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A Study of the Marks and Seeman MMPI Profile Types as Applied to a Sample of 2,875 Psychiatric Patients

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[1]This study could not have been undertaken were it not for a methodical system of data collection instituted by Starke Hathaway many years ago. In addition, the cooperation of the Clinical Psychology staff, the support of the National Institutes of Mental Health in transferring case files to magnetic tape, and support by the Vocational Rehabilitation Administration, Department of Health, Education and Welfare, Washington, D. C. under Research and Training Center Grant No. 2 of the authors and of personnel involved in programming and analysis of data. Salaries of the authors were, in part, also supported directly by the Vocational Rehabilitation Administration. The computer time was donated to this project by the Numerical Analysis Center of the University of Minnesota, for which the authors wish to express their thanks.

The publication of Marks and Seeman's Actuarial Description of Abnormal Personality (1963) made their system available for clinical and research purposes. The utility of the system depends not only on the validity of the actuarial description but also on the breadth of its applicability to a clinical population. Individual psychometric signs are not always clinically useful because of low rates of occurrence, although even a rare psychometric sign may have sufficient utility to warrant its cost. In the Marks and Seeman profile types, we have a classification system intended to be comprehensive, and the validity of such a system is a direct function of its capacity for "typing" a large proportion of the profiles that occur in the domain of application.

It is particularly appropriate, therefore, that Marks and Seeman have reported the number of profiles that fell within their system of classification for each of their code types in their cross-validation sample (Marks and Seeman, Table 26, p. 61). The authors indicate that, in total, they were able to type by their system approximately 78 percent of the profiles encountered in a sample of 826 patients. However, subsequent clinical impressions in other settings have been that their system of classification does not cover the same high percentage of patient profiles. Indeed, Pauker (1966) reported that he was able to fit only 22 percent of his profiles into the categories provided by Marks and Seeman. However, Pauker found that of the patients in his sample 53 percent fit Marks and Seeman's categories reasonably well, although not perfectly. Thus, Pauker was able to classify 75 percent of his sample if rules were not strictly applied.

This report presents in detail the results of applying the Marks and Seeman system to a large psychiatric population. These data may give the clinician some notion of the frequency with which each code type appears in a population of this kind and the frequency with which individual rules are the sole obstacle to classification. Tables indicate the magnitudes of violations for each rule and the increased yield obtained for each type through certain relaxation of the rules.

We intend this report to be exhaustive and therefore do not apologize for what may seem to be an inability to cut our material. We believe that an extended report will be useful for investigators with specialized interests in this area and hope that the detailed information provided will serve as planning and programming aids for such persons. Our major hope is that these data may stimulate needed reflection about the direction of future actuarial MMPI technology and what should be demanded of this area of research now that it is no longer in its infancy. Some suggestions about these matters will be found at the conclusion of this report.

The Sample

Our population comprised all psychiatric patients who took the MMPI over a four-year period and whose names occurred in alphabetical file A through M. This happened to be the group of records that had been transferred to magnetic tape at the time that the study was undertaken. All records with fewer than ten unanswered items were accepted, except when more than one test record from the same patient occurred in the file, in which case only the first record was used.

The basic demographic information (mean age by sex and by outpatient or inpatient status) appears in Table 1. A comparison of mean ages with the mean age (39.7 years) of the Marks and Seeman sample (p. 222, Marks and Seeman) show that our sample was somewhat younger than theirs.

Methods and Results

The purposes of the analysis were to determine the rate of correct classifications by Marks and Seeman system and to study more closely rule violations in a large psychiatric population with the aid of computer classification. Accordingly, the first computer program adapted the logic incorporated in the profile-type rules and an attempt was made to match each MMPI profile with a profile type. At this stage of analysis, rules were interpreted stringently.

A summary of the first computer analysis appears in Table 2. It can be seen that it was possible to classify 14.8 percent of all profiles in one of the 15 clinical profile types, of which 6.8 percent fell in the Normal K+ profile type. These results provided the same impetus for examining the extent to which single rules within each code type were responsible for the exclusion of profiles from that type. The profiles in question represent what we have called one-rule violations.

The second computer program was designed to identify one-rule violations, and further analysis was concerned with the magnitude of such violations. The profiles which were classified without violating a rule and those which could be classified by violating only one rule are tabulated in Table 2. The bottom of the first column shows that about 15 percent of this population could fit into Marks and Seeman categories according to a strict interpretation of their rules; this percentage augmented by the NK+ cases corresponds to the 22 percent reported by Pauker. The second column shows the percentage of profiles that would fit Marks and Seeman categories f one-rule violations of not more than eight points were allowed. The third column shows the percentage of profiles that could be typed if one-rule violations of any magnitude were permitted. A total of about 71 percent of the cases could thus be classified into one of the 15 clinical profile types and, with the same rule relaxation, an additional ten percent could be classified as Normal K+ profiles.

The strictly applied Marks and Seeman rules are designed to prevent a profile from being classified as more than one type, and with one-rule violations permitted, the types are indeed not always mutually exclusive. Using the computer program, we determined that of 1,703 profiles which could be classified only if one-rule violations were permitted, 72 (or four percent) were classified in more than one profile type. Such a small percentage reveals that type differentiation depends to a very small extent on any single rule. This is a rather interesting result and one wonders whether it indicates a degree of profile clustering that is specifically characteristic of a psychiatric population.

The body of results pertaining to each profile type and violations associated with each of the rules specifying the type appear for the 16 types in Tables 3 through 18. The results for each type will be briefly discussed.

Type 2-3-1. The three levels of stringency in interpreting the rules defining type 2-3-1 and the number of cases classified at each level of stringency appear at the bottom of Table 3; on the left margin are each of the eight defining rules provided by Marks and Seeman. The table is set up so that the sub-rules may be evaluated separately. Thus, Rule 1, written by Marks and Seeman as "D, Hy, or Hs greater than 70," is written here as "D greater than 70," "Hy greater than 70," and "Hs greater than 70." The body of the table shows the distribution of violations in I-score points for each rule. A violation of zero would indicate that the I-score was 63. For example, a difference of minus nine I-score points (D=80, Hs=89) in Rule 2 (D-Hs>5T) would be recorded as a violation of 14 I-score points, while a difference of one point (D=85, Hs=84) would be recorded as a violation of four I-score points. The right margin of the table provides a summary of each line, and lines that correspond to subrules are bracketed. The first column on the right margin gives the total cases with violations of eight or fewer points; the second column gives the corresponding information for violations greater than eight points; and the third column gives the overall total. The total number of cases for a given rule cannot be obtained by summing the cases for each of the subrules, since a single case may be counted under more than one subrule.

The longest rule in Table 3, Rule 4, includes the greatest number of violations. Most of these violations have more than 8 I-score points and the majority has more than 15 I-score points. A modest relaxation of all rules increases the classification rate from .58 percent to 1.80 percent, which is still small, much less than the 5.9 percent reported by Marks and Seeman for the 2-3-1 type. Thus, permitting all one-rule violations does not raise the rate above 2.67.

Type 2-7. It is apparent from Table 4 that most rule violations in this category are less than eight points, for the net improvement is only .56 percent if violations of greater than eight points are included. Most of the greater-than-eight-point violations are associated with Rules 4 and 5. Marks and Seeman report the rate of correct classification was 7.9 percent for this profile type, which is considerably above our rate of 2.13 when rules were stringently applied and above our rate of 4.63 when rules were most relaxed.

Type 2-7-4. It is apparent that, except for Rule 6, few profiles exceeded the lower range of rule relaxation (see Table 5). This rule requires an excess of five T-score points in one direction between two highly correlated scales. The clinical population would probably yield quite a number of 2-7-4 profiles were it not for the Pt-Sc rule. Marks and Seeman report a rate of correct classification of 5.6 percent in their population; when rules were stringently applied, our rate was only 1.17; and when rules were most relaxed, our rate was approximately 7 percent.

Type 2-7-8. In our population, this was a relatively rare profile type (see Table 6). Permitting one-rule violations increased the rate of classification by only three percent. Most violations were eight or fewer points. Certain rules (namely, 1, 7, and 10) were especially inactive and allowed only a few more classifications when relaxed, while Rules 2, 3, and 4 enabled a major gain in profiles classified when relaxed. The latter three rules require T-score differences that are ten points or higher. Marks and Seeman report a total of seven percent correct classifications for this code type, which is approximately five times our rate and considerably in excess of the rate obtained under complete relaxation of any one rule.

Type 2-8. Almost all of the gain associated with relaxation of rules comes from Rule 3 (Pt>Pd and Pt>Pa) and Rule 5 (Sc-Pt>5T) (see Table 7). It is noteworthy that Rule 5 again involves an Sc-Pt difference. While our rate of correct classification was negligible (three percent) when rules were strictly interpreted, the rate of classification was relatively high when either the eight-point cutoff or complete

single-rule relaxation were used; at both levels it was higher than the 4.8 percent reported by Marks and Seeman with application of the strict profile rules.

Type 3-1. There is little to be said about the 3-1 profile type reported in Table 8. We were able to classify few cases in our sample as 3-1 types when the rules were strictly interpreted, and this number did not increase appreciably with relaxation of the rules, even though the increase was approximately threefold. Most violations of a single rule were at or under the eight-point level. Marks and Seeman reported a rate of classification of 3.7 percent, one of their lower profile-type frequencies.

Type 3-2-1. In type 3-2-1 (see Table 9), there were few correct classifications. The rate went up to approximately five percent when one-rule violations of eight points or less were allowed and to about seven percent when violations of any size were permitted. Quite a number of rules participated in holding back one-rule violators. Most of these rules, except for Rule 6, were effective at the level of eight points or less, as there were few violations in excess of eight points. Marks and Seeman report a classification rate of 4.9 percent. This is approximately the same as ours when violations of eight points or less were admitted.

Type 4-6. The incidence of profile type was very low in our population (see Table 10), and allowing one-rule violations did not increase it very much. Marks and Seeman report a rate of 3.5 percent in their population, which is seven times greater than our classification rate with single-rule violations of any magnitude allowed.

Type 4-6-2. The 4-6-2 profile is the type with the least frequent occurrence in the Marks and Seeman data and we found that less than one percent of our population could be so classified. Approximately two percent more were classified in this type when one-rule violations of eight points or less were included. The classification rate again increased to a total of 4.34 percent if all one-rule violations were accepted.

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Type 4-6-2. The 4-6-2 profile is the type with the least frequent occurrence in the Marks and Seeman data and we found that less than one percent of our population could be so classified. Approximately two percent more were classified in this type when one-rule violations of eight points or less were included. The classification rate again increased to a total of 4.34 percent if all one-rule violations were accepted.

Type 4-8-2. The majority of the violations of profile type 4-8 rules were of eight points or less (see Table 12). Rule 5, the Sc-Pt rule, was a major contributor to violations above the eight-point level. Marks and Seeman report a rate of 5.4, which is approximately the same as the rate we found when violations not greater than eight points were included.

Type 4-9. The 4-9 profile was a low-frequency profile in our sample (see Table 13). While Marks and Seeman report a rate of 5.3 with strict interpretation of the rules, we found a rate approximating only 0.33 percent. This rate remained negligible at any level of single-rule relaxation.

Type 8-3. The data on the 8-3 type appear in Table 14. Only one rule, Hy-D, appeared to take any substantial toll of one-point violators. Other rules, when relaxed to admit one-rule violations of eight points or less, caused the classification rate to rise from 0.79 percent to 2.60 percent. Marks and Seeman report a rate of 3.9 percent which is comparable to the rate we found when single-rule violations of any magnitude were allowed.

Type 8-6. This profile was of no significance within our population (see Table 15). Marks and Seeman, applying strict rules, report a classification rate of 4.5 percent. Our rate, when all one-rule violations were allowed, was only 1.46 percent.

Type 8-9. The 8-9 profile was one of the more common types within our sample (see Table 15). While Marks and Seeman report a classification rate of 4.1 percent with rules strictly applied, our rate with stringent rule application was only 4.4 percent. When all single-rule violations of eight points or less were allowed, this rate was raised to 11 percent, and inclusion of single-rule violations of any magnitude raised it to 15 percent. Every rule barred a fairly substantial number of profiles, although relaxation of the first rule, Sc and Ma>70 I-score points, was the major contributor to the increase in classification rate.

Type 9-6. While Marks and Seeman report a classification rate of three percent, our rate was negligible when rules were strictly applied, allowing all single-rule violations did not raise the rate above 1.36 percent. Obviously, no one rule was responsible for withholding many cases from classification (see Table 17).

Type NK+. In accordance with Marks and Seeman's definition, the Normal K+ type (NK+) was sought among our 1,196 inpatient profiles. In this group, this profile had a fairly substantial incidence, namely, 6.85 percent (see Table 18), which is in excess of the Marks and Seeman rate of 5.4 percent.

With regard to all the profile types, it should be noted that the Pt scale repeatedly occurred in association with one-rule violations. This is illustrated by the fact that Pt is involved in 31 percent of the subrules for which the largest number of one-rule violations was recorded, although this scale is involved in only 13 percent of the total body of subrules.

Discussion

The findings indicate that the Marks and Seeman system failed to function as a comprehensive taxonomy for our particular sample of MMPI profiles. It is also true that allowing one-rule violations raised the classification rate from 20 percent to 70 percent. Since this expansion resulted in classifying one profile in two or more categories at a rate of only four percent, one can conclude that even the relaxed rules define types that are relatively discrete. While between-type distinctiveness may be reassuring, it does not guarantee satisfactory homogeneity within profile types. The task is to define types large enough in membership to allow for collection of reliable data about type characteristics, yet narrow enough to achieve homogeneity of members. It is clear that in our particular sample, most of the Marks and Seeman types contained too few cases for data collection. Yet, one cannot be sure that the executed rule relaxation might not have resulted in too much within-type heterogeneity. The requirement of type homegeneity may eventually force abandonment of the goal of a comprehensive all-purpose descriptive system that contains no more than 20 or so profile types. Instead, one might anticipate a continuing accumulation of information on a growing number of narrowly defined MMPI types. This approach would often require very

large samples, obtained perhaps by pooling data from several different sources. Such future typological developments might profit from more sophisticated kinds of cluster analysis.

In the meantime, we feel that it is critical for actuarial research not to proceed exclusively along typological lines. We do recognize that the profile-type approach has the appeal of not prejudging the form of relationships between variables under consideration. For example, it does not impose the classical linear and homoscedastic regression model on the data. A given typological system might capitalize on highly configural relationships that would elude linear regression. However, one should not minimize the problem of obtaining samples of adequate size in this approach. Also, it has so far remained quite unclear to what extent configural effects actually characterize relevant test-criterion relationships. With respect to one well-researched criterion, the neurotic-psychotic distinction, the evidence to date is that simple linear combinations of MMPI scale scores are more effective diagnostic tools than configural formulas, including the Meehl-Dahlstrom rules (Goldberg, 1965). More comprehensive comparative analyses of linear versus configural models have not yet been done. Such studies would be of practical and of analytic-descriptive interest. They might enable us to separate relatively simple relationships from those that are more complex. At this point, one might, for example, consider a multiple-criterion study concerned with the following two tasks: first, the collection of actuarial data on profile types that have been described in the literature and are represented in the sample and second, the derivation of linear regression formulas for each of the criteria under consideration (perhaps, restricting possible regression weights to values of -1, 0 and +1). Properly cross-validated, the results of such a relatively simple design might even within present knowledge prove illuminating. Diagnostic feats accomplished by profile types but not by linear formulas might point the way to significant deviations from the linear regression model. On the other hand, relationships that are adequately represented by linear formulas

would not remain obscured in the piecemeal presentation of profile types. At one time the typological approach was useful in demonstrating the effectiveness of actuarial methods. It may be well to recall, however, that Meehl, who instigated this research (Meehl, 1956) has also shown how to study different actuarial models concurrently (cf., Meehl; Lykken and Rose, 1963; Goldberg, 1965).

A final point concerns the utilization of additional variables. Why not incorporate variables like sex, age, intelligence, socioeconomic status, and professional classification and possibly medical classifications like psychiatric-nonpsychiatric and inpatient-outpatient as well? Explicit inclusion of such variables in one's analysis would be useful in several ways. First, the presence of basic background information would clarify the incremental validity associated with the MMPI. Further, important configural (or "moderator") effects might be revealed if we were to study the MMPI in the context of such variables as age and sex. Finally, the availability of these non-MMPI background data would provide a firmer basis than is presently to be had for deciding whether actuarial MMPI interpretations derived in one setting may be applied to a different group. The refinement resulting from inclusion of age, sex, etc., as part of the "profile" would, of course, reduce the membership of certain types below the critical minimum; on the other hand, incorporation of the same variables in one's regression formulas would not create problems beyond reaffirming the need for cross-validation. One might study types and regression formulas with these additional variables both included and excluded.

In conclusion, it seems fair to say that actuarial MMPI research has so far mainly been concerned with its practical justification rather than with describing and analyzing empirical relationships. Yet, faced with this approach and with problems such as we encountered in applying its results, one is inclined to reflect on how little is known about the nature of the domain. Certainly, we do not disapprove of the particularism of a discrete profile typology. A great deal of important information has been provided by Marks and Seeman and, on a different population, by Gilberstadt and Duker (1965). What we do want to emphasize is

the desirability of trying out alternative approaches as well in order to facilitate the search for underlying structure.

REFERENCES

Gilberstadt, H., and Duker, J. A Handbook for Clinical and Actuarial MMPI Interpretation. Philadelphia: Saunders, 1965.

Goldberg, L. R., Diagnostician vs. diagnostic signs: The diagnosis of psychosis vs. neurosis from the MMPI. Psychological Monographs, 1965, 79, (9, Whole No. 602).

Lykken, D. T., and Rose, R., Psychological prediction from actuarial tables. Journal of Clinical Psychology, 1963, 19, 139-151.

Marks, P. A., and Seeman W., Actuarial Description of Abnormal Personality. Baltimore: Williams Wilkins, 1963.

Meehl, P. E., Wanted--a good cookbook. American Psychologist, 1956, 11, 263-272.

Meehl, P. E., A comparison of clinicians with five statistical methods of identifying psychotic MMPI profiles. Journal of Counseling Psychology, 1959, 6, 102-109.

Pauker, J. D., Identification of MMPI profile types in a female, inpatient, psychiatric setting using the Marks and Seeman rules. Journal of Consulting Psychology, 1966, 30, 90.

Table 1

Patients Comprising Sample, Number, Mean Age, SD of Age, Service from which Patient Came

SERVICE		MALE	FEMALE
Outpatient of Psychiatry Service	Number	603[a]	1003[a]
	Mean Age	36.4	35.2
	SD Age	14.5	13.7
Inpatient of Psychiatry Service	Number	435	603
	Mean Age	37.1	37.0
	AD Age	17.1	13.9

[a]There were 172 cases for whom age or sex did not appear in the record.

Table 2

Percentage of MMPI's Falling in Each of the Profile Types Specified at Three Levels of Rule Stringency

Profile Type	Marks & Seeman Type with No Rule Violations[a]	M & S Type with only One-Rule Violation of 8 T-score Points or Less	M & S Type with only One-Rule Violation of Any Magnitude
2-3-1	.58	1.80	2.67
2-7	2.13	4.07	4.63
2-7-4	1.17	5.34	6.95
2-7-8	1.41	3.67	4.54
2-8	.31	5.29	8.77
3-1	.83	2.47	2.75
3-2-1	.96	4.96	7.12
4-6	.10	.42	.56
4-6-2	.79	2.81	4.34
4-8-2	.96	5.49	7.40
4-9	.31	.83	1.35
8-3	.79	2.60	3.78
8-6	.00	.96	1.46
8-9	4.40	11.11	14.94
9-6	.10	.76	1.36
All Types	14.84	b	10.97[c]
K +	6.85	10.03	10.87[c]

[a] See text for further explanation
[b] Not determined
[c] Based upon 1,196 hospitalized cases (See Marks & Seeman, Rule 1, p. 214)

Table 3

Atlas Code: 2-3-1

Distribution of Violations in T-Scores

	Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1)	D>70T																		0	0	0
	Hy>70T	1					1			1									3	0	3
	Hs>70T	1		1															2	0	2
	Total																		3	0	3
(2)	D-Hs>5T		4		1	1		1			1							1	7	2	9
(3)	D-Hy>5T	4		1				1	1	1			1						8	1	9
(4)	PT<D			1	1			2			1								4	1	5
	Si<D																		0	0	0
	PT<Hy	2	2			2			1	1	2	1	1	1	3			7	8	15	23
	Si<Hy																		0	0	0
	PT<Hs	1	1	1	2			1	1	1	2	1	1	2	1			11	8	18	26
	Si<Hs																		0	0	0
	Total																		8	20	28
(5)	Sc-Pt<5T			1					1										2	0	2
(6)	Ma<70T																		0	0	0
	Si<70T		1	1	1				1							1			4	1	5
	Total																		4	1	5
(7)	Si>Ma				2		1										1		3	1	4
(8)	L<70T																		0	0	0
	F<70T																		0	0	0
	K<70T																		0	0	0
	Total																		0	0	0

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
2-3-1 Type as specified by Marks and Seeman	17	17	0.58	0.58
2-3-1 Type with only one rule violation of 8 T-Scores or less	35	52	1.22	1.80
2-3-1 Type with only one rule violation of more than 8-T-Scores	25	77	0.87	2.67

Table 4

Atlas Code: 2-7

Distribution of Violations in T-Scores

Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1) D≥70T																		0	0	0
Pt≥70T		2																2	0	2
Total																		2	0	2
(2) D>Pt	1	3	2		2		1											9	0	9
(3) L-Sc>15T	2	1	1															4	0	4
(4) Pt>Hs			2	1		2			1				1			2	3	6	6	12
Pt>Hy	1		1	2	2		1			1	1				1	2		7	5	12
Total																		7	9	16
(5) Pt-Fd>10T	3	3		3					1		1	1	1		2			10	5	15
(6) Pt-Fa>10T		3	2	1		1	1		1									9	0	9
(7) Pt-Sc>10T	1	1			1		1	1										5	0	5
(8) Ma<60T	4			1		1			1									7	0	7
(9) L<70T	1			1													1	2	1	3
F<70T	1								1									2	0	2
K<70T																		0	0	0
Total																		3	2	5

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
2-7-4 Type as specified by Marks and Seeman	61	61	2.13	2.13
2-7-4 Type with only one rule violation of 8 I-Scores or less	56	117	1.95	4.07
2-7-4 Type with only one rule violation of more than 8 I-Scores	16	133	.56	4.63

Table 5

Atlas Code. 2-7-4

Distribution of Violations in T-Scores

Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1) D>70T	1	2	2			2		2		1				1				9	2	11
Pt>70T		2							1									3	0	3
Pd>70T		2		3			3											8	0	8
Total																		15	2	17
(2) D-Pd<15T	1	1																2	0	2
(3) D-Pt<10T			1		1													2	0	2
(4) Pt>Hs		2		2			1								2			5	2	7
Pt>Hy		5	1	2	2	1		1	1	1						1		13	2	15
Total																		14	3	17
(5) Pt-Pd<10T	2	3	2	1		2	2	2			1							14	1	15
(6) Pt-Sc>5T	6	8	9	7	7	7	6	7	8	2	8	2	3	2	4	4	12	65	37	102
(7) Sc>Ma	1	2		1													3	4	3	7
(8) Ma>40T	1							1										2	0	2
(9) L<70T																		0	0	0
K<70T	1		1															2	0	2
F<80T																		0	0	0
Total																		2	0	2

Profiles typed at three levels of rule stringency	N	Sum N	%N	% Sum N
2-7-8 Type as specified by Marks and Seeman	34	34	1.17	1.17
2-7-8 Type with only one rule violation of 8 T-Scores or less	120	154	4.17	5.34
2-7-8 Type with only one rule violation of more than 8 T-Scores	46	200	1.60	6.95

Table 6

Atlas Code: 2-7-8

Distribution of Violations in T-Scores

Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1) D>70T		1	1					1										3	0	3
Pt>70T																		0	0	0
Sc>70T		1					2											3	0	3
Total																		5	0	5
(2) D-Hs>15T	1			1	2	1	1	3							1			9	1	10
(3) D-Sc<15T	2		2	1		1				1	1	1		1	1		1	6	6	12
(4)Pt-Pd>10T	2	1	1		2	1		2	2	2	1	1	2				2	11	8	19
(5)Pt-Pa>10T	1	1					1	2								1		5	1	6
(6)Sc-Pt<5T			1			1												2	0	2
(7)Pt>Hs																		0	0	0
Sc>Hs																		0	0	0
Pt>Hy																		0	0	0
Sc>Hy																		0	0	0
Total																		0	0	0
(8)Ma<70T	1			1		1												3	0	3
(9)Si>70T	5	5	1	3		2	1	3	1	3	2		1			1	2	21	9	30
(10)L<70T																		0	0	0
K<70T																		0	0	0
F<80T			1				2											3	0	3
Total																		3	0	3

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
2-7-8 Type as specified by Marks and Seeman	41	41	1.41	1.41
2-7-8 Type with only one rule violation of 8 T-Scores or less	65	106	2.26	3.67
2-7-8 Type with only one rule violation of more than 8 T-Scores	25	131	0.87	4.54

Table 7

Atlas Code: 2-8

Distribution of Violations in T-Scores

Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1) D>70T				1		1				1							1	2	2	4
Sc>70T																		0	0	0
Total																			2	4
(2) D=Sc<15T																		1	0	1
(3) Pt>Ba	5	3	4	5	2	6	5	2	3	6	3	1	4	1	3	2	10	35	30	65
Pt>Pa	1	6	3	3	5	7	3	4	4	1	4	2	3	2	1	1	10	36	24	60
Total																		40	44	84
(4) Sc>Hs			1			1				1	1							2	2	4
Sc>Hy				2				1	1									4	0	4
Total																		4	2	6
(5) Sc-Pt>5T	8	5	10	15	7	6	15	6	11	7	10	6	5	2	4	3	8	83	45	128
(6) Ma<70T	6			1		1												8	0	8
(7) Si>Ma		2	1	1						1			1	1			3	4	6	10
(8) L<F	1																	1	0	1
K<F										1		1						0	2	2
Total																		1	1	2

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
2-8 Type as specified by Marks and Seeman	9	9	0.31	0.31
2-8 Type with only one rule violation of 8 T-Scores or less	143	152	4.97	5.29
2-8 Type with only one rule violation of more than 8 T-Scores	100	252	3.48	8.77

Table 8

Atlas Code: 3-1

Distribution of Violations in T-Scores

Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1) Hy>70T																		0	0	0
Hs>70T																		0	0	0
Total																		0	0	0
(2) Hs-D>10T		2		1														3	0	3
(3) Hy-D>10T	2	1	1	1		1		2	1	1								9	1	10
(4) Hy-Pd>10T	1	1				1	1	2		1				1	1			6	3	9
(5) Mf>45T	2		2		1		2											7	0	7
(6) Sc-Pt<5T	6		3	1	2		1			1	1							13	2	15
(7) Ma<70T						1											1	1	1	2
Si<70T									1									1	0	1
Total																		2	1	3
(8) K>F		1		1		1		1									1	4	1	5
F<60Ts	3		2		1													6	0	6
Total																		7	1	8

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
3-1 Type as specified by Marks and Seeman	24	24	.83	.83
3-1 Type with only one rule violation of 8 T-Scores or less	47	71	1.63	2.47
3-1 Type with only one rule violation of more than 8 T-Scores	8	79	.28	2.75

Table 9

Atlas Code: 3-2-1

Distribution of Violations in T-Scores

	Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1)	Hy>70ts	3		2	1		2			1									9	0	9
	D>70ts	2	1						1										4	0	4
	Hs>70t	2		5	1	1	1	1		1		1							12	1	13
	Total																		17	1	18
(2)	Hs-D<5T	6	1	2	2	2	4	2	2	1	1		1				1	5	22	8	30
(3)	Hy-Hs<15T	1	1																2	0	2
(4)	Hy-L<10T					1													1	0	1
(5)	Sc-Ft<5T			3	1	2	1	1	1				1					1	9	2	11
(6)	Pt<Hy	2	7	3	2	3	1	3	2	3	5	3	2	2	4	1	4	11	26	32	58
	Si<Hy																		0	0	0
	Ft<L	4	7	2	3	1	2	4	1	1	1	2	2		2			1	25	8	33
	Si<L																		0	0	0
	PT<Hs	1	5	5	4	5	1	4	4	4	3	3	4	2	4	2	1	16	33	35	68
	Si<Hs																		0	0	0
	Total																		36	42	78
(7)	Ma<70T	3			1													2	4	2	6
	Si<70T	1	3	1	1	1	2		3	1						1			13	1	14
	Total																		13	6	19
(8)	L<70T	1			5			2			1				1				8	2	10
	F<70T							2											2	0	2
	K<70T	2		3		4			1										10	1	11
	Total																		15	3	18

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
3-2-1 Type as specified by Marks and Seeman	28	28	.96	.96
3-2-1 Type with only one rule violation of 8 T-Scores or less	115	143	4.00	4.96
3-2-1 Type with only one rule violation of more than 8 T-Scores	62	205	2.16	7.12

Table 10

Atlas Code: 4-6

Distribution of Violations in T-Scores

Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1) Pd>70T																		0	0	0
Pa>70T																		0	0	0
Total																		0	0	0
(2) Pd-L>15T			1															1	0	1
(3) Pd-Mf>25T																	1	0	1	1
Pa-Mf>25T																	1	0	1	1
Total																		0	1	1
(4) Pd>Sc					1													1	0	1
Pa>Sc																		0	0	0
Total																		1	0	1
(5) Pa-L>10T					1													1	0	1
(6) Sc>Pt	1					1					1	1						2	2	4
Sc>Ma																		0	0	0
Total																		2	2	4
(7) Ma<70T																		0	0	0
Si<70T				1														1	0	1
Total																		1	0	1
(8) L<70T																		0	0	0
F<70T	1						2						1					3	1	4
K<70T																		0	0	0
Total																		3	1	4

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
4-6 Type as specified by Marks and Seeman	3	3	.10	.10
4-6 Type with only one rule violation of 8 I-Scores or less	9	12	.31	.42
4-6 Type with only one rule violation of more than 8 I-Scores	4	16	.14	.56

Table 11

Atlas Code: 4-6-2

Rule	Distribution of Violations in T-Scores																	Sums		Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	≤8	>8	
(1) Pd>70T		2		4			2									1		8	1	9
Pa>70T	1			2		6			4			3			2		1	13	6	19
D>70T	1			2		3												6	0	6
Total																		15	7	22
(2) Pd-D<15T			1															1	0	1
(3) Pd>Sc		2	2	3	1		1	1										10	0	10
Pa>Sc		3	4		3	1		1	1	1	4	2		2			5	13	14	27
Total																		13	14	27
(4) PT-Pd<5T		2			1								1					3	1	4
(5) Pa-D<10T				1														1	0	1
(6) Sc-PT<5T	1		1	2	1	1		1										7	0	7
(7) Ma<70T	1			1		2			1									5	0	5
(8) L<F	1	2	2	1			1			1	3						3	7	7	14
K<F			1	1		1	3	1	2	2	1	1	1				3	9	8	17
F<80T	1				1		1		1								1	4	1	5
Total																		13	13	26

rofiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
4-6-2 Type as specified by Marks and Seeman	23	23	.79	.79
4-6-2 Type with only one rule violation of 8 T-Scores or less	58	81	2.02	2.81
4-6-2 Type with only one rule violation of more than 8 T-Scores	44	125	1.53	4.34

Table 12

Atlas Code: 4-8-2

Distribution of Violations in T-Scores

	Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1)	Pd>70Ts		8		2			2		4		2							16	2	18
	Sc>70Ts		2		1				3				1						6	1	7
	D>70Ts	1	1	4			2		2		1	1							10	2	12
	Total																		20	5	25
(2)	Pd-D<15T	1	1									1							2	1	3
(3)	PT-Pd<5T	1					2			1				1		1		2	4	4	8
(4)	Sc-D<15T			1	1		1		1										4	0	4
(5)	Sc-Pt>5T	5	2	7	5	7	6	4	5	6	5	5	1	2	2	1	2	5	47	23	70
(6)	Sc-Ma>10T	1	2		1				2										6	0	6
(7)	Ma<70Ts	4			1		5						2						10	2	12
(8)	L<F	3				1			1	1		1		2		1		4	6	8	14
	K<F	2		2				1	1	2	1	2	1	1	2			4	8	11	19
	F<80T	6		7		4		3		8		2		3		1		3	28	9	37
	Total																		37	20	57

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
4-8-2 Type as specified by Marks and Seeman	28	28	.96	.96
4-8-2 Type with only one rule violation of 8 T-Scores or less	130	158	4.52	5.49
4-8-2 Type with only one rule violation of more than 8 T-Scores	55	213	1.91	7.40

Table 13

Atlas Code: 4-9

Rule	Distribution of Violations in T-Scores: 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1) Pd>70Ts																		0	0	0
Ma>70Ts																		0	0	0
Total																		0	0	0
(2) Pd>Sc																		0	0	0
(3) Ma-Pd<5T	1																	1	0	1
(4) Ma<Sc		1	1		1		1									1	5	4	6	10
(5) Ma-Sc>5T				1		1		1										3	0	3
(6) D<70T													1					0	1	1
Pt<70T		1																1	0	1
Total																		1	1	2
(7) Si<60T											1							0	1	1
(8) F>L								1			2						1	1	3	4
F>K			1						2	3						1	2	3	6	9
F<70T				2														2	0	2
Total																		6	7	13

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
4-9 Type as specified by Marks and Seeman	9	9	.31	.31
4-9 Type with only one rule violation of 8 T-Scores or less	15	24	.52	.83
4-9 Type with only one rule violation of more than 8 T-Scores	15	39	.52	1.35

Table 14

Atlas Code: 8-3

Distribution of Violations in T-Scores

Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1) Sc>70T		1																1	0	1
Hy>70T		2				2									1			4	1	5
Hs>70T				1	1	1											1	3	1	4
Total																		6	1	7
(2) Hy-Hs<10T	1		1															2	0	2
(3) Hy-D>5T		2	2		3	6	4	3	2	3	5	2	2		2		10	22	24	46
(4) Hy-Sc<5T		1		1			1	1			1							4	1	5
(5) Sc-PT>5T	1		1	1				2										5	0	5
(6) Sc-Ma>10T	1	1	1		1		1	1	3		1				1		2	9	4	13
(7) Ma>Si			1	1		1				1			1		1	1		3	4	7
(8) Si<70T	1																	1	0	1

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
8-3 Type as specified by Marks and Seeman	23	23	.79	.79
8-3 Type with only one rule violation of 8 T-Scores or less	52	75	1.81	2.60
8-3 Type with only one rule violation of more than 8 T-Scores	34	109	1.18	3.78

Table 15

Atlas Code: 8-6

Distribution of Violations in T-Scores

Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1) Sc>70T																		0	0	0
Pa>70T																		0	0	0
Pd>70T		2		1					1									4	0	4
D>70T								1										1	0	1
Total																		4	0	4
(2) Hs<D																		0	0	0
Hy<D		1		1								1						2	1	3
Hs<Pa	1																	1	0	1
Hy<Pa		1					1											2	0	2
Hs<PT			1		1		1											3	0	3
Hy<PT	1	1		1				2	1									6	0	6
Hs<Sc																		0	0	0
Hy<Sc																		0	0	0
Total																				
(3) D-Hs>10T		1		1			1											3	0	3
(4) Pa-MF>25T	1	1	1	1								1		1			1	4	3	7

(continued on next page)

(Atlas Code: 8-6, con't)

Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(5) _a>PT		1							2		1	1						3	2	5
(6) Sc-PT>10T	2	1	1							1		1	3		1	1		4	7	11
(7) Sc-Ma>10T																		0	0	0
(8) F>L				1														1	0	1
F>K																		0	0	0
L<60T	1			2			1							1				4	1	5
K<60T		1			1													2	0	2
Total																		4	1	5

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
8-6 Type as specified by Marks and Seeman	0	0	0	0
8-6 Type with only one rule violation of 8 T-Scores or less	28	28	.97	.97
8-6 Type with only one rule violation of more than 8 T-Scores	14	42	.49	1.46

Table 16

Atlas Code: 8-9

Distribution of Violations in T-Scores

Rule	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1) Sc>70T		6		6			3	3		1		1						18	2	20
Ma>70T			34			28		20			17		15			8	38	82	78	160
Total																		82	78	160
(2) MF>40T		4		3			2				2							9	2	11
(3) Sc-Pt>5T	8	5	8	2	5	4	4	5	2	1	2	2	1	2	1			43	9	52
(4) Ma-Sc<5T	2	4	4						3		3			1	1		5	13	10	23
(5) Si<70T	9	3	3	3	1	6	4	4		2			1				1	33	4	37
(6) F>L	3				1	1	2		1		1	1		1			1	8	4	12
F>K	2		3	1	1		1			1							3	8	4	12
Total																		13	7	20

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
8-9 Type as specified by Marks and Seeman	127	127	4.40	4.40
8-9 Type with only one rule violation of 8 T-Scores or less	193	320	6.71	11.11
8-9 Type with only one rule violation of more than 8 T-Scores	110	430	3.83	14.94

Table 17

Atlas Code: 9-6

Rule	Distribution of Violations in T-Scores																Sums		Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	≤8	>8	
(1) Ma>70T																		0	0	0
Pa>70T																		0	0	0
Total																		0	0	0
(2) Hs<70T	2		1					1			2						7	4	9	13
D<70T							1	1			2							2	2	4
Hy<70T	2					1		1		1			1				1	4	3	7
Total																		4	9	13
(3) Pd-Pa<5T				2	2	2				1					1		1	6	3	9
(4) Ma-D<15T																		0	0	0
(5) Ma-Pd>5T																		0	0	0
(6) Ma-Sc>10T		2		2			2			1					1		1	6	3	9
(7) Si<70T																		0	0	0
(8) L<70T																		0	0	0
K<70T																		0	0	0
F>80T			2				1										2	3	2	5
Total																		3	2	5

Profiles typed at three levels of rule stringency	N	Sum N	%N	%Sum N
9-6 Type as specified by Marks and Seeman	3	3	.10	.10
9-6 Type with only one rule violation of 8 T-Scores or less	19	22	.66	.76
9-6 Type with only one rule violation of more than 8 T-Scores	17	39		1.36

Table 18

Atlas Code: Normal K+

Rule	Distribution of Violations in T-Scores: 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	Sums ≤8	Sums >8	Total
(1) Psy IP only																				61
(2) Hs<70T			3		2		1				2					1		6	3	9
D<70T		1					3										1	4	1	5
Hy<70T	3					1		1		1	2		1					5	4	9
Pd<70T		1										1						1	1	2
Mf<70T																		0	0	0
Pa<70T																		0	0	0
PT<70T																		0	0	0
Sc<70T		1																1	0	1
Ma<70T	1																	1	0	1
Total																		4	7	11
(3) >5 Clinical scales	<60																	3	0	3
(4) L>F	1		3		11	1	1	1		3								18	3	21
K>F																		0	0	0
Total																		18	3	21
(5) K-F>5	5	3	3		2													13	0	13
(6) F<60T																		0	0	0

Profiles typed at three levels of rule stringency		N	Sum N	%N*	%Sum N
Normal K+	Type as specified by Marks and Seeman	82	82	6.85	6.85
Normal K+	Type with only one rule violation of 8 T-Scores or less	38	120	3.18	10.03
Normal K+	Type with only one rule violation of more than 8 T-Scores	10	130	.84	10.87

*Based upon 1,196 hospitalized cases