

PHYSIOLOGICAL RESPONDING IN ANHEDONIC AND PERCEPTUALLY
ABERRANT COLLEGE STUDENTS

A Thesis

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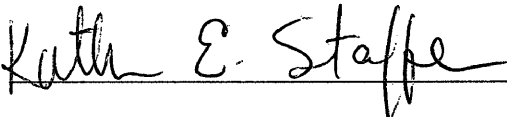
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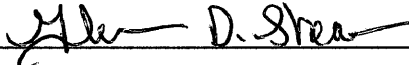
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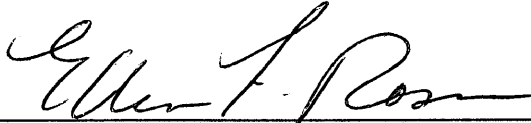

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Abstract

This study examines some of the relationships between vulnerability to psychosis as measured by psychometric scales and skin conductance orienting response in college students. A series of scales developed by L. and J. Chapman and their associates including the Physical Anhedonia Scale (1978), the Social Anhedonia Scale (1982), the Perceptual Aberration Scale (1978) and the Magical Ideation Scale (1983) were given to 256 undergraduate students. Baseline skin conductance responses, magnitude of stimulus associates responses, and number of non-stimulus-associated responses to a series of auditory and visual stimuli were measured for three groups of subjects, high scorers on the combined Anhedonia scales, high scorers on the combined Perceptual Aberration/Magical Ideation scales and a group with low scores on all scales.

It was predicted that the students who scored high on the Anhedonia scales would show hyporesponsive patterns of response while high scorers on the Aberration/Ideation scales would show a hyperresponsive pattern. Overall baseline conductance was analyzed using two 3 (Group) x 12 (Responses) repeated measures ANOVA's one for visual and a second for auditory stimuli.

Results indicate that for the auditory stimuli only the Perceptual Aberration/Magical Ideation group was significantly different from the control group. No other significant results were found. Results are discussed in terms of Meehl's (1989, 1990) reformulation of the schizotaxia construct.

**Physiological Responding in
Anhedonic and Perceptually Aberrant College Students**

Introduction

A large body of current research in schizophrenia has focused on identifying possible patterns of "risk" i.e., people with family histories of the disorder as well as those with perceptual abnormalities, affective disturbances, and/or eccentric cognitions as measured by a number of scales. Rado (1954, as cited in Meehl) first proposed a personality organization called schizotypy. The behavioral characteristics of this personality organization include anhedonia, a "marked, widespread, and refractory defect in pleasure capacity" (p. 829), affective impoverishment, impaired capacity for empathy, and social dependency. Rado incorporated this concept into his diathesis model of schizophrenic development. In this model, the schizotypal person with good coping skills will not develop a severe form of schizophrenia but those who do not cope well will develop the disorder.

Meehl (1962) expanded Rado's model of schizotypic predisposition to schizophrenia to include cognitive slippage, slightly disordered patterns of thought, as well as anhedonia. He proposed that a neural integrative defect (schizotaxia) led to a personality pattern (schizotypy) characterized by social withdrawal, inappropriate behavior, and perhaps deviant logic. Only a subset of people with schizotypic personality patterns however were thought to develop actual schizophrenia. Meehl (1989, 1990) has recently revised his

model by reducing the emphasis on anhedonia, which he now calls hypohedonia to reflect the fact that even the most decompensated schizophrenic may occasionally take pleasure at something, and by specifying the proposed neural integrative deficit.

Meehl (1989, 1990) proposes the following causal chain for schizophrenia: a single dominant gene (the schizogene) causes a neuronal integrative deficit consisting of "a functional aberration of the synaptic control system" (1990 p.12) that in turn leads to soft neurologic signs, cognitive slippage, and aversive drift when reinforcement schedules are mixed (positive/negative). This series of deficits in turn leads to anhedonia, ambivalence, and social fear which leads to inappropriate social behavior, and as social interactions become increasingly bizarre, lead to what Meehl terms accessory symptoms; delusions, hallucinations and catatonia, (1989 p.941). This model is thus concerned with the underlying structures of the developing disorder not with the florid end symptoms that are characteristic of schizophrenia. Meehl's model seems broad enough to adequately cover many of the symptoms of both schizotypy and schizophrenia.

The behavioral features of schizotypy include, oddness of speech, feeling different from others in a negative sense, impulsivity, extreme anger, derealization, depersonalization, and unusually acute or dulled senses (Fujioka

& Chapman, 1984). In Meehl's (1989, 1990) model these features lead to aversive drift, a pattern in which experiences become increasingly negative due to continual mixed (negative/positive) reinforcements. Meehl maintains that only about 10% of true genotypic schizotypes will experience a schizophrenic breakdown while 90% will exhibit subclinical symptoms. The genetic vulnerability does not lead directly to schizophrenia, it must be combined with what Meehl terms potentiators, personality variables that reduce the likelihood of positive social interactions. These include, submissiveness, hypohedonia, anxiety, introversion, and trauma. The genetic loading combined with these various personality factors increases vulnerability to breakdown but the person will not experience a schizophrenic episode in the absence of adverse life events, the factor Meehl calls "bad luck". Thus the model proposes a number of necessary but not sufficient steps for an episode of schizophrenia.

In their similar vulnerability model of schizophrenia, Zubin & Spring (1977) state that each person has a different vulnerability to many disorders including schizophrenia. This vulnerability is thought to result from interactions between genetic and environmental factors. The schizotypic predisposition, when combined with various life stresses can cause an episode of schizophrenia. They state that "the primary persistent characteristic of the schizophrenic is vulnerability, not disorder. Life stresses and problems with

adjustment lead to manifestations of disorder" (p. 117).

The stress–diathesis model of schizophrenia has stimulated two avenues of research. Initial studies attempted to identify marker traits in the offspring of diagnosed schizophrenics. This research generated some interesting results in areas such as the relationship between family functioning and the age of onset and course of the disorder (Hans & Marcus 1987). A group led by Mednick (Mednick & Schulsinger 1968; Mednick, Parnas, & Schulsinger 1987), has studied the children of severely schizophrenic mothers over a number of years. Those children who later developed some type of psychiatric illness were compared to those with no signs of illness. The "sick" group was found to have a very fast GSR recovery time, greater amplitude of response, shorter response latency, and poorer habituation to stimuli than the "normal" group. The authors propose that brain damage, especially that occurring in the second trimester of gestation, may lead to increased risk for schizophrenia.

A number of researchers have proposed that paper and pencil tests that measure aberrations in perception, cognition, and social functioning could be useful in assessing non–psychotic people who may be at risk of developing schizophrenia. This research implies that there is a continuum of functioning from normal behavior to severe schizophrenia and those nearer the schizophrenia end of the spectrum are at increased risk for developing the full

disorder. This dispositional view of psychiatric disorder assumes a continuity between clinical and subclinical behavior or disposition (Hewitt & Claridge, 1989). Lenzenweger & Loranger (1989) have stated "the assumption that individuals at heightened risk for schizophrenia will display some evidence of that latent liability in their psychological functioning suggests that a useful research and clinical approach would involve detection and evaluation of those indicators of schizotypy" (p.902).

A group headed by L. and J. Chapman has attempted to do just that by developing a number of scales that measure different aspects of schizotypy, these include the Chapman, Chapman, and Raulin (1976) Physical Anhedonia Scale designed to test Meehl's hypothesis that anhedonia may be a trait marker for a genetic diathesis in psychosis. The Chapman group has also developed scales measuring social anhedonia, (Eckblad, Chapman, Chapman, & Mishlove, 1982), perceptual aberration, (Chapman, Chapman, & Raulen, 1978), and magical ideation (Eckblad, & Chapman, 1983). These scales have been developed as measures of different traits associated with the Rado and Meehl definitions of schizotypy. The scales appear to measure at least two separate subsets of the schizotypal personality, a positive and a negative set of behavioral indicators.

A series of positive symptoms such as unusual bodily perceptions and

deviant beliefs are explored in the Perceptual Aberration and Magical Ideation Scales. For example, on the Perceptual Aberration Scale (PAB) questions include, "Sometimes I have felt that I could not distinguish my body from other objects around me" (an answer of true is scored positively). The Magical Ideation Scale (MID) measures beliefs in relationships between events which are not causally related "Numbers like 7 and 13 have no special powers", (an answer of false is scored positively).

Other scales seem to measure a withdrawn negative trait associated with schizotypal vulnerability. These include the scales for Physical and Social Anhedonia which measure level of interest in activities which many people find pleasurable. A representative question from the Social Anhedonia Scale (SAN) is "Having close friends is not as important as many people say" (true scored positively). The Physical Anhedonia Scale (PAN) includes items such as "The taste of food has always been important to me" (false scored positively).

Perceptual Aberration and Physical Anhedonia scores have been found to be uncorrelated (Chapman, Edell, & Chapman, 1980). The Perceptual Aberration/ Magical Ideation Scales and the two Anhedonia Scales are each highly correlated however and often used together to assign subjects to two separate groups (Chapman, Chapman, & Miller, 1982).

Bentall, Claridge, & Slade, (1989) used a factor analytic procedure to

examine a number of scales which attempt to measure schizotypal traits and discovered a positive factor with high loadings on the PAN and MID scales and a negative factor with high loadings on the anhedonia scales. The two types, anhedonic-withdrawn, with deficits in social functioning, and perceptually aberrant, with odd cognitive beliefs, seem to roughly parallel the positive and negative symptom clusters observed in diagnosed schizophrenia.

Hewitt & Claridge (1989) used a factor analytic technique to evaluate the structure of a schizotypy scale (the STQ that was designed using the DSM-III criteria for schizotypy) on a normal population. They found that the scale consisted of three main factors, magical thinking, unusual perceptual experiences, and paranoid ideation, the first two of these parallel very closely the Chapman scales for perceptual aberration and magical ideation, while the third seems to tap anhedonia and extreme withdrawal. This would provide some indication of criterion validity for the Chapman Scales used in this experiment.

Other researchers have attempted to assess the construct validity of the Chapman scales by giving them to people suffering their first lifetime episode of psychosis with diagnoses of schizophrenia, major depression, bipolar disorder, or schizophreniform disorder; immediate relatives of the patients, and normal controls. Katsanis, Iacono, & Beiser (1990) found that the scores of

psychotic patients with different diagnoses did not differ significantly. The combined psychotic group had the highest scores on the Physical Anhedonia, Social Anhedonia and Perceptual Aberration scales, their relatives scored significantly higher than normal controls on both of the anhedonia scales as well. This supports the idea of a continuum between normal and schizophrenic patterns on these scales with patients scoring highest, and those closely genetically linked to the patients having slightly elevated scores as well. This result further suggests that these scales may measure a predisposition to psychosis of all kinds not just to schizophrenia.

Chapman & Chapman (1987) have begun a follow-up study to track individuals with high scores on these scales and determine if they do in fact have higher rates of psychosis. They found that 25 months after the administration of the Perceptual Aberration/Magical Ideation and Physical Anhedonia Scales, 22% of the PAB/MID group had sought professional psychological or psychiatric help while only 7% of the anhedonia and control groups had done so. Three of their 162 PAB/MID subjects were diagnosed as psychotic during the follow-up period while none of the other subjects were hospitalized for psychosis. Studies using this scale support the hypothesized continuum between slight cognitive aberrations and the later development of more severe cognitive disturbances.

Chapman (1979) reviewed the literature that deals with possible measures of cognitive disorder that may indicate vulnerability to schizophrenia, these include; deficiencies on the continuous performance task, reaction time cross-over, difficulty with object sorting tasks, communication deviancy, distractibility, as well as iconic, and verbal memory problems. The wide range of differential abilities between normals and those hypothesized to be at risk for psychosis indicates that the vulnerability may be global in nature and can be expressed to varying degrees.

All of these are separate studies and little work has been done to look at a number of these factors in a single group of subjects. Differences between those hypothesized to be at risk for schizophrenia and controls have also been found in physiological as well as cognitive measures, for example those proposed to be at risk for schizophrenia have visual pursuit tracking disturbances (Clementz, Sweeney, Hirt, & Haas, 1990). Other physiological measurements including electrodermal responding have also been studied in schizophrenics and those hypothesized to be at risk for the disorder.

Identification of possible atypical patterns of electrodermal activity in schizophrenics prompted a great deal of research (Ohman, 1981; Bernstein, 1987) Dawson & Nuechterlein, (1984) found that some categories of schizophrenic patients showed an absence of skin conductance orienting

response to stimuli as well as an increased sympathetic nervous system arousal. Ohman et al (1989) found that this hyporesponsive pattern was associated with poor social functioning, withdrawn behavior, and poor outcome in hospitalized schizophrenics. Other researchers have found different patterns, Gruzelier and Venables (1972) found a bimodal pattern, schizophrenics were either nonresponders or nonhabituated. Thus when schizophrenics respond to stimuli they often show electrodermal hyperresponsivity which may indicate a deficient pattern of filtering out irrelevant stimuli from the outside world. Other researchers have also reported that schizophrenics show this hyperresponsive pattern of skin conductance, they over-respond and fail to habituate, (Zahn, Rosenthal, & Lawlor, 1967).

Levinson and Edelberg and their colleagues (1984, 1985), have proposed a possible explanation for the apparently different forms of responsiveness to stimuli among schizophrenic patients. They propose that the discrepancy is not due to different response patterns of the subjects but to different scoring criteria and latency windows. They recommend that a two trials to habituation criteria and a shorter than standard post-stimuli response window be used to minimize instances in which spontaneous activity is counted as response to stimuli. Using these criteria, they argue that schizophrenics are generally found to be either nonresponders or fast habituated.

This avenue of research has been expanded to those predicted to be at risk for schizophrenia as well as those diagnosed with the disorder. Simons, (1981) found that subjects selected using Chapmans' PAN and PAB scales showed support for the hypothesis that Anhedonic subjects would demonstrate the hyporesponsive pattern parallel to that of many diagnosed schizophrenics. Simons however was unable to support the hypothesis that Perceptual Aberration subjects would be more likely to hyperrespond to stimuli. This may have been caused by the scoring criteria problem addressed by Levinson and Edelberg (1985).

While there have been a number of conceptual and methodological concerns related to this area of research, there does appear to be a link between schizotypy and clinical schizophrenia and there is an established connection between the scales used here to classify subjects into the aberration and anhedonic groups and the definition of schizotypy as proposed by Rado and Meehl. This study examines possible relationships between schizotypy as defined by the series of Chapman scales and electrodermal habituation. Due to the nature of the habituation model, attentional deficits could confound any results. To reduce the influence of this possible confound a control task has been designed to measure attention. It is anticipated that groups will not differ in performance on this task.

This study will attempt to examine electrodermal responsivity to visual stimuli for high scorers on the Perceptual Aberration/Magical Ideation scales and the two Anhedonia Scales using the restrictive criteria of Levinson and Edelberg (1985). It is hypothesized that:

1. The overall pattern of responses for the full set of scales will be similar to those found by the Chapman group. The means, sd's, and approximate numbers of high scorers in each group will be similar for the Chapman data and that collected in this study.
2. The anhedonic group, due to the expected hyporesponsive pattern, will have fewer non-stimulus associated responses than normals and the aberrant/magical ideation group will have more of these responses than controls due to their expected hyperresponsive pattern.
3. The aberration group will show larger skin resistance changes in response to the stimuli than the control or anhedonia group. The anhedonia group will show smaller resistance changes in response to stimuli than the aberration or control groups.
4. The anhedonia group will show a hyporesponsive pattern compared to the aberration/ideation group and controls in their overall baseline rate while aberration/ideation subjects will show hyperresponsive baseline rate patterns compared to anhedonic and control subjects.

Method

Subjects

The Magical Ideation, (Eckblad & Chapman, 1983), Perceptual Aberration, (Chapman, Chapman, & Raulin, 1978), Social Anhedonia (Eckblad, Chapman, Chapman, & Mishlove, 1982), and Physical Anhedonia, (Chapman, Chapman, & Raulin 1976) scales were administered to 256 undergraduates in introductory psychology, 172 females and 82 males. The four scales were combined into positive and a negative groups by adding the scores for the Aberration and Magical Ideation scales into a positive scale, and the two Anhedonia scales into a negative scale. Students scoring in the top quartile of scores for their gender on either the combined Perceptual Aberration/Magical Ideation or the Anhedonia scales were telephoned and asked to participate in the physiological testing portion of the experiment. Any subject scoring 3 or more on the Chapman infrequency scale (items rarely endorsed) was eliminated from the study.

A control group was selected at random from the students who scored near or below the means for their gender on all of the tests. The control group consisted of 16 subjects, 13 female and 3 male, the Perceptual Aberration/Magical Ideation group was made up of 10 females and 5 males, and the anhedonic group contained 9 females and 6 males. The gender ratio

reflects the almost 2:1 ratio of females to males in Introductory Psychology this year as well as differences in the average scores for males and females. The subjects received one hour of credit toward completion of a course research requirement for participation.

Apparatus

Attentional Task:

In order to control for overall differences in attention a computer generated task was utilized. The task was a self-paced modified signal detection laboratory experiment that when run flashed a random series of fifty P's onto the screen, 50% of the time a capital Q was randomly located on the screen. The subjects were asked to respond by pressing the Y or N keys to indicate if the Q had appeared on the screen for each trial. When the subject responded N the screen indicated that they should press C for the next trial. When the subject responded Y a new screen appeared which then asked the subject to specify where they had seen the Q. This screen consisted of text which indicated that they were to press the keys which corresponded to the quadrant of the screen in which the Q appeared.

The quadrant commands were UR for the upper right quadrant, LL for the lower left, UL for the upper left, and LR for the lower right. Subjects were given five practice trials after the task was explained to them. If they had no

further questions they were instructed to be as accurate as possible and go as quickly as they could through the 35 test trials.

Orienting–Habituation Task:

An E&M physiograph Model 1001 was used to record electrodermal response data. Visual stimuli were produced by a General Radio Company strobe generator (Strobotac type 1531–A). The visual stimulus appeared as a rapidly flashing light with a .5 second duration. The auditory stimuli were produced by a Beltone model 10D tone generator. The 80 dB, 1000 Hz. tone had a 1 second duration. Intertrial intervals were variable to allow for calibration of equipment and return of subject EDR to a stable level. Intervals were not less than 15 nor more than 45 seconds.

Procedure

The experiment was explained to the subjects in everyday language. The participants were told that they would perform the attention task on a computer and then electrical changes in the skin would be measured during a series of light and sound stimuli presentations in the next room. Both written and verbal informed consent were obtained for each subject. Subjects selected had been classified into three groups, the positive group being those with high scores on the Perceptual Aberration and Magical Ideation scales, the negative group with high scores on the Anhedonia scales and the control group which

consisted of people with low scores on both combined scales. Any subject who scored in the high range on both dimensions was not used.

Due to the flashing nature of the visual stimuli the physiological testing proceeded only once each subject had stated that they did not suffer from any type of seizure disorder. After the procedure was further explained to them and any questions had been answered subjects were seated and EDR electrodes were attached to the tips of the index and ring fingers of their right hand. A resting baseline measurement of skin resistance was recorded. After a two minute acclimatization period a series of 12 consecutive auditory stimuli and 12 consecutive visual stimuli were presented to each subject. The variable intertrial interval allowed the experimenter to record the trial number, changes in baseline resistance, and to allow the subject to return to a relatively quiescent state.

Results

Means and standard deviations for the full series of Chapman scales given to 1610 undergraduates at the University of Wisconsin were obtained from the Chapman group (L. Chapman, December, 1989 personal communication). For our sample of 256 undergraduates the means were found to be somewhat different from those of the Chapman sample.

Insert Figure 1. about here

Females were found to have higher scores on the positive dimension (the Perceptual Aberration/Magical Ideation scales) while males scored higher on the anhedonia scales. This observation was true for both the Chapman sample and the William & Mary sample, however males in the Chapman sample reported much higher scores on both of the anhedonia scales than males at William & Mary. The only significant gender difference found for the four scales in the William & Mary sample was for the Physical Anhedonia scale $t(171, 81) = -4.64, p < .001$, with males scoring significantly higher than females.

A Pearson correlation coefficient was computed for the two anhedonia scores and for the aberration/ideation scales to determine if the relationships between the scales was similar to the pattern described in factor analytic studies of these scales (Bentall, Claridge, & Slade, 1989). It was predicted that the aberration and ideation scales would be highly correlated and the anhedonia scales would also be highly correlated. The two dimensions would be negatively correlated with each other.

Insert Table 1. about here

The overall correlation for William & Mary subjects for the aberration/magical ideation scales was $r = .661$ $p > .001$, and for the two Anhedonia scales $r = .422$ $p > .001$. Thus the organization of the four scales into two groups is supported. In contrast to Chapman's results, however, subject scores on the Social Anhedonia scale seem to correlate positively with both the Magical Ideation $r = .246$ $p < .05$ and the Perceptual Aberration Scale $r = .298$ $p < .05$. According to the Chapman model, these correlations were expected to be negative. The results indicate that the Social Anhedonia scale does not fit neatly into the grouping pattern. A further breakdown of the correlations by gender indicated that males show a significantly higher correlation between Social and Physical Anhedonia than females (z obs = 2.19).

Insert Table 2. about here

The prediction that there would be group differences in the number of non-stimulus associated responses was tested using two one-way ANOVA's,

one for the auditory and a second for the visual stimuli. A non-stimulus associated response was defined as any response of characteristic shape, at least 2 K in magnitude that occurred less than 1.0 or more than 2.5 seconds after stimulus onset. There were no significant differences between the groups for the number of overall skin conductance responses during the visual or auditory stimuli series. This finding does not support the hypothesis that the Perceptually Aberrant/Magical Ideation subjects should show a more hyperresponsive pattern while the anhedonic group show a hyporesponsive pattern.

A 3 (group) x 12 (trials) repeated measures ANOVA performed on the amount of resistance change to each stimuli found no differences between the groups. The responses that occurred within the 1.0–2.5 second interval after stimulus onset, had a magnitude of at least 2 K and were of characteristic shape, were counted as stimulus related responses. Response magnitude in who was analyzed. All of the groups showed typical patterns of habituation to stimuli.

Insert Figure 2. about here

Insert Figure 3. about here

An examination of the individual patterns of response indicated that in the auditory condition 15 subjects responded to two or fewer of the stimuli and were called non-responsive. Twenty two of the subjects habituated to the series of stimuli, their response magnitude decreased across the series of trials, and the responses of 6 subjects either remained the same throughout the series or increased between the first and the final trial, these subjects were called hyperresponsive. For the visual condition there were 8 nonresponsive, 27 habituators and 9 hyperresponsive subjects. There were no group differences in the number of nonresponsive or hyperresponsive subjects.

In order to analyze the data for the final hypothesis GSR records were initially scored by converting skin resistance scores to their reciprocal, skin conductance, using the standard transformation formula ($C \text{ in mho} = 1000/R \text{ in kilohms}$ Greenfield & Sternbach, eds 1972). This was done to satisfy current convention that EDR of this type be reported in terms of conductance rather than resistance (Fowles et al, 1981; Lykken, & Venables, 1971).

The main hypothesis that there would be group differences in baseline conductance rate was tested by two 3(group) x 12(responses) repeated measure

ANOVA's, one for the auditory and a second for the visual stimuli. The ANOVA design was chosen because of the skewed distribution of the scores, the Chapmans indicate that only a small percentage of college students will score within the upper range on any one scale, thus the important high scoring subjects appear very infrequently. For the auditory series a significant between-group difference was found $F(2,43) = 3.522, p = .038$. For the visual condition a marginally significant result was found, $F(2,43) = 3.076, p = .056$.

Insert Table 3. about here

As indicated in Figures 2 and 3, for both the visual and auditory conditions the Perceptual Aberration/Magical Ideation group had the highest overall baseline conductance rate, the anhedonic group had the next highest scores with the normal group having the lowest baseline rate.

Insert Figure 4. about here

Insert Figure 5. about here

A post hoc Tukey's honestly significant difference test performed on the data from the auditory condition indicated that only the Perceptual Aberration and control groups differed significantly ($p > .05$). A series of two one-way ANOVA's performed on the data from the attention task found no differences between the groups for either the percentage of correct responses or in the elapsed time required to complete the task.

Discussion

It was proposed that the two sets of scales used here would select two distinct groups of subjects who manifest different aspects of Meehl's multifaceted concept of schizotypy as well as different patterns of electrodermal responsivity. The nature of these differences could be an important clue in the examination of how mental illness develops.

The final hypothesis that the anhedonia group would show a hyporesponsive baseline pattern while the Perceptual Aberration/Magical Ideation group would be hyperresponsive was partially supported by the finding that in the auditory stimulus condition the aberration/ideation group had significantly higher baseline conductance rate than the control group while for the visual condition a similar but less strong result was found. This indicates that the aberration/ideation group may be less able to screen out irrelevant stimuli from the environment (Gruzelier & Venables, 1972) this would seem

consistent with the types of unusual experiences reported by subjects to other researchers. The pattern of results was the same for both the auditory and visual conditions with Perceptual Aberration/Magical Ideation subjects having the highest levels of baseline conductance, the Anhedonic group next and the control group having the lowest mean scores. We did not find that the anhedonic group differed from the control group for either stimulus series. This may be due to the initial gender differences in the correlations between Social Anhedonia and the Perceptual Aberration and Magical Ideation scales. The fact that the correlations did not fit the factor analytic model that was used to divide the scales into positive and negative dimensions may have confounded these results.

This may have been related to the subject selection methods that were used here. Due to the limited number of subjects that could be given the full set of scales the cut-offs used were less stringent than those used by the Chapman group. Rather than the Chapman cut-off of 2 standard deviations above the mean, subjects scoring in the top quartile for their gender were selected for testing. This modification of the Chapman procedure served to increase the number of false positives in our sample and thus led to the inclusion of 'normal' subjects into our Anhedonic and Perceptual Aberration/Magical Ideation groups.

The differences between the Chapman and William & Mary samples in the overall pattern of scores on the scales is also of interest in assessing the results of this study. The much larger numbers of females than males in the initial sample as well as the uneven number of males and females in the experimental and control groups is of concern. Along with differences in the numbers of male and female subjects obtained there are also gender differences in response patterns with males scoring higher on both Anhedonia scales and females scoring higher on the Perceptual Aberration/ Magical Ideation scales. Follow-up studies should include a larger, more gender balanced initial sample and a larger number of subjects per cell to allow for interpretation of possible gender by group interactions.

A further difference between the Chapman and William and Mary samples is the correlation of Social Anhedonia with the positive dimension scales. The correlation was expected to be negative but was significant in the positive dimension. This could contribute to the lack of a significant difference between the Anhedonia and both the Perceptual Aberration/Magical Ideation and control groups by confounding the separation of the four scales into the positive and negative dimensions.

Meehl has stated in his recent work (1989, 1990) the key is lies not in psychometric instruments that are a number of steps removed from the direct

measurement of vulnerability but with investigation of soft neurology such as smooth pursuit eye movement.

This type of work on the subscales of schizotypy and the use of physiological measurement can lead to increased reliability in diagnosis of schizophrenia and other forms of psychosis and most importantly a better understanding of some of the many factors leading to mental illness. Follow up studies of those classified as psychosis-prone using the psychometric scales need to be completed to further assess the criterion validity of the scales and the usefulness of the schizotypy construct.

The multifaceted and extremely complex interactions of the various genetic, social and developmental influences on the development of mental health and mental illness means that there is no simple answer and no simple direction for research to take.

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Table 1.

Correlations for all W&M subjects

	Scale			
	MID	PAB	SAN	PAN
Magical Ideation (MID)	---			
Perceptual Aberration (PAB)	0.661***	---		
Social Anhedonia (SAN)	0.246*	0.298*	---	
Physical Anhedonia (PAN)	-0.129	-0.144	0.422*	---

N=254; * <.05, ** <.01, *** <.001

Table 2.

Separate Correlations for Males and Females

	Males				Females			
	MID	PAB	SAN	PAN	MID	PAB	SAN	PAN
MID	---				---			
PAB	0.695***	---			0.650***	---		
SAN	0.221*	0.262*	---		0.301**	0.333***	---	
PAN	-0.116	-0.169	0.537***	---	-0.09	-0.132	0.291**	---

Male N=82

Female N=172

Table 3.

ANOVA tables for baseline conductance for auditory and visual conditions

Auditory condition

Source	S.S.	D.F.	M.S.	F	p
group	54.44	2	27.22	3.52	.038
error	332.30	43	7.728		

Visual condition

Source	S.S.	D.F.	M.S.	F	p
group	45.52	2	22.76	3.07	.056
error	318.18	43	7.40		

Figure Captions

Figure 1. Comparison of William & Mary and Chapman scores for the Magical Ideation, Perceptual Aberration, Social Anhedonia, and Physical Anhedonia Scales

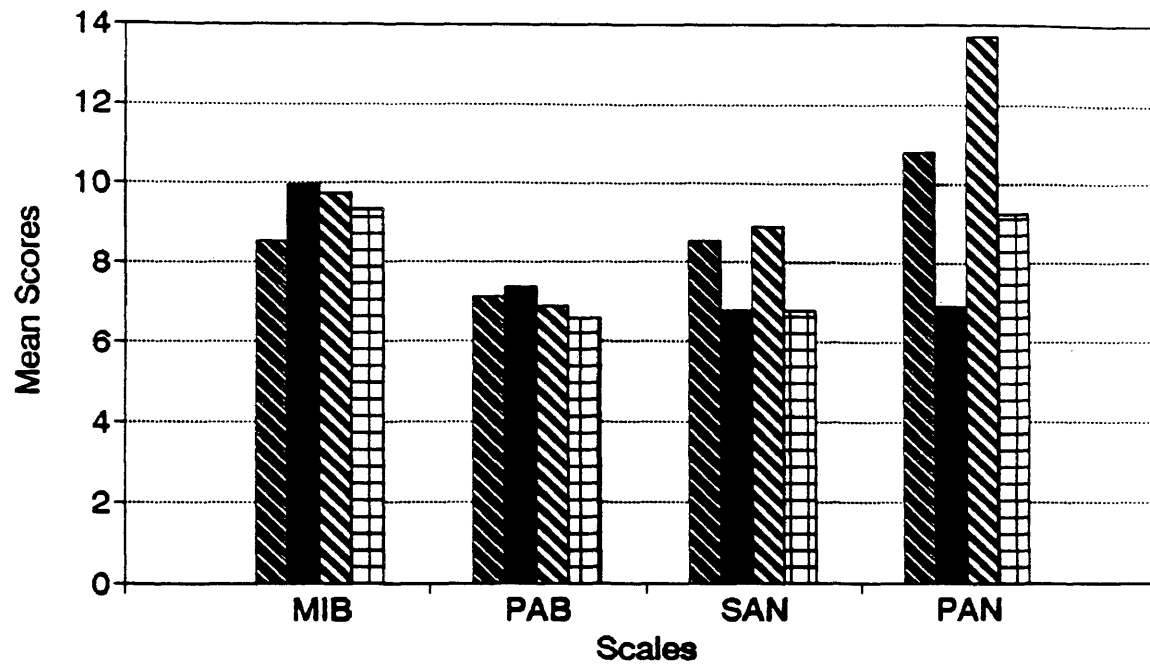
Figure 2. Skin resistance change across trials in the visual condition.

Figure 3. Skin resistance change across trials in the auditory condition.

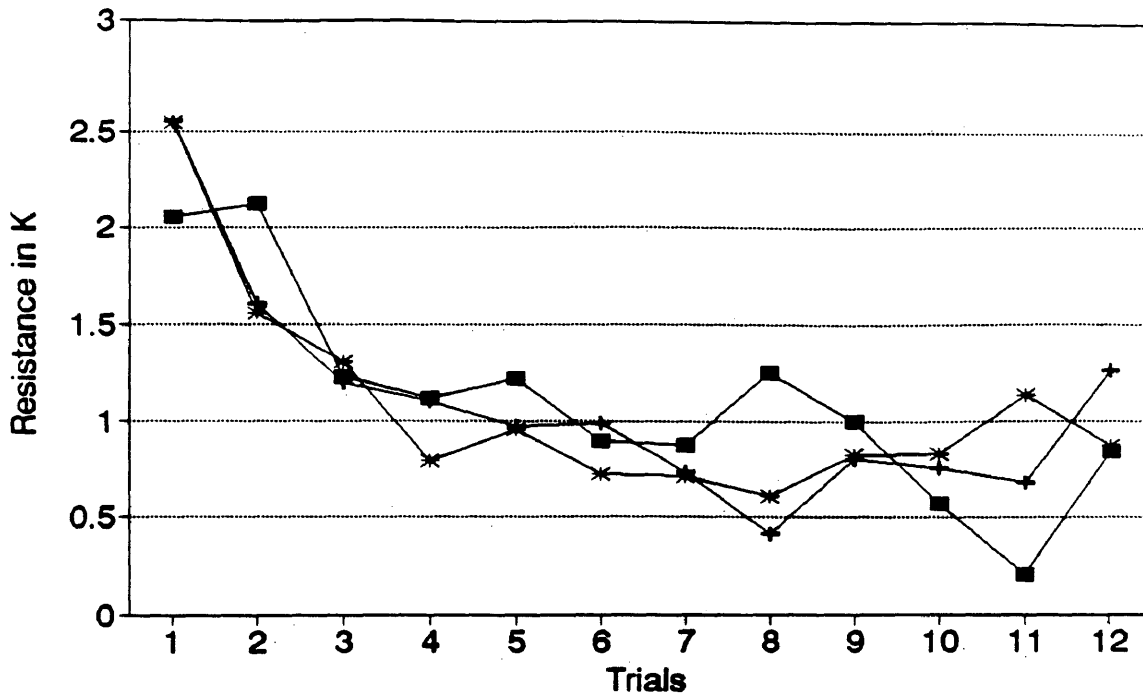
Figure 4. Baseline conductance in the visual condition.

Figure 5. Baseline conductance in the auditory condition.

Means For All Scales Compared With Chapman Group Means

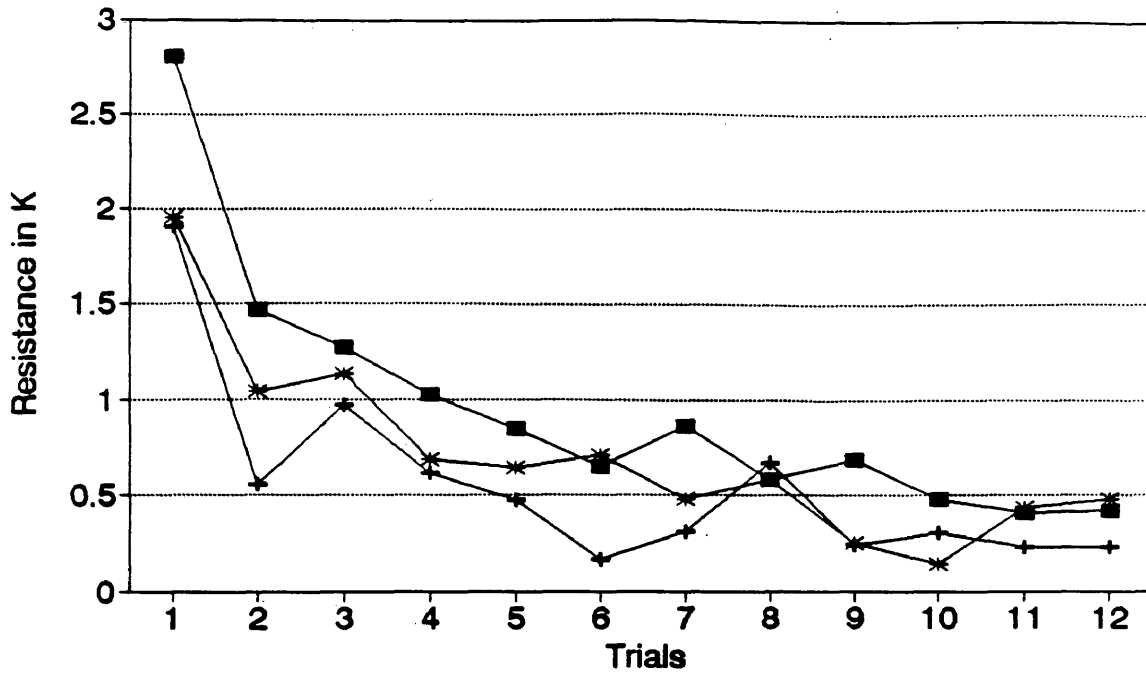


Visual Condition
Skin Resistance Change Across Trials



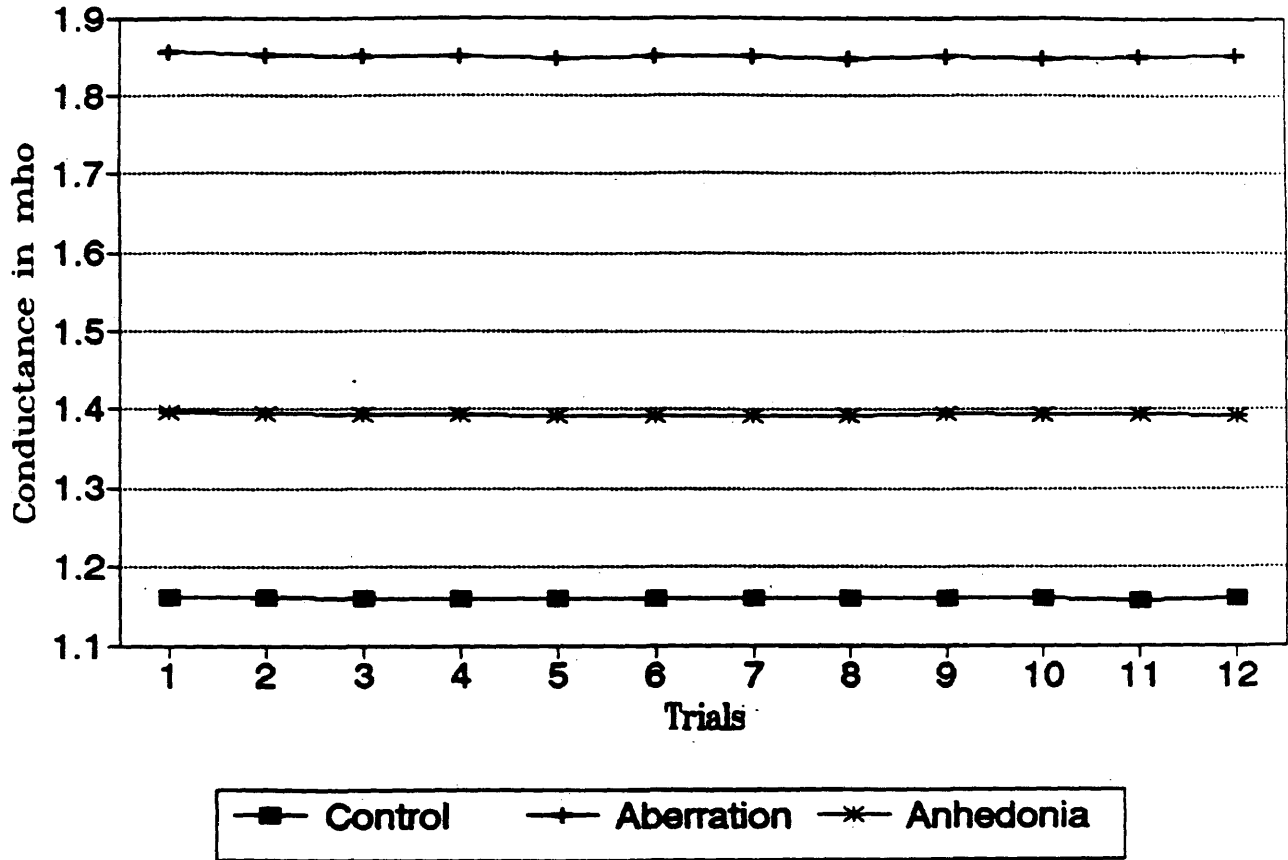
■ Controls + Aberration Subs * Anhedonia Subs

Auditory Condition Skin Resistance Change Across Trials

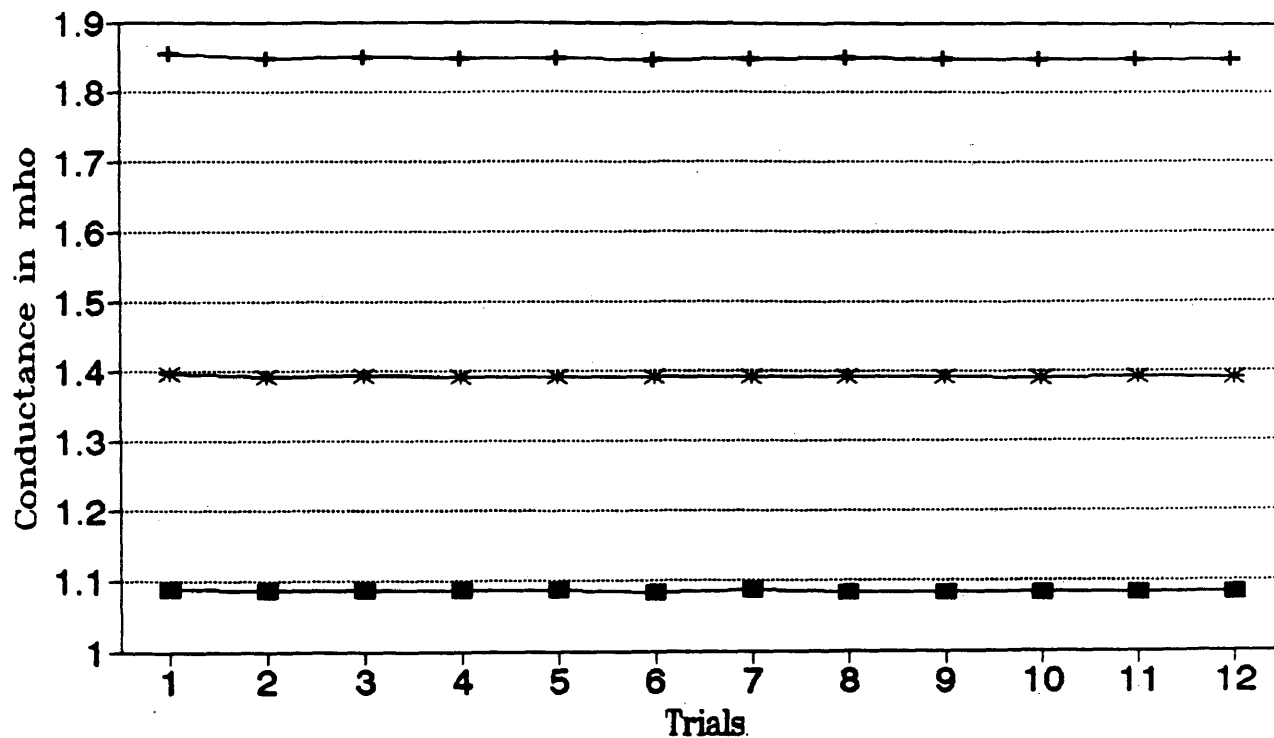


■ Controls + Aberration Subs * Anhedonic Subs

Visual Condition Baseline Conductance



Auditory Condition Baseline Conductance



■ Control + Aberration * Anhedonia

Instructions for Administration of
Scales of Psychosis Proneness

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The items from our several scales should be intermixed with one another or else intermixed with items from other scales of different sorts. We have found that when we administer, for example, all of the perception aberration items in sequence, or the impulsive nonconformity items in sequence, subjects become less candid.

We precede the items by the following instructions:

Please answer each item true or false. Please do not skip any items. It is important that you answer every item, even if you are not quite certain which is the best answer. An occasional item may refer to experiences which you have had only when taking drugs. Unless you have had the experience at other times, mark it as if you have not had that experience.

Some items may sound like others, but all of them are slightly different. Answer each item individually, and don't worry about how you answered a somewhat similar previous item.

Circle either:

True False 1. The beauty of sunsets is greatly overrated.

etc.

Code:

On each list of items,

p = the proportion of subjects who answered in the keyed direction, that is, in the direction of a high, or pathological, score.

r = the point-biserial correlation of item score with total score.

The first two columns give the above data for males and the third and fourth columns give the same data for females. All subjects used here were college students enrolled in the University of Wisconsin's introductory psychology course.

The T or F by each item indicates whether a True or False answer contributed to a high score on the scale.

Reported in

Eckblad, M. & Chapman, L. J. (1983). Magical ideation as an indicator of schizotypy. Journal of Consulting and Clinical Psychology, 51, 215-225.

Males N = 775		Females N = 840			
<u>p</u>	<u>r</u>	<u>p</u>	<u>r</u>		
.24	.44	.24	.44	T	1. I have occasionally had the silly feeling that a TV or radio broadcaster knew I was listening to him.
.26	.51	.23	.42	T	2. I have felt that there were messages for me in the way things were arranged, like in a store window.
.31	.43	.30	.38	T	3. Things sometimes seem to be in different places when I get home, even though no one has been there.
.10	.19	.12	.15	F	4. I have never doubted that my dreams are the products of my own mind.
.39	.39	.24	.42	T	5. I have noticed sounds on my records that are not there at other times.
.13	.41	.10	.37	T	6. I have had the momentary feeling that someone's place has been taken by a look-alike.
.34	.39	.28	.31	F	7. I have never had the feeling that certain thoughts of mine really belonged to someone else.
.52	.48	.56	.50	T	8. I have wondered whether the spirits of the dead can influence the living.
.38	.53	.29	.45	T	9. At times I perform certain little rituals to ward off negative influences.
.42	.56	.40	.54	T	10. I have felt that I might cause something to happen just by thinking too much about it.
.42	.50	.45	.46	T	11. At times, I have felt that a professor's lecture was meant especially for me.
.32	.59	.39	.59	T	12. I have sometimes felt that strangers were reading my mind.
.28	.52	.26	.50	T	13. If reincarnation were true, it would explain some unusual experiences I have had.
.41	.46	.40	.45	T	14. I sometimes have a feeling of gaining or losing energy when certain people look at me or touch me.

Males N = 775		Females N = 840			
<u>P</u>	<u>r</u>	<u>P</u>	<u>r</u>		
.33	.44	.35	.41	F	15. It is not possible to harm others merely by thinking bad thoughts about them.
.49	.55	.38	.54	T	16. I have sometimes sensed an evil presence around me, although I could not see it.
.32	.47	.27	.41	T	17. People often behave so strangely that one wonders if they are part of an experiment.
.32	.32	.24	.31	T	18. The government refuses to tell us the truth about flying saucers.
.51	.36	.53	.42	F	19. I almost never dream about things before they happen.
.43	.43	.26	.44	T	20. I have sometimes had the passing thought that strangers are in love with me.
.46	.42	.46	.39	T	21. The hand motions that strangers make seem to influence me at times.
.32	.43	.40	.34	F	22. Good luck charms don't work.
.29	.34	.40	.36	T	23. I have sometimes been fearful of stepping on sidewalk cracks.
.17	.35	.14	.33	F	24. Numbers like 13 and 7 have no special powers.
.21	.39	.17	.37	T	25. I have had the momentary feeling that I might not be human.
.31	.47	.31	.41	T	26. I think I could learn to read others' minds if I wanted to.
.09	.24	.17	.33	T	27. Horoscopes are right too often for it to be a coincidence.
.37	.40	.40	.39	T	28. Some people can make me aware of them just by thinking about me.
.17	.39	.16	.42	T	29. I have worried that people on other planets may be influencing what happens on Earth.
.44	.33	.43	.28	F	30. When introduced to strangers, I rarely wonder whether I have known them before.

Reported in

Chapman, L. J., Chapman, J. P., & Raulin, M. L. (1978). The original scale, by the above authors was reported in Journal of Abnormal Psychology, 1976, 85, 374-382.

Males		Females			
N = 775		N = 840			
<u>p</u>	<u>r</u>	<u>p</u>	<u>r</u>		
.14	.16	.29	.24	F	1. I have usually found lovemaking to be intensely pleasurable.
.34	.30	.21	.20	F	2. When eating a favorite food, I have often tried to eat slowly to make it last longer.
.17	.36	.07	.27	F	3. I have often enjoyed the feel of silk, velvet, or fur.
.11	.30	.23	.36	F	4. I have sometimes enjoyed feeling the strength in my muscles.
.16	.29	.03	.24	T	5. Dancing, or the idea of it, has always seemed dull to me.
.44	.35	.43	.37	T	6. I have always found organ music dull and unexciting.
.11	.21	.12	.21	F	7. The taste of food has always been important to me.
.02	.18	.03	.19	T	8. I have had very little fun from physical activities like walking, swimming, or sports.
.12	.12	.15	.22	T	9. I have seldom enjoyed any kind of sexual experience.
.21	.23	.14	.19	T	10. On hearing a good song, I have seldom wanted to sing along with it.
.11	.21	.10	.21	T	11. I have always hated the feeling of exhaustion that comes from vigorous activity.
.17	.26	.08	.21	T	12. The color that things are painted has seldom mattered to me.
.27	.44	.11	.38	T	13. The sound of rustling leaves has never much pleased me.
.30	.28	.19	.32	T	14. Sunbathing isn't really more fun than lying down indoors.
.09	.15	.05	.19	T	15. There just are not many things that I have ever really enjoyed doing.

Males N = 775		Females N = 840			
<u>p</u>	<u>r</u>	<u>p</u>	<u>r</u>		
.07	.27	.04	.26	T	16. I don't know why some people are so interested in music.
.17	.45	.02	.22	T	17. Flowers aren't as beautiful as many people claim.
.15	.30	.08	.29	F	18. I have always loved having my back massaged.
.07	.15	.06	.16	T	19. I never wanted to go on any of the rides at an amusement park.
.40	.39	.24	.39	F	20. Trying new foods is something I have always enjoyed.
.11	.31	.04	.24	T	21. The warmth of an open fireplace hasn't especially soothed and calmed me.
.21	.38	.14	.28	T	22. Poets always exaggerate the beauty and joys of nature.
.62	.32	.48	.34	F	23. When I have seen a statue, I have had the urge to feel it.
.04	.10	.03	.10	F	24. I have always had a number of favorite foods.
.06	.24	.03	.20	T	25. I don't understand why people enjoy looking at the stars at night.
.30	.38	.15	.40	T	26. I have had very little desire to try new kinds of foods.
.38	.33	.10	.31	T	27. I never have the desire to take off my shoes and walk through a puddle barefoot.
.23	.26	.19	.25	T	28. I've never cared much about the texture of food.
.07	.21	.03	.09	F	29. When I have walked by a bakery, the smell of fresh bread has often made me hungry.
.21	.30	.13	.31	F	30. I have often enjoyed receiving a strong, warm handshake.
.27	.17	.18	.24	T	31. I have often felt uncomfortable when my friends touch me.
.11	.34	.14	.30	T	32. I have never found a thunderstorm exhilarating.
.09	.28	.08	.27	F	33. Standing on a high place and looking out over the view is very exciting.

Males N = 775		Females N = 840			
<u>p</u>	<u>r</u>	<u>p</u>	<u>r</u>		
.15	.42	.06	.31	F	34. I have often found walks to be relaxing and enjoyable.
.22	.40	.13	.30	F	35. The sound of the rain falling on the roof has made me feel snug and secure.
.12	.32	.05	.19	F	36. I like playing with and petting soft little kittens or puppies.
.67	.33	.68	.38	F	37. The sound of organ music has often thrilled me.
.06	.45	.02	.29	F	38. Beautiful scenery has been a great delight to me.
.08	.38	.02	.17	F	39. The first winter snowfall has often looked pretty to me.
.17	.12	.19	.26	T	40. Sex is okay, but not as much fun as most people claim it is.
.48	.30	.34	.31	F	41. I have sometimes danced by myself just to feel my body move with the music.
.47	.25	.49	.32	T	42. I have seldom cared to sing in the shower.
.07	.17	.05	.14	T	43. One food tastes as good as another to me.
.34	.39	.10	.31	F	44. On seeing a soft, thick carpet, I have sometimes had the impulse to take off my shoes and walk barefoot on it.
.33	.36	.17	.33	F	45. After a busy day, a slow walk has often felt relaxing.
.17	.35	.07	.27	F	46. The bright lights of a city are exciting to look at.
.14	.34	.05	.17	T	47. The beauty of sunsets is greatly overrated.
.10	.24	.06	.17	F	48. It has always made me feel good when someone I care about reaches out to touch me.
.25	.29	.13	.25	T	49. I have usually found soft music boring rather than relaxing.
.20	.14	.16	.16	T	50. I have usually finished my bath or shower as quickly as possible just to get it over with.
.02	.19	.02	.11	T	51. The smell of dinner cooking has hardly ever aroused my appetite.

Males N = 775		Females N = 840			
<u>p</u>	<u>r</u>	<u>p</u>	<u>r</u>		
.72	.38	.27	.44	F	52. When I pass by flowers, I have often stopped to smell them.
.69	.07	.80	.16	F	53. Sex is the most intensely enjoyable thing in life.
.12	.32	.03	.23	T	54. I think that flying a kite is silly.
.27	.26	.18	.24	T	55. I've never cared to sunbathe; it just makes me hot.
.35	.32	.16	.38	T	56. The sounds of a parade have never excited me.
.09	.26	.04	.29	F	57. It has often felt good to massage my muscles when they are tired or sore.
.47	.39	.34	.39	F	58. When I'm feeling a little sad, singing has often made me feel happier.
.26	.40	.11	.31	F	59. A good soap lather when I'm bathing has sometimes soothed and refreshed me.
.18	.43	.05	.37	F	60. A brisk walk has sometimes made me feel good all over.
.16	.42	.09	.39	F	61. I have been fascinated with the dancing of flames in a fireplace.

Reported in

Chapman, L. J., Chapman, J. P., & Raulen, M. L. (1978). Body-image aberration in schizophrenia. Journal of Abnormal Psychology, 87, 399-407.

Males		Females			
N = 775		N = 840			
<u>p</u>	<u>r</u>	<u>p</u>	<u>r</u>		
.05	.43	.05	.49	T	1. I sometimes have had the feeling that some parts of my body are not attached to the same person.
.10	.50	.10	.54	T	2. Occasionally I have felt as though my body did not exist.
.30	.45	.31	.49	T	3. Sometimes people whom I know well begin to look like strangers.
.31	.41	.28	.37	T	4. My hearing is sometimes so sensitive that ordinary sounds become uncomfortable.
.41	.45	.41	.40	T	5. Often I have a day when indoor lights seem so bright that they bother my eyes.
.20	.44	.17	.52	F	6. My hands or feet have never seemed far away.
.06	.49	.07	.51	T	7. I have sometimes felt confused as to whether my body was really my own.
.05	.41	.03	.35	T	8. Sometimes I have felt that I could not distinguish my body from other objects around me.
.21	.36	.26	.32	T	9. I have felt that my body and another person's body were one and the same.
.10	.48	.08	.50	T	10. I have felt that something outside my body was a part of my body.
.30	.48	.32	.53	T	11. I sometimes have had the feeling that my body is abnormal.
.49	.48	.54	.48	T	12. Now and then, when I look in the mirror, my face seems quite different than usual.
.27	.46	.20	.47	F	13. I have never had the passing feeling that my arms or legs have become longer than usual.
.09	.55	.09	.53	T	14. I have sometimes felt that some part of my body no longer belongs to me.
.22	.57	.17	.55	T	15. Sometimes when I look at things like tables and chairs, they seem strange.

Males N = 775		Females N = 840			
<u>r</u>	<u>r</u>	<u>r</u>	<u>r</u>		
.06	.50	.06	.53	T	16. I have felt as though my head or limbs were somehow not my own.
.23	.59	.17	.59	T	17. Sometimes part of my body has seemed smaller than it usually is.
.14	.40	.14	.47	T	18. I have sometimes had the feeling that my body is decaying inside.
.08	.41	.08	.41	T	19. Occasionally it has seemed as if my body had taken on the appearance of another person's body.
.11	.29	.09	.30	T	20. Ordinary colors sometimes seem much too bright to me.
.11	.41	.09	.36	T	21. Sometimes I have had a passing thought that some part of my body was rotting away.
.20	.48	.25	.52	T	22. I have sometimes had the feeling that one of my arms or legs is disconnected from the rest of my body.
.18	.53	.15	.47	T	23. It has seemed at times as if my body was melting into my surroundings.
.38	.43	.34	.40	F	24. I have never felt that my arms or legs have momentarily grown in size.
.30	.49	.31	.51	F	25. The boundaries of my body always seem clear.
.22	.43	.17	.48	T	26. Sometimes I have had feelings that I am united with an object near me.
.47	.47	.51	.47	T	27. Sometimes I have had the feeling that a part of my body is larger than it usually is.
.09	.50	.06	.38	T	28. I can remember when it seemed as though one of my limbs took on an unusual shape.
.11	.62	.11	.57	T	29. I have had the momentary feeling that my body has become misshapen.
.07	.39	.04	.32	T	30. I have had the momentary feeling that the things I touch remain attached to my body.
.28	.53	.22	.53	T	31. Sometimes I feel like everything around me is tilting.
.10	.43	.16	.49	T	32. I sometimes have to touch myself to make sure I'm still there.

Males		Females			
N = 775		N = 840			
<u>p</u>	<u>r</u>	<u>p</u>	<u>r</u>		
.20	.57	.19	.55	T	33. Parts of my body occasionally seem dead or unreal.
.15	.49	.17	.48	T	34. At times I have wondered if my body was really my own.
.24	.44	.17	.41	T	35. For several days at a time I have had such a heightened awareness of sights and sounds that I cannot shut them out.

REVISED SOCIAL ANHEDONIA SCALE, by Eckblad, M. L., Chapman, L. J., Chapman, J. P., & Mishlove, M. (1982), unpublished test. Reported in Mishlove, M., & Chapman, L. J., Journal of Abnormal Psychology, 1985, 94, 384-396. ⁴⁶

Item	Key	775 Males		840 Females	
		<u>P</u>	<u>E</u>	<u>P</u>	<u>E</u>
1. Having close friends is not as important as many people say.	T	.06	.35	.03	.32
2. I attach very little importance to having close friends.	T	.04	.38	.02	.29
3. I prefer watching television to going out with other people.	T	.07	.28	.06	.35
4. A car ride is much more enjoyable if someone is with me.	F	.25	.30	.28	.39
5. I like to make long distance phone calls to friends and relatives.	F	.30	.34	.14	.31
6. Playing with children is a real chore.	T	.19	.27	.13	.19
7. I have always enjoyed looking at photographs of friends.	F	.12	.27	.03	.18
8. Although there are things that I enjoy doing by myself, I usually seem to have more fun when I do things with other people.	F	.10	.34	.12	.41
9. I sometimes become deeply attached to people I spend a lot of time with.	F	.07	.22	.05	.21
10. People sometimes think that I am shy when I really just want to be left alone.	T	.61	.33	.59	.30
11. When things are going really good for my close friends, it makes me feel good too.	F	.09	.39	.05	.26
12. When someone close to me is depressed, it brings me down also.	F	.18	.32	.12	.14
13. My emotional responses seem very different from those of other people.	T	.42	.36	.27	.38
14. When I am home alone, I often resent people telephoning me or knocking on my door.	T	.18	.34	.17	.42

	<u>Item</u>	<u>Key</u>	<u>775 Males</u>		<u>840 Females</u>	
			<u>P</u>	<u>F</u>	<u>P</u>	<u>F</u>
15.	Just being with friends can make me feel really good.	F	.01	.29	.01	.14
16.	When things are bothering me, I like to talk to other people about it.	F	.30	.38	.17	.36
17.	I prefer hobbies and leisure activities that do not involve other people.	T	.23	.40	.21	.51
18.	It's fun to sing with other people.	F	.37	.33	.16	.33
19.	Knowing that I have friends who care about me gives me a sense of security.	F	.05	.35	.01	.28
20.	When I move to a new city, I feel a strong need to make new friends.	F	.23	.37	.13	.40
21.	People are usually better off if they stay aloof from emotional involvements with most others.	T	.23	.41	.10	.33
22.	Although I know I should have affection for certain people, I don't really feel it.	T	.53	.33	.47	.40
23.	People often expect me to spend more time talking with them than I would like.	T	.53	.37	.43	.42
24.	I feel pleased and gratified as I learn more and more about the emotional life of my friends.	F	.19	.36	.14	.29
25.	When others try to tell me about their problems and hangups, I usually listen with interest and attention.	F	.09	.30	.03	.18
26.	I never had really close friends in high school.	T	.11	.30	.08	.31
27.	I am usually content to just sit alone, thinking and daydreaming.	T	.54	.36	.63	.36
28.	I'm much too independent to really get involved with other people.	T	.10	.46	.08	.40

	<u>Item</u>	<u>Key</u>	<u>775 Males</u>		<u>840 Females</u>	
			<u>P</u>	<u>F</u>	<u>P</u>	<u>F</u>
29.	There are few things more tiring than to have a long, personal discussion with someone.	T	.14	.25	.11	.29
30.	It made me sad to see all my high school friends go their separate ways when high school was over.	F	.41	.32	.30	.31
31.	I have often found it hard to resist talking to a good friend, even when I have other things to do.	F	.14	.24	.08	.25
32.	Making new friends isn't worth the energy it takes.	T	.03	.31	.01	.24
33.	There are things that are more important to me than privacy.	F	.14	.27	.19	.32
34.	People who try to get to know me better usually give up after awhile.	T	.15	.39	.07	.43
35.	I could be happy living all alone in a cabin in the woods or mountains.	T	.34	.30	.25	.36
36.	If given the choice, I would much rather be with others than be alone.	F	.18	.42	.22	.55
37.	I find that people too often assume that their daily activities and opinions will be interesting to me.	T	.45	.36	.35	.43
38.	I don't really feel very close to my friends.	T	.16	.44	.09	.44
39.	My relationships with other people never get very intense.	T	.22	.42	.09	.36
40.	In many ways, I prefer the company of pets to the company of people.	T	.36	.37	.31	.34

Infrequency Scale

Loren J. Chapman and Jean P. Chapman

University of Wisconsin

- True False 1. On some mornings, I didn't get out of bed immediately when I first woke up.
- True False 2. There have been a number of occasions when people I know have said hello to me.
- True False 3. There have been times when I have dialed a telephone number only to find that the line was busy.
- True False 4. At times when I was ill or tired, I have felt like going to bed early.
- True False 5. On some occasions I have noticed that some other people are better dressed than myself.
- True False 6. Driving from New York to San Francisco is generally faster than flying between these cities.
- True False 7. I believe that most light bulbs are powered by electricity.
- True False 8. I go at least once every two years to visit either northern Scotland or some part of Scandinavia.
- True False 9. I cannot remember a time when I talked with someone who wore glasses.
- True False 10. Sometimes when walking down the sidewalk, I have seen children playing.
- True False 11. I have never combed my hair before going out in the morning.
- True False 12. I find that I often walk with a limp, which is the result of a skydiving accident.
- True False 13. I cannot remember a single occasion when I have ridden on a bus.

VITA

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