Personality Variables and Allergic Skin Reactivity

A Cross-Validation Study

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In an earlier investigation, psychological test differences were found between groups of women with allergy symptoms who differed in degree of hypersensitivity on allergy skin testing. In the present study the MMPI and other tests were given to 132 women patients with asthma, rhinitis, or hay fever. Patients with minimal evidence of hypersensitivity on skin tests (nonreactors and weak reactors) expressed significantly more personal discomfort and unhappiness than women with clear evidence of hypersensitivity (moderate and strong reactors). Nonreactors described themselves as more passive, negative, withdrawn, and complaining than the relatively satisfied and confident stronger reactors. Differences between groups were found on several clinical scales, an item analysis, and a large number of experimental scales.

These findings confirm the previous conclusion that there are measurable, important psychological differences within samples of allergy patients, related to degree of demonstrable hypersensitivity on skin testing. Thus many contradictions in the literature may have resulted from inadvertent mixing of physiologically and psychologically dissimilar groups.

THE SEARCH for relationships between personality variables and allergic symptoms has persisted in spite of a frustratingly small number of consistent research findings. Most of the work done thus far has used 1 of 3 typical designs: The first approach has been to contrast a group of allergic persons with a group of normal individuals;[1-3] a second design compares groups within the allergic population, such as asthmatics and rhinitis patients;[4] a third method compares groups with different psychosomatic diseases such as asthma and peptic ulcer.[5, 6] A recent formulation is leading to greater precision in both theory and research

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design. This formulation notes that within a population of sufferers from allergy-like symptoms a complex continuum of sensitivity to allergens exists, and along this continuum one can identify at least 2 large groups: (1) those persons with symptoms of allergic illness who clearly demonstrate an allergic constitution, as inferred from positive skin test results, family history, and personal history; and (2) those persons who do not demonstrate a constitutional diathesis, or do so only minimally. The assumption is then made that psychological investigations which contrast these 2 groups will find important personality differences between them. The relevance of emotional-behavioral events for the etiology and course of allergic symptoms may be quite different for the 2 groups.

A few recent studies have explored the view that groups defined on the basis of degree of response to various measures of allergic hypersensitivity will differ in personality characteristics. The intent of this work has been to see whether individuals with an allergic constitution differ in significant ways psychologically from those whose symptoms are less obviously due to measurable allergic factors. Thus in a study of asthmatic children and their parents, Block *et al.*[7] contrasted a group showing strong evidence of an allergic constitution (using a combined score from 5 variables: skin tests, ease of diagnosis, number of allergies, personal history, and family history) with a group showing less immunological basis for their asthma. The children in what they called the low "allergic potential" group as well as their parents demonstrated more psychopathology on interviews and a number of psychological tests than did the group with a greater allergic predisposition.

Purcell *et al.*,[8–10] in a series of studies, were able to make differentiations within samples of severely asthmatic children on the basis of need for continued steroid medication after admission to a residential treatment center. While response to treatment rather than immunological status was the basic measure for differentiating groups, it is interesting that psychological differences were found between children whose asthma remitted rapidly and those who continued to require steroid medication. The rapidly remitting children more often viewed emotional events as precipitants of asthma attacks than did steroid-dependent children, and parents of rapidly remitting children gave evidence on tests of more authoritarian control and psychological tension than did parents of the steroid-dependent group. The prevalence of neurotic characteristics on a number of psychological tests, however, did not distinguish the children in the 2 groups. Dekker *et al.*[11] likewise found no differences in neuroticism on the Heron Two-Part Personality Inventory between groups of adult female asthmatics in treatment classified as having "manifest allergy" and "no manifest allergy" on the basis of skin and inhalation tests.

Feingold *et al.*[12] however, did find differences in personality patterns related to severity of reaction to skin testing. Women diagnosed as suffering from bronchial asthma, perennial rhinitis, or seasonal hay fever were given the Minnesota Multiphasic Personality Inventory (MMPI); women who reacted slightly or not at all to allergy testing admitted to significantly more personal discomfort and unhappiness than did women who reacted strongly to skin testing.

Thus 2 studies which were closely related to the issue of psychological differences within the allergic population, those by Block *et al.*[7] and by Feingold *et al.*[12] obtained results in the predicted direction, while the Dekker *et al.* study[11] did not. This discrepancy suggests the need for further exploration of the distinctions between individuals in an allergic sample; both the effects of variation along dimensions such as age, diagnosis, and chronicity, and differences between

test instruments need to be examined. In this report a cross-validation and amplification of the earlier Feingold *et al.* results is presented.

Method

A cross-validation sample, selected with the same criteria as the original group, was composed of 132 white women, aged 20–40, who presented themselves to an outpatient allergy department with symptoms suggestive of respiratory allergic illness. At the initial visit subjects were interviewed by a staff physician seeking an allergy-oriented history and were given a complete physical examination. Of the 132 women, 47 were diagnosed as having bronchial asthma; 37, perennial rhinitis; and 48, hay fever. All patients then underwent a thorough series of allergy skin tests, including 5 groups of inhalant factors: environmentals and spring, late spring, fall, and tree pollens. For most patients in the sample, this procedure involved about 150 allergens, of which 40 were environmental inhalants and the remainder pollens of the California flora. For the initial test, the puncture technique was applied, with a 1:50 dilution (w/v) of 50% glycerolated extract. Patients who failed to react were retested on the arm by the intradermal technique with a 1:1000 dilution (w/v) of 50% glycerolated extract diluted in normal saline. Patients who again failed to react were tested on the back.

Reactivity Ratings

Skin tests were performed by trained allergy technicians, and reactions were read after 20 min. by a physician. Reactions to each skin test were graded on a 1–4 scale; a rating of 1 was applied to a barely visible local whealing and flare reaction, while a rating of 4 indicated strong whealing with pseudopods surrounded by a pronounced flare. Next an allergist reviewed and interpreted each person's total series of graded reactions to the skin tests and assigned a summary score for each group of allergens (environmentals and spring, late spring, fall, and tree pollens). Two major summary scores were to be derived: over-all reactivity and environmental reactivity. A rating of "no reaction" to a group of allergens was given a score of 1; weak reaction, 2; moderate reaction, 3; and strong reaction, 4.

The summary scores for each group of allergens were then combined to produce an over-all classification of reactivity which was intended to reflect the individual's general degree of reactivity. The c'assification of ratings of over-all skin reactivity is shown below.

Score	*Rating*
5–6	Non-
7 with no "moderate" ratings	Non-
7 with any "moderate" ratings	Weak
8–10	Weak
11–12 with 1 "strong" rating	Weak
11–12 with 2 or more "strong" ratings	Moderate
13–16	Moderate
17–20	Strong

These scores ranged from a minimum of 5—i.e., no reaction to any of the 5 groups of allergens, to a maximum of 20—i.e., strong reactions to all 5 groups of allergens.

Reactivity to the group of environmental allergens was also considered alone, and the same rating procedures were used; a trained allergist rated reactions to the environmental group along a continuum from no reactivity to strong reactivity.

The over-all reactivity scoring shown above classified 15% of the sample as nonreactors, 26% as weak reactors, 26% as moderate reactors, and 32% as strong reactors. The environmental reactivity scoring classified 14% of the sample as nonreactors, 21% as weak reactors, 41% as moderate reactors, and 24% as strong reactors (see Table 1). There was a high degree of correspondence between an individual's reactivity to the environmental allergens and his over-all rating; however, the 2 ratings did not result in identical classification for all subjects. Thirty-six percent of the subjects received the same ratings for environmental and over-all reactivity, and another 49% differed by only one step in either direction. Thus only 5% had a large discrepancy between their over-all and environmental ratings.

TABLE 1. NUMBER OF PERSONS WITH EACH REACTIVITY RATING

Diagnosis	*Non-*	*Weak*	*Moderate*	*Strong*	*Total*
		OVER-ALL REACTIVITY			
Asthma	7	16	11	13	47
Rhinitis	9	13	9	6	37
Hay fever	4	7	14	23	48
TOTAL	20	36	34	42	132
		ENVIRONMENTAL REACTIVITY			
Asthma	4	7	19	16	46
Rhinitis	7	9	16	5	37
Hay fever	7	11	19	11	48
TOTAL	18	27	54	32	131*

*One individual did not have environmental testing.

Other Data

The subjects were interviewed and given psychological tests by a clinical psychologist shortly after their initial visit. The psychological procedures were scheduled in this way to ensure that the subjects were unaware of the outcome of their skin testing studies when the psychological data were collected. The interview focused on social history; the tests consisted of the MMPI and the Rorschach.

The mean age of the group was 30.33 years, mean education was 13.89 years, and mean socioeconomic status (Hollingshead and Redlich[13]) fell within the middle social class grouping. There were 110 who were married and living with their first husbands, 17 who were in their second or third marriage, and 5 who were divorced or widowed and living alone. A total of 31 women (23%) had received psychiatric help; 8 had had a brief experience and 23 had had more prolonged treatment. None of these characteristics, nor a variety of other social history data collected in the interviews, differentiated between the diagnostic groups of asthma, rhinitis, and hay fever or the non, weak, moderate, and strong reactivity groups.

Results

This report will present results obtained with the MMPI. Separate analyses of variance were carried out for the over-all reactivity and environmental reactivity classifications.

Over-all Reactivity

MMPI scores without K corrections on the usual 12 clinical scales, for each of the 4 over-all reactivity groups (non, weak, moderate, and strong), and the 3 diagnostic groups (asthma, rhinitis, and hay fever) were included in analysis of variance design for unequal group size and nonindependent measures. Two-tailed tests were used throughout the analysis. Significant differences in the same direction as in the earlier Feingold *et al.* study[12] were found: The skin reactivity classification produced over-all MMPI differences significant between the 5 and 10% levels ($F = 2.18$); the interaction classification of over-all skin reactivity by MMPI scale scores was significant at the .01 level ($F = 1.75$). Classification by diagnosis did not yield significant results.

Environmental Reactivity

The same kind of analysis of variance design was carried out for environmental reactivity. Significant differences between environmental reactivity groups

were not found. Diagnostic categorization again did not yield significant results, although an interaction term—diagnosis by scale scores—did approach significance ($F = 1.51$, $p<.10>.05$).

These results confirm the previous study's finding that statistically meaningful differences occur within an allergic sample; in particular, classification by degree of over-all skin reactivity appears to be the most useful grouping. Neither diagnostic classification nor response to the environmental group of allergens alone produced significant findings. The remainder of this report therefore deals only with findings obtained from groups differing with respect to over-all reactivity.

Comparisons of Over-all Reactivity Groups

To study the nature of the differences between reactivity groups in more detail, mean scores on the 12 scales which are usually used in clinical practice were compared for the 4 reactivity groups by means of the *t* technique. In this analysis, scores of non- and weak reactors were combined and compared with scores of the combined moderate and strong reactors (Table 2). Significant differences occurred on 6 of the scales: The combined group of non- and weak reactors scored higher on hypochondriasis, depression, psychasthenia, schizophrenia, and hypomania; the moderate and strong reactor groups scored higher on the K scale, a measure of defensiveness (Fig. 1). In the earlier study the non- and weak reactor group scored significantly higher on 3 of these same scales: hypochondriasis, psychasthenia, and hypomania, while the group composed of moderate and strong reactors had scored higher on the K scale.

In further scrutiny of the results, nonreactors were compared with the 3 reactor groups combined. In this analysis, significant *t* test differences were found on 9 of the 12 scales: Nonreactors scored higher on hypochondriasis, depression, hysteria, psychopathic deviation, paranoia, psychasthenia, schizophrenia, hypomania, and the F scale, the latter a measure of dissatisfaction and inconsistency (Fig. 2). When nonreactors were contrasted with the strong reactor group alone, identical results were obtained.

It should be noted that the absolute *magnitude* of the MMPI scale elevations of both the weaker and stronger reactivity groups cannot be taken as indica-

TABLE 2. *t* TESTS ON MMPI SCALES AMONG OVER ALL REACTIVITY GROUPS

	Non-+weak vs. mod.+strong			*Non- vs. weak+mod +strong*			*Non- vs. strong*		
Scale	*Direction*	*t*	*p*	*Direction*	*t*	*p*	*Direction*	*t*	*p*
L		—			—			—	
F		—		N>WMS	2.59	<.02	N>S	2.84	<.01
K	MS >NW	2.20	<.05		—			—	
Hs	NW>MS	3.98	<.001	N>WMS	2.66	<.01	N>S	2.91	<.01
D	NW>MS	3.34	<.01	N>WMS	3.39	<.001	N>S	3.66	<.001
Hy		—		N>WMS	2.30	<.05		—	
Pd		—		N>WMS	3.16	<.01	N>S	2.17	<.05
Mf		—			—			—	
Pa		—		N>WMS	3.38	<.001	N>S	2.05	<.05
Pt	NW>MS	2.92	<.01	N>WMS	2.63	<.01	N>S	2.44	<.02
Sc	NW>MS	2.16	<.05	N>WMS	3.33	<.01	N>S	2.37	<.02
Ma	NW>MS	2.19	<.05	N>WMS	2.54	<.02	N>S	2.77	<.01

tive of *gross* psychological disturbance. Nevertheless, the differences between the 2 groups suggest that the non- and weak reactors tend to have personality characteristics suggestive of greater personal discomfort than those of the stronger-reacting women. Thus, the results from the 12 clinical MMPI scales depict the weaker reactors as having more somatic complaints; greater feelings of pessimism, hopelessness, or worthlessness; difficulties in impulse control; abnormal fears and worries; excessively high personal standards and self-critical feelings; feelings of both self- and social alienation; and greater anxiety.

Next, 76 experimental MMPI scales drawn from many research reports[14] and pertaining to a variety of behavioral dimensions were scored and analyzed for the 4 reactivity groups. Because some of these scales are highly correlated with the 12 clinical scales described above, these results represent mainly an expansion and confirmation of the differences reported above rather than a set of additional, independent personality dimensions. A total of 47 scales yielded significant differences when the nonreactor group was compared with the 3 reactor groups combined. Nonreactors scored higher on 39 scales which reflect feelings of unhappiness and inner maladjustment; the reactor group scored higher on 8 scales measuring factors such as social desirability, social responsibility, and ego strength. When scores of non- and weak reactors were combined and compared with scores of the combined moderate and strong reactors, 53 experimental scales yielded significant dif-

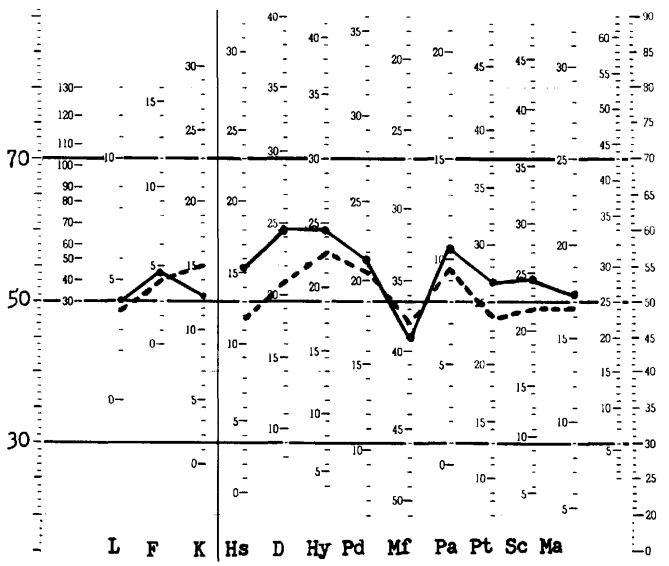

FIG. 1. MMPI profile differences between non- and weak reactors (solid line) and moderate and strong reactors (broken line).

ferences. Most of these scales were the same as in the previous comparisons.

When the usual 12 clinical scales and the 76 experimental scales are considered together, a total of 56 scales out of these 88 MMPI scales differentiated nonreactors from the 3 groups of reactors combined. Fifty-six scales did so at the 10% level of significance, 50 scales at the 5% level, and 31 scales at the 1% level. Fifty-nine of these 88 MMPI scales differentiated the combined non- and weak reactors from the combined moderate and strong reactors: 59 scales at the 10% level, 51 at the 5% level, and 22 at the 1% level. To estimate the probability of obtaining such results by chance, a series of random comparisons was performed. The results indicated that with such a sample one could find by chance 19 differences significant at the 10% level, 16 at the 5% level, and 9 at the 1% level.

Item Analysis

Further amplification of the psychological differences between nonreactors and reactors came from an item analysis, in which responses from nonreactors were again compared with responses from the other 3 reactivity groups combined. A total of 71 items differentiated nonreactors from reactors at probabilities of .01–.10. When each subject's test protocol was scored on these 71 items, the nonreactor group had a mean score of 32 items, and the reactor group, of 15.2 items, a mean difference significant at the .001 level. Nonreactors described themselves in more negative and dissatisfied terms than did reactors. The item analysis yielded a unilateral picture of the nonreactors as feeling depressed, helpless, physically ill, socially worried and incompetent, tense, and generally

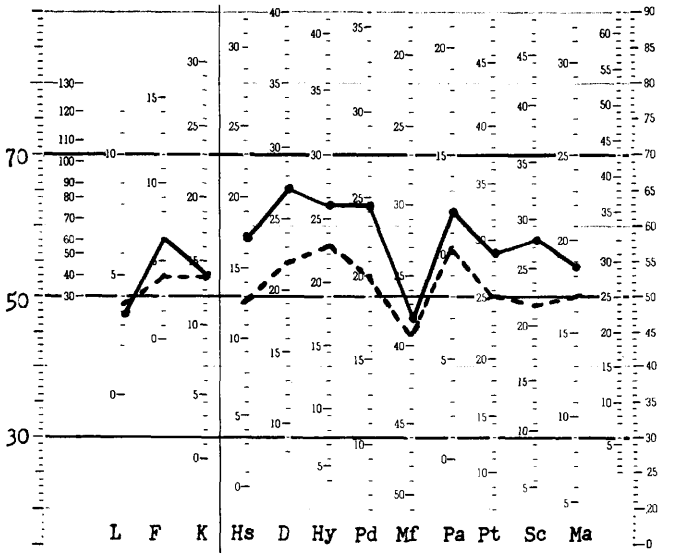

FIG. 2. MMPI profile differences between nonreactors (solid line) and weak, moderate, and strong reactors combined (broken line).

unhappy. In contrast, reactors described themselves as feeling relatively less troubled, more active, and confident. Examination of these 71 items for overlap with existing clinical and experimental scales showed high correlations with such scales as schizophrenia ($r = .829$), inner maladjustment ($r = .865$), and the A-scale, a measure of generalized neuroticism ($r = .835$). Selected correlations of these 71 allergy items with other MMPI scales are shown below.

	Pearson r
Inner maladjustment	+0.865
Schizophrenia	0.829
A-scale (neuroticism)	0.835
Psychasthenia	0.806
Psychosomatic-inner maladjustment	0.806
Self alienation	0.80
Dissimulation	0.79
Judged anxiety	0.79
Subjective depression	0.78
Mental dullness	0.78

When another item analysis was performed comparing non- and weak reactors to moderate and strong reactors, 67 items distinguished the groups. Of these 27 were identical with the previous analysis (non- versus combined weak, moderate, and strong reactors) and the remainder were items of highly similar content.

Discussion

These findings are a clear cross-validation of our earlier work and indicate that differing psychological characteristics are found between reactors and nonreactors within an allergic sample. We want to call special attention to those descriptions that apply to the nonreactor group. The scales and items which distinguish them are couched in terms which in past clinical psychiatric descriptions were often the ones generalized to allergic persons as a whole. These findings may cast some light on a number of discrepant findings and descriptions in the literature on psychological variables in allergic disease. Our work as well as that of other recent investigators indicates that when one looks *within* an allergy population, one finds not only the obvious and expected immunological differences but also important differences in personality.

These psychological differences are most apparent between groups which differ in degree of allergic hypersensitivity. We did not find vivid differences between groups of patients with asthma, with rhinitis, and with hay fever, for example. To date our findings suggest that the over-all degree of hypersensitivity is the more fruitful parameter and that the form the disease appears in is of less value in subgrouping for psychological studies.

The question arises as to the usefulness of allergy skin test results as the major physiological criterion variable. Certainly there is no one-to-one relationship between skin test findings and clinical symptoms of allergy.[15] The position taken in this research is that a composite of personal and family history, suggestive symptoms, physical findings, and positive response to a thorough series of carefully controlled skin tests indicates a high probability that the individual is allergic. Negative findings, however, are not necessarily indicative of the absence of allergic sensitivity since for a wide variety of potentially allergenic substances (food additives, drugs, chemicals, etc.), no reliable diagnostic tests are available. For these reasons the observations in this report are confined to comparisons between symptomatic individuals who differ in reactivity to skin testing. These are not to be construed as comparisons between allergic and nonallergic individuals.

The MMPI items and scales differentiating reactivity groups combine to present a picture of weaker reactors as unhappy and dissatisfied with them-

selves in most spheres of life. Many of these findings appear to be descriptive of the MMPI Factor A, a measure of general neuroticism, which correlates highly with the items discriminating our reactivity groups. Indeed, the profiles characteristic of the nonreactors are quite similar to those obtained from series of patients entering psychiatric clinics;[14] for both groups the experiencing of anxiety and the need for help are salient characteristics. Thus these patients do not describe themselves in terms of any particular conflict or set of conflicts. As a group they can be best characterized as generally distressed and feeling unable to defend themselves against the onslaughts of everyday life. In comparison with stronger reactors, weaker reactors tend to devaluate themselves and their achievements, to feel incompetent and helpless. They describe themselves as depressed, often withdrawn, and uneasy about their capacity to deal with their environment. They see the environment acting on or impinging on them; a typical response is complaint and passive resentment.

Stronger reactors present quite a different picture. They appear to be relatively more satisfied with themselves and with their adjustment, and less critical of people around them. They feel adequate to cope with their environment and are for the most part well defended, although there are suggestions of undue conformity and denial in some of the women. Recent work with Rorschach protocols of non- and strong reactors, to be reported in detail in a later communication, corroborates these descriptions. Thus these 2 groups—the stronger reactors and the weaker reactors—express themselves in markedly different ways.

The work of Dekker *et al.*[11] should be examined in this connection. When they evaluated groups of "allergic" and "nonallergic" female asthma patients for neuroticism on the Heron Two-Part Personality Inventory, no significant differences were found. This is in contradistinction to the work reported here and in the earlier Feingold *et al.* study,[12] as well as the investigations of Block *et al.*[7] Numerous possibilities need to be explored. The most apparent possibility is that the kinds of differences which have been described here may be better reflected on some test instruments than others. Further, the effects of chronicity or severity of illness need to be studied. Many of the differences in level of discomfort which are apparent among patients presenting themselves for treatment may be obscured by either the positive effects of regular contact with a physician or the negative effects of prolonged, irritating illness. Dekker's results suggest that such could be the case. Differences between groups of chronic patients, then, might be more apparent along other dimensions, such as those pertaining to personal style and other enduring structures of personality organization.

A few explorations with other psychosomatic disease entities such as a study of EEG patterns in peptic ulcer by Rubin and Bowman[16] and a study in hypertension by Hardyck *et al.*[17] have cast doubt on the homogeneity of groups with these syndromes, too—i.e., these investigators also have reported identifiable subgroups within the illness group, as based on physiological and psychological measurements. There are a few interesting studies relating physiological and psychological patterns among relatives of patients with a particular illness; thus Solomon and Moos[18] describe 2 groups among the relatives of rheumatoid arthritis patients: those with the rheumatoid factor in their serum were better defended and less troubled psychologically than those lacking the rheumatoid factor. In the series of studies by Wolff *et al.*[19, 20] on the parents of children with fatal neoplastic disease, relationships between effectiveness of

defense and urinary 17-hydroxycorticosteroid level were found. Whether and how the findings from these studies with widely differing samples may be related to this work with allergy patients are questions for future research. The usefulness of the approach, however, becomes increasingly clear. Many contradictions in previous research on asthma and other allergic symptom patterns may result from inadvertent mixing of physiologically and psychologically dissimilar groups.

Work of this kind can lead to a much more precise understanding of relevance of personality factors in symptom formation.

Summary

The results of earlier work, in which psychological test differences were found between groups of women with symptoms of respiratory allergy who differed in degree of demonstrable immunological basis for their symptoms, have been cross-validated and amplified. In the present study 132 women with diagnoses of bronchial asthma, perennial rhinitis, or seasonal hay fever were studied by means of history, physical examination, and thorough series of allergy skin tests. On the Minnesota Multiphasic Personality Inventory (MMPI) differences were found between those patients who, on skin testing, showed minimal hypersensitivity (nonreactors and weak reactors) and those with clear evidence of hypersensitivity (moderate and strong reactors). Over-all differences between groups were found with the analysis of variance technique, and when comparisons were made on the 12 clinical scales of the MMPI, there were 5 significant scale differences. When nonreactors were compared with the 3 groups of reactors combined, differences occurred on 9 scales. In all cases weaker reactors had higher—i.e., more disturbed, scores. Seventy-six experimental MMPI scales pertaining to a variety of behavioral dimensions were analyzed, and 47 of these also yielded differences in the same direction. Additionally, many individual items differentiated the groups.

Items and scales differentiating the groups combine to describe nonreactors and weak reactors as experiencing considerable personal discomfort and unhappiness; they characterized themselves as depressed, uneasy, withdrawn, and incompetent. Stronger reactors, though sometimes giving evidence of denial, appeared considerably more active, optimistic, and confident, and much less troubled. Interestingly, no such differences were found between groups differing with respect to diagnosis.

Thus there is strong evidence that the allergy population is far from homogeneous either physiologically or psychologically. Many contradictions in previous research on asthma and other allergic syndromes may well have resulted from inadvertent mixing of groups with differing personality characteristics.

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