (1938) demonstrated that while the primacy effect in the learning of lists of nonsense syllables is unaffected by the rate of item presentation, acquisition of the middle and late portions of a list is impaired at fast rates. Another

explanation for the serial position curves shown in Figure 2, could thus be that schizophrenia-prone students process information more slowly than control students, and therefore perceive the rate of digit presentations as relatively rapid; thus the drop in performance past the first few digits.

The different shapes of serial position curves for schizophrenia-prone students under neutral and distraction conditions must also be accounted for. While the classical negatively skewed, bow-shaped curve is relatively preserved under the neutral condition, the curves obtained under distraction are, instead, asymptotic. This particular effect has been observed in experiments where a task, such as counting backward for 10 seconds, is interpolated between the end of a list and the recall period (Glanzer and Cunitz, 1966). This has been interpreted as the result of interference caused either by decay of the transient sensory trace or by retroactive inhibition. One might hypothesize that schizophrenia-prone subjects are sensitive to the interference caused by the last distracting digit (which was heard after the last relevant digit) while control subjects can process the digits and be minimally affected by such interference.

It is unclear whether procedural differences can account for the discrepant findings obtained in Harvey et



al's research (1981) and the present study. The only apparent difference was the mode of recall employed which was oral rather than written as in Harvey et al's study. Finkelstein (note 5), from whose work the digit lists of the present study were derived also used oral recall. Nevertheless, no difference was found in neutral or distraction scores between the control groups in Finkelstein's research and the present study. This argues against method of recall as an important influence on overall performance. However, it remains possible that different recall methods could generate different serial position patterns. Unfortunately, Finkelstein did not report any primacy-recency information. This leaves the issue unresolved at this stage.

To sum up the findings on the Digit Span task, schizophrenia-prone college students did not manifest the distractibility observed in children of schizophrenics. However, since patterns of recall are very sensitive to task demands, further exploration of the performance of vulnerable subjects under various task conditions appears warranted. This may help in clarifying the nature of the discrepancy between the results obtained in different studies, and may also help understand the underlying cognitive operations which may be impaired in schizophrenia-prone individuals. Tentative

explanations for the recency deficit observed in perceptual aberration and anhedonia students may involve inefficiency of recall strategy, slowness of information processing, and vulnerability to interference effects.

#### Summary and conclusions

The heterogeneous symptom picture observed in the schizophrenic population is most probably a reflection of interactions between multiple etiological variables. As Chapman et al. (1980) found, there are certain types of individuals who manifest distinctive symptoms or characteristics of schizophrenia, and who are able to function without requiring hospitalization or medication. Such individuals were studied in order to investigate the relation between certain variables and specific symptoms of schizophrenia in relative isolation from other symptoms. The results showed, in agreement with the stated hypothesis, that anhedonia, but not perceptual aberration was associated with social incompetence. The hypothesis that ~~perceptual aberration, but not anhedonia,~~ would be associated with the type of selective attention deficit found in schizophrenics was not borne out. In fact, none of the groups of schizophrenia-prone students differed from control students on the Span of Apprehension task or on the Digit Span task under distraction.

However, an unexpected and as yet inexplicable recency deficit on the Digit Span task was associated with both perceptual aberration and anhedonia characteristics. With respect to patterns of schizophrenic symptoms, it was interesting to find that the mixed perceptual aberration and anhedonia students, with only moderate elevations on both scales, were socially incompetent, manifested the recency deficit, and also obtained the highest "schizoidia" score. Such widespread deviance may be indicative that certain combinations of symptoms, which by themselves could be necessary, but not sufficient conditions, have multiplicative effects, and perhaps increase the risk of later disturbance.

A major working assumption in the present study was that high scorers on either or both of Chapman's scales are at greater risk for later schizophrenia than are low scorers. Under this assumption, strict interpretation of the data would suggest that auditory distractibility and limited span of apprehension are not general markers or precursors of schizophrenia, but that social incompetence, although certainly not a specific precursor of schizophrenia, appears to be a salient characteristic of certain high risk individuals. If on the other hand, prospective research failed to demonstrate a higher frequency of psychotic breakdowns in high scorers relative

to low scorers on the Perceptual Aberration scale, the Anhedonia scale, or both, the above conclusion would be invalidated. In this eventuality, it might be interesting to study the factors which are negatively related to future deterioration, such as the possibility that absence of distractibility might be a protective factor in individuals who manifest symptoms of schizophrenia. Alternatively, the frequency of negative outcome may be found to vary between groups of psychosis-prone individuals. Based on the evidence linking premorbid adjustment and prognosis in schizophrenia, one might hypothesize that poor outcome will result in anhedonic individuals who may or may not also be perceptually deviant, but that positive outcome will result in individuals who only manifest perceptual aberrations. The latter type of individuals would resemble those relatively rare recovered schizophrenics who have learned to "live with their voices" and to function very well otherwise. Such a pattern of outcome would readily suggest that preventive efforts might be fruitfully directed toward the development of methods which can enhance social competence in young high risk individuals.

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APPENDIX A

Perceptual Aberration (Chapman, Chapman, & Raulin, 1978)  
and Physical Anhedonia (Chapman & Chapman, note 3) scales

(French translations)

(PA) - Perceptual Aberration item

(AH) - Anhedonia item

Other items are from MMPI L and K scales

2

	VRAI	FAUX	
1. On surestime beaucoup la beauté des couchers de soleil.	_____	_____	AE
2. J'ai parfois dansé seul uniquement pour sentir mon corps suivre la musique.	_____	_____	AE
3. J'ai rarement eu envie de chanter dans la douche.	_____	_____	AE
4. De temps à autre, je pense à des choses trop vilaines pour en parler.	_____	_____	
5. J'ai parfois eu la sensation de faire corps avec un objet près de moi.	_____	_____	PA
6. Il m'est déjà arrivé d'avoir la sensation qu'un de mes bras ou qu'une de mes jambes soit détaché du reste de mon corps.	_____	_____	PA
7. Après une journée de labeur, j'ai souvent apprécié la détente qu'offre une longue promenade.	_____	_____	AE
8. J'ai fréquemment apprécié une poignée de mains ferme et sincère.	_____	_____	AE
9. J'ai parfois envie de proférer des jurons.	_____	_____	
10. Je n'ai jamais trouvé excitante la musique de fanfare.	_____	_____	AE
11. A l'occasion, il m'arrive de devoir me pincer pour m'assurer que je suis toujours là.	_____	_____	PA
12. En mangeant un plat favori, j'ai souvent essayé de le déguster longuement pour faire durer le plaisir.	_____	_____	AE
13. A la vue d'un tapis moelleux, j'ai déjà eu envie de retirer mes chaussures et d'y marcher pieds nus.	_____	_____	AE
14. A mon avis, quant au goût, tous les aliments se valent.	_____	_____	AE
15. J'ai parfois eu la sensation qu'une partie de mon corps était plus grande que d'habitude.	_____	_____	PA
16. Je me suis déjà demandé si mon corps m'appartenait vraiment.	_____	_____	PA
17. Je ne dis pas toujours la vérité.	_____	_____	
18. Je ne lis pas tous les jours les éditoriaux du journal.	_____	_____	
19. Il m'arrive parfois de me fâcher.	_____	_____	
20. Des parties de mon corps me semblent parfois mortes ou irréelles.	_____	_____	PA

	VRAI	FAUX	
21. Je n'ai jamais pris beaucoup de plaisir à des activités physiques comme la marche, la natation, ou d'autres sports.	_____	_____	AH
22. Je me suis souvent arrêté pour sentir des fleurs que j'apercevais.	_____	_____	AH
23. Le sexe est agréable, mais pas autant que la plupart des gens le prétendent.	_____	_____	AH
24. J'ai déjà eu l'impression passagère que quelque partie de mon corps était en train de pourrir.	_____	_____	FA
25. Il m'est déjà arrivé d'éprouver la sensation que mon corps n'existait pas.	_____	_____	FA
26. J'ai souvent pris des marches pour me délasser et me distraire.	_____	_____	AH
27. De temps à autre, je remets à demain ce que je devrais faire aujourd'hui.	_____	_____	
28. J'aime la sensation de me trouver dans un endroit élevé et d'observer le panorama.	_____	_____	AH
29. La critique ou la réprimande me blesse profondément.	_____	_____	
30. Je me rappelle avoir déjà eu l'impression de ne pouvoir discerner mon corps des autres objets environnants.	_____	_____	FA
31. Goûter des plats différents m'a toujours plu.	_____	_____	AH
32. Je n'ai jamais trouvé qu'un orage puisse être grisant ou excitant.	_____	_____	AH
33. Il m'est arrivé à l'occasion de sentir mon corps se fondre dans l'espace environnant.	_____	_____	FA
34. Parfois, j'ai l'impression nette d'être inutile.	_____	_____	
35. Je ressens une certaine exaltation à regarder les lumières de la ville le soir.	_____	_____	AH
36. Je me suis souvent senti(e) mal à l'aise quand des amis m'ont touché(e).	_____	_____	AH
37. Je n'ai jamais senti que mes bras ou mes jambes avaient momentanément poussé.	_____	_____	FA
38. Au jeu, j'aime mieux gagner que perdre.	_____	_____	
39. Je ne me suis jamais préoccupé de la texture des aliments.	_____	_____	AH
40. En passant devant une boulangerie, l'odeur du pain frais m'a souvent ouvert l'appétit.	_____	_____	

- |  | VRAI  | FAUX    |
|--|-------|---------|
| 41. Les poètes exagèrent toujours la beauté et les joies de la nature.   | _____ | _____ A |
| 42. Les frontières de mon corps m'ont toujours semblées claires.   | _____ | _____ P |
| 43. J'ai déjà éprouvé beaucoup de joie à admirer un paysage majestueux.  | _____ | _____ A |
| 44. Je me rappelle avoir senti un de mes membres prendre une forme insolite.                                     | _____ | _____ P |
| 45. Je prends toujours plaisir à être touché(e) par quelqu'un que j'aime.  | _____ | _____ A |
| 46. Je ne me suis jamais senti aussi bien de ma vie que maintenant.  | _____ | _____ V |
| 47. J'ai souvent ressenti un certain bien-être en massant mes muscles fatigués ou endoloris.                     | _____ | _____ A |
| 48. J'ai parfois eu l'impression que mon corps était anormal.  | _____ | _____ P |
| 49. J'ai déjà eu la sensation que l'intérieur de mon corps se décomposait.                                       | _____ | _____ P |
| 50. J'aime connaître des gens importants parce que cela me donne le sentiment d'être important.                  | _____ | _____   |
| 51. J'ai toujours aimé un bon massage de dos.  | _____ | _____ A |
| 52. Ecouter de la musique m'a souvent fait vibrer intérieurement.  | _____ | _____ A |
| 53. J'ai toujours trouvé jolie la première chute de neige de l'hiver.  | _____ | _____ A |
| 54. Il m'est arrivé d'avoir la sensation passagère que les choses que je touchais restaient attachées après moi. | _____ | _____ P |
| 55. Je suis indifférent à ce que les gens pensent de moi.  | _____ | _____   |
| 56. Faire voler un cerf-volant est un jeu stupide.   | _____ | _____ A |
| 57. Le bruissement des feuilles d'arbre ne m'a jamais particulièrement charmé.                                   | _____ | _____ A |
| 58. Il m'a déjà semblé que mon corps avait pris la forme de celui de quelqu'un d'autre.                          | _____ | _____ P |
| 59. J'ai parfois l'impression que la pièce autour de moi est en train de pencher.                                | _____ | _____ P |
| 60. Règle générale, j'ai toujours trouvé la musique douce plutôt ennuyante que délassante.                       | _____ | _____ A |

	VRAI	FAUX	
61. Jè n'ai jamais aimé les bains de soleil, ça me donne trop chaud,	_____	_____	AB
62. J'ai déjà eu une impression de bien-être et de sécurité en entendant le crépitement de la pluie sur le toit.	_____	_____	AB
63. Les odeurs qui s'échappent d'une cuisine à l'heure des repas ont rarement éveillé mon appétit.	_____	_____	AB
64. Faire des blagues dans une soirée me rend mal à l'aise même lorsque les autres font la même chose.	_____	_____	
65. Je n'aime pas tous ceux que je connais.	_____	_____	
66. Parfois, je fais un peu de commérage.	_____	_____	
67. Je prend habituellement mon bain ou ma douche de façon à en finir au plus vite.	_____	_____	AB
68. Il m'arrive de trouver les couleurs ordinaires beaucoup trop éclatantes. (sans être dû à l'effet d'aucune drogue).	_____	_____	PA
69. Je n'ai jamais eu l'impression que mes pieds ou mes mains étaient étrangement loin de moi.	_____	_____	PA
70. J'aime caresser et jouer avec des chatons ou des chiots.	_____	_____	AB
71. Il est arrivé qu'une partie de mon corps semblait ne plus m'appartenir.	_____	_____	PA
72. De temps à autre, les histoires sales me font rire.	_____	_____	
73. Quand j'étais triste, chanter m'a quelquefois remonté le moral.	_____	_____	AB
74. J'ai déjà eu la sensation qu'un objet, en réalité distinct de moi, faisait partie de mon corps.	_____	_____	PA
75. Je n'ai jamais été curieux d'essayer de nouveaux mets.	_____	_____	AB
76. Je n'ai jamais compris le plaisir qu'ont les gens à observer les étoiles le soir.	_____	_____	AB
77. Sans raison apparente, je me sens, à certains moments, plus gai que d'habitude.	_____	_____	
78. J'ai toujours eu un certain nombre de plats préférés.	_____	_____	AB
79. Il y a des périodes où mon esprit semble fonctionner plus lentement que d'habitude.	_____	_____	
80. S'étendre au soleil n'est pas vraiment plus agréable qu'à l'intérieur.	_____	_____	AB



	VRAI	FAUX	
81. Il m'a déjà semblé que mon corps et celui d'une autre personne me formaient qu'un seul et même corps.	_____	_____	PA
82. De temps à autre lorsque je me regarde dans un miroir, mon visage semble méconnaissable.	_____	_____	PA
83. J'ai toujours détesté la sensation d'épuisement après un exercice vigoureux.	_____	_____	AE
84. Je ne sais pas pourquoi les gens aiment tant la musique.	_____	_____	AE
85. J'ai déjà eu le sentiment que, pour une raison ou pour une autre, ma tête ou mes membres ne m'appartenaient plus.	_____	_____	PA
86. On exagère toujours la beauté des fleurs.	_____	_____	AE
87. J'ai parfois senti que les difficultés s'accumulaient au point que je ne pourrais les surmonter.	_____	_____	
88. La chaleur d'un feu de foyer ne m'a jamais vraiment apporté apaisement et quiétude.	_____	_____	AE
89. Le sexe est l'activité qui procure le plus intense plaisir imaginable.	_____	_____	AE
90. Certains objets tels une chaise ou une table, lorsque parfois je les regarde, me paraissent étranges.	_____	_____	PA
91. Je n'ai jamais éprouvé la sensation dans mes bras ou mes jambes que ces membres étaient devenus plus longs que d'habitude.	_____	_____	PA
92. Je me suis rarement préoccupé(e) de la couleur dont les choses sont peintes.	_____	_____	AE
93. J'ai rarement pris plaisir au sexe, d'aucune façon.	_____	_____	AE
94. J'ai parfois eu l'impression que différentes parties de mon corps n'étaient pas toutes rattachées à la même personne.	_____	_____	PA
95. Entendre une bonne chanson m'a rarement incité à la chanter en même temps.	_____	_____	AE
96. J'ai déjà senti, le temps d'un instant, que mon corps était devenu difforme.	_____	_____	PA
97. J'ai souvent aimé palper de la soie, du velours, ou de la fourrure.	_____	_____	AE
98. J'aime beaucoup faire l'amour.	_____	_____	AE
99. Une partie de mon corps m'a déjà semblé plus petite qu'elle ne l'est ordinairement.	_____	_____	PA
100. J'ai souvent rencontré de supposés experts qui n'étaient pas meilleurs que moi.	_____	_____	

	VRAI	FAUX
101. Je n'ai jamais voulu monter dans les manèges à la Ronde.	_____	_____ AH
102. Mon ouïe est parfois si sensible que les sons usuels deviennent inconfortants.	_____	_____ PA
103. Je n'ai jamais eu l'impulsion d'ôter mes souliers et de marcher nu-pieds dans une mare.	_____	_____ AH
104. Il y a des fois où des gens que je connais bien commencent à m'apparaître comme des inconnus.	_____	_____ PA
105. En vérité, il y a peu de choses que j'ai réellement pris plaisir à faire.	_____	_____ AH
106. Je trouve difficile de mettre de côté, même pour très peu de temps, une tâche que j'ai entreprise.	_____	_____
107. J'ai parfois aimé sentir la puissance de mes propres muscles.	_____	_____ AH
108. J'ai déjà ressenti une certaine confusion, ne sachant plus si mon corps m'appartenait vraiment.	_____	_____ PA
109. Parfois j'ai le goût de saccager des objets.	_____	_____
110. Il y a des jours où la lumière d'une pièce est si vive qu'elle m'agace les yeux.	_____	_____ PA
111. J'ai toujours trouvé la musique d'orgue plate et ennuyante.	_____	_____ AH
112. J'ai parfois trouvé qu'un bon savonnage en prenant mon bain était rafraichissant et soulageant.	_____	_____ AH
113. Il m'est arrivé que durant plusieurs jours de suite, je ressentais sons et lumières avec une telle intensité que je ne pouvais les éliminer de ma conscience.	_____	_____ PA
114. J'aime que les gens sachent à quoi s'en tenir avec moi.	_____	_____
115. Une marche vive et rapide m'a parfois fait du bien physiquement.	_____	_____ AH
116. Les flammes qui dansent dans un foyer m'ont toujours fasciné(e).	_____	_____ AH
117. J'ai toujours attaché de l'importance au goût de ce que je mangeais.	_____	_____ AH
118. Lorsque je vois une statue, j'aime bien la regarder avec les doigts aussi.	_____	_____ AH
119. Danser, ou la pensée même de danser, m'ont toujours paru ennuyant.	_____	_____ AH

APPENDIX B

Group means and standard deviations on the Perceptual Aberration and Anhedonia scales.

<u>Group (n)</u>	<u>Scale</u>	
	<u>Perceptual Aberration</u>	<u>Anhedonia</u>
	<u>mean,</u> <u>s.d.</u>	<u>mean,</u> <u>s.d.</u>
Perceptual Aberration (11)	<u>27.36,</u> <u>4.0</u>	<u>6.82,</u> <u>4.4</u>
Anhedonia (9)	<u>4.38,</u> <u>3.9</u>	<u>26.50,</u> <u>3.7</u>
Mixed PA/AH (9)	<u>17.67,</u> <u>3.2</u>	<u>18.78,</u> <u>3.8</u>
Control (11)	<u>7.40,</u> <u>2.3</u>	<u>8.00,</u> <u>3.4</u>

APPENDIX C

Psychometric information concerning the Vocabulary, Block Design, and Picture Arrangement tests.

Vocabulary (source: Dayhaw, 1941)

- Split-half reliability coefficients,  $N = 400$  :  $r = .93$  .
- Pearson correlation coefficient with a 100-item version of the same scale,  $N = 400$  :  $r = .95$  .
- No test-retest reliability data available.

Block Design and Picture Arrangement (source: Barbeau & Pinard, 1963)

- Pearson correlation between full scale non-verbal IQ and:

Block Design,  $N = 100$ ,  $r = .74$ ;

Picture Arrangement,  $N = 100$ ,  $r = .84$  .

- Test-retest reliability coefficient for non-verbal IQ with a seven-month interval,  $N = 35$  :  $r = .89$  (not available for individual subtests).

APPENDIX D

Beck Depression Inventory,  
13-item version (Beck, 1972)

(French translation)

Instructions: Dans ce questionnaire il y a des groupes d'énoncés. Lisez tous les énoncés de chaque catégorie et cochez celui qui correspond le mieux à ce que vous ressentez aujourd'hui, c'est-à-dire, maintenant! Encerclez le chiffre à côté de l'énoncé que vous avez choisi. Si plusieurs énoncés du même groupe décrivent ce que vous ressentez, encerclez chacun d'eux.

N.B. Lisez tous les énoncés de chaque catégorie avant de faire votre choix.

- 
- A- 3) Je suis triste et malheureux(ue) au point de ne pas pouvoir le supporter.  
 2) Je suis tout le temps triste et je ne peux m'en sortir.  
 1) Je suis triste ou cafardeux(ue).  
 0) Je ne suis pas triste.
- B- 3) Je sens que l'avenir est irrémédiable et que les choses ne vont pas s'améliorer.  
 2) Je sens que je n'ai plus rien à espérer.  
 1) Je suis découragé(e) face à l'avenir.  
 0) Je ne suis pas pessimiste ou découragé(e) face à l'avenir.
- C- 3) Je pense que je suis une personne complètement ratée.  
 2) Tout ce que je vois en regardant en arrière c'est une série d'échecs.  
 1) Je sens que je n'ai pas échoué plus souvent que la moyenne des gens.  
 0) Je ne pense pas être un(e) raté(e).
- D- 3) Tout me déçoit.  
 2) Je n'obtiens plus de satisfaction de quoi que ce soit..  
 1) Je n'ai plus autant de plaisir qu'avant.  
 0) Je ne suis pas particulièrement déçu(e).
- E- 3) Je me trouve très mauvais(e) ou très indigne.  
 2) Je me sens vraiment coupable.  
 1) Je me trouve mauvais(e) ou indigne assez souvent.  
 0) Je ne me sens pas particulièrement coupable.
- F- 3) Je me hais.  
 2) Je suis écoeuré(e) de moi-même.  
 1) Je suis déçu(e) de moi-même.  
 0) Je ne suis pas déçu(e) de moi-même.
- G- 3) Je me tuerais si j'avais l'occasion de le faire.  
 2) Je songe définitivement à me suicider.  
 1) Je serais mieux mort que vivant.  
 0) Je n'ai jamais pensé à me faire du mal.

- H- 3) Je ne m'intéresse plus aux autres, et je me fous complètement d'eux.  
 2) J'ai perdu presque tout l'intérêt que je portais aux autres et je ne ressens pas grand chose à leur égard.  
 1) Je ne m'intéresse plus aux autres autant qu'avant.  
 0) Je n'ai pas perdu mon intérêt pour les autres.
- I- 3) Je n'arrive plus à prendre des décisions.  
 2) J'ai beaucoup de difficulté à prendre des décisions.  
 1) J'essaye d'éviter de prendre des décisions.  
 0) Je prends mes décisions de la même façon qu'avant.
- J- 3) Je me sens laid(e) et repoussant(e).  
 2) Je sens qu'il y a eu des changements permanents dans mon apparence qui me rendent peu attrayant(e).  
 1) Je crains d'avoir l'air vieilli et peu attrayant.  
 0) Je n'ai pas l'impression de paraître moins bien qu'avant.
- K- 3) Je suis incapable de travailler.  
 2) Je dois vraiment me pousser dans le dos pour commencer quoi que ce soit.  
 1) Ça me demande un certain effort pour commencer quelque chose.  
 0) Je travaille aussi bien que d'habitude.
- L- 3) Je me sens trop fatigué(e) pour faire quoi que ce soit.  
 2) Un rien me fatigue.  
 1) Je me fatigue plus souvent que d'ordinaire.  
 0) Je ne me fatigue pas plus que d'habitude.
- M- 3) Je n'ai plus d'appétit du tout.  
 2) J'ai très peu d'appétit maintenant.  
 1) Je n'ai plus aussi bon appétit qu'avant.  
 0) J'ai toujours le même appétit.

N.B. Maintenant réalisez tous les énoncés 2 et 3 de chaque groupe et soulignez ceux qui évoquent quelque chose que vous avez déjà ressenti à un moment donné de votre vie, et pas nécessairement maintenant.

APPENDIX E

Youth Self-Report,

Achenbach & Edelbrock, note 2

(French translation)

(I) - Internalizing item

(E) - Externalizing item



INVENTAIRE PERSONNEL (15-20 ans)

nom: \_\_\_\_\_ sexe: \_\_\_\_\_ niveau scolaire actuel: \_\_\_\_\_

occupation du père: \_\_\_\_\_ date (aujourd'hui): \_\_\_\_\_

occupation de la mère: \_\_\_\_\_ date de naissance: \_\_\_\_\_

habites-tu chez tes parents?  oui  non (décrire) \_\_\_\_\_

Indique, s'il te plaît les sports auxquels tu préfères participer: ex., la nage, le patinage, la bicyclette, etc.

	Comparé(e) à d'autres personnes de ton âge, à peu près combien de temps y passes-tu?	Comparé(e) à d'autres personnes de ton âge, avec quelle habileté pratiques-tu chacun de ces sports?
_____ aucun	Moins que la moyenne	Moins que la moyenne
	Comme la moyenne	Comme la moyenne
	Plus que la moyenne	Mieux que la moyenne
a. _____	---	---
b. _____	---	---
c. _____	---	---

II. Indique tes passe-temps, activités et jeux favoris, autres que les sports: ex. collections, livres, piano, etc.

	Comparé(e) à d'autres personnes de ton âge, à peu près combien de temps y passes-tu?	Comparé(e) à d'autres personnes de ton âge, comment te classes-tu dans chacune de ces activités?
_____ aucun	Moins que la moyenne	Pire que la moyenne
	Comme la moyenne	Comme la moyenne
	Plus que la moyenne	Mieux que la moyenne
a. _____	---	---
b. _____	---	---
c. _____	---	---

III. Énumère les organisations, clubs, équipes ou groupes auxquels tu appartiens.

	Comparé(e) à d'autres personnes de ton âge, jusqu'à quel point participes-tu à ces groupes?
_____ aucun	Moins activement
	Comme la moyenne
	Plus activement
a. _____	---
b. _____	---
c. _____	---

IV. (i) Indique les tâches domestiques que tu fais

	Comparé(e) à d'autres personnes de ton âge, comment exécutes-tu ces tâches?
_____ aucune	Pire que la moyenne
	Comme la moyenne
	Mieux que la moyenne
a. _____	---
b. _____	---
c. _____	---

(ii) Indique les emplois d'été et/ou à temps partiel que tu as ou as eus

	Comparé(e) à d'autres personnes de ton âge, comment exécutes-tu ces emplois?
_____ aucun	Pire que la moyenne
	Comme la moyenne
	Mieux que la moyenne
a. _____	---
b. _____	---
c. _____	---
d. _____	---

- V. 1. A peu près combien de bons amis as-tu?    aucun    1    2 ou 3    4 ou plus  
(et bonnes amies)
2. A peu près combien de fois par semaine faites-vous des choses ensemble?    moins de 1    1 ou 2    3 ou plus

VI. Comparé(e) à d'autres personnes de ton âge, comment:

	Pire	Comme la moyenne	Mieux
a. t'entends-tu avec tes frères et soeurs?	<u>  </u>	<u>  </u>	<u>  </u>
b. t'entends-tu avec les autres en général?	<u>  </u>	<u>  </u>	<u>  </u>
c. te comportes-tu avec tes parents	<u>  </u>	<u>  </u>	<u>  </u>
d. t'occupes-tu et travailles-tu seul(e)	<u>  </u>	<u>  </u>	<u>  </u>

VII. 1. Rendement scolaire actuel:

<u>  </u> ne vais pas à l'école	échec	en-dessous de la moyenne	comme la moyenne	au-dessus de la moyenne
a. Français	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
b. Maths	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
autres matières:				
c. _____	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
d. _____	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
e. _____	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
f. _____	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
g. _____	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>

2. As-tu déjà été dans une classe spéciale?

   non    oui, quel genre? \_\_\_\_\_

3. Es-tu que tu as déjà doublé une année?

   non    oui, quelle année et pour quelle raison? \_\_\_\_\_

4. Pourrais-tu décrire tout problème académique ou autre que tu as à l'école.

   aucun

VIII. Tu trouveras ci-dessous une liste d'items qui s'appliquent aux gens de ton âge. Encerle le numéro 2 de chaque item qui est vrai ou souvent vrai pour toi à présent ou qui l'a été dans les 12 derniers mois. Encerle le numéro 1 si l'item est quelques fois ou à peu près vrai. Encerle le 0 si l'item ne s'applique pas à toi.

- 0 1 2 1. Je me comporte de façon trop jeune pour mon âge
- 0 1 2 2. J'ai une allergie (décrire): \_\_\_\_\_
- 0 1 2 3. Je me dispute beaucoup (E)
- 0 1 2 4. Je fais de l'asthme
- 0 1 2 5. Je me comporte comme l'autre sexe (I)
- 0 1 2 6. J'aime les animaux
- 0 1 2 7. Je me vante
- 0 1 2 8. Je ne peux concentrer mon attention pour longtemps (E)

- 0 1 2 9. Je ne peux m'empêcher de penser à certaines choses (décrire): \_\_\_\_\_ (I)
- 0 1 2 10. J'ai de la difficulté à rester assis pour longtemps (E)
- 0 1 2 11. Je dépends trop des adultes
- 0 1 2 12. Je me sens seul(e) (I)
- 0 1 2 13. Je me sens confus(e), dans le brouillard (I)
- 0 1 2 14. Je pleure beaucoup (I)
- 0 1 2 15. Je suis assez honnête
- 0 1 2 16. Je suis méchant(e) envers les autres (E)
- 0 1 2 17. Je me perds en rêveries ou dans mes pensées (I)
- 0 1 2 18. J'essaie de me faire du mal exprès ou de me suicider
- 0 1 2 19. J'essaie d'obtenir beaucoup d'attention
- 0 1 2 20. Je détruis mes propres choses (E)
- 0 1 2 21. Je détruis des choses appartenant à d'autres (E)
- 0 1 2 22. Je désobéis à mes parents (E)
- 0 1 2 23. Je désobéis à l'école (E)
- 0 1 2 24. Je n'ai pas bon appétit
- 0 1 2 25. Je ne m'entend pas avec les autres (E)
- 0 1 2 26. Je ne me sens pas coupable après avoir fait quelque chose que je n'aurais pas dû faire. (E)
- 0 1 2 27. Je jalouse les autres (E)
- 0 1 2 28. Je suis prêt à aider ceux qui ont besoin d'aide
- 0 1 2 29. J'ai peur de certains animaux, certains endroits ou situations autres que l'école (décrire): \_\_\_\_\_ (I)
- 0 1 2 30. J'ai peur d'aller à l'école (I)
- 0 1 2 31. J'ai peur d'avoir de mauvaises pensées ou de faire quelque-chose de mal (I)
- 0 1 2 32. Je pense que je dois être parfait(e) (I)
- 0 1 2 33. J'ai l'impression que personne ne m'aime
- 0 1 2 34. J'ai l'impression qu'on me persécute
- 0 1 2 35. Je me crois bon(ne) à rien ou inférieur(e) (I)
- 0 1 2 36. Je me fais souvent mal accidentellement (I)
- 0 1 2 37. Je me bagarre souvent (E)
- 0 1 2 38. Je me fais taquiner beaucoup
- 0 1 2 39. Je fréquente des gens qui s'attirent des ennuis (E)
- 0 1 2 40. J'entends des choses que personne d'autre ne semble entendre (décrire): \_\_\_\_\_ (I)
- 0 1 2 41. J'agis sans m'arrêter pour réfléchir (E)
- 0 1 2 42. J'aime être seul(e) (I)
- 0 1 2 43. Je mens ou je triche (E)
- 0 1 2 44. Je ronge mes ongles (I)
- 0 1 2 45. Je suis nerveux(se) ou tendu(e)
- 0 1 2 46. J'ai des mouvements nerveux ou des contractions involontaires (décrire): \_\_\_\_\_ (I)
- 0 1 2 47. J'ai des cauchemars (I)
- 0 1 2 48. Je ne suis pas aimé(e) des autres (E)
- 0 1 2 49. Je fais certaines choses mieux que la plupart des gens de mon âge
- 0 1 2 50. Je suis trop peureux(ou) ou timide(se) (I)
- 0 1 2 51. J'ai des étourdissements (I)
- 0 1 2 52. Je me sens trop coupable (I)
- 0 1 2 53. Je mange trop
- 0 1 2 54. Je suis excessivement fatigué(e) (I)
- 0 1 2 55. Je pèse plus que la moyenne

56. Problèmes physiques 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 mes yeux (décrire) : \_\_\_\_\_
- 0 1 2 d. nausée, me sens 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. J'attaque les gens physiquement (E)  
 0 1 2 58. Je me gratte la peau ou certaines parties de mon corps (décrire) : \_\_\_\_\_
- 0 1 2 59. Je peux être très amical(e)  
 0 1 2 60. Je suis retiré(e), ne me mêle pas aux autres
- 0 1 2 61. J'ai de la difficulté à l'école (E)  
 0 1 2 62. Je manque de coordination, je suis maladroit(e) (E)  
 0 1 2 63. Je préfère la compagnie de gens plus âgés que moi (E)  
 0 1 2 64. Je préfère la compagnie de gens plus jeunes que moi (I)  
 0 1 2 65. Je refuse de parler (I)  
 0 1 2 66. Je répète sans cesse certains actes (décrire) : \_\_\_\_\_ (I)
- 0 1 2 67. Je me pousse de la maison (E)  
 0 1 2 68. Je crie beaucoup (E)  
 0 1 2 69. Je suis renfermé(e), je garde les choses pour moi-même (I)  
 0 1 2 70. Je vois des choses que personne d'autre ne semble voir (décrire) : \_\_\_\_\_ (I)
- 0 1 2 71. Je suis facilement embarrassé(e) ou gêné(e) (I)  
 0 1 2 72. J'allume des feux (E)  
 0 1 2 73. Je suis habitué(e) de mes maux  
 0 1 2 74. Je fais le fin (la fine) ou le clown (E)  
 0 1 2 75. Je suis timide (I)  
 0 1 2 76. Je dors moins que la plupart des gens de mon âge (I)  
 0 1 2 77. Je dors plus que la plupart des gens de mon âge pendant le jour et/ou la nuit (décrire) : \_\_\_\_\_ (I)  
 0 1 2 78. J'ai beaucoup d'imagination  
 0 1 2 79. J'ai des problèmes d'élocutions (décrire) : \_\_\_\_\_
- 0 1 2 80. J'essaie d'affirmer mes droits
- 0 1 2 81. Je vole des choses à la maison (E)  
 0 1 2 82. Je vole en dehors de la maison (E)  
 0 1 2 83. J'amasse des choses dont je n'ai pas besoin (décrire) : \_\_\_\_\_ (I)
- 0 1 2 84. Je fais des choses que certains trouvent étranges (décrire) : \_\_\_\_\_ (I)
- 0 1 2 85. J'ai des pensées que certains trouveraient étranges (décrire) : \_\_\_\_\_ (I)
- 0 1 2 86. Je suis têtu(e)  
 0 1 2 87. J'ai des sautes d'humeur ou de sentiment  
 0 1 2 88. J'aime être avec les gens  
 0 1 2 89. Je suis méfiant(e)  
 0 1 2 90. Je sacre ou me sers de mots obscènes (E)

- 0 1 2 91. Je pense à me tuer  
 0 1 2 92. J'aime faire rire les gens  
 0 1 2 93. Je parle trop (E)  
 0 1 2 94. Je taquine beaucoup les autres (E)  
 0 1 2 95. Je m'emporte facilement (E)  
 0 1 2 96. Je pense trop au sexe (I)  
 0 1 2 97. Je menaçé les gens (E)  
 0 1 2 98. J'aime parler au gens  
 0 1 2 99. Je suis trop préoccupé(e) d'ordre ou de propreté  
 0 1 2 100. J'ai de la difficulté à dormir (décrire) : \_\_\_\_\_ (I)
- 0 1 2 101. Je manque mes cours (E)  
 0 1 2 102. Je manque d'énergie (I)  
 0 1 2 103. Je suis malheureux(se), triste, ou déprimé(e) (I)  
 0 1 2 104. Je suis plus bruyant(e) que les autres (I)  
 0 1 2 105. Je fais usage de drogues ou d'alcool pour des raisons autres que médicales (décrire): \_\_\_\_\_ (E)
- 0 1 2 106. J'essaie d'être juste avec les autres  
 0 1 2 107. J'ai le sens de l'humour  
 0 1 2 108. Je suis plutôt sérieux(se) (I)  
 0 1 2 109. Je prends la vie du bon côté  
 0 1 2 110. Je voudrais appartenir à l'autre sexe  
 0 1 2 111. J'évite de m'impliquer avec les autres (I)  
 0 1 2 112. Je me fais beaucoup de soucis. (I)

Utilise le reste de l'espace pour ajouter autre chose qui peut décrire tes sentiments, comportements, et intérêts.

As-tu répondu à toutes les questions?

APPENDIX FFrench instructions for the Span of Apprehension 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.

"Certaines 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 apparaît au centre de l'écran.

"Maintenant, appuie ton front 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 GFrench instructions for the Digit Span task.

"Ceci est essentiellement une épreuve pour savoir comment tu peux retenir certaines choses et en ignorer d'autres.

Dans quelques instants, je vais te demander de mettre ces écouteurs sur tes oreilles. Tu vas entendre des listes de chiffres et tu devras essayer de te retenir autant de chiffres que tu peux, dans leur ordre de présentation. Tu vas ensuite devoir écrire les chiffres sur cette feuille devant toi, en commençant en haut à gauche.

Tu sauras quand une liste est sur le point de commencer lorsque tu entendras une voix dire: 'attention'. Il s'agit d'un signal pour te dire d'être prêt(e). A la fin de la liste, tu entendras une espèce de 'bip'. Cela signifiera que la liste est complète et que tu peux commencer à écrire les chiffres de mémoire, dans l'ordre qu'ils ont été récités.

Il y a deux sortes de listes. Dans la première, une voix masculine récite les chiffres. Il s'agit pour toi de mémoriser les chiffres récités par cette voix. Dans la deuxième sorte de liste, une voix féminine récitera des chiffres dans l'intervalle entre chaque paire de chiffres dite par la voix masculine. Dans ce type de liste, fais seulement attention à la voix masculine, et essaie d'ignorer la voix féminine. Tu dois mémoriser les chiffres récités par la voix masculine seulement. Donc pour les deux types de listes, la consigne est la même : écoute, mémorise, et écris sur cette feuille autant de chiffres que tu peux de la liste dite par la voix masculine, et ce dans l'ordre de présentation des chiffres.

Il est essentiel que tu écrives les chiffres dans leur ordre de présentation. Si tu écris les chiffres dans le mauvais ordre, ils vont être considérés incorrects.

Les deux types de listes vont être mélangés. Alors pour te pratiquer, au début de l'enregistrement, il y a quelques exemples. Tu peux mettre les écouteurs maintenant et écoute les instructions qui te sont données au tout début."

APPENDIX H

Lists of digits presented to subjects in the Digit Span task (source: Finkelstein, note 4). Lists entering in the computation of neutral and distraction scores are preceded by an asterisk. Underlined digits were spoken by a female voice.

- |  |   |
|--|---|
| 1) 3 1 6 2 7 8   | * 11) 4 <u>6</u> 8 <u>7</u> 2 <u>5</u> 3 <u>1</u> 6 <u>9</u> 1 <u>3</u> 7 <u>8</u>        |
| * 2) 8 <u>6</u> 4 <u>3</u> 1 <u>9</u> 3 <u>1</u> 6 <u>8</u> 5 <u>4</u> | * 12) 8 <u>7</u> 5 <u>3</u> 7 <u>9</u> 4 <u>1</u> 9 <u>2</u> 1 <u>5</u> 6 <u>4</u>        |
| * 3) 8 <u>9</u> 7 <u>1</u> 4 <u>5</u> 2 <u>4</u> 9 <u>6</u> 3 <u>8</u> | * 13) 2 6 4 1 5 8 3 9   |
| * 4) 1 7 3 9 4 2 6   | * 14) 8 2 1 4 6 5 7 9   |
| 5) 8 4 7 2 6 5 9   | * 15) <u>8</u> <u>9</u> 3 <u>7</u> 6 <u>8</u> 9 <u>3</u> 5 <u>3</u> 1 <u>4</u> 2 <u>5</u> |
| 6) 6 <u>3</u> 2 <u>9</u> 5 <u>6</u> 7 <u>1</u> 4 <u>8</u> 9 <u>2</u>   | * 16) 2 9 4 7 3 6 5 8 1   |
| * 7) 1 3 7 5 9 4 2   | * 17) 3 4 6 9 8 1 5 2   |
| * 8) 9 <u>8</u> 1 <u>3</u> 8 <u>5</u> 2 <u>7</u> 4 <u>1</u> 7 <u>6</u> | * 18) 1 6 2 4 8 3 5 7   |
| * 9) 5 3 6 8 9 4 1   | * 19) 7 4 3 5 2 8 6 9 1   |
| 10) 5 <u>3</u> 1 <u>6</u> 8 <u>4</u> 3 <u>9</u> 7 <u>8</u> 9 <u>5</u>  | * 20) 7 <u>2</u> 1 <u>4</u> 3 <u>1</u> 6 <u>9</u> 5 <u>7</u> 8 <u>5</u> 4 <u>8</u>        |

(pause)



APPENDIX I

## Letter to participants

Cher(ère) étudiant(e),

la présente lettre fait suite au questionnaire auquel tu as répondu au printemps ou à l'été dernier à ton Cégep. Pour te rafraîchir la mémoire, il s'agissait d'un questionnaire psychologique portant sur des perceptions et des expériences sensorielles de divers types.

Nous t'avions demandé d'écrire ton nom et ton adresse si tu étais intéressé(e) à participer plus tard à une entrevue au laboratoire de psychologie de l'Université. Le but de cette lettre est donc de te demander si tu peux toujours venir au Centre de recherche.

L'entrevue consistera à répondre à quelques brefs questionnaires et à passer des tests de coordination, de perception visuelle, et de perception auditive. Ce ne sera pas désagréable, et peut-être même plutôt intéressant. Le tout prendra environ 1 heure et demi.

Pour simplifier les choses, je te contacterai par téléphone dans quelques jours pour obtenir ta réponse et afin de fixer un rendez-vous. L'adresse du Centre de recherche est:

1550 de Maisonneuve ouest, suite 601  
(sortie du métro Guy, coin Guy et  
de Maisonneuve)  
téléphone: 879-8069 ou 843-3664

Je te remercie à l'avance,

APPENDIX J

Intercorrelations between the Social Competence Activity,  
Social, and School subscales of the Achenbach Youth Self-Report.

	<u>Activity</u>	<u>Social</u>	<u>School</u>
<u>Activity</u>	*		
<u>Social</u>	.11	*	
<u>School</u>	.19	.21	*

Note: N= 40

APPENDIX K

DSM-III descriptions of Paranoid, Schizoid, Schizotypal, Borderline, and Narcissistic Personality Disorders (source: DSM-III Training Guide, Webb et al., 1981)

Paranoid Personality diagnosis is used for individuals who demonstrate pervasive, unwarranted suspiciousness and mistrust of people, hypersensitivity, and restricted affective expression.

Schizoid Personality Disorder applies to individuals who demonstrate defects in the motivation and capacity to form relationships or to become emotionally involved with others, but who do not demonstrate any oddities of thinking, perceiving, or behaving. Characteristics of the Schizoid Personality are emotional coldness, indifference to the praise, criticism, or feelings of others, and very few close friendships.

Schizotypal Personality Disorder is diagnosed when there is demonstrated communication, thinking, or action that is strange or odd, but not so severely deviant to qualify for a Schizophrenia diagnosis.

Individuals with a Schizotypal diagnosis have clinical features that resemble some of the features of persons with prodromal or residual schizophrenic symptomatology. Often Schizotypal individuals were previously diagnosed as Latent, Simple, or Borderline Schizophrenia (e.g., Kety et al., 1971; Rosenthal et al., 1971). In addition to social isolation and inadequate interpersonal relationships, schizotypal personalities often demonstrate magical thinking, ideas of reference, recurrent illusions, paranoid ideation, and vague, overelaborate, or circumstantial speech without a loosening of associations.

Borderline Personality Disorder is marked by a basic identity disturbance related to self-image, gender identity, or goals; intense interpersonal relationships; impulsive and self-damaging acts; anger dyscontrol and affective instability; problems in tolerating being alone; and chronic feelings of emptiness.

This Borderline category is more closely related to the conceptualizations of Kernberg (1967) and of Gunderson and Singer (1975) than the traditional borderline schizophrenia concept. In DSM-III the traditional concept coincides more with the Schizotypal Personality Disorder.

Narcissistic and Borderline Disorders are new diagnostic categories, even though the terms have been used in the past.

Narcissistic Personality Disorder is characterized by a grandiose sense of self-importance or uniqueness; fantasies of unlimited success or ideal love; a constant need for attention and admiration; overreaction or indifference to criticism or defeat; feelings of entitlement; exploitiveness; and lack of empathy.

APPENDIX L

Reduction of digit lists to equal length of 6 digits for purpose of serial position analysis.

Coefficients were attributed to digits in each list according to the following procedure:

- (1) the two first and the two last digits were used integrally;
- (2) the coefficients assigned to the middle position digits were attributed in order to give equal weight to each digit in the combined 3rd and 4th positions of the standard 6-digit list.

	<u>Original list</u>		<u>Serial position</u>			
	<u>length</u>		<u>in the reduced 6-digit list</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
(6)	1.0*1st	1.0*2nd	1.0*3rd	1.0*4th	1.0*5th	1.0*6th
(7)	1.0*1st	1.0*2nd	+ .66*3rd + .33*4th	+ .33*4th + .66*5th	1.0*6th	1.0*7th
(8)	1.0*1st	1.0*2nd	+ .50*3rd + .50*4th	+ .50*5th + .50*6th	1.0*7th	1.0*8th
(9)	1.0*1st	1.0*2nd	+ .40*3rd + .40*4th + .20*5th	+ .20*5th + .40*6th + .40*7th	1.0*8th	1.0*9th