Physical Anhedonia, Perceptual Aberration, and Psychosis Proneness

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Abstract

Two groups of hypothetically psychosis-prone subjects were chosen from among college students who scored deviantly high on scales of Physical Anhedonia (n = 50) or Perceptual Aberration (n = 65). Scores on these two scales had a small negative correlation, indicating that the scales identify different sets of deviant subjects. These experimental subjects and a control group (n = 66) were interviewed using a modification of the Schedule for Affective Disorders and Schizophrenia—Lifetime Version. A second interview covered social and academic adjustment. Psychotic and psychotic-like symptoms (attenuated forms of psychotic experiences) were scored on a recently devised scale of deviancy. The perceptual aberration subjects exceeded the control subjects on each of several psychotic-like experiences (auditory and visual experiences, thought transmission, passivity experiences, aberrant beliefs), as well as on depression, hypomania, social withdrawal, problems of concentration, deviances in communication and speech, and a composite score for schizotypal features. Anhedonics did not differ from controls on psychotic-like experiences but were more socially withdrawn, had less heterosexual interest and activity, and scored higher on the composite score of schizotypal features. The findings support the hypothesis that the scales identify persons who are at risk for psychosis but probably for different psychoses.

Numerous writers have described traits and symptoms that are believed to characterize persons who are at elevated risk for psychosis. In particular, these descriptions have usually been offered for persons at risk for schizophrenia, and have been based on several different sources of data. These include case histories of schizophrenics, retrospective studies of premorbid school or clinic records of persons who later became schizophrenic, studies of persons who appear clinically to be schizophrenic-like, clinical reports of the symptoms of very early schizophrenia, and studies of relatives of schizophrenic patients. It should be possible to measure the traits described in this literature and to use these measures to predict possible future psychosis.

Traits and symptoms that have been prominently implicated include perceptual distortion, especially in relation to one's own body (Fenichel 1945; Meehl 1964; Frosch 1970), anhedonia (Rado 1956, 1962; Schmideberg 1959; Meehl 1964, 1973), emotional ambivalence (Bychowski 1957; Hoch and Cattell 1959; Schmideberg 1959; Meehl 1964, 1973), social isolation and avoidance of other people (Wittman and Steinberg 1944; Friedlander 1945; Meehl 1964, 1973; Nameche, Waring, and Ricks 1964), mild thought disorder (Hoch and Cattell 1959; Singer and Wynne 1966; Meehl 1964, 1973), transient or isolated psychotic symptoms (Frosch 1964; Kety et al. 1968; Chessick 1971; Adler 1973), and antisocial behavior (Kraepelin 1919; Klannmann 1938; Dunai and Hoch 1955; O'Neal and Robins 1958; Heston 1966; Planansky 1972; Watt 1972, 1974; Roff, Knight, and Wertheim 1976).

The present study is an examination of college students who score high on measures of two of these traits, physical anhedonia and per-
ceptual aberration. Its purpose is to determine if such persons have other characteristics that one might expect in the psychosis-prone.

**Earlier Attempts to Measure Personality Traits of the Psychosis-Prone**

There have been several previous attempts to measure personality traits which indicate a predisposition toward psychosis.

The **MMPI as a Measure of Schizophrenia Proneness.** Gilberstadt and Duker (1965) reported, on the basis of study of psychiatric hospital records, that patients who have a 2-7-8 profile on the Minnesota Multiphasic Personality Inventory (MMPI), that is, have elevated scores on Scale 2 (Depression), Scale 7 (Psychasthenia), and Scale 8 (Schizophrenia), are most often either pseudoneurotic schizophrenic or chronic schizophrenic. Peterson (1954) found that 2-7-8 profiles were correlated with the later development of schizophrenia in non-psychotic patients. Fine (1973) interviewed college students with a 2-7-8 profile and formed a clinical impression that half of them were nonpsychotic schizophrenics, although he did not have that impression of college students who scored in the normal range on the MMPI. Koh and Peterson (1974), Schulman (1976), and Sterenko and Woods (1978) found various cognitive abnormalities in college students with 2-7-8 profiles.

The **Eysenck Psychoticism Scale.** The largest prior attempt to measure the predisposition toward psychosis has been the research on psychoticism by Eysenck's group (Eysenck and Eysenck 1975, 1976). The Eysenck Psychoticism Scale consists largely of items that appear to tap nonconformity and antisocial attitudes, paranoid traits, and mildly sadistic impulses. High-psychoticism subjects were found to be less accurate in discriminating light flashes, to score lower on scholastic achievement, and to be overinclusive in listing adjectives that apply to a noun. These deviances are not compelling as characteristics of the psychosis-prone. Bishop (1977) has argued that the scale does not measure psychosis proneness, pointing out that many other groups score higher on the scale than do schizophrenics. Such groups include art students, alcoholics, prison inmates, drug addicts, and patients with personality disorders. Bishop also pointed out that people who are high on the scale lack characteristics that one would expect of subjects truly prone to psychosis. For example, high-psychoticism subjects are faster than control subjects on a reaction time task, rather than slower, like schizophrenics.

The **Schizophrenism Scale.** Nielsen and Peterson (1976) developed a 14-item scale based on the early symptoms of schizophrenia, especially symptoms of attentional dysfunction and social withdrawal. They found that undergraduates who were high on their scale showed abnormal patterns of electrodermal reactivity resembling those that Mednick and Schulsinger (1968) found in those children of schizophrenic mothers who, like their mothers, became psychiatrically disturbed.

The Present Approach

The present approach differs from earlier ones because it is based on the assumption that schizophrenia is probably more than one disorder. This research began as an attempt both to measure proneness toward schizophrenia and to distinguish proneness toward different varieties of disorder within schizophrenia. Initially, a broad definition of schizophrenia was used. Because DSM-III (American Psychiatric Association 1980) narrows the definition of schizophrenia and places some patients formerly called schizophrenic into other categories of psychosis, we have now restated the goal of our project as measuring proneness toward psychosis, and as differentiating among psychotic disorders. The identification of the psychosis-prone and the study of their characteristics should facilitate the search for distinct psychoses, because different disorders should have different precursors.

This goal of identifying proneness toward different psychoses should not be interpreted as that of differentiating proneness toward the various psychoses of DSM-III, that is, schizophrenia, affective disorder, schizoaffective disorder, schizophreniform disorder, paranoid disorder, brief reactive psychosis, and atypical psychosis. The new DSM-III diagnostic categories for psychosis advance nosology by attempting to describe more homogeneous groups of patients. However, further modifications will surely occur as psychosis becomes better understood. Thus, attainment of the goal of differentiating proneness toward different psychoses would probably mean finding other diagnostic categories. Finding such disorders might be easier among psychosis-prone subjects than among clinical psychotics because the symptoms are less clouded by drug effects, hospitalization effects, and the massive disruptions of psychosis. We seek syndromes of psychosis-proneness by measuring various symptoms and traits that have been reported to characterize the psychosis-prone.
The Scales for Physical Anhedonia and Perceptual Aberration

Chapman, Chapman, and Raulin (1976, 1978) have previously reported the development of scales for physical anhedonia and for perceptual aberration. Both scales were developed with an emphasis on internal consistency and on as low as possible a correlation with independent measures of social desirability and acquiescence. Illustrative items for physical anhedonia are “On seeing a soft, thick carpet, I have sometimes had the impulse to take off my shoes and walk barefoot on it” (keyed false) and “Sex is OK but not as much fun as most people claim it is” (keyed true). The Perceptual Aberration Scale consists largely of items designed to tap major distortions in the perception of one's own body. Illustrative items for perceptual aberration are “I have never felt that my arms or legs have momentarily grown in size” (keyed false), and “Occasionally it has seemed as if my body had taken on the appearance of another person’s body” (keyed true).

The original Physical Anhedonia Scale consisted of 40 items. To increase reliability, Chapman and Chapman (1978) lengthened the scale to 61 items. Heterosexual items were dropped so that the scale would be equally applicable to homosexual and heterosexual subjects.

Test-retest reliability with 12 weeks between the first and second testing was computed for 178 male and 333 female students. The reliability of the Physical Anhedonia Scale was .78 for the male group and .79 for the female group. The reliability of the Perceptual Aberration Scale was .75 for males and .76 for females.

Although schizophrenics, as a group, score higher than normal subjects on both scales, not all schizophrenics are deviant on either one. Poor premorbid schizophrenics are more often anhedonic than good premorbid, and tend to be more often perceptually aberrant than good premorbid schizophrenics. When these two scales are both scored in the pathology direction, they correlate slightly in the negative direction in large samples of college students. This is surprising, given the fact that any acquiescence or social desirability bias in the scales would tend to produce a positive correlation, as would generalized psychopathology. Thus, if these two scales identify psychosis-prone subjects, they may identify different kinds of psychosis proneness, possibly corresponding to different potential psychoses.

Earlier research in our laboratory has indicated that subjects high on physical anhedonia and on perceptual aberration have some characteristics that are expected in the psychosis-prone. Edell and Chapman (1979) found that both of these groups sharply exceed control subjects in schizophrenic-like thought disorder on the Rorschach Test. Haberman et al. (1979) found that anhedonic subjects are poorer than control subjects on social skill as measured by a role-playing task. The present research used interviews to extend and clarify the description of the deviances of these subjects.

Method

The Perceptual Aberration Scale and Physical Anhedonia Scale were administered to 1,209 male and 1,367 female college students as part of a larger battery of true-false paper-and-pencil measures. The mean perceptual aberration score was 5.96 (SD = 5.8) for males, and 7.35 (SD = 6.6) for females. Coefficient alpha (Kuder-Richardson Formula 20) estimate of reliability was .89 for males and .91 for females.

The mean physical anhedonia score was 12.93 (SD = 6.2) for males, and 8.96 (SD = 5.2) for females, with a coefficient alpha value of .79 for males and .78 for females. The two scales correlated —.19 for males and —.09 for females.

Subjects were selected for further study on the basis of their scores. Subjects were labeled as high on physical anhedonia or high on perceptual aberration if they scored at least two standard deviations above the mean on one of the scales. Because of skewed distributions, 5.2 percent of the subjects scored this high on perceptual aberration and 4.4 percent on physical anhedonia. Only 2 of the 2,576 subjects scored deviantly on both scales, and these subjects were not included in the interview sample. Subjects were designated as control subjects if they scored no higher than one-half a standard deviation above the mean on either of the two scales.

Altogether, 181 subjects were seen. These included 50 anhedonics (29 male, 21 female), 65 perceptual aberration subjects (35 male, 30 female), and 66 control subjects (35 male, 31 female). The three groups were matched on distribution of academic year: 50 percent freshman, 35 percent sophomore, and the remainder junior or senior. The sample was limited to white subjects because our scales had been standardized using a primarily white group.

Interview Procedures. Subjects were telephoned and invited to participate in an interview concerning variables related to college adjustment. Extra credit in their course and/or money were used as inducements. Almost all those invited did participate, although we observed, anecdotally, that perceptual aberration subjects
often missed their first appointments. The interviewers were two advanced graduate students, both of whom had considerable clinical experience. They were trained in use of the Schedule for Affective Disorders and Schizophrenia—Lifetime Version (SADS-L) interview. The callers, interviewers, and scorers of the interviews were blind as to group membership.

Structured interview procedures were used. For inquiry into symptoms, parts of Spitzer and Endicott's (1977) SADS-L were used. The SADS-L sections that were used investigate schizophrenia, major and minor depressive symptoms, manic and hypomanic symptoms, and schizotypal features. Drug experiences were inquired after, as well as the possible relationship of each symptom of psychopathology to drug usage, in order to avoid scoring drug experiences and flashback experiences. The groups were almost identical on reported history of use of marijuana. The perceptual aberration subjects showed a tendency toward greater use of other drugs, but none of the statistical comparisons yielded a significant difference.

A second interview consisted of questions that dealt with social adjustment, heterosexual interests, academic problems, distractibility, and difficulty in concentrating. Both interviews were tape recorded to facilitate reliable rating of symptoms.

The Evaluation of Psychotic and Psychotic-like Experiences as Continua. Systems for diagnosing individuals as psychotic rely on either/or judgments concerning the presence or absence of a given symptom, and only very deviant symptoms are judged to be psychotic. The subjects in the present study were not full-blown psychotics, although many of them reported either isolated psychotic experiences or experiences that might be called "psychotic-like." A dichotomous judgment of presence or absence of psychotic symptoms would overlook most of the rich pathology of these subjects. In order to score these psychotic-like experiences, Chapman and Chapman (1980) constructed a rating manual. It provides rating values for degree of deviancy of 80 such psychotic-like types of experience. These 80 types of deviant experiences fall into six classes or continua, each of which is represented by a scale.

Ratings of deviancy can range from 1 to 11 for each scale. The rating values provided by the manual are the median of the ratings suggested by six schizophrenia researchers. The manual provides descriptions, often with examples, of experiences that fit the various rating scores. The 11- and 10-point ratings are for symptoms of a psychotic degree of deviancy, that is, symptoms that are similar to those experiences reported by clinical psychotics. Scores from 9 to 6 are for symptoms that are judged to be of psychotic degree but are less severe than those earning a score of 10. The nonpsychotic symptoms range from 5 (not psychotic but very psychotic-like) to 2 (slightly deviant in a psychotic-like direction).

The description of the six rating scales must be very brief here. A more detailed presentation is found in Chapman and Chapman (1980).

1. Experiences of transmission of one's own thoughts (14 items) range from the subject's active experience of thoughts leaving his head so that everyone in the area can hear his thoughts through their ears (score of 10) to the suspicion that one or two people who know him well can read his mind when he is physically with them (score of 2). A midrange example is a subject's experience of suspecting (but not firmly believing) that strangers whom she passes on the street can read her mind and know her bad thoughts (score "5").

2. Passivity experiences (16 items) range from the subject's belief that another person or force other than God, the devil, or an angel or spirits, seized control of his body or mind to think ideas, or to feel feelings, or to act (score of 10), to the suspicion that God gave him thoughts or feelings or forced him to act, feel, or think, but in a socially acceptable way (scores of 2 to 4). A midrange example is a subject's experience of suspecting (but not firmly believing) that other people put thoughts into his head at a distance (score "5").

3. Voice experiences and other auditory hallucinations (24 items) range from a hallucinatory outer voice that recites a running commentary on the subject's behavior (score of 10) to the subject's hearing the voice of his conscience as an inner voice (score of 3). A midrange example is a subject's experience of hearing her deceased grandfather speak as an inner voice, and believing that her grandfather is truly communicating with her (score "6").

4. Thought withdrawal (6 items) ranges from the subject's active experience of another person or being, other than God, snatching his thoughts away (score of 10) to his suspicion that God took his thoughts away (score of 2 to 4). A midrange example is a subject's frequent experience of hearing her deceased grandfather speak as an inner voice, and believing that his grandfather is truly communicating with her (score "6").

5. Other personally relevant aberrant beliefs (8 items) range from bizarre delusional beliefs (score of 10) to nonbizarre ideas of reference, or mistaken ideas of mistreatment or of being observed (score of 4). A midrange example is the report of a
young man who, for 3 months after arriving in a new town, believed that strangers on the street were staring at him (scored "5").

6. Visual experiences (12 items) range from seeing external hallucinatory objects for longer than a moment when not resting or meditating and believing the experience was veridical (score of 8) to hypnagogic hallucinations or illusions which the subject did not later suspect as being veridical (score of 2). A midrange example is a person's claim that he usually sees "auras" around other people (scored "4").

The rating values provided by the manual for each of the 80 types of experience are modal values. The rater is permitted to rate 1 point higher or 1 point lower than this modal value to recognize either exceptionally severe or exceptionally mild deviancy of the type described in the item. Such variations in deviancy are judged by bizarreness of content, amount of time preoccupied with the experience, frequency and duration of the experience, as well as degree of cultural support for the experience. Many items require evaluation of whether the subject believes in or merely suspects the validity of an experience. Belief is evaluated for the time of the experience, rather than the time of the interview. In addition, some experiences, especially those with religious content, can receive one of a range of scores, with the value assigned depending on the extent of subcultural support for the experience.

Only experiences that are reported as occurring after the 13th birthday are scored, to avoid the problems of scoring children's fantasies on deviancy. Differences in frequency of experience are scored by the 1-point raising or lowering of score for exceptionally severe or exceptionally mild deviancy. A subject who has multiple experiences of one type is scored only once, and receives the score of the most deviant of those experiences. An experience that could qualify for a score on either of two or more scales is scored only on the one on which it qualifies for the higher score. Experiences which occurred only while the subject was on drugs, or which appear to be flashback experiences, are not scored.

It is important to note that rating an experience as psychotic in this system does not mean that the person reporting the symptom can be considered to be clinically psychotic. Instead, he is merely judged to have had an experience of the kind that characterizes clinical psychotics. A person may function fairly adequately in most aspects of living despite occasional or isolated psychotic symptoms.

As previously reported (Chapman and Chapman 1980), two studies were done on the reliability of ratings of interviews using the scales. The senior author and a second experienced clinician each rated 14 interview excerpts and obtained a correlation value of .81. In a second comparison the senior author and a graduate student rated 69 interview excerpts and obtained a correlation value of .78.

Results

The results for the two sexes were essentially the same, and so the male and female subjects were combined for purposes of the analyses. To test differences between experimental and control groups on number of subjects showing a symptom, chi-square was used except when the expected number of subjects in a cell was less than five. In that case, the Fisher-Yates Exact Test was used. To compare the experimental group with the control group on continuous variables, t tests were used except when the data were extremely skewed. In that case, a Mann-Whitney U-Test was used. Two-tailed tests were used throughout. For each symptom, two planned comparisons were made, that is, each experimental group was compared with the control group.

Psychotic and Psychotic-like Experiences. The perceptual aberration subjects reported many more psychotic (ratings of 6 to 10) and psychotic-like (ratings of 2 to 5) experiences than the control subjects, while the anhedonic subjects did not differ significantly from the control subjects. Table 1 lists the percentage of each group who reported an experience either psychotic or psychotic-like by deviancy on each of the six scales. When the six scales were combined, 32 percent of the anhedonic, 69 percent of the perceptual aberration, and 23 percent of the control subjects reported an experience judged either psychotic or psychotic-like. An experience in the psychotic range was reported by 2 percent of the anhedonics, 17 percent of the perceptual aberration, and 2 percent of the control subjects. In a group comparison, the perceptual aberration subjects were found to exceed the control subjects, both on number of subjects who reported psychotic experiences, \( \chi^2 = 7.58, p < .01 \), and on number of subjects who reported either psychotic or psychotic-like experiences, \( \chi^2 = 26.69, p < .001 \).

The perceptual aberration subjects were found to exceed the control subjects on five of the six scales considered separately. In reporting these data, we will list the percentage of subjects in each group who reported each type experience. (The chi-square analyses and Fisher-Yates exact tests
Table 1. Percentage of subjects reporting psychotic and psychotic-like experiences for each class of symptoms

<table>
<thead>
<tr>
<th>Group</th>
<th>Transmission of one's own thoughts</th>
<th>Passivity experiences</th>
<th>Voice experiences and other auditory hallucinations</th>
<th>Thought withdrawal</th>
<th>Other personally relevant aberrant beliefs</th>
<th>Visual experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anhedonic</td>
<td>16%</td>
<td>6% (2%)</td>
<td>16%</td>
<td>0%</td>
<td>12%</td>
<td>4%</td>
</tr>
<tr>
<td>Perceptual aberration</td>
<td>25% (2%)</td>
<td>28% (9%)</td>
<td>51% (6%)</td>
<td>3%</td>
<td>32% (5%)</td>
<td>11%</td>
</tr>
<tr>
<td>Control</td>
<td>6% (2%)</td>
<td>3%</td>
<td>15%</td>
<td>0%</td>
<td>5%</td>
<td>0%</td>
</tr>
</tbody>
</table>

1The first percentage in each entry is the total percentage of subjects reporting such symptoms. The second number is the percentage of subjects reporting the symptom of psychotic degree (rating of 6 or higher).

were, however, computed on the raw frequency data.) We will also briefly summarize the nature of each deviant experience.

Transmission of thoughts (16 percent of the anhedonic, 25 percent of the perceptual aberration, and 6 percent of the control subjects). The perceptual aberration group exceeded the control group on mean deviancy score, $t = 2.89$, $p < .01$. (In this computation, and other such $t$ tests reported here, subjects who did not report a deviant experience of the type were given a score of zero.) One perceptual aberration subject reported that it once seemed to him that his thoughts were echoing around the room at his place of work, although he realized at the time that it could not be so (score of 6). Four others reported having directly experienced, with varying degrees of conviction, that other people could either hear, or see, or receive their thoughts, and at the time of the experience felt anxious lest other people learn their thoughts (score of 5). Eight other perceptual aberration subjects reported the belief that they transmit thoughts which various other people receive, but concluded this from the fact that other people knew what they were thinking rather than by any direct experience of their thoughts leaving their heads (scores of 4 or 5). Three other subjects reported that close friends received their thoughts on occasion (scores of 2, 3, or 4).

Among the anhedonic subjects, two subjects reported having had the suspicion, based on experience with their thoughts, that other people might read their thoughts or receive their thoughts by thought transmission (score of 5). One subject concluded with certainty, from other people's reports, that others could receive her thoughts at a distance (score of 5). Five subjects reported having drawn the conclusion that someone physically near received their thoughts (scores of 2, 3, or 4).

One control subject reported the active experience of other people receiving her thoughts by direct transfer to their brains (score of 8). One reported a fear that this might happen when she was thinking bad thoughts (score of 4), and two subjects reported that they received their thoughts when the friend was physically present (scores of 3 and 4).

Passivity experiences (6 percent of the anhedonic, 28 percent of the perceptual aberration, and 3 percent of the control subjects). The perceptual aberration group exceeded the control group on mean deviancy score, $t = 4.56$, $p < .001$. The experiences of the perceptual aberration group were fairly varied. Four reported the belief or suspicion that thoughts or songs or feelings were frequently put into their heads (scores of 6 to 9). The experience was variously attributed to a mechanical device, spirit possession, unknown people, and alien creatures from another planet. Six of the subjects related experiences of passive automatic behavior or robot-like behavior, and explained the experience, with varying degrees of conviction, by an external agent that was taking control of them (scores of 3 to 8). Three of those six believed that the external agent was God. One thought it was either God or the devil, and two had not identified the agent. Four other perceptual aberration subjects drew a conclusion of external influence from the experience of having thoughts or feelings that seemed not to be their own (scores of 3 to 5). These three subjects variously identified the agents as a secret friend at a distance, psychic energies, and
Satan. Two others attributed their bad, hostile, or alien thoughts to social influences which they believed they must have undergone without full awareness (score of 2).

Three anhedonic subjects reported having had beliefs or feelings that they were controlled by someone else who was not physically present (scores of 2, 4, and 6). One implicated both God and Satan, another named her own mother, while another could not suggest the source.

One control subject suspected that God and Satan put thoughts into his head (score of 3). Another believed that his violent thoughts were not his own, but he did not account for their origin (score of 3).

Voice experiences and other auditory hallucinations (16 percent of the anhedonic, 51 percent of the perceptual aberration, and 15 percent of the control subjects). The perceptual aberration group exceeded the control group on mean deviancy score, \( t = 5.32, p < .001 \). Most of the voice experiences and all those described below were inner voices, unless otherwise specified. Inner voice experiences appear to be on a continuum with thinking, and the distinction between them may be somewhat arbitrary. In the present study, an experience was not scored as an inner voice unless the subject stated that it was more like a voice than like thoughts and unless he could distinguish this kind of experience from his usual thoughts.

Six perceptual aberration subjects reported frequently hearing an inner voice give a running commentary on their behavior as it occurred (score of 5 to 7). The voice was never the subject's own. One subject attributed the voice to a second person living inside him, another attributed it to God, and four subjects could not identify it. For one subject, the voice was sometimes an outer voice and the rest were inner voices. Surprisingly, three of the six subjects spontaneously likened the experience to hearing the description by a sports announcer at a football game. Four of the six subjects also reported hearing other inner voices from time to time, including one subject who heard his good and bad angel, and another who heard the voice of an alien creature from another planet.

Among other perceptual aberration subjects, one reported hearing, as an inner voice, people talking at a distance (score of 8), another reported the voice of an acquaintance speaking critical comments (score of 8), another reported hearing the voice of God instructing her (score of 4). Five subjects reported hearing two or more voices as inner voices (scores of 5 or 6), in each case discussing the pros and cons of aspects of the subject's behavior. These pairs of voices include those of two deceased relatives, unknown persons (reported by two subjects), one unknown person talking with the subject's own voice, and the subject's father talking with the subject's friend.

Fourteen other perceptual aberration subjects reported hearing their own voices as an inner voice (scores of 3 to 5). In 11 cases the voice was critical or a voice of conscience, and in the other three cases it gave advice or recited useful material. Two or more subjects heard an unidentified person's voice as the voice of conscience (scores of 3 and 5). In two cases the subject reported hearing his name called as an outer voice two or three times over a few minutes (score of 5). Another heard outer music which he discovered was not there (score of 5).

One anhedonic subject reported that he heard his own voice reciting a running commentary on his behavior (score of 5), and sometimes heard two voices, both his own, argue about his behavior (score of 5). A second anhedonic subject heard two voices, again both his own, discussing his behavior (score of 5). Six others occasionally have other experiences of hearing their own voices (scores of 3 or 4). For three of these subjects the voice gives advice or encouragement, and for the other three the voice is more one of conscience.

Among the control subjects, one heard his own voice give a running commentary from time to time (score of 5). Another heard two voices, both his own, talk to one another on the two sides of an issue of conscience (score of 5). Two control subjects sometimes heard the voice of God as an inner voice (score of 4 and 5), and one of these suspected that he sometimes heard the voice of Satan as well. Six other control subjects reported hearing their own voices as either a voice of conscience or giving advice (score of 3).

Because this voice of conscience experience was so common among our control subjects, we reduced its deviancy rating to "2" in the rating manual for general use (Chapman and Chapman 1980). In the present analysis we retained the "3" rating, the modal suggestion of our original six judges, to avoid any circularity of finding.

Thought withdrawal (no anhedonic, 3 percent of the perceptual aberration, and no control subjects). One perceptual aberration subject reported that his thoughts often disappeared mysteriously, and he was uncertain whether someone or other external force was taking them away (score of 5). A second subject reported that God takes his bad thoughts away (score of 3).

Aberrant beliefs (12 percent of the anhedonic, 32 percent of the percep-
tual aberration, and 5 percent of the control subjects). The perceptual aberration group exceeded the control group on mean deviancy score, $t = 4.53, p < .001$. A number of deviant beliefs were not scored here because they were a feature of experiences which could be scored on other scales on which the experiences received higher scores, such as the scales for passivity experiences and transmission of thoughts.

Among the perceptual aberration subjects, the deviant beliefs which were scored include a belief in hypnagogic influence by people whom the subject meets (score of 7), an elaborate personal theory by which the subject explains his out-of-body experiences (score of 5), a belief that other people control his verbal behavior by dropping odd words in conversation (score of 8), and a belief that the entire world is an artificial arrangement that is constructed in order to test the subject for his reactions (score of 10). Two subjects often believe that strangers are talking about them (score of 5), and one of these feels that the lecturer in his classes is speaking only to him and that everyone in the class knows it (score of 5). Another subject has unusually strong beliefs in his own psychic powers, which include both extrasensory perception and precognition (score of 4). Fourteen subjects reported that they sometimes have the mistaken belief that other people are talking about them (scores of 3 and 4).

Visual experiences (4 percent of the anhedonic, 11 percent of the perceptual aberration, and no control subjects). The perceptual aberration group exceeded the control group on mean deviancy score, $t = 2.56, p < .02$.

One perceptual aberration subject reported very brief hallucinations of people (score of 5). Another often sees animals from the corner of her eye and then realizes they are not there (score of 2). Two subjects reported hypnopompic hallucinations of people; one subject tends to believe that these are spirits (score of 5), while the other never believes in the validity of the experience (score of 2). Another subject hallucinates colors including auras around people (score of 4). Two subjects reported the experience of looking in a mirror and finding that the image does not appear to be oneself (scores of 2 and 3). One of these two subjects also has hypnopompic hallucinations (score of 2) as well as illusions while awake in which she misperceives shadows as threatening people (score of 3).

One anhedonic subject sometimes briefly hallucinates animals and people and then realizes they are not there (score of 3). Another subject reported hypnopompic visions which he believed were valid (score of 5).

Other Schizotypal Symptoms. The interviews yielded information on other schizotypal symptoms that were not included in the ratings of psychotic-like symptoms. (This list of schizotypal symptoms is taken in part from the SADS-L, and in part from the lists of Meehl, 1964, and of Hoch and Cattell, 1959.)

Depersonalization (4 percent of the anhedonic, 36 percent of the perceptual aberration, and 8 percent of the control subjects). The perceptual aberration subjects exceeded the controls, $\chi^2 = 13.46, p < .001$. The experience was usually that some part of the body sometimes seems not to be one's own, or acts on its own, or seems detached from the rest of the body, or seems not to be there, or takes on an unusual appearance. Two perceptual aberration subjects reported experiences of feeling that they are someone else. The high number of perceptual aberration subjects who report body misperceptions is not surprising, since most of the items in the Perceptual Aberration Scale were designed to tap this kind of experience.

Derealization (4 percent of the anhedonic, 11 percent of the perceptual aberration, and 2 percent of the control subjects). The perceptual aberration subjects exceeded the control subjects, exact test, $p = .03$. This is usually the report that one's surroundings on occasion seem unreal or dream-like or very different from usual, or like a specific other environment, or that people seem sometimes strange or robot-like.

Ideas of reference, extreme suspiciousness, and paranoid ideation (12 percent of the anhedonic, 28 percent of the perceptual aberration, and 3 percent of the control subjects). The perceptual aberration subjects exceeded the controls, $\chi^2 = 13.55, p < .001$. These deviant ideas were included under deviant beliefs, but were scored separately here because the SADS-L treats them as schizotypal.

Out-of-body experiences (6 percent of the anhedonic, 37 percent of the perceptual aberration, and 3 percent of the control subjects). The perceptual aberration subjects exceeded the control subjects, $\chi^2 = 21.56, p < .001$. Subjects who had this symptom
reported two different kinds of experiences and both kinds were included in this analysis. Eight perceptual aberration subjects (but none of the other subjects) reported that they sometimes leave their bodies and observe their bodies from another point in space, usually from above. For five of them this occurs when falling asleep or awakening or while resting. For three others it occurs while engaged in other activities. The remaining subjects who feel that they leave their bodies do not observe their bodies from another point in physical space, but either experience their minds and bodies in the act of separating from one another or feel that their bodies act without participation of the mind.

Feeling physically cut off from other people (6 percent of the anhedonic, 12 percent of the perceptual aberration, and 5 percent of the control subjects). The difference between perceptual aberration and control subjects fell short of significance, \( \chi^2 = 1.66, \text{NS.} \) This experience is one of feeling a sharp separation and isolation from other people who are actually present. The experience was reported as usually occurring at social gatherings and is sometimes accompanied by the feeling that other people are not real.

Dissociative episodes (4 percent of the anhedonic, 5 percent of the perceptual aberration, and no control subjects). None of the differences were significant. One perceptual aberration subject reported episodes of “blanking out.” Another often finds himself in places where he does not remember going, and a third said that he often believes for a few minutes that he is in a different place than he really is. One anhedonic subject reports that she often loses touch with where she is, and a second said he often finds himself in class without remembering how he got there.

Complaints of difficulty concentrating. This report was rated on a 3-point scale, with a score of 1 indicating that the subject finds it hard to concentrate and a score of 3 indicating that the subject finds it easy to concentrate. The mean ratings were anhedonic, 2.16, perceptual aberration 1.83, and control 2.23. The perceptual aberration group reported greater difficulty in concentrating than the control group, \( t = 2.98, p < .01. \)

Complaints of speech being mixed up. These reports of symptoms were rated on a 4-point scale of none, mild, moderate, and severe. Subjects reporting moderate or severe deviancy were 34 percent of the anhedonic, 55 percent of the perceptual aberration, and 20 percent of the control subjects. On a score of mean deviancy, the perceptual aberration subjects exceeded the control subjects \( (t = 4.10, p < .001). \) These reports consisted most often of the complaint by the subject that he often fails to put words together so as to make sense. In addition, two perceptual aberration subjects said that they use words with different meanings than other people. Two other perceptual aberration subjects characterized their own use of words as sometimes “weird,” and another said that she mixes up syllables and first letters of words.

Deviant vocalization (16 percent of the anhedonic, 28 percent of the perceptual aberration, and 8 percent of the control subjects). The difference between perceptual aberration and control subjects was significant, \( \chi^2 = 7.82, p < .01. \) This consists of complaints of unclear or distorted sounds (8 percent of the anhedonic, 12 percent of the perceptual aberration, and no control subjects), garbled words (4 percent of the anhedonic, 5 percent of the perceptual aberration, and no control subjects), speaking too fast (2 percent of the anhedonic, 5 percent of the perceptual aberration, and 3 percent of the control subjects), speaking too softly (4 percent of the anhedonic, 5 percent of the perceptual aberration, and 2 percent of the control subjects), mumbling (6 percent of the anhedonic, 9 percent of the perceptual aberration, and 3 percent of the control subjects), and stammering (0 percent of the anhedonic, 3 percent of the perceptual aberration, and 2 percent of the control subjects).

Odd communication (4 percent of the anhedonic, 11 percent of the perceptual aberration, and no control subjects). The perceptual aberration subjects were more often judged odd in their communication than the control subjects, exact test, \( p = .007. \) This score is for odd communication as observed by the examiner, rather than as reported by the subject. We did not use a formal scoring scheme for this variable, but instead merely asked the examiners to note any subjects whose communications were quite odd.

The perceptual aberration subjects showed several kinds of odd communication which resemble the more severely disordered schizophrenic speech. They used odd phrases and vague forms of expression, which often leave the listener feeling that he might be able to grasp the meaning if he could listen more closely. One subject said “I would say the real is what exists and there’s no way we could come upon talking about what exists.” For some subjects, the idiosyncratic expression appeared to have personal meaning centered on their own experiences. One subject used the word “silence” to refer to the feeling of separation from other people who are physically present, as in “I can remember I had all this silence,” and “The silence will keep people away from me.”
the unusual expressions have a stilted quality, as in the subject who, in describing his own problems of communication, said "The way I put the words together lacks the form of persuasion." Many subjects misused words; for example, "Let me see if I can pertain that question to anything else." At least one subject coined a neologism, "I could think coralogically things could occur."

Several subjects answered questions in a loose associative manner so that they spoke of subject matter quite removed from the original question. An example is a response to the question, "Have you often felt that the world looks different or has changed in some way?" The subject started out appropriately by describing a visit to his childhood home. He then wandered free associatively, to discuss in a sentence or two each of the following topics: his parents' admonition to eat everything on his plate, the starving people of India, the worth of the study of economics, the price of gasoline, and the adequacy of the nation's energy policy. At this point the interviewer interrupted to ask another question.

Some subjects occasionally became incoherent. One of the more extreme examples is the following. "But say, in the sense of arts, you know if you want to strip down all the sciences and things like and in the same instance I think how you affect people and wh- how; what your influence on this world is almost like an art in itself, less independent of mathematics involved."

Oddness of communication is sufficiently marked in our subjects to warrant the development of a formal rating system. Members of our research team are working on the problem.

Social withdrawal (32 percent of the anhedonics, 31 percent of the perceptual aberration, and 11 percent of the control subjects). The anhedonics were more often socially withdrawn than the control subjects, $\chi^2 = 6.90$, $p < .01$, as were the perceptual aberration subjects, $\chi^2 = 6.95$, $p < .01$. The interviewer asked several questions on social interests. A subject was scored as being socially withdrawn if he stated that he usually prefers to be by himself rather than with others, or if he declared that he seldom enjoys the company of other people, or that he has little need for social life.

Ability to meet and get to know people. This ability was scored on a 3-point scale, with a score of 1 indicating definite inability to meet and get to know people as much as the subject would like, a score of 2 indicating some such problem in this area, and a score of 3 indicating no problem in this area. The mean scores were anhedonic 1.88, perceptual aberration 2.25, and control 2.21. The anhedonics differed marginally from controls, $t = 1.94$, $p < .06$.

Poor heterosexual adjustment. We asked each subject the number of dates he or she had had in each year, starting with the ninth grade. A date was defined as getting together by prearrangement with a member of the opposite sex. The median total number of dates was 53 for the anhedonics, 128 for the perceptual aberration subjects, and 139 for the control subjects, but the distributions were extremely skewed. The anhedonics reported significantly fewer dates than the control subjects, as indicated by a Mann-Whitney U-Test, $p < .01$. Among the anhedonic subjects, 40 percent reported that they had never gone steady with a member of the opposite sex. This compared with 22 percent of the perceptual aberration and 15 percent of the control subjects. The difference between the anhedonic and control subjects was significant, $\chi^2 = 7.91$, $p < .01$. One might suspect that some of these subjects were merely late in their development of heterosexual interests, and would be interested in the opposite sex in college even though not in high school. Therefore, subjects were also asked if they were more interested in dating now than in high school. The number of subjects who had neither gone steady nor had increased sexual interest as compared to high school was 22 percent of the anhedonics, 5 percent of the perceptual aberration, and 3 percent of the control subjects. The difference between anhedonic and control subjects was significant, $\chi^2 = 8.47$, $p < .01$.

Another way of viewing heterosexual interests is in terms of preference for spending time with the opposite sex. This preference was rated on a 3-point scale, with a 1 indicating a preference not to spend much time now with the opposite sex, and a 3 indicating a definite desire to spend time with the opposite sex. The mean ratings were anhedonic 1.96, perceptual aberration 2.17, and control 2.36. The anhedonic group differed from the control group, $t = 2.64$, $p < .01$.

Composite score for schizotypal features. The SADS-L groups a variety of schizotypal features under six clusters, and gives 1 point for each. A score of 1 point is interpreted as evidence for "probable schizotypal features" and 2 points is interpreted as "definite schizotypal features." The symptoms that should enter each cluster are suggested only in loose descriptive terms by the SADS-L, and the operationalism of those principles in a scoring scheme is not specified. The scoring system that follows represents our own interpretation of the SADS-L criteria for each of the six clusters, using data from both interviews. The data from the present
study were sufficient to score five of the six clusters. The sixth cluster, inadequate rapport, was omitted because of serious problems of interjudge reliability. One point was assigned for each of the following five symptoms:

1. Feeling physically cut off from other people, or out-of-body experiences, or dissociation, or depersonalization, or derealization, or a score for voice experiences or other auditory hallucinations of "4" or above, or visual experiences rated "4" or above on our scale for psychotic and psychotic-like experiences.
2. Aberrant beliefs rated "5" or above, or transmission of thoughts rated "4" or above.
3. Ideas of reference; extreme suspiciousness; or paranoid ideation.
4. Odd communication.
5. Social isolation as previously scored.

Unlike the SADS-L procedure, we rated every subject on these schizotypal symptoms regardless of whether he or she qualified for another diagnosis.

At least two of the five schizotypal features were shown by 18 percent of the anhedonics, 49 percent of the perceptual aberration subjects, and 3 percent of the control subjects. The anhedonics were more often schizotypal than the control subjects, exact test, \( p < .01 \), as were the perceptual aberration subjects, \( \chi^2 = 34.01, p < .001 \).

Using this 5-point scoring scheme, the mean scores were anhedonics, .72; perceptual aberration subjects, .16; and control subjects, .36. The anhedonics exceeded the control subjects (\( t = 1.97, p < .05 \)), as did the perceptual aberration subjects (\( t = 7.35, p < .001 \)).

Depression and Mania. The SADS-L diagnostic criteria were used to evaluate the presence of manic and depressive symptoms. A number of our subjects qualified for major or minor depression. None qualified for manic syndrome, although a number qualified for hypomanic episodes.

**Major depressive syndrome and minor depressive disorder.** The criteria for major depressive syndrome in the SADS-L are somewhat lenient. A person is diagnosed as having had a major depressive syndrome if he meets each of three criteria. These are:

1. One or more distinct periods, lasting at least 1 week during which he was bothered by depressive or irritable mood, or had pervasive loss of interest or pleasure (other than a grief reaction).
2. Sought or was referred for help during a dysphoric period, or took medication, or showed impaired functioning.
3. Had at least three symptoms associated with the most severe period of depressed or irritable mood or loss of interest or pleasure. These symptoms are (a) poor appetite or weight loss or increased appetite or weight gain, (b) trouble sleeping or sleeping too much, (c) loss of energy, easily fatigued or feeling tired, (d) loss of interest or pleasure in usual activities or sex, (e) feeling guilty, worthless, or down on oneself, (f) trouble concentrating, thinking, or making decisions, (g) thinking about death or suicide, (h) being unable to sit still or having to keep moving, or the opposite—feeling slowed down or having trouble moving.

The SADS-L criteria for minor depressive disorder resemble those of major depressive syndrome, except that the episodes must be nonpsychotic and need not occur in distinct periods, and may be diagnosed with only two of a somewhat longer list of symptoms under Criterion #3.

Criterion #2 is the same as for major depression, but we interpreted it more leniently. The SADS-L questions and research diagnostic criteria treat the act of talking to a friend about one's depression as meeting Criterion #2 of seeking help. We did not consider that talking about one's problems with one's friends or one's family was sufficient to satisfy this criterion for the major depressive syndrome, but that it did for minor depressive episodes. Similarly, we interpreted impairment of functioning rather strictly for major depressive syndrome, requiring impairment as serious as failure to attend school or one's job or not talking to one's family for more than 1 day. Under minor depressive syndrome, the criterion of impaired functioning was judged to be satisfied by lowered performance in work or by uncharacteristic irritability or quietness. A subject could not be scored for minor depression if he was diagnosed as having had a major depressive syndrome.

The subjects who met the criteria for major depressive syndrome were 8 percent of the anhedonic, 17 percent of the perceptual aberration, and 3 percent of the control subjects. The perceptual aberration group exceeded the control group on this diagnosis, \( \chi^2 = 5.60, p < .02 \).

The subjects meeting the criteria for minor depressive disorder were 10 percent of the anhedonic, 31 percent of the perceptual aberration, and 30 percent of the control subjects. The anhedonic group included fewer such subjects than the control group, \( \chi^2 = 5.79, p < .02 \), but the groups did not differ significantly on total number of subjects diagnosed as having had either major or minor depression.

Hypomanic episodes (8 percent of the anhedonic, 22 percent of the perceptual aberration, and 6 percent of
the control subjects). The SADS-L criteria for hypomanic episodes are:

1. At least one 2-day period with elevated mood or irritability that is more than just feeling good and that is unrelated to drugs or alcohol intake.

2. At least two manic symptoms associated with a euphoric period or three symptoms associated with an irritable period. The symptoms include (a) increased activity or physical restlessness, (b) increased talkativeness, (c) thoughts racing or speech confused, (d) grandiosity, (e) lessened need for sleep, (f) distractibility, and (g) foolish actions.

The perceptual aberration group exceeded the control subjects on this diagnosis, $\chi^2 = 5.38, p < .02$.

The finding of affective symptoms in the perceptual aberration group may indicate that at least some of these subjects are at risk for affective psychosis. Yet, there was not a statistically significant relationship between the history of affective symptoms and the history of psychotic or psychotic-like symptoms. Of 11 perceptual aberration subjects with psychotic symptoms (at least one score of 6 or above), eight had an affective symptom. Of 54 perceptual aberration subjects without psychotic symptoms, 29 had an affective symptom. The relationship between the two was not significant, $\phi = .14$, $\chi^2 = .69$, NS. Similarly, there was no significant relationship between affective symptoms and a composite score of psychotic and psychotic-like symptoms, $\phi = .20$, $\chi^2 = 1.72$.

**History of having seen a psychiatrist or psychologist** (2 percent of the anhedonic, 14 percent of the perceptual aberration, and 3 percent of the control subjects). We asked our subjects if they had ever seen a psychologist, psychiatrist, or other mental health professional for other than vocational and academic counseling. The perceptual aberration subjects tended to exceed the control subjects on this report, $\chi^2 = 3.67$, $p < .06$.

Two of the male perceptual aberration subjects reported that they had been hospitalized, one for manic-depressive psychosis and one for “nervous breakdown.” The latter subject described symptoms during his hospitalization which included delusions, hallucinations, and passivity experiences.

**Discussion**

If one considers psychotic, psychotic-like, and schizotypal experiences to be valid indicators of proneness to psychosis, then the present study yields strong evidence for the predictive validity of the perceptual aberration scale and suggestive evidence for the scale of physical anhedonia. As compared to nondeviant controls, perceptual aberration subjects reported many more such experiences, including voice experiences and other auditory hallucinations, aberrant beliefs, visual experiences, depersonalization and out-of-body experiences, ideas of reference, extreme suspiciousness and paranoid ideation, difficulty concentrating, complaints of mixed up speech, deviant vocalization, odd communication, aberrant visual experiences, social withdrawal, a higher composite score for schizotypal features, and histories of having seen a psychologist or psychiatrist. In addition, the perceptual aberration subjects were more likely to have met the criteria for major depressive disorder and hypomania. In contrast, persons deviantly high on physical anhedonia did not significantly exceed control subjects on number of psychotic or psychotic-like experiences. Nonetheless, anhedonics were more often socially withdrawn, had fewer dates, less often went steady with a member of the opposite sex, did not have increased sexual interest since high school, and had higher composite scores for schizotypal features.

Thus, the perceptual aberration scale identifies subjects who are psychotic-like and schizotypal. Many of these subjects show affective symptoms, but they are not necessarily the same perceptual aberration subjects who are psychotic-like. One must consider the possibility that the perceptual aberration scale may identify two or more groups of subjects who may be at risk for different forms of psychosis. For example, some of them may be at risk for psychosis that will be labeled affective disorder or schizoaffective disorder, and others may be at risk for psychosis that will be labeled schizophrenia or schizophréniform disorder. The anhedonic subjects do not report psychotic-like symptoms, but report more schizotypal symptoms and are more socially isolated and withdrawn and less interested in the opposite sex. The anhedonics had been identified by a scale of physical anhedonia, not social anhedonia. The items of the scale had been chosen to minimize social content and included no heterosexual items. The finding that persons high on this physical anhedonia scale were socially withdrawn and had reduced interest in the opposite sex probably indicates that a general capacity for physical pleasure is part of the basis of both social and heterosexual interaction. (We might add that many of the anhedonics, as well as some of the perceptual aberration subjects, appeared to the interviewers to be emotionally flat, although we abandoned for the time being an attempt to rate...
However, we view the results of the study of such deviant individuals can only elegantly demonstrate the pitfalls of ignoring base rates when making predictions of this nature. Nonetheless, it is our belief that greater understanding of the psychotic disorders will accrue from prospective studies of high-risk individuals than from retrospective or cross-sectional studies of active psychotics, in which potentially confounding variables (e.g., medications, hospitalization) often cloud the results. Thus, we view as important the search for valid indices of psychosis-proneness. This study is a step in that direction.

References


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American Psychopathological Association Meeting

The Annual Meeting of the American Psychopathological Association (Paula Clayton, M.D., President) will be held at the Sheraton Centre Hotel, New York, NY, March 5-March 7, 1981. The theme of the meeting is Treatment of Depression—Old Controversies and New Approaches. Papers from invited guests will be presented in plenary sessions on theory and research in depression. The final day will be reserved for brief communications from members of the American Psychopathological Association.

CME Credit is offered. Further information on registration may be obtained from:

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