In G. Serban (Ed.), Cognitive defects in the development Mental Illness. New York. Brunner-Mazel, 1978.

Schizotypy and Thought Disorder as a High Risk Approach to Schizophrenia

LOREN J. CHAPMAN, JEAN P. CHAPMAN, MICHAEL L. RAULIN and WILLIAM S. EDELL

Our knowledge of schizophrenia would progress more rapidly if we had a way to identify persons at high risk for the disorder. If psychopathologists could identify pre-schizophrenic persons before they became schizophrenic, they would be better able to search more effectively for genetic markers of schizophrenia. Several investigators are doing research guided by these principles. The most commonly chosen high-risk samples are the offspring of schizophrenics. In this paper we use Meehl's term "schizotype" for persons at risk for schizophrenia.

In our own research, we are attempting to identify and to study those young adults who, we think, are at high risk for schizophrenia. We seek to identify persons at risk for schizophrenia using measures of personality characteristics and measures of thought disorder and of other schizotypic symptoms. One advantage of studying young adults rather than children at high risk for schizophrenia is that they are close to the age of risk. The number of years needed for longitudinal work would thus be diminished. Another advantage is that if college students are used as the young adults, they can be readily obtained in large numbers. Large samples should make it possible to determine if different putative measures of schizotypy are correlated. If they are not, there may be different syndromes of schizotypy which might possibly correspond to distinct

This research was supported by a research grant (MH-18354) from the National Institute of Mental Health.

psychoses within schizophrenia. The identification of persons at risk for schizophrenia by their traits rather than by their being offspring of schizophrenics might yield a more representative sample of such persons. After all, only about 5% of schizophrenics had a schizophrenic parent (Rosenthal, 1970).

We have not yet followed our subjects long enough to determine whether or not they truly show a heightened incidence of schizophrenia. However, from our preliminary findings together with what is known about the precursors of schizophrenia we believe that a reasonable case can be made for the expectation that they are a high-risk sample. This work is still in progress and our findings are incomplete, but we believe the results thus far show sufficient promise to warrant communicating them.

We started by developing true-false scales for several traits of schizotypy as described by Paul Meehl (1964). Schizotypy is Meehl's term for a predisposition toward schizophrenia. Meehl's descriptions of schizotypy closely resemble Hoch and Cattell's (1959) descriptions of pseudoneurotic schizophrenia. About 20% of Hoch and Cattell's pseudoneurotic schizophrenics were found on follow-up five to 20 years later to have developed overt schizophrenic symptoms (Hoch et al., 1962). Such patients are most often called "borderline" by writers now. We will focus here on scales for two of these traits of schizotypy. One trait is physical anhedonia, or an abnormally low amount of pleasure from physical sensations. The other trait is perceptual aberration.

THE PHYSICAL ANHEDONIA SCALE

The Physical Anhedonia Scale was designed to tap pleasures of eating, touching, feeling, sex, temperature, movement, smell, and sound. Examples of items are: "The beauty of sunsets is greatly overrated" (True), "I have seldom cared to sing in the shower" (True), "I have always had a number of favorite foods" (False), "Sex is OK, but not as much fun as most people claim it is" (True), "I have always loved having my back massaged" (False).

An attempt was made to minimize effects of depression within schizophrenia. Depressed patients often complain about loss of capacity to experience pleasure, but we believed that the anhedonia of most depression would be relatively transient. Items were worded to refer to long-standing characteristics rather than to present characteristics. For example, an item read: "I have had very little desire to try new kinds of foods" rather than "I have little desire to try new kinds of foods." As an additional guard against the effects of transient anhedonia, the subjects

were instructed to "describe yourself as you have been during most of your adult life."

In order to eliminate subjects who responded randomly, a 22-item Infrequency Scale was also included in the questionnaire. This scale was modeled after Jackson's (1974) Infrequency Scale in his Personality Research Form. It consists of items which almost everyone answers in one direction so that a converse answer indicates invalid test taking. Examples from our Infrequency Scale are: "I visited Easter Island last year"; "Sometimes I feel sleepy or tired."

Also included were 37 items from Jackson's (1974) Desirability Scales from his Personality Research Form. The correlation of each candidate anhedonia item with Desirability score was computed in order to screen items for social desirability and remove such variance from the Anhedonia Scale.

Screening and Revision of Items

The subjects used for screening of items were 371 college students, of whom 125 were male and 246 were female. Items were retained if they had a higher item-scale correlation than correlation with Desirability score, and minimal bias toward one sex rather than the other.

Normal Standardization Sample

The final revised 40-item scale was given to a normal standardization sample, most of whom were found by approaching strangers at shopping centers or their homes and by approaching firefighters at fire stations. This sample consisted of 241 males and 263 females of varying social classes as measured by the Hollingshead (1957) system, stratified by age, from 18 to 45. Coefficient alpha (Kuder-Richardson Formula 20) was used to estimate the reliability of the scales. For this normal standardization sample the coefficient alpha reliability was .74 for males and .66 for females.

Schizophrenic Sample

The questionnaire without the Desirability items was administered to 123 male schizophrenics. We gave it to schizophrenics because we believed that any trait of schizotypes should also be found in a number of schizophrenics. For the male schizophrenics, coefficient alpha was .82.

The male schizophrenics were more anhedonic than the normal male subjects $t(362) = 5.62$, $p < .01$. The means were 7.2 for normal males and 10.6 for schizophrenics. Figure 1 shows the distributions of scores. Of special interest is the shape of the distribution of scores on Physical

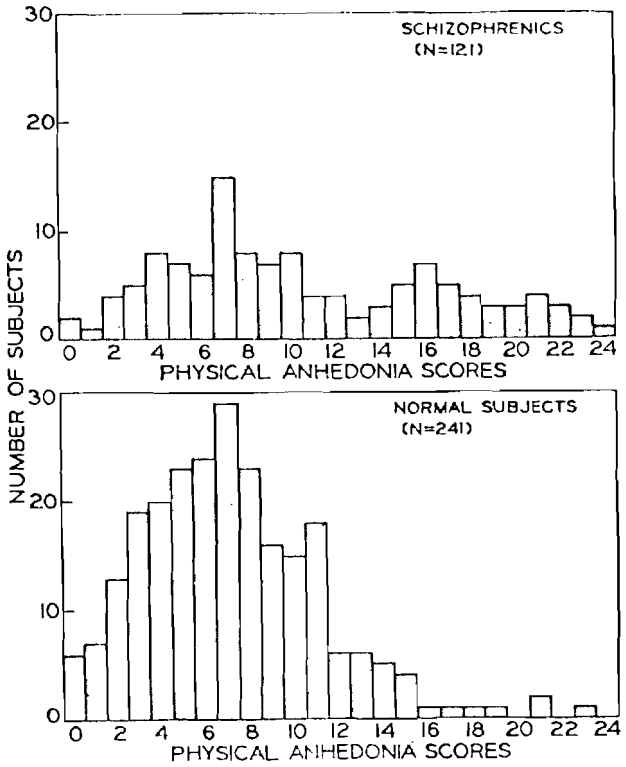

FIGURE 1. Physical Anhedonia scores of normal and schizophrenic subjects.

Anhedonia. The schizophrenics' scores on Physical Anhedonia appear to fall into two clusters. The first cluster is like the entire distribution of the normal subjects, with a model score of "7," and almost bell-shaped. The second cluster has a mode at 16. Unfortunately there is no satisfactory statistical test to determine whether an apparent bimodality truly reflects the presence of two underlying distributions or is instead a chance fluctuation within a single distribution. The striking similarity of the first half of the distribution to the whole distribution for normal subjects encourages us to speculate that the schizophrenics' distribution in Figure 1 may reflect two underlying distributions. In any case, Figure 1 indicates clearly that about one-third of schizophrenics are anhedonic.

CONSTRUCTION OF THE PERCEPTUAL ABERRATION SCALE

We started out to measure body-image aberration. We constructed true-false items around various experiences of body-image aberration as they are commonly reported in the clinical literature for schizophrenics

and borderline schizophrenics. Items were worded to ask whether the subject has sometimes had the deviant experience rather than whether he has it at the present time. Items were intended to tap deviant experiences which are uncommon in normal people. The experiences included unclear boundaries of the body: e.g., "Sometimes I have had the feeling that I am united with an object near me" (true); feelings of unreality or estrangement of parts of one's body: e.g., "I have sometimes felt that some part of my body no longer belongs to me" (true); feelings of deterioration of one's body: e.g., "I have sometimes had the feeling that my body is decaying inside" (true); perceptions of change in the size and/or relative proportions of one's body: e.g., "My hands or feet have never seemed far away" (false); changes in the appearance of the body: e.g., "Occasionally it has seemed as if my body had taken on the appearance of another person's body" (true).

Pretesting and Scale Development

For purposes of scale development, candidate items were administered to three successive samples of college students together with a 13-item Infrequency Scale of our own design, 30 items of the 33-item Crowne-Marlowe Social Desirability Scale (Crowne & Marlowe, 1964), and 55 items from Jackson and Messick's (1962) 60-item DY-3 Acquiescence Scale. Body-image Aberration items were revised or dropped and new items were added before testing the next sample in an attempt to maximize item-scale correlation and to minimize correlation of the items with Social Desirability and with Acquiescence. We ended up with 28 Body-image Aberration items in our final scale.

We were also trying out other scales at the same time as these Body-image Aberration items and encountered seven perceptual distortion items which correlated as high with the Body-image Aberration Scale as did the individual Body-image Aberration items themselves. Examples of these seven items are "Sometimes people whom I know well begin to look like strangers" (true) and "My hearing is sometimes so sensitive that ordinary sounds become uncomfortable" (true). The Body-image Aberration items themselves deal mainly with perceptual experiences. Therefore, we combined these seven items with the 28 Body-image Aberration items and named the entire scale "Perceptual Aberration."

Performance of College Students

The final version of the Perceptual Aberration Scale was then administered to 518 male and 659 female college students. These subjects were also given the Infrequency Scale and a 61-item version of the Physical Anhedonia Scale. We had lengthened it over the earlier 40-item version

to improve its reliability. The mean Perceptual Aberration score was 6.6 (SD = 5.9) for males and 7.8 (SD = 6.6) for females. The coefficient alpha estimate of reliability for Perceptual Aberration was .88 and .90 for males and females respectively. The correlation with Physical Anhedonia was —.10 for females and —.14 for males. Thus these data indicate satisfactory reliability for the Perceptual Aberration Scale, and minimal relationship to the Anhedonia Scale. Testing with a group of 139 non-college control subjects yielded a similar reliability and low correlations with demographic variables.

Schizophrenic Performance

We gave 65 male schizophrenics the Perceptual Aberration Scale and the 61-item version of the Physical Anhedonia Scale. Coefficient Alpha estimates of reliability were .92 for Perceptual Aberration and .85 for Anhedonia. The two scales correlated only .12. This minimal correlation leads us to speculate that the two scales tap different schizotypies. If schizophrenia is more than one disorder, one would expect more than one schizotypy; that is, a different schizotypy for each disorder within schizophrenia. Mean score on the Perceptual Aberration Scale was 7.67 (SD = 7.27) for the schizophrenics and 5.06 (SD = 5.40) for the male non-college normal control subjects. This difference was significant ($p < .01$).

INTERVIEW DATA FOR ANHEDONIA AND PERCEPTUAL ABERRATION SUBJECTS

We have begun studies of characteristics of college students who are deviant on these two scales of schizotypy. We have arbitrarily designated as deviant those subjects who score more than two standard deviations above the mean on either scale. Because the distributions are skewed, between 4% and 5% are this deviant on each scale. We are trying to learn if these subjects have characteristics expected of schizotypes. We have interviewed a number of subjects and will report here the results for some groups of male subjects for whom we have analyzed the data. These were 24 Perceptual Aberration subjects, 27 Anhedonics and 25 control subjects. Our interviewers and raters were blind as to the group to which each student belonged.

We obtained the following significant differences for these male college students. The Perceptual Aberration subjects, more than control subjects, said that they are dissatisfied with their experience at the university and said that they are unable to meet and get to know people as much as they would like. They also, more often than control subjects, reported that they lack close friends. They also reported themselves as

more distractible than controls, specifically more distractible by things they see, things they hear, and by thoughts that occur to them. The Perceptual Aberration subjects were also more depressed than controls as measured by the Beck (1967) Depression Inventory.

The Anhedonic subjects also reported themselves less satisfied with the university experience than did the control subjects. Like the subjects with Perceptual Aberration, the Anhedonic subjects reported themselves as more distractible than controls, but only by thoughts that occur to them and not by things they see or hear. They reported themselves as having less need for social life than the controls.

We have also been interviewing schizotypic and control subjects using the portion of Spitzer and Endicott's (1975) SADS-L which deals with psychotic symptoms. Thus far we have interviewed 55 subjects. The interview tapes are currently being evaluated for diagnosis and for the presence or absence of psychotic symptoms. We can say in advance of completing this evaluation, however, that the Perceptual Aberration subjects have psychotic or borderline psychotic symptoms more often than the other groups. For example, six of the 19 Perceptual Aberration subjects reported having heard a hallucinatory voice at least once a week for an extended period, and three reported having regularly had the mistaken idea that people were out to get them or were talking about them. Others reported various other psychotic symptoms including thought insertion and thought withdrawal.

RORSCHACH PERFORMANCE OF ANHEDONIC AND PERCEPTUAL ABERRATION SUBJECTS

Past research literature indicates that thought disorder on the Rorschach is a good indicator of schizotypy. We decided to score the Rorschach for Delta Percentage Index Score of Watkins and Stauffacher (1952) as modified by Kataguchi (1959). This index combines several classic Rorschach indicators of schizophrenic thought disorder. The score includes fabulized response, fabulized combinations, confabulation, contamination, autistic logic, peculiar and queer verbalization, incoherence, overly elaborate symbolic responses, deterioration color, percepts of mangled or distorted objects, and perseveration. The definitions of each of these scoring categories are from Rapaport, Gill and Schafer (1946).

Schizophrenics have been found to be markedly more deviant on the Delta Percentage Index Score than normal and/or neurotic patients by Watkins and Stauffacher (1952), Powers and Hamlin (1955), Kataguchi (1959), and Quirk, Quarrington, Neiger and Slemon (1962). Other investigators who reported similar findings for some components of the Delta Score include Herman Rorschach (1942), Rapaport, Gill and

Schafer (1946), Hertz and Paolino (1960) and Quinlan and Harrow (1974).

Patients labeled "preschizophrenic" or "latent schizophrenic" have been reported to be as deviant as schizophrenics on such Rorschach responses by Rapaport, Gill and Schafer (1946), Powers and Hamlin (1955) and Quinlan and Harrow (1974). Gunderson and Singer (1975) and Singer (1976) mentioned nearly a dozen other writers who reported similar conclusions based on clinical observation. Herman Rorschach (1942) reported that pathological indicators are often more frequent in latent schizophrenia than in manifest schizophrenia.

We gave Rorschach Tests to 26 Perceptual Aberration subjects, 26 Anhedonic and 26 control subjects. The testing and scoring were done blind as to group membership. As shown in Table 1, there was, for males, very little overlap of Delta Percentage Index Score between the Perceptual Aberration subjects and the controls or between Anhedonics and controls. Both differences were significant ($p < .01$). For female subjects, the Perceptual Aberration subjects showed almost no overlap with controls and the difference was significant ($p < .01$), but the Anhedonics were much more similar to controls.

We interpret these data as indicating that the Perceptual Aberration Scale identifies schizotypes among both sexes and that the Anhedonia Scale does so for males, but possibly not for females.

CONCLUSION

Scales for Anhedonia and Perceptual Aberration identify individuals who appear to be promising candidates for the label of schizotypy, or persons at high risk for schizophrenia. The data are also consistent with the possibility that there are different types of schizotypy which may correspond to distinct disorders within schizophrenia. Of course, the sheer frequency of subjects with scores which we define as deviant on these scales precludes the possibility that most of them will become schizophrenic. This does not discourage us. After all, only about 10% of the children of schizophrenics become schizophrenic (Rosenthal, 1970).

We have begun to gather data using other measures which may help us to describe the functioning of our schizotypes. These include measures of attention, thought disorder, motor functioning and reaction time. We are scoring the TAT for communication deviancy by Singer's method, and are working on a system for scoring interviews for similar deviancy. We are also developing other scales of schizotypy, including scales for soft neurological signs and for intense ambivalence. We plan to follow up our subjects and will study the relationship between scores on these tasks and the development of overt schizophrenia.

TABLE 1

Number of Subjects with High and Low Delta Percentage Index Scores

Males

Score	*Perceptual Aberration*	*Anhedonic*	*Control*
1 to 12	2	2	12
13 to 45	11	12	1

Females

Score	*Perceptual Aberration*	*Anhedonic*	*Control*
1 to 12	3	8	11
13 to 45	10	4	3

REFERENCES

BECK, A. T.: *Depression: Clinical, Experimental and Theoretical Aspects*. New York: Hoeber, 1967.

CROWNE, D. P. and MARLOWE, D.: *The Approval Motive: Studies in Evaluative Dependence*. New York: Wiley, 1964.

GUNDERSON, J. G. and SINGER, M. T.: Defining borderline patients: An overview. *American Journal of Psychiatry*, 1975, 132:1-10.

HERTZ, M. R. and PAOLINO, A. F.: Rorschach indices of perceptual and conceptual disorganization. *Journal of Projective Techniques*, 1960, 24:370-388.

HOCH, P. and CATTELL, J.: The diagnosis of pseudoneurotic schizophrenia. *Psychiatric Quarterly*, 1959, 33:17-43.

HOCH, P. H., CATTELL, J. P., STRAHL, M. O., and PENNES, H. H.: The course and outcome of pseudoneurotic schizophrenia. *American Journal of Psychiatry*, 1962, 11: 106-115.

HOLLINGSHEAD, A. B.: *Two Factor Index of Social Position*. New Haven, Conn.: Author, 1957.

JACKSON, D. N.: *Manual for the Personality Research Form*. Goshen, N. Y.: Research Psychologists Press, 1974.

JACKSON, D. N. and MESSICK, S.: Response styles on the MMPI: Comparison of clinical and normal samples. *Journal of Abnormal and Social Psychology*, 1962, 65: 285-299.

KATAGUCHI, Y.: Rorschach schizophrenic score (RSS). *Journal of Projective Techniques*, 1959, 23:214-222.

MEEHL, P. E.: *Manual for Use with Checklist of Schizotypic Signs*. Minneapolis: Psychiatric Research Unit, University of Minnesota Medical School, 1964.

POWERS, W. T. and HAMLIN, R. M.: Relationship between diagnostic category and deviant verbalizations on the Rorschach. *Journal of Consulting Psychology*, 1955, 19:120-124.

QUINLAN, D. M. and HARROW, M.: Boundary disturbances in schizophrenia. *Journal of Abnormal Psychology*, 1974, 83:533-541.

QUIRK, D. A., QUARRINGTON, M., NEIGER, S., and SLEMON, A. G.: The performance of acute psychotic patients on the Index of Pathological Thinking and on selected signs of idiosyncrasy on the Rorschach. *Journal of Projective Techniques*, 1962, 26:431-441.

RAPAPORT, D., GILL, M., and SCHAFER, R.: *Diagnostic Psychological Testing* (Vol. II). Chicago: Year Book Publishers, 1946.

RORSCHACH, H.: *Psychodiagnostics*. Berne: Hans Huber, 1942.

ROSENTHAL, D.: *Genetic Theory and Abnormal Behavior*. New York: McGraw-Hill, 1970.

SINGER, M. T.: Performance of borderlines on structured versus unstructured tests. Paper presented at the International Conference on Borderline Disorders, Topeka, March 20, 1976.

SPITZER, R. L. and ENDICOTT, J.: *Schedule for Affective Disorders and Schizophrenia—Lifetime Version: SADS-L*. Unpublished manual, October 8, 1975.

WATKINS, J. O. and STAUFFACHER, J. C.: An index of pathological thinking in the Rorschach. *Journal of Projective Techniques*, 1952, 16:276-286.