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## GLOBAL AND COMPONENT MEASURES OF TYPE A BEHAVIOR AS PREDICTORS OF SELF-REPORTS OF PSYCHOLOGICAL SYMPTOMS AND LIFE ENJOYMENT<sup>1</sup>

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### ABSTRACT

The structured interview assessment of global Type A behavior and six components of Type A behavior were related to eight indices of psychological symptoms and life enjoyment. The Type A component of verbal response latency (faster responding) was found to be positively correlated with the "Life Enjoyment" index and negatively correlated with the "Life Dissatisfaction," "Psychosomatic Symptoms," and "Depressed Affect" indices. The Type A component of hostility was found to be positively correlated with the indices of "Irritability" and "Anxiety." The hostility and response latency components were the primary, independent predictors of the psychological symptoms and life enjoyment indices in a series of multiple regression analyses in which the global Type A assessment and Type A components were entered as predictors and the effects of demographic variables were held constant. The composition of a global score from component scores which relate to external variables in opposite directions yields attenuated correlations of those external variables with the global score. Failure to attend to interactions of the global or component scores with other classes of variables, such as demographics, can also mask relationships with external variables.

**KEYWORDS:** Type A behavior; Type A components; psychological symptoms; life enjoyment

### GLOBAL AND COMPONENT MEASURES OF TYPE A BEHAVIOR PATTERN AS PREDICTORS OF SELF-REPORTS OF PSYCHOLOGICAL SYMPTOMS AND LIFE ENJOYMENT

Studies of the psychological correlates of the Type A behavior pattern (TABP) have been reviewed by Mathews (1982). Problems in the interpretation and integration of many studies have arisen because different measures of the TABP which are not highly correlated have been employed. Further, the use of

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the different measures of the TABP in different, usually fairly restricted, segments of the population has rendered it impossible to generalize the findings beyond the particular study groups. Another impediment to the understanding of the TABP pattern has been the failure to approach the measurement of TABP with the psychometric techniques typically employed in the development and validation of psychological constructs (Matthews, 1982). This includes, but is not limited to, the tendency displayed by many investigators to regard the TABP, however measured, as unidimensional.

Dembroski and his associates (1978) have focused on the potential multidimensionality of the TABP in their measurement of several components, including hostility, response latency, verbal competitiveness, rapid and accelerated speech, etc., which can be derived from the standard structured interview (SI Rosenman, 1978). It is possible that one or more of these components may explain the relationship between coronary heart disease (CHD) and the global TABP. For example, Matthews et al. (1977) found that two factors resulting from a factor analysis of the structured interview items — “competitive drive” and “impatience” — were significantly associated with the onset of CHD. Similarly, some recent studies have found “hostility,” as measured by the Cook and Medley (1954) hostility scale, to be positively associated with coronary heart disease (Shekelle et al., 1983; Williams et al., 1980). McCranie et al. (1986), using the same measures, failed to find a significant relationship between hostility and CHD. Williams et al. (1986) have presented evidence of an interaction between age and the TABP in the prediction of CHD which could account for the differences in these two studies. The Williams et al. (1986) results indicated a positive relationship between the TABP and CHD among respondents under 50 years of age, but a negative relationship among respondents over 50 years of age.

Several studies have focused on the psychological correlates of the global TABP. In a study by Chesney et al. (1981), 384 adult, employed males classified by the SI as A1 or A2 were compared to those classified as X or B to examine differences between the groups on several psychological attributes. Type A subjects had higher scores than Type B subjects on measures of aggression, autonomy, self-confidence, extraversion, and impulsiveness, and lower scores on measures of personal adjustment and self-control. No differences were found on measures of neuroticism, anxiety, depression, or risk-taking behavior. In another recent investigation, Vickers et al. (1981) studied the relation of the SI and Jenkins Activity Survey (JAS, Jenkins et al., 1967) to the Joffe-Naditch (1977) measures of defense and coping mechanisms. They found, contrary to hypothesis, that the global SI measure of Type A was unrelated to all of the measures of defense and coping mechanisms except suppression. The Jenkins “speed and impatience” measure was positively related to 4 of the 10 measures of defensiveness, and the Jenkins “hard driving” measure was negatively related to 3 of the 10 coping measures. The Jenkins Activity Survey overall scale and subscales correlated from .01 to .48 with the global SI measure of TABP in the two samples.

These mixed results emphasize the need to approach the study of the relationship of the TABP to other constructs in a multivariate analytic fashion, focusing first on the structured interview of the TABP and its components. Further, as in any correlational study, it is possible that the relationships between the TABP and other psychological constructs may be confounded by

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other variables. In a previous paper (Mopss et al., 1986) the authors reported significant relationships between the global SI measure of the TABP and several demographic variables. In the study, the global TABP measure was found to be significantly and positively related to income and education, and a significant quadratic relationship was found between age and global TABP. When relating the TABP to other psychological and behavioral measures it is therefore advisable to control for the relationship of these basic demographic variables.

The present study was designed to determine, in a large, general population sample, the relative contributions of SI global and component measures of the TABP, controlling for standard demographic variables, to the explanation of the variance in measures of psychological symptomatology and life enjoyment. The basic questions addressed were: 1) "What is the relationship between the global SI measure of the TABP to measures of psychological symptomatology and life enjoyment?" 2) "What are the relationships of the components of the TABP to measures of psychological symptomatology and life enjoyment?" and 3) "Are the relationships of global and component TABP measures with psychological symptomatology and life enjoyment independent of the basic demographic variables of age, family income, education, gender, and race?"

### METHODS

#### POPULATION SAMPLE

A probability sample of residents of Washtenaw County, Michigan was selected using a multistage probability sampling of households. To be eligible, respondents had to be 18 years old or older and not residing in the county primarily for the purpose of attending a college or university. Respondents were interviewed in their homes twice: the first time by a trained survey interviewer collecting data on a variety of sociological, psychological, sociodemographic, and health-related variables, and the second time by an interviewer trained in the SI technique. These interviews were conducted independently because the expertise and approach required by each are different. The survey interviews ranged from one-half hour to three and one-half hours in length, with a median interviewing time of one hour and fifteen minutes, and the Type A interviews averaged 15 minutes. Of a total of 1,439 eligible respondents, 963 (66.9 percent) completed the survey interview. Of these, 903 (93.8 percent) were contacted and agreed to be interviewed by the Type A interviewer. The 60 nonrespondents at this stage of interviewing either could not be located or refused the structured interview. Details of the sample selection, response rates, interviewer training and quality control procedures have been published in Moss et al. (1986).

#### TYPE A ASSESSMENTS

Subsequent to the completion of the Type A structured interview, a tape of the structured interview was rated for global Type A using a six-point assessment scale (A1, A2, XA, XB, B3, B4). The Type A structured interviews and assessment were conducted by six trained interviewers. The distribution of SI assessments for the total sample was: A1 = 13%, A2 = 30%, XA = 21%, XB = 17%, B3 = 15%, B4 = 4%.

The tapes were then randomly assigned to one of the six study assessors to conduct component assessments. The components of voice volume, voice emphasis, speed of speaking, response latency, hostility and verbal competitiveness were scored on five-point scales according to procedures taught to the staff by T.M. Dembroski at the time this study was implemented. Thirty percent of the global ratings and 20 percent of the component ratings were reassessed independently by randomly selected study assessors. The overall level of interrater reliability among the study staff assessors was .80 for the global rating and ranged from .47 to .68 for the component ratings, as measured by intraclass correlation coefficients. Reliability levels for the individual components were as follows: voice volume = .68, voice emphasis = .60, speed of speaking = .61, response latency = .65, hostility = .51, and verbal competitiveness = .47. Details concerning the interrater agreement on both the global and component assessments and concerning the psychometric properties of the components are available (Dielman et al, 1987).

#### PSYCHOLOGICAL SYMPTOMS AND LIFE ENJOYMENT SCALES

The survey interview data discussed in this report were respondents' reports of various psychological symptoms and life enjoyment. A psychological symptoms list was compiled by combining 10 items from the Center for Epidemiological Studies Depression Scale (CESD, Markush and Favero, 1974) with 18 items from a worker health study (Caplan et al., 1975, 1980). The psychological symptoms items asked subjects to report whether they had experienced certain emotions or physical symptoms associated with psychological stress or problems during the past six months. Examples of these items are: "I felt angry," "My hands sweated so that they felt damp and clammy," and "I was bothered by having an upset stomach or stomach ache." A listing of all the psychological symptoms items, in condensed form, is provided in Table 1. The seven life enjoyment items concerned enjoyment of one's personal life, health, self, work, and life as a whole; reports of current happiness, and satisfaction with life (Caplan et al., 1984; Gurin et al., 1960; Veroff et al., 1981). The psychological symptoms list and life enjoyment items were factor analyzed separately using principal axes factor extraction and orthogonal (Varimax) factor rotation procedures. The latent root of 1.0 criterion was used to determine the number of factors to be extracted. These solutions were employed as the basis for simple, unit weighted index score computation.

#### BIVARIATE AND MULTIVARIATE ANALYSES

As a first step in establishing the nature of the relationships among the demographic variables, psychological symptoms and life enjoyment indices, and the global and component TABP scores, the bivariate correlations among the 20 variables were computed. Subsequently, to determine the combined effects of global and component TABP variables on the psychological measures, a series of multiple regression analyses were conducted with the demographic variables used as control variables. Little is known about the relationship of the TABP to various measures of psychological symptomatology and in particular whether such relationships are linear or nonlinear. Therefore, to ensure that important predictors were not overlooked because their relationship with a given criterion was nonlinear, the following empirical procedure was used. Prior to setting up the

multiple regression analyses, polynomial regressions of each criterion on each predictor were performed to determine the order of these relationships.<sup>6</sup> When only a significant linear relationship was found or when there was no significant relationship, the variable was entered as an ordinal predictor in the multiple regression analyses. When a higher order polynomial relationship was significant, the variable was entered into the multiple regression analyses as a categorical predictor by constructing a series of dummy variables. When categorical predictors were constructed, a collapsed form of the original variable was used to insure a sufficiently large N in each of the categories. Race and gender were entered as categorical predictors in all instances. Multiple regression analyses were also conducted using all ordinal predictors (other than race and gender) in order to examine the extent to which the results were dependent upon the use of categorical predictors. Virtually identical substantive conclusions were reached with both sets of analyses.

## RESULTS

### PSYCHOLOGICAL SYMPTOMS SCALE

As shown in Table 1, the factor analysis of the psychological symptoms list resulted in seven eigenvalues greater than 1.0 (the eighth was .96). These seven factors accounted for 59.75 percent of the variance, the sum of the next to last row of Table 1. Index scores were computed for each of the factors by simple summation of the items which had their highest loadings on that factor. These are the loadings which are enclosed in boxes in Table 1. No item was included in more than one index. Cases were assigned a missing data code for the index score if half or more of the items for that index were missing data. Otherwise, the index was constructed by summing the items for that index on which valid codes were present, dividing by the number of items contributing to that sum, and multiplying by the total number of items possible for that index. As shown in the last row of Table 1, the internal consistency (alpha) coefficients for these seven indices ranged from .64 to .89, with a median coefficient of .79.

Table 1 reveals that the first factor resulting from the 28-item factor analysis received its highest loadings from the variables: "Didn't feel as good as others," "Didn't feel calm," "Felt life was a failure," "Not happy," "Felt bored," "Felt lonely," "Life wasn't interesting," and "Didn't enjoy life." Loadings over 0.3 were also received from "Couldn't shake off the blues," "Felt depressed," and "Felt sad," but these three variables were included in Factor VII rather than Factor I because of their higher loadings on that factor. Factor I has been termed "**Life Dissatisfaction**" on the basis of item content and had an alpha coefficient of .81. The second factor, termed "**Autonomic Responsiveness**," received its highest loadings from: "Shortness of breath," "Heart beats hard," "Dizzy spells," and "Heart beats fast." The alpha coefficient for this index was .79. The "**Sleep Problems**" index (Factor III) was formed from the items: "Restless sleep" and "Trouble sleeping," and had an alpha coefficient of .89. The items "Felt angry," "Felt irritated," and "Felt annoyed" were used to form the fourth index, which was labeled "**Irritability**," and had an alpha coefficient of .74. Items with the

TABLE 1

RESULTS OF FACTOR ANALYSIS ON 28 PSYCHOLOGICAL SYMPTOMS ITEMS  
(Varimax Factor Pattern Coefficients, Eigenvalues, Communalities, and Alpha Coefficients)

Variable Name	h <sup>2</sup>	Factor I	Factor II	Factor III	Factor IV	Factor V	Factor VI	Factor VII
		Life Dissatisfaction	Autonomic Responsiveness	Sleep Problems	Irritability	Psychosomatic Symptoms	Anxiety	Depressed Affect
Felt jittery	.49	.13	.23	.12	.23	.19	.54	.18
Felt angry	.40	.18	.02	.00	.57	.11	.11	.16
Couldn't shake off the blues	.52	.32	.12	.12	.22	.18	.23	.51
Didn't feel as good as others	.14	.31	.10	.01	.01	.01	.13	.14
Felt nervous	.56	.21	.17	.14	.29	.26	.53	.18
Felt depressed	.62	.44	.10	.11	.28	.17	.18	.52
Didn't feel calm	.46	.46	.08	.11	.14	.13	.41	.17
Felt irritated	.54	.15	.09	.08	.66	.13	.13	.16
Felt life was failure	.42	.45	.07	.07	.23	.17	.09	.34
Felt annoyed	.45	.21	.10	.12	.58	.06	.11	.17
Restless sleep	.72	.16	.19	.78	.11	.12	.11	.14
Not happy	.49	.61	.04	.07	.19	.02	.19	.20
Felt bored	.32	.38	.01	.06	.24	.33	.02	.06
Felt lonely	.46	.45	.07	.16	.18	.25	.02	.36
Life wasn't interesting	.56	.69	.09	.11	.13	.23	.02	.05
Didn't enjoy life	.59	.73	.08	.10	.14	.02	.06	.15

TABLE 1 continued

Variable Name	h <sup>2</sup>	Factor I Life Dissatisfaction	Factor II Autonomic Responsiveness	Factor III Sleep Problems	Factor IV Irritability	Factor V Psychosomatic Symptoms	Factor VI Anxiety	Factor VII Depressed Affect
Crying spells	.38	.21	.10	.10	.17	.13	.11	.51
Felt sad	.52	.33	.14	.13	.27	.10	.10	.53
Trembling hands	.32	.15	.29	.10	.12	.38	.20	.05
Shortness of breath	.37	.08	.50	.15	.01	.28	.06	.08
Heart beats hard	.67	.09	.78	.10	.07	.12	.11	.05
Sweaty hands	.25	.03	.22	.03	.08	.38	.21	.03
Dizzy spells	.35	.07	.46	.13	.04	.29	.02	.16
Upset stomach	.22	.05	.18	.11	.18	.31	.16	.12
Heart beats fast	.67	.08	.78	.09	.06	.15	.12	.06
Health affects work	.30	.12	.28	.10	.05	.43	.05	.08
Loss of appetite	.37	.14	.19	.13	.07	.50	.05	.20
Trouble sleeping	.73	.16	.22	.78	.09	.16	.09	.13
Eigenvalue		8.31	2.48	1.45	1.29	1.12	1.05	1.04
% of variance accounted for		29.67	8.86	5.17	4.61	4.00	3.74	3.70
Alpha coefficient		0.81	0.79	0.89	0.74	0.64	0.74	0.80

Note: Boxed figures formed the indices upon which the alphas are based.

highest loadings on Factor V were "Trembling hands," "Sweaty hands," "Upset stomach," "Health affects work," and "Loss of appetite." The item "Felt bored" also loaded Factor V in the 0.3 range but was included in Factor I because of its higher loading on that factor. Factor V has been termed "**Psychosomatic Symptoms**" and had an alpha coefficient of .64. The items which loaded the "**Anxiety**" factor (Factor VI) were "Felt jittery" and "Felt nervous." The alpha coefficient was .74. One additional item, "Didn't feel calm," also had a high loading on this factor, but had a slightly higher loading on the "Life Dissatisfaction" factor and was included in that index instead. The final index, "**Depressed Affect**," (Factor VII) was formed from four items: "Couldn't shake off the blues," "Felt depressed," "Crying spells," and "Felt sad." The items "Felt life was a failure" and "Felt lonely" also had moderate loadings on this factor, but were included in the "Life Dissatisfaction" index due to having higher loadings on that factor. The alpha coefficient for the "Depressed Affect" index was .80.

#### LIFE ENJOYMENT SCALE

A separate principal axes factor analysis of the seven life enjoyment items indicated that these could be parsimoniously explained in terms of one factor which was labelled the "Life Enjoyment" index. The factor loadings resulting from this analysis are given in Table 2. The first and second eigenvalues were 3.46 and .82 respectively. The first factor accounted for 49.48 percent of the variance. Once again simple summation was used to construct the index, with a missing data value assigned to the index score if valid data were not present on at least four of the items. The alpha coefficient for the "Life Enjoyment" index was .81.

#### DESCRIPTIVE STATISTICS AND BIVARIATE CORRELATIONS

The variable identification, range of scores, means, and standard deviations are shown in Table 3 for each of the eight indices resulting from the factor analyses, for the SI Type A global assessment and each component, and for the five demographic variables (education, family income, gender, age, and race). The product moment correlations among these 20 variables are shown in Table 4. The correlations of the demographic variables with the TABP and psychological variables are provided for information, but are not the major focus of this paper. The demographic variables were used as control variables in the later multivariate analyses. The need to exercise this control is indicated by the small to moderate correlations shown in Table 4 between the demographic and psychological measures and between the demographic and Type A global and component measures.

The interrelations among all of the SI assessed component and global Type A scores (variables nine through fifteen in Table 4) were positive and significant. A detailed analysis of the relationship between the global Type A pattern and components is available in Dielman et al., 1987. The intercorrelations among the indices which were constructed on the basis of the factor analysis of the psychological symptoms items (variables one through seven in Table 4) were also

## TYPE A PREDICTORS OF PSYCHOLOGICAL SYMPTOMS

all positive and significant. The correlations between the "Life Enjoyment" index (variable eight) and the psychological symptoms indices (variables one through seven) were all significant and negative. The first psychological symptom factor, "Life Dissatisfaction," showed significant, negative correlations with the global Type A assessment and all of the Type A component scores with the exception of hostility. Those who scored lower (toward the "B" end) on the global scale, as well as those who had lower scores on the components of voice volume, voice emphasis, speed of speaking, response latency and verbal competitiveness, tended to express a greater degree of dissatisfaction with life. This "Life Dissatisfaction" index was the only one of the seven psychological symptom indices which correlated significantly with the global Type A assessment.

TABLE 2

### RESULTS OF FACTOR ANALYSIS ON LIFE ENJOYMENT ITEMS

Variable Name	Factor I Life Enjoyment
Happy these days	.73
Satisfying life	.64
Enjoyment from personal life	.75
Enjoyment from health	.60
Enjoyment from self	.77
Enjoyment from work	.57
Enjoyment from life as whole	.82
Eigenvalue	3.46
% of variance accounted for	49.48
Alpha coefficient	.81

TABLE 3

SUMMARY STATISTICS FOR PSYCHOLOGICAL SYMPTOMS  
AND LIFE ENJOYMENT INDICES, TYPE A COMPONENTS  
AND GLOBAL ASSESSMENT, AND DEMOGRAPHICS

Variable Name	N	Mean	Standard Deviation	Range	
				Min	Max
1. Life Dissatisfaction	963	16.21	4.27	8	37
2. Autonomic Responsiveness	963	5.44	2.15	4	18
3. Sleep Problems	961	4.29	1.85	2	10
4. Irritability	963	7.35	1.75	3	14
5. Psychosomatic Symptoms	963	7.38	2.35	5	22
6. Anxiety	956	4.43	1.52	2	10
7. Depressed Affect	963	7.69	2.52	4	18
8. Life Enjoyment	963	26.56	4.84	7	35
9. Voice Volume	889	3.21	.84	1	5
10. Voice Emphasis	889	3.40	1.07	1	5
11. Speed of Speaking	889	3.13	.95	1	5
12. Response Latency "	889	3.52	.86	1	5
13. Hostility	889	3.09	.95	1	5
14. Verbal Competitiveness	888	2.62	1.09	1	5
15. Global Assessment	903	3.96	1.40	1	6
16. Education	959	13.88	2.8	0	17+
17. Family Income	929	6.95	3.30	1	12
18. Gender	963	.57	.50	0	1
19. Age	962	40.50	16.31	18	92
20. Race	958	.10	.29	0	1

NOTE: Items 1-11, 13-14. A higher score indicates a greater amount of the construct described by the variable name.

Item 12. A higher score indicates faster responding.

Item 15. A higher score indicates more extreme Type A behavior: 1 = B4, 2 = B3, 3 = XB, 4 = XA, 5 = A2, 6 = A1

Item 16. Number coded is the highest grade of school or year of college completed.

Item 17. 1 = Less than \$5,000, 2 = \$5,000-\$9,999, 3 = \$10,000-\$12,499, 4 = \$12,500-\$14,999, 5 = \$15,000-\$17,499, 6 = \$17,500-\$19,999, 7 = \$20,000-\$24,999, 8 = \$25,000-\$34,999, 9 = \$35,000-\$39,999, 10 = \$40,000-\$44,999, 11 = \$45,000-\$49,999, 12 = \$50,000 and over.

Item 18. 0 = Male, 1 = Female.

Item 19. Number coded is age in years.

Item 20. 0 = White, 1 = Nonwhite.

The "Life Enjoyment" index (variable eight in Table 4), although constructed on the basis of a separate factor analysis than the "Life Dissatisfaction" index, behaved in many ways as a mirror image of the "Life Dissatisfaction" index with respect to its correlations with the Type A global and component scores. Indeed, the correlation of the "Life Enjoyment" index with the "Life Dissatisfaction" index was  $-.68$ . In contrast to the "Life Dissatisfaction" index, however, the correlations between "Life Enjoyment" and the Type A components of voice volume and voice emphasis were not significant. The "Life Enjoyment" index was significantly and positively related to the global Type A score and to the speed of speaking, response latency, and verbal competitiveness component scores, indicating that individuals who scored more toward the Type A end of these scales tended to receive higher "Life Enjoyment" scores. The "Psychomatic Symptoms" index (variable five) was significantly and negatively related to the component scores to which "Life Enjoyment" was positively related: speed of speaking, response latency, and verbal competitiveness. The "Depressed Affect" index (variable seven) was significantly and negatively related to the Type A component of response latency. The psychological symptoms indices which were labelled "Anxiety" (variable six) and "Irritability" (variable four) were both related to only the hostility component. It is clear from this pattern that the degree to which the psychological symptoms correlate with Type A behavior depend upon the component of Type A behavior which is being considered.

#### COMPARATIVE PREDICTIVE VALUE OF GLOBAL AND COMPONENT ASSESSMENTS

The relative predictive value of the Type A global and component measures to the psychological symptoms and life enjoyment indices was assessed using multiple regression analyses with ordinal and categorical predictors. Of interest was the proportion of independent criterion variance accounted for by the Type A global assessment as opposed to the combined set of component measures in the prediction of each of the psychological symptoms and life enjoyment indices. Comparisons were also made while controlling for the five basic sociodemographic variables of education, family income, gender, age, and race.

Table 5 shows the results of the multiple linear regression analyses predicting each of the eight criterion variables from all demographic variables combined; from the SI Type A global assessment; from the demographic variables and global assessment combined; from all Type A component assessments and from all Type A component assessments and the demographic variables combined. Note that since the demographic variables and the Type A global and component assessments could be entered as either ordinal or categorical predictors, the number of predictors in a column varies from analysis to analysis. A greater number of predictors indicates that one or more categorical predictors were used because the relationship between a predictor and the criterion was not linear. The first two columns in Table 5 show that the demographic variables accounted for between approximately four and 14 percent of the variance in the psychological and life enjoyment indices. These results were significant at least at the .001 level in all cases. As shown in columns three and four of Table 5, the global SI

TABLE 4

CORRELATIONS AMONG PSYCHOLOGICAL SYMPTOMS AND LIFE ENJOYMENT INDICES,  
TYPE A COMPONENTS AND GLOBAL ASSESSMENT, AND DEMOGRAPHICS (N = 851)

Variable Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Life Dissatisfaction	—																			
2. Autonomic Responsiveness	30	—																		
3. Sleep Problems	38	39	—																	
4. Irritability	51	20	28	—																
5. Psychosomatic Symptoms	41	51	36	35	—															
6. Anxiety	47	39	37	44	47	—														
7. Depressed Affect	68	33	39	53	42	51	—													
8. Life Enjoyment	-68	-36	-31	-42	-43	-38	-53	—												
9. Voice Volume	-11	00	01	-03	-04	-04	-05	02	—											
10. Voice Emphasis	-13	02	02	-02	-05	-01	-01	05	73	—										
11. Speed of Speaking	-10	-05	-02	02	-07	03	-00	07	41	51	—									
12. Response Latency	-16	-04	-00	-03	-08	-02	-09	11	44	49	59	—								
13. Hostility	00	04	04	13	04	08	03	-05	25	28	34	31	—							
14. Verbal Competitiveness	-10	00	-02	-05	-07	-03	-06	10	30	42	41	36	32	—						
15. Global Assessment	-10	-03	03	02	-04	03	-03	08	55	57	56	61	46	48	—					
16. Education	-12	-21	-14	09	-09	01	-05	12	02	04	12	09	10	09	13	—				
17. Family Income	-18	-12	-13	03	-07	-06	-18	16	07	05	11	08	15	09	17	36	—			
18. Gender	14	06	13	09	01	12	25	02	-11	00	04	01	-08	05	00	-06	-16	—		
19. Age	-12	15	11	-26	-14	-17	-17	03	21	21	-01	03	-06	19	06	28	-04	07	—	
20. Race	04	08	00	-03	-02	-00	04	-08	-05	-10	-08	-07	-04	-05	-07	-13	-13	03	01	—

Note: Decimal points have been omitted. Correlations are based on cases with valid data on all variables. Correlations above .067 are significant at the .05 level.

TABLE 5

R<sup>2</sup> VALUES RESULTING FROM THE PREDICTION OF PSYCHOLOGICAL SYMPTOMS  
AND LIFE ENJOYMENT INDICES FROM DEMOGRAPHIC VARIABLES,  
TYPE A GLOBAL ASSESSMENT, AND TYPE A COMPONENTS (N=851)

Dependent Variables	Demographic Variables		Global Type A		Demographics and Global Type A		Type A Components		Demographics and Type A Components	
	Number of Predictors	R <sup>2</sup>	Number of Predictors	R <sup>2</sup>	Number of Predictors	R <sup>2</sup>	Number of Predictors	R <sup>2</sup>	Predictors	R <sup>2</sup>
Life Dissatisfaction	5	.0764***	1	.0106**	6	.0795***	6	.0354***	11	.1036***
Autonomic Responsiveness	5	.0587***	5	.0083	10	.0662***	14	.0252	19	.0815***
Sleep Problems	5	.0438***	1	.0009	6	.0462***	8	.0092	13	.0560***
Irritability	13	.1060***	1	.0006	14	.1067***	6	.0321***	19	.1270***
Psychosomatic Symptoms	5	.0410***	1	.0014	6	.0410***	10	.0191	15	.0558***
Anxiety	13	.0786***	5	.0081	18	.0876***	10	.0219*	23	.0921***
Depressed Affect	12	.1436***	5	.0080	17	.1510***	6	.0204**	18	.1644***
Life Enjoyment	5	.0383***	1	.0058*	6	.0397***	6	.0275***	11	.0618***

NOTE: The number of predictors differ depending on whether the variables were used as ordinal or categorical predictors. This decision was based on the results of polynomial regressions of each predictor on each criterion. Asterisks refer to the level of significance of the regression with all predictors entered. The R<sup>2</sup> values may be adjusted for shrinkage by applying the formula  $R_a^2 = R^2 \cdot p / (N - p - 1)$ , where R<sup>2</sup> is the original variance accounted for given in the table, N is the number of cases (851), and p is the number of predictors given in the table. This correction is less important when the number of cases is large relative to the number of predictors, as can be seen in the formula. For this table the differences between the R<sup>2</sup> and adjusted R<sup>2</sup> values range from .0001 to .0253.

\*p < .05    \*\*p < .01    \*\*\*p < .001

assessment of Type A behavior, considered separately from all other predictors, was a statistically significant predictor of "Life Dissatisfaction" and "Life Enjoyment," although accounting for one percent or less of the criterion variance in each case. As shown in column six of Table 5, the addition of the global Type A assessment to the demographic variables added less than one percent to the criterion variance accounted for in each case. As shown in column eight of Table 5, the combination of the six component measures accounted for approximately one to three and one-half percent of the variance in the psychological symptoms and life enjoyment indices. The variance accounted for in the psychological symptoms and life enjoyment indices by the Type A components was statistically significant in five of the eight instances: "Life Dissatisfaction," "Irritability," "Anxiety," "Depressed Affect," and "Life Enjoyment." Column 10 of Table 5 shows that the addition of the six component measures to the demographic variables added from approximately one to two and one-half percent to the criterion variance accounted for in each case.

To assess the significance of the increase in  $R^2$  when either the global Type A measure was added to the demographic predictors or the six component measures were added to the demographic predictors, a series of F ratios were computed. As can be seen in Table 6, addition of the global Type A assessment to the demographic predictors did not result in a significant increase in  $R^2$  for any of the criterion variables. Addition of the Type A components to the demographic variables, however, resulted in a statistically significant increase in the percentage of variance accounted for in four of the five instances in which the components alone accounted for a significant percentage of the variance: "Life Dissatisfaction", "Irritability", "Depressed Affect", and "Life Enjoyment".

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A further question posed in conducting these analyses concerned the relative importance of each component and the global assessment with respect to each of the dependent variables. A series of forward selection multiple regression analyses were conducted predicting each of the eight psychological symptoms and life enjoyment indices from the global Type A and the six Type A component scores, both controlling for and not controlling for the five demographic variables.

The global Type A score and three of the component scores — voice volume, voice emphasis, and speed of speaking — did not contribute significantly to the criterion variance in predicting any of the psychological symptoms or life enjoyment indices, with or without controlling for demographic variables. The verbal competitiveness component was a significant independent predictor of the "Irritability," "Anxiety," and the "Life Enjoyment" indices, but only when the demographic variables were not controlled. After controlling for the demographic variables, however, these relationships were not significant.

The response latency and hostility components proved to be significant predictors whether or not the demographic variables were held constant. Whether the demographic variables were controlled or not, the response latency component made a significant contribution, independent of the other components and the global assessment, to the criterion variance in the "Life Dissatisfaction" ( $p < .01$ ), "Depressed Affect" ( $p < .01$ ), and "Life Enjoyment" ( $p < .05$ ) indices.

TABLE 6

TABLE OF F-RATIOS TESTING THE SIGNIFICANCE OF INCREASE IN R<sup>2</sup> WHEN PREDICTING FROM DEMOGRAPHICS, DEMOGRAPHICS AND TYPE A GLOBAL ASSESSMENT, AND DEMOGRAPHICS AND TYPE A COMPONENTS

	<u>Demographic vs. Demographics and Type A Global Assessment</u>	<u>Demographics vs. Demographics and Type A Components</u>
Life Dissatisfaction	2.92	4.24***
Autonomic Responsiveness	1.35	1.47
Sleep Problems	2.14	1.35
Irritability	.59	3.33**
Psychosomatic Symptoms	.03	3.33**
Anxiety	1.63	1.23
Depressed Affect	1.45	3.45**
Life Enjoyment	1.15	3.50**

NOTE: Asterisks refer to the significance of the increase in R<sup>2</sup> when global or component Type A predictors were added to the demographic predictors.

\*\*p < .01  
\*\*\*p < .001

In addition, when the demographic variables were controlled, response latency made a significant, independent contribution to the criterion variance in the "Irritability" ( $p < .05$ ) and "Anxiety" ( $p < .05$ ) indices. The hostility component entered as a significant and independent predictor of the "Irritability" ( $p < .001$ ), "Anxiety" ( $p < .05$ ) and "Life Enjoyment" ( $p < .01$ ) indices, both with and without controlling for the demographic variables. It was also a significant, independent predictor of the "Life Dissatisfaction" ( $p < .05$ ), "Autonomic Responsiveness" ( $p < .05$ ) and "Depressed Affect" ( $p < .05$ ) indices when the demographic variables were held constant. In all these cases, the regression coefficient estimates for response latency were negative for the psychological symptoms indices and positive for the life enjoyment index. Thus, for a unit change in response latency toward faster responding, respondents' level of the various psychological symptoms indices decreased and level of life enjoyment increased. The reverse was found for the hostility component. In all cases, the hostility regression coefficients were positive for the psychological symptoms indices and negative for the life enjoyment index.

## DISCUSSION

In general, the global and component Type A scores, considered separately, accounted for at most three and one-half percent of the variance in predicting the psychological symptoms and life enjoyment indices, whether or not demographic variables were controlled. The demographic variables explained between four and 14 percent of the variance in the psychological symptoms and life enjoyment indices, which indicates a small to moderate relationship of the demographic variables to the psychological constructs. Thus, the demographic control variables were more useful predictors of psychological symptomatology and life enjoyment than were the global and component Type A measures. Of the Type A measures, the response latency and the hostility components emerged as the primary predictors of the psychological symptoms and life enjoyment indices. The response latency component of Type A behavior (faster responding), which correlated .61 with the global Type A assessment, was positively correlated with psychological adjustment regardless of demographic characteristics such as age, income, education, race, and sex. Individuals with faster verbal response times expressed less depressed affect, life dissatisfaction, anxiety and irritability, and a greater degree of life enjoyment. However, due to the small amount of variance accounted for by response latency, at most two and one-half percent, it is likely that the differences in behavior would be small.

The direction of the relationship between response latency and these various psychological symptoms measures indicates that this aspect of Type A behavior is positively correlated with psychological adjustment. It is possible that this positive correlation is merely reflective of a positive self-report bias or perhaps differential degrees of self-insight or defensiveness on the part of Type A and Type B individuals. In terms of the differential self-insight or defensiveness explanation, however, it should be noted that many of the symptoms items were concrete, behavioral items which were not self-disparaging. In addition, the Vickers et al. (1981) study has suggested that Type A and B individuals do not differ in terms of their use of defense mechanisms. Another possible interpretation for the negative correlation between response latency and the "Depressed Affect" and "Life Dissatisfaction" indices is that response latency is measuring not only an aspect of Type A behavior, but also a decreased level of autonomic responsiveness generally associated with a depressed state. Further research on issues such as these is needed.

Individuals who were scored by the Type A component assessors as being more hostile expressed a greater degree of irritability and anxiety in response to the survey interview questions measuring these constructs, although once again these differences were small. The relationship between SI-assessed hostility and the "Irritability" index should not be surprising, inasmuch as the hostility assessment is based on the subjects' reports of being easily irritated as well as on the subjects' speech stylistics. The hostility component of Type A behavior, which was correlated .46 with the global Type A assessment and which correlated .31 with response latency, was thus negatively correlated with psychological adjustment. This finding would argue against the "positive response bias"

explanation of the relationship between response latency and the indices of "Life Dissatisfaction," "Depressed Affect," "Irritability," "Anxiety," and "Life Enjoyment." If positive response bias were operating, then the hostility and response latency components, which are positively correlated, should correlate in the same direction with the indices of psychological adjustment.

The Type A components are hypothesized to relate to a single underlying construct, and other analyses by the authors strongly support this hypothesis (Dielman et al., 1987). In such an instance, one would expect that the components as a group would relate in a similar manner to other constructs such as the psychological symptoms. The correlations in Table 4, however, emphasize that hostility differs from the other components in its pattern of relationships with the psychological symptoms and life enjoyment indices. The other components, and the global Type A pattern, were negatively related to the psychological symptoms measures and positively related to life enjoyment, whereas the reverse was true of the hostility component. The global and component Type A behavior assessments other than hostility appeared to be measuring positive involvement rather than distress, whereas hostility was more correlated with measures of distress.

Attention has increasingly focused on the hostility component as the most important component of the global Type A pattern (Dembroski and Costa, 1987; Matthews et al., 1977; Shekelle et al., 1983; and Williams et al., 1980, 1986). Other investigators (Scherwitz et al., 1977; Shucker and Jacobs, 1977; Howland and Siegman, 1982) found response latency to be a significant predictor of global Type A ratings, although this relationship could not be examined in conjunction with the relationship of hostility and global Type A ratings in these studies, as hostility was not included among the predictors. However, in other analyses of the Type A components used in this study (see Dielman et al., 1987), response latency and hostility were two of the three components (with voice emphasis) that accounted for most of the variance in global Type A assessments. Thus, the global Type A assessment was based heavily on two components that related to the psychological symptoms scales in opposite directions. The combination of these two components, which relate to external variables of interest (such as health or psychological well-being) in opposite directions, would yield attenuated correlations of the global score with the external variables.

In addition, the significant relationships of both the psychological symptoms indices and the Type A behavior components with demographic variables indicate that the results of studies relating the TABP to other variables could differ from study to study depending on the demographic characteristics of the sample studied. It is important that researchers be aware of the possibility of an interaction between demographic variables and the TABP in the prediction of external variables, and that sample homogeneity with respect to one or more demographic variables may mask significant relationships between the TABP and the outcome variables being studied. The recommendations for further study, therefore, are that the component measures of Type A be included in future studies relating TABP to other variables, and that the study samples be either representative of the population of interest or carefully chosen because of some known special characteristic which is of overriding theoretical interest. If the

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latter course of action is taken, the interpretation of the relationship of global and component Type A scores with other variables, such as health or psychological well being, must take the effects of restriction of range on one or more variables into consideration.

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# THE REJECTION OF THE HYPOTHESIS OF COMPLETE INDEPENDENCE PRIOR TO CONDUCTING A FACTOR ANALYSIS

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## ABSTRACT

Two tests of complete independence were compared in terms of relative power efficiency on 50 equi-correlation matrices and 26 published data sets.  $\Lambda_1$  a test based on Fisher's  $\tanh^{-1}(r)$  transformation had greater power efficiency than  $\Lambda_0$  a test based on  $-\log|R|$  with finite sample corrections. Consequently, sample size requirements for rejecting  $P=I$  should be determined from  $\Lambda_1$  instead of  $\Lambda_0$ . In addition, Baggaley's estimate of  $Q=-\log|R|/k$  from the average absolute off-diagonal correlation was compared with a root mean square estimate of  $Q$ . The root mean square estimate was preferable but also demonstrated considerable bias. Because of the bias in estimating  $Q$  from the off-diagonal correlations, because  $\Lambda_1$  has greater relative power efficiency for  $P=I$  than  $\Lambda_0$ , and because the test statistic for  $\Lambda_1$  can be approximated from the root mean square off-diagonal correlation, it is preferable to tabulate power results for  $\Lambda_1$  as a function of the average correlation instead of  $\Lambda_0$ .

Baggaley (1982) reported that when testing whether a  $k$ -variate correlation matrix  $R$  is from a population characterized by an identity correlation matrix ( $P=I$ ),  $Q=-\log|R|/k$  could be approximated from the average absolute off-diagonal correlation. This result was used by Baggaley to analytically obtain power results for the distribution of  $-\log|R|$  in testing  $P=I$ . Subsequently, Reddon and Jackson (1984) evaluated the bias in estimating  $Q$  for various equi-correlation matrices and also tabulated power results from the asymptotic distribution of  $-\log|R|$ . Reddon and Jackson (1984) demonstrated that there was considerable bias in Baggaley's estimate of  $Q$ , as a function of the equi-correlation and number

of variates. In response Baggaley (1986) evaluated six contrived correlation matrices with heterogeneous correlations based on a 12 variate, 2 factor model. These results indicated that Baggaley's estimate of Q may be reasonable for correlation matrices with heterogeneous elements.

In the present paper a set of equi-correlation matrices were analyzed and power results for testing  $P=I$  were compared for  $-\log|R|$  with finite sample corrections for bias (Reddon, Jackson, & Schopflocher, 1985) to a test based on Fisher's  $\tanh^{-1}$  transformation of the correlation coefficient (Reddon, 1987). These two tests of complete independence were also compared on 17 previously analyzed data sets (Hakstian & Muller, 1973) and on the 9 normative age samples for the Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1981). For the 26 example data sets Baggaley's estimate of Q was compared with the root mean square off-diagonal correlation as an estimate of Q.

### METHOD

Equi-correlation matrices with constant off-diagonal correlation of .10(.10).50 (i.e., .10 to .50 in increments of .10) and with variables numbering 10(10)100 were analyzed. Twenty-six other data sets were also analyzed. The cumulative distribution for  $-\log|R|$  with finite sample corrections for bias was obtained by evaluating

$$\Lambda_0 = P(-\rho \log|R| < z) = P(\chi_m^{2\rho} \leq z) \\ - \gamma_2 \{P(\chi_{m+4}^2 \leq z) - P(\chi_m^2 \leq z)\} \\ - \gamma_3 \{P(\chi_{m+8}^2 \leq z) - P(\chi_m^2 \leq z)\}$$

where the multiplier  $\rho = (N-1-(2k+5)/6)$ ,  $\gamma_2$  and  $\gamma_3$  are negative weights that converge asymptotically to zero, and  $m = k(k-1)/2$  is the degrees of freedom. The cumulative distribution for the test based on Fisher's  $\tanh^{-1}$  transformation of the correlation coefficient was obtained by evaluating

$$\Lambda_1 = P\left(\sum_{i < j}^k (N-3) \Sigma_{ij}^k = \sum_{i < j}^k \tanh^{-1}(r_{ij})^2 < z\right) = P(\chi_m^2 \leq z)$$

where  $m = k(k-1)/2$  is the degrees of freedom. A test size of .05 was used for both tests and the smallest sample size considered for rejecting  $P=I$  was the number of variates plus one so that R would be of full rank.

### RESULTS

Results for the 50 equi-correlation matrices that were analyzed are presented in Table 1.

The finite sample corrections for  $-\log|R|$ , while providing more protection against Type I error rates than without, produced power results that were comparable to those reported by Reddon and Jackson (1984). Baggaley's estimate of Q was biased as a function of the size of the equi-correlation and number of variates. The regression of Q on r and k resulted in  $Q = -.155 + 1.326r + .001k$ ,  $R^2 = .98$ . The test of complete independence  $\Lambda_1$  based on  $\tanh^{-1}(r)$  had greater power efficiency than the test  $\Lambda_0$  based on  $-\log|R|$  with finite sample corrections.

Results for the 17 data sets analyzed by Hakstian and Muller (1973) are presented in Table 2.

**Table 1**  
**RATIO OF OBSERVATIONS (N) TO VARIATES (k) REQUIRED**  
**TO REJECT THE HYPOTHESIS OF COMPLETE INDEPENDENCE**  
**FOR 50 EQUI-CORRELATION MATRICES ( $\alpha = .05$ )**

$r$	$Q$	$k$	$\Lambda_0$ N/k	$\Lambda_1$ N/k
.10	.03	10	20.70	14.00
.10	.05	20	12.35	6.00
.10	.06	30	9.97	3.80
.10	.06	40	8.80	2.78
.10	.07	50	8.10	2.20
.10	.07	60	7.65	1.80
.10	.07	70	7.33	1.54
.10	.08	80	7.08	1.34
.10	.08	90	6.88	1.18
.10	.08	100	6.73	1.06
.20	.10	10	6.90	3.70
.20	.13	20	4.65	1.60
.20	.15	30	3.97	1.03
.20	.16	40	3.65	1.03
.20	.17	50	3.46	1.02
.20	.18	60	3.32	1.02
.20	.18	70	3.23	1.01
.20	.19	80	3.16	1.01
.20	.19	90	3.10	1.01
.20	.19	100	3.06	1.01
.30	.19	10	3.80	1.80
.30	.24	20	2.75	1.05
.30	.27	30	2.43	1.03
.30	.28	40	2.28	1.03
.30	.29	50	2.18	1.02

**Table 1 (continued)**  
**RATIO OF OBSERVATIONS (N) TO VARIATES (k) REQUIRED**  
**TO REJECT THE HYPOTHESIS OF COMPLETE INDEPENDENCE**  
**FOR 50 EQUI-CORRELATION MATRICES ( $\alpha = .05$ )**

r	Q	k	$\Lambda_0$ N/k	$\Lambda_1$ N/k
.30	.30	60	2.12	1.02
.30	.31	70	2.07	1.01
.30	.31	80	2.04	1.01
.30	.32	90	2.00	1.01
.30	.32	100	1.98	1.01
.40	.31	10	2.60	1.10
.40	.38	20	1.95	1.05
.40	.41	30	1.77	1.03
.40	.43	40	1.65	1.03
.40	.44	50	1.60	1.02
.40	.45	60	1.55	1.02
.40	.46	70	1.53	1.01
.40	.46	80	1.50	1.01
.40	.47	90	1.48	1.01
.40	.47	100	1.47	1.01
.50	.45	10	2.00	1.10
.50	.54	20	1.50	1.05
.50	.58	30	1.37	1.03
.50	.60	40	1.30	1.03
.50	.61	50	1.26	1.02
.50	.62	60	1.23	1.02
.50	.63	70	1.20	1.01
.50	.64	80	1.19	1.01
.50	.64	90	1.18	1.01
.50	.65	100	1.16	1.01

Table 2

RATIO OF OBSERVATIONS (N) TO VARIATES (k)  
 REQUIRED TO REJECT THE HYPOTHESIS OF  
 COMPLETE INDEPENDENCE FOR 17 DATA SETS ( $\alpha = .05$ )

Source Study	k	n	r	RMS(r)	Q	$\Lambda_0$ N/k	$\Lambda_1$ N/k
Ahmavaara & Markkanen	25	293	.21	.26	.42	1.76	1.04
Bechtoldt (sample 1)	17	212	.31	.36	.55	1.53	1.06
Bechtoldt (sample 2)	17	213	.32	.36	.53	1.59	1.06
Chapman	7	329	.42	.43	.33	2.71	1.57
Davis	9	421	.50	.53	.58	1.78	1.11
Denton & Taylor	13	170	.21	.26	.44	1.85	1.31
Emmett	9	211	.45	.47	.52	1.89	1.11
Fleishman & Hempel	26	197	.38	.42	.77	1.15	1.04
Green et al.	34	283	.25	.27	.38	1.85	1.03
Harman	8	305	.52	.56	.87	1.38	1.13
Harman	13	145	.33	.36	.46	1.85	1.08
Harman	24	145	.30	.33	.48	1.63	1.04
Karlin	8	163	.31	.33	.27	3.00	1.88
Karlin	33	200	.14	.17	.28	2.30	1.15
McLeish	6	100	.25	.28	.18	4.50	3.83
Pemberton	25	154	.29	.33	.54	1.48	1.04
Rimoldi	19	138	.19	.23	.27	2.58	1.21

Note. n = sample size in source study, r = average absolute off-diagonal correlation, RMS(r) = root mean square off-diagonal correlation. See Hakstian & Muller (1973) for source study references.

Baggaley's estimate of Q based on the average absolute off-diagonal correlation was inferior to the root mean square off-diagonal correlation in all but 3 of the 17 data sets. In the 3 cases where Baggaley's estimate was better there were only a small number of variates (Chapman = 7, Karlin = 8, McLeish = 6). The regression of Q on RMS(r) and k resulted in  $Q = -.341 + 1.754r + .011k$ ,  $R^2 = .74$ . For all 17 data sets  $\Lambda_1$  had greater power efficiency than  $\Lambda_0$ .

Results for the 9 normative WAIS-R data sets are presented in Table 3.

Table 3

RATIO OF OBSERVATIONS (N) TO VARIATES (k) REQUIRED TO REJECT THE HYPOTHESIS OF COMPLETE INDEPENDENCE FOR 9 WAIS-R DATA SETS ( $\alpha = .05$ )

Age	k	n	r	RMS(r)	Q	$\Lambda_0$ N/k	$\Lambda_1$ N/k
16-17	11	200	.45	.47	.52	1.73	1.09
18-19	11	200	.45	.47	.52	1.73	1.09
20-24	11	200	.45	.46	.51	1.82	1.09
25-34	11	200	.52	.53	.62	1.55	1.09
35-44	11	200	.55	.56	.66	1.55	1.09
45-54	11	200	.53	.53	.64	1.55	1.09
55-64	11	160	.52	.53	.63	1.55	1.09
65-69	11	160	.57	.58	.72	1.46	1.09
70-74	11	160	.48	.49	.57	1.64	1.09

Note. n = sample size in source study, r = average absolute off-diagonal correlation, RMS(r) = root mean square off-diagonal correlation.

For all 9 data sets the root mean square estimate of Q was equal to or superior to Baggaley's estimate. The regression of Q on RMS(r) resulted in  $Q = -.271 + 1.694r$ ,  $R^2 = .98$ . The  $\Lambda_1$  test of complete independence had greater power efficiency than  $\Lambda_0$  for all 9 data sets.

### DISCUSSION

Regression analysis indicated that  $Q = -\log|R|/k$  was not simply equal to the average correlation. That is, Baggaley's estimate of Q or the root mean square estimate of Q were biased as a function of the average correlation and number of variates.

Given that the test of complete independence  $\Lambda_1$  based on the  $\tanh^{-1}(r)$  transformation has acceptable Type I error rates (Reddon, 1987) and given that it has substantially better power than  $\Lambda_0$ , it is the preferred method of determining sample size requirements for rejecting  $P = I$ . Sample size requirements previously reported by Baggaley (1982) and Reddon and Jackson (1984) are over estimates. Because, with  $i < j$ ,  $\sum_{i=1}^k \sum_{j=1}^k = \tanh^{-1}(r_{ij})^2$  can be approximated by  $k(k-1)/2 \tanh^{-1}(\text{RMS}(r))^2$ , and also because  $\Lambda_1$  is a more powerful test than  $\Lambda_0$ , it would be preferable to tabulate power results for  $\Lambda_1$  instead of  $\Lambda_0$  as a function of the average off-diagonal correlation.

If the complete independence hypothesis cannot be rejected then there is no justification for conducting a factor analysis because any dependence between the variates may be attributed to sampling error. If the hypothesis of complete independence can be rejected it may be concluded that there is a least one factor.

The number of factors and the stability or reliability of these factors is another issue (cf. Cliff, 1988; Guadagnoli & Velicer, 1988; Krzanowski, 1987). In exploratory factor analytic applications where more than one factor is used  $\Delta_0$  may actually be preferable to  $\Delta_1$  because  $\Delta_0$  will be more conservative and less likely to capitalize on chance.

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# MULTIVARIATE EXPERIMENTAL CLINICAL RESEARCH

The following text is extremely faint and largely illegible. It appears to be a multi-paragraph document, possibly a research paper or report, discussing experimental and clinical research. The text is organized into several paragraphs, with some lines appearing as bolded or indented text. Due to the low contrast and blurriness of the scan, the specific content of the text cannot be accurately transcribed. The document likely contains statistical analysis, experimental procedures, and clinical observations related to multivariate research.

## A RESEARCH-ORIENTED PRIVATE PSYCHOLOGICAL CLINIC: THE POTENTIALITY AND THE ACTUALITY

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### AUTHOR NOTE

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### ABSTRACT

The potentiality for research in a private practice psychological clinic is often unrecognized. Clinical psychologists may present good reasons for not doing research for which they are uniquely trained among mental health professionals. Yet it is possible to do research through the private clinic *if research procedures are built into its structure and functioning*. It has been the observation of others as well as that of the writer that by and large clients are willing to participate in research if they can be assured that no harm will come to them or theirs. Additionally, research procedures can be planned in such a fashion as to maximize both service and research potential. One generalization which arises out of limited but representative experience is that adequate research is directly proportional to the adequacy of the clinic's files. That the potentiality for research can be actualized has been demonstrated by the author's private practice clinic in which different types of research have been carried out.

### A RESEARCH-ORIENTED PRIVATE PSYCHOLOGICAL CLINIC: THE POTENTIALITY AND THE ACTUALITY

It is well known that the modal publication rate of clinical psychologists is zero. However, that figure may be misleading. If the proportion of manuscripts accepted by the major psychological journals is 15 percent or near that, then, obviously there are 85 percent of reports on research which have been rejected.

Even though many of the latter may ultimately be accepted somewhere, the truth is that there must be much more research going on than the zero modal rate usually cited. The fact that the several psychological conventions abound in research reports would underscore the contention that more research is being done than is published.

Nevertheless, examination of the latest convention program of the Southeastern Psychological Association, which presumably is representative of regional associations, reveals that only .075 percent of the participants can be identified, by generous interpretation, as private practitioners, clinical, I/O, or others, although it is no doubt true that many academicians who present at conventions also moonlight in private practice.

Granting, then, that publication rate is a flawed index of research activity, the reality almost certainly is that most private practice clinicians are not doing what by scientific standards would be acceptable research. To be sure, private clinicians are constantly engaging in setting up hypotheses and attempting to confirm or disconfirm them, so to an extent they can be considered to be doing "research." But such activity does not constitute scientific research as such; and clinicians know that it is not, for across many years and in many places this author has heard them apologize for not doing research.

How is it that so many individuals, obviously very bright and knowledgeable, highly qualified to do the one thing for which they are unique among mental health practitioners, scientific clinical research, are not doing so? As well-trained in research methodology as any social scientists, having role models in professors who usually do both practice and research, having had extensive experience with clinical subjects by the time their formal training is completed, equipped in other words ideally to carry on research with clinical populations, they simply do not do so?

Conversation with clinicians from all parts of the country produce the major and indeed over-riding reason, "I just do not have time to do research." It is not that private clinicians act on the "eight-(or nine-)to-five" mentality, for obvious reasons. When they say, "I do not have time for research," it *may* mean that research is not very high on their priority list; but may *not*. On the assumption that there is a fairly substantial number who genuinely would like to make use of their research expertise, but feel bound by realistic temporal restraints, what "I don't have time" may mean is "I do not know how to fit research procedures into my busy private practice." It is to these individuals, a number of whom have expressed guilt feelings about not doing research, the following suggestions are addressed to assist them in doing through their private practices what they have been so highly trained to do.

#### THE RESEARCH POTENTIAL OF THE PRIVATE PRACTICE PSYCHOLOGICAL CLINIC

*First* in the list of assets for doing research in private practice is that clients on the whole are willing and often eager to engage in research as part of their over-all evaluation and intervention regimen. As long as they can be assured of confidentiality and that no harm will come to them or theirs, clients give quite

willing assent to participate. Nine years of private practice in which one of the requirements for acceptance of service was signed consent to take part in the clinic's research programs is rather strong evidence for this assertion. Discussions with others who do engage in research through their private practices reinforces the same. Clinicians who truly do wish to engage in research, but fear that their clients might not be willing to do so, can fairly safely be assured that their fears are not based on empirical evidence. An ethical issue which may confront the clinician at the start is dealt with in a footnote because discussion here would sidetrack from the main theme.<sup>1</sup>

*Second*, the majority of data-gathering can be meshed into regular clinic routines. And in fact, clinic routines can be devised so as to maximize the research potential of the clinic. Paradoxical as it may seem, maximizing that potential yields a high probability that the service potential of the clinic will also be maximized. However, there is a difficulty in this procedure which some who would like to do research but are not willing to pay the price will find a stumbling block. That is, a re-orientation in thinking about the aims of the clinic is required, not merely a vague idea that "We'd like to do some research." Some quite definite steps are then required to incorporate research procedures into the over-all clinic operation.

Initially, it must be decided that the records kept by the clinic on its clients are meant for both research and practice. Although the author has not examined the files of other private clinics than his own, from conversation with other clinicians the conclusion has had to be drawn that records of their clinics are most likely not suitable for research purposes. They seem not to be organized in a systematic way that they can be utilized for research. Some attempts are sometimes made to standardize social intakes; but often these are not quantifiable. Tests are given only "as needed," when in order to be useful for comparative and follow-up studies there has to be a standard core battery. Improvements have taken place in record-keeping for behavioral interventions; but for other types of interventions — and despite the emphasis on behavioral techniques, most clinicians seem to have more than one string to their bow — lack of uniformity would appear to be the rule rather than the exception.

A legitimate question arises at this point. "How much data should be gathered on clients, especially in the evaluation phases?" The response is, "As much as can feasibly be garnered. You never know when the information will be useful even beyond its initial purposes of research and service." This postulate is especially pertinent in the present litigious era. As an expert witness or as a defendant, the psychologist with a high amount and quality of information speaks with authority. One without such information has sometimes been made to look like a fool by a clever lawyer (Faust, 1985, 1989; Gudjonsson, 1985; Gutheil & Burszajn, 1986).

However, regarding the maximizing of research potential mentioned above, and exercising prolepsis in relation to the actuality section of this paper, the adoption of the research orientation in the author's private clinic resulted in providing superior service to clients. For one thing, the test batteries which were designed for the dual purposes of service and research, which together with social intakes and interviews constituted the formal evaluation of the client, proved to be *the only service* the clinic provided to *about one half* of its clientele, both individuals and families. With children, only one-third were continued in

treatment following the formal evaluation and interpretations. If evaluations were superficial, almost no service would have resulted or, worse, clients would have been inappropriately served. Agencies to whom referrals were made virtually all expressed considerable appreciation for the thoroughness of the reports they received. With adolescents and adults, the thorough analyses enabled the staff to determine rather precisely what disposition was required, based on more than peremptory judgment.<sup>2</sup> From the single standpoint of maximizing the research potential, it appears that for either retrospective or prospective research in a private clinic, as also in a public agency,<sup>3</sup> the potentiality is directly proportional to the extent and adequacy of its files.

*Third*, in the present technological era the widespread presence of computer terminals or microcomputers in private clinics makes the possibility of doing research immensely greater than it was only a relatively few years ago. Anyone who follows *The APA Monitor* recognizes the burgeoning field of computerized testing, record-keeping, analysis, and report-writing available. Sophisticated statistical analyses are immediately available for both individual diagnosis and associated research purposes. Data bases are accumulating on floppies and hard disks, so that what at one time took hours and days to record — if done at all — now enters computer archives in minutes. With the possibility of developing data bases of accurate information so handily, an open invitation is extended to psychologists to do research.<sup>4</sup>

*Fourth*, if a private clinic is equipped with neuropsychological batteries, experimental manipulations can be carried out which are not harmful to the client but are highly useful in answering scientific questions. Some clinicians who possess more elaborate systems like the Reitan or Luria-Nebraska do think in research terms, for these lend themselves to setting up hypotheses and testing them in the course of neuropsychological examinations. Even as simple instruments as the Bender and Benton can be utilized in this way on a lesser scale.

*Finally*, the private psychological clinic has resources in the dual use of data gathered in its experimental testing of intervention procedures. A new technique is proposed in the literature, or a staff member returns from a workshop with a new idea, or someone in the clinic suggests a different way of treating a disorder. The new method has not been *proven* more effective than the established way, but it is worth trying. There are no known harmful effects, though to be sure one cannot prove the null hypothesis. If the new method had been proven differentially effective, it would be unethical to deny its use with clients. The fact is, however, that it is only, though seriously, *promising*. To apply it to a portion of the clients and not to others, is thus not unethical. Informed consent, of course, is required for any research done. But that requirement does not vitiate the random assignment of some clients to the traditional treatment and some to the new treatment.

The alternative open to animal experimenters, that of no treatment vs. treatment, is not open to the private practice clinician. And yet, a natural “no-treatment” group develops in any psychological clinical setting. There are those clients who for one reason or another do not continue beyond the initial formal evaluation phase of clinic contact. It may be that evaluation is all that is deemed necessary, either by the clinician, by the client, or both; or there could be other

causes for discontinuing service beyond the formal evaluation phase. With sufficiently adequate evaluations, the "remainers" and the "leavers" (with no pejorative implication to the term) can be equated. Then, over the treatment period(s) for the former, the two groups can be compared for changes on specific variables postulated in advance. It can be argued that the "remainers" are more seriously dysfunctional than the "leavers." Nevertheless, the "leavers" have *some* dysfunction, else they would not have sought help in the first place. Either the presumed general greater disturbance of the "remainers" can be taken into account in the analyses, or what is likely the more prevalent case, the two groups can be fairly well equated on the measures important to the investigation.

Another way of doing research in the intervention phase is by use of single case experimentation (e.g., Barlow & Hersen, 1984; Chassan, 1979). Measuring change is not as easy as it seems (Harris, 1967), so the clinician doing single case studies needs to be aware of the pitfalls and possibly seek the advice of statistical authorities before undertaking it.<sup>5</sup> However, as behavioral studies have demonstrated, such designs can be fitted into regular clinic routines, and if done correctly can make a unique contribution to science. Computers which can rather effortlessly monitor progress are a boon to this type of research.

Taken all in all, the potentialities for research in a private practice psychological clinic are far greater than most practitioners realize: Clients are generally willing to participate if assured that they or theirs will not be harmed. Clinic routines can be utilized or devised to maximize research potential. Computer and/or neuropsychological equipment for data-gathering and analyses have vastly multiplied research possibilities. Some natural control groups develop in ordinary clinical operations making possible experimentation. And judicious use of single-case designs, with the client serving as her or his own control, may generate generalizable findings on important psychological principles (putting idiographic research to nomothetic uses).

#### THE RESEARCH ACTUALITY IN ONE PRIVATE PRACTICE PSYCHOLOGICAL CLINIC

Forced by a high and unexpected external demand to supplement his income as a professor of psychology, the author and two colleagues established and maintained for nine years a private all-purpose psychological clinic in a Southern City. This is a Standard Metropolitan Statistical Area, the home of two state universities; it is a highly industrialized region and a culture center supporting literature and the arts in a number of ways. As with most private practices, the clientele was predominantly white middle class, though a relatively small number of lower income whites and blacks took advantage of the clinic's services, since the fee schedule was adjusted to income level. The name of the practice revealed the twin purposes for which it was established: Psychological Research and Services (PRS).

The general structure of PRS was very similar in outline to the children's psychiatric clinics the author knew when he entered psychology; but the resemblance is quite misleading. In two very, very important ways PRS differed from its predecessors. The first was that the entire process from beginning to end was regarded as, and behaviors directed toward, the idea that *all* of the

functioning of the clinic was therapeutic (or non-therapeutic as the case might be). Even the Brief Inquiry Interview, which was designed to determine whether the clinic could be of service or not and for which a very modest fee was charged, was expected to be therapeutic in its way. Thus, it was not considered a failure in service when a client either was judged to be unsuitable for the clinic or himself or herself decided not to take advantage of further services. *Whatever* interaction the client and clinic had was regarded to have therapeutic implications. For the old-fashion psychiatric clinic this idea was not at all prominent if even thought of; the social workup, the psychological testing, and the psychiatric interview were three procedures capped by the pronouncement of a diagnosis by the psychiatrist; then, the interpretations were made, and treatment was instituted and only at that stage did "therapy" begin. Such was not the case with PRS, for the therapeutic aspects of all contacts from beginning to end were recognized.

A second major difference between the old-style psychiatric clinic and PRS was that research was built into the structure and functioning of the clinic. The application for service included a statement that part of the purpose of the clinic was to engage in research, that clients were expected to participate in research, and that by signing the application they agreed to do so. Assurance was given that no harm would come to them or the one(s) for whom they were responsible by taking part. In the course of the nine years of operation, not one person refused to sign the application form containing the research condition.

Across the years preceding the opening of PRS, the author had progressed from a "non-directivist," who followed Carl Rogers (1942) philosophy that one did not use psychological tests except in the later stages of therapy to answer specific problems, to the belief that a thorough psychological evaluation is required. For one thing, in dealing with individuals in therapy the author found he was sometimes taking many weeks and even months to find out facets of clients' personalities which could have been uncovered in a short time by use of psychological instruments. Second, just as Rogers found, for research to which the author was dedicated from the start, it was necessary to use such instruments.

Accordingly, for both service and research purposes, a set of test batteries was devised for seven overlapping age ranges from infancy to adulthood. The last battery included marital and vocational preference inventories. A distinctive feature of these batteries was that *a basic core of tests* was required at each age range, expressly for research though with service also in mind. A very large supplementary set of tests at each age level was provided which could be and were usually drawn upon as called for by specific client needs.

As explained above, the evaluations, including social intakes and interviews, were the only service provided by PRS to about one-half of its clients, both individuals and families.

Several different kinds of research were carried out during the years PRS was in operation, and other research has subsequently been done utilizing the data bases residing in the files. Examples of some of the research are given in abbreviated form below.

#### VOLUNTEERS, NON-VOLUNTEERS, AND NO-SHOWS

Dreger and Johnson (1974) made several specific predictions on the basis of the literature on volunteers, which claimed that volunteers are less conventional,

more sociable, better-adjusted, and more self-accepting than non-volunteers. These predictions were operationalized using the 16PF and the MMPI, which were part of the adult test battery or required of caretakers of children. Contrary to the results of some studies, principally with non-clinical subjects, clinical volunteers were not less conventional, but they were more sociable and well-adjusted than non-volunteers. And volunteers were also more self-accepting but only if their level of anxiety was low. An unexpected finding, which would have to be verified by additional research, was that no-shows proved higher in self-esteem than either volunteers or non-volunteers.

#### MARITAL ROLES AND DIMENSIONS OF PERSONALITY

Barton and Dreger (1986) endeavored to verify that previously-revealed relations between marital stability and normal temperament (personality) would likewise obtain between marriage roles and pathological dimensions of personality. In keeping with the previous design, the 16PF factors were selected to represent normal dimensions; and 25 MMPI scales, including four validity indicators, all 10 basic scales, the Welsh A and R scales, and nine additional chosen for relevance to the marital situation were utilized for abnormal variables. Assessment of perceived marital roles was made by means of the original 12 dimensions of the Marriage Role Questionnaire (MRQ) (Barton & Cattell, 1972). On the whole, the MMPI alone was a far superior predictor to MRQ dimensions than was the 16PF. However, in four cases the multiple *R* decreased from the MMPI alone to the MMPI and 16PF combined, in seven cases the combined *R* increased over that for the MMPI as sole predictor.

#### CBCP FACTOR II

This study has not yet been published, so it is given in greater detail than otherwise. Long-term research with the Children's Behavioral Classification Project (Dreger, 1981) led the author and his colleagues to place considerable confidence in the factor derived from the CBCP inventory known as "Factor II. Intellectual and Scholastic Retardation vs. Alert, Socialized Scholastic Achievement." For the present study, it was hypothesized that Factor II would be a valid indicator of intellectual level and school progress. To test this dual hypothesis correlations among five intellectual indicators were entered into a correlation analysis, the WPPSI or WISC-R, Goodenough-Harris Draw-a-Person Test, the Full-Range Picture Vocabulary Test, Factor B (assumed to assess "g") of the Early School or Children's Personality Questionnaire, and Factor II; in addition, all tests were correlated with the Wide Range Achievement Test Reading, Spelling, and Arithmetic scores. *N* was 210.

The correlational analysis results are shown in Table 1. Although rather weak, the hypothesized relations between Factor II and the standard intelligence tests is confirmed except for the relation to the Full-Range Picture Vocabulary Test, and even that is in the predicted direction. Quite interestingly, the second part of the hypothesis dealing with Factor II and the WRAT Reading, Spelling, and Arithmetic scores is confirmed also, just about as well as for the Wechsler tests and the FRPVT should those tests have been hypothesized to be related to WRAT scores.

**Table 1**

**INTERCORRELATIONS OF INTELLIGENCE INDICATORS  
AND WRAT SCORES**

	II	WISC	GH	B	FRPVT	WRATR	WRATS	WRATA
II		-0.23	-0.18	-0.28	-0.10	-0.45	-0.44	-0.38
WISC			0.58	0.53	0.64	0.50	0.42	0.44
GH				0.38	0.35	0.33	0.26	0.24
B					0.38	0.34	0.37	0.34
FRPVT						0.47	0.37	0.39
WRATR							0.76	0.49
WRATS								0.61

Note: N = 210. II = CBCP Factor II, Intellectual and Scholastic Retardation; WISC = WISC-R of WPPSI; GH = Goodenough-Harris Drawing Test; B = Early School Personality Questionnaire, Factor B, "g" type intelligence; FRPVT = Full-Range Picture Vocabulary Test; WRATR, WRATS, WRATA = Wide Range Achievement Test Reading, Spelling, Arithmetic. All coefficients are significant beyond the .01 level, except II with GH ( $p > .05$ ) and II with FRPVT ( $p > .10$ ).

**Table 2**

**ROTATED FACTOR PATTERN OF INTELLIGENCE  
AND ACHIEVEMENT INDICATORS**

Variable	Factor I "Intelligence"	Factor 2 "Achievement"
II	0.13	-0.89
WISC	1.09	-0.02
GH	0.87	-0.10
B	0.70	0.19
FRPVT	0.85	0.01
WRATR	0.15	0.84
WRATS	-0.06	1.05
WRATA	0.18	0.75

Note: For variable identification, see Table 1.

Inasmuch as the correlation matrix itself can give only a rough estimate of what the true relations are between or among the underlying constructs assessed by the tests, a principal factor analysis with Varimax and Promax rotations was carried out on the matrix. By both the Scree test and the K-G latent-root-of-one criterion, two factors only were retained; the first three eigenvalues were 5.554, 1.274, and 0.626. A bit of caution must be expressed here, for the correlation matrix is singular and two of the variables produced Heywood cases. The SAS program was instructed to substitute 1.0 for the communalities exceeding 1.0 and completed the analysis. Table 2 reveals the resulting rotated factor structure. Despite the fact that the variance accounted for is over 9.00, a manifest impossibility, the factors bear out the hypothesis. The two factors could be denominated "Intelligence" and "Scholastic Achievement" with Factor II's relation to each one quite clear.

With some reservations, it can be concluded that the dual hypothesis was supported by the analyses. The limitations of the WRAT should be recognized, however; about the 1965 edition Thorndike (1972) wrote that he hesitated to recommend it for anything other than a clinical or research setting with individual administration for a quick estimate of general ability level and educational background. Presumably, the present use qualifies for both. It should also be recognized that even at best, as with the Wechsler or the FRPVT, not more than a quarter of the variance in school achievement as assessed by the WRAT is accounted for by any of the intelligence indicators.

Other research can be cited, but these instances suffice to demonstrate that through its very service this one private psychological clinic was able to carry on research of a meaningful nature. With the modern trend to utilize existing data bases for research purposes, using computers to digest large masses of data, PRS is still producing research from its files. One special investigation is yet to be accomplished, a follow-up study of youngsters who scored high on Factor VII, "Anti-Social Aggressiveness," one of the few characteristics which in other studies are predictors of similar behavior in adulthood (Quay, 1986).

Did the research being done in this one private clinic affect its operating procedures as well as accomplish interesting scientific results? It can be said that in general there were no immediate changes in procedures, primarily because the total clinic operation had been carefully thought out well in advance. However, one very practical alteration came about because of the scientific orientation of PRS. It was in the beginning years that the "behavioral revolution" took place. The clinic was set up originally with traditional modes of intervention for children and adults predominating. But when the reports of behavioral methods became prominent, especially when those reports cited the unbelievable successes of 90 to 95%, the staff of PRS had to consider instituting such methods and techniques. Controlled observation of both traditional and behavioral methods with children was begun. The results confirmed what more sober estimates of success of behavioral methods had come to, that is, that the estimates for success were about two-thirds. It was found, however, that these methods could deal with some problems which could not be reached by the more traditional ones. Balancing that statement is another, that some, especially loss-related problems could not be reached by behavioral techniques.

REPORTING RESEARCH RESULTS FROM THE  
PRIVATE PRACTICE CLINIC

Research can be done just to answer someone's questions. For the answers to be sound the clinician must exercise the same careful controls recommended in methodology texts. (Cf. Dreger, 1990, [still in press.]) The question may be about some new intervention strategy, or the introduction of a new assessment instrument. Scientific method need not give way to hunches and guesses which appear to be the usual decision factors, which is perhaps one reason for the exaggerated claims of success for the use of some new procedures. Careful measurement and keeping of ample records can enable the clinician to make sound judgments. Some of the studies of this nature may be worth publishing; but regardless, they are worth doing for their own sakes.

But after saying these things, if the clinician believes that her or his research is worth sharing, there are ways of disseminating the information which do not require formal publication. Private newsletters constitute one of the ways. A number of such newsletters cross the writer's desk. Although these publications do not in general enjoy high prestige, partly one would suppose because they are mimeographed or desk-top published sheets, some of the most respectable and useful research reports this author has read have been in some of these non-formal publications. Often when these are abbreviated reports, authors offer to send free of charge a full report.

Another well-known outlet, in which it is not so difficult to achieve acceptance as into a refereed journal, are local, state, regional, national, and international conventions. Even if one should be submitting a manuscript to a journal, a brief oral presentation or poster on the subject is permissible. In any case, even if one is only passing out tables or figures, it is incumbent on the presenter to have the source identified. Many times conventioners return from a convention with a sheaf of papers which seemed important at the time, only to find no title or author identification, so the inquirer cannot even go to the program to locate where to follow up on the information. This a failure in communication and is not good scientific practice.

Private distribution of manuscripts has been utilized for many years and has been one of the ways some scientists keep current with research in their fields. Along with newsletters and conventions, this form of disseminating information does enable one to be more fully abreast of a field than trusting entirely to journal articles, for the time lag from the initial research to its formal publication may be upwards of two or three years.

At long last, however, after due and sometimes painful recognition of the inadequacies of journals for conveying scientific information, it is still true that refereed journals constitute the basic depository of knowledge of a science. Private newsletters or privately-distributed manuscripts are not ordinarily filed in libraries. Papers at conventions are usually forgotten unless they are also published in journals (or in books which are devoted to, say, extensive research projects). By far the majority of studies reported in other ways are not incorporated in permanent form, and when they do get into books, they are not reported in such manner and extent that their methods can be examined. Only in journals (or books as above) can their methods be examined and the excellencies

or limitations of the research be fully recorded. Parallel to Churchill's famous dictum about democracy, journals are the worst of any reporting medium, except any other.

Therefore, the private clinician who has done a worthwhile piece of research should seek diligently to have it published in a reputable journal. Before doing so, however, an author must become familiar with the *Publication manual of the American Psychological Association* (3rd ed., 1983). Many non-APA journals like this one have adopted the APA Manual, so ordinarily the author is safe in using the APA format. At any rate, the submitter should consult the guidelines for authors in the front or rear cover of the journal. If the author does not have access to a particular journal, a covering letter can accompany the submission explaining the situation and suggesting that if the manuscript is otherwise acceptable it can be retyped in appropriate format.

To which journal would the practitioner submit his or her work? (Note the singular "journal" — editors are singularly averse to receiving manuscripts submitted to several journals at the same time.) There is a host of journals available, some more particularly suited to clinical studies than others, but any one of which could be a vehicle for a specific type of study, biological, neurological, abnormal, psychiatric, experimental, etc. The American Psychological Association lists *Respected resources for current research in psychology*, which consists of all APA periodicals, and provides a listing of other journals which will give discounted subscription rates to APA members, which is a source for prospective submitters. Besides the APA journals which are most likely known to readers, this journal (MECR), the *Journal of Clinical Psychology*, and the *Journal of Abnormal Child Psychology* are quite suitable; the so-called "Murchison journals" (like the *Journal of Psychology*) and the Ammons's group of journals published in Missoula, Montana (*Psychological Reports* in particular) are definitely worth considering.

Two points should be observed in submitting manuscripts. First, to be assured that one's report will be given due respect by the psychological public, submission should be to a refereed (sometimes called juried) journal. Even a fully adequate study has some flaws; at least in the hundreds of manuscripts this writer has examined for journals none has failed to have at least a few flaws. Critiques by thoughtful and knowledgeable reviewers can be of great help in remedying non-fatal weaknesses in design or writeup. (Some authorities suggest that an author have his or her manuscript critiqued by a colleague before submission, which may be a good idea depending on the caliber of the colleague and her or his willingness to devote considerable time to the task.)

Second, rejection of a manuscript need not be the end of the endeavor. To keep on keeping on is often necessary. A paper can be revised and submitted again, either to the same journal or to another one (preferably). A consideration in this regard which should not have to be a consideration but realistically is, according to recent discussion in the pages of scientific journals, is that some reviewers can be professionally biased with axes of their own to grind; this situation is not general, yet must be kept in mind. Other things being equal, patience, willingness to work over a manuscript again and again, may well pay off if the study has been done well and the writeup profits from reviewers' and editors' critiques.

## SUMMARY AND CONCLUSIONS

The main thesis of this article is that there is great potential in a private clinic which wishes to do research. One clinic which combined research and service successfully is cited, though this is just one example of other such clinics, to demonstrate that the potential can become the actual. Some attention is given to what should be done with the results of research.

## ADDENDUM

The reader may well ask, "Why did the author terminate his private practice? Did the clinic fail financially because of all this research business?" The answer is simply, "No, not at all." Because of the heavy demand for services of Psychological Research and Services, at one time during the nine years of its existence it became necessary for the author to decide whether to go full time and give up his teaching or to continue on a part-time basis. He was not willing to give up teaching, so continued part time, serving as many as he and his colleagues could handle. And when the final decision to close down the clinic came, the reasons were entirely extraneous to the clinic itself. As far as the success of the clinic itself was concerned, the part-time private practice could have continued indefinitely.

## FOOTNOTES

<sup>1</sup>Is it ethical to expect people to pay for service and at the same time engage in research which *may not directly* benefit them but which instead benefits science generally? Private practice of medicine has apparently solved this problem. The Mayo Clinic, Ochsner's Hospital and Clinic, Kaiser-Permanente, and other private medical facilities regularly engage in research with their paying patients. Not many private medical facilities could afford to accept *non-paying* patients on condition that they participate in research; nor could private psychological clinics afford to. Nothing in the actual operation of the private clinic described in the text ever caused doubt about the wisdom of combining service *and* research with its paying clients. In many cases, indeed, clients did receive *direct* benefit from the research requirement.

<sup>2</sup>The writer has a transcript of an adult psychiatric clinic staffing which would be almost ludicrous, if its implications were not so serious, in its arbitrary, non-data-based decision processes.

<sup>3</sup>From the writer's experience as head of a research team for the mental health facilities in Florida, he and the team found that the files of clinics they examined were abysmally unadaptable for research.

<sup>4</sup>A caution to be observed in respect to computer testing is that norms developed for standard (non-computer-assisted) testing are not necessarily applicable to the results obtained from computer testing. Mazzeo and Harvey (1988) review the literature comparing the methods and find a general lack of equivalence.

<sup>5</sup>The exaggerated success claims in the early days of behavioral interventions had to be revised downwards when the institution of better controls brought such estimates of success to a more credible 60 to 70% (Ross, 1978) One of the errors encountered in the first place was unfamiliarity with statistical problems in measuring change (Gurman & Kniskern, 1978).

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# A BRIEF NOTE ON SECOND-ORDER COMMUNITY SATISFACTION FACTORS FOR TWO SUB-COMMUNITIES IN ISTANBUL, TURKEY\*

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## ABSTRACT

First-order Community Satisfaction factors obtained for a sample of residents of Istanbul, Turkey, were subjected to second-order factor analysis; a solution with two oblique factors ("General Satisfaction" and "Excitement/Dullness") resulted. Findings were compared to those of previous studies and results were discussed with regard to their implications for theories of community satisfaction.

## INTRODUCTION

Social and community psychologists have long been concerned with the nature of people's perceptions of, and satisfaction with, their community environments. The significance of this issue rests on variations in posited relationships between human cognitions and perceptions of community environmental stimuli (see, for instance, Hall, 1969, 1977; Bardo, 1985). Much recent attention has been paid to the possible role of cultural differentiation in determining the structural components of residents' satisfactions with their communities. Some social psychologists (e.g., Rigby & Vreugdenhil, 1986) are seeking measures of community satisfaction which are generalizable across populations drawn from divergent cultures, while others (Bardo & Dökmeci, forthcoming; Hughey & Bardo, 1987) argue that community satisfaction (CS) is a

culturally bound construct which will vary in internal structure across populations. This paper extends the debate on the culturally-based instability of structural components of CS through analysis of the second-order factors obtained for the Community Satisfaction Scale (CSS) when it was administered in two Turkish sub-communities.

Previous applications of the CSS on samples drawn from communities in Great Britain and the United States have reported divergent first- and second-order factors (Bardo & Hughey, 1984, 1979; Bardo & Newton, 1976). Divergences in results were found to include both the number and interpretation of factors (when consistent methodologies were employed) and in the results of comparison of factor patterns through Procrustian analysis. Especially at the more theoretical second-order, differences in results between samples drawn from an American and a British community were striking. For the British sample, five relatively specific factors were found (Bardo & Newton, 1976) including: Social Interaction, Comparative Quality of Housing, Degree of Alienation from Community Institutions, Adequacy of Housing and Income, and Social and Physical Livability. For the American sample (Bardo & Hughey, 1979), second-order factors were much more diffuse and included an Acceptance-Alienation and two General Satisfaction dimensions.

This accumulation of research is beginning to provide detailed analyses of culturally-based variations in the conceptualization of affective community response. To date, however, analyses of the CS concept have generally been conducted in Western cultures and in developed societies. Very little is known about the patterning of the CS concept in non-Western or developing situations.

## METHODS

During the fall of 1987, two systematic samples (from random starts) of residents in two neighborhoods in Istanbul, Turkey, were drawn by urban planning students from the Technical University of Istanbul (see Bardo & Dökmeçi, forthcoming, for details). The first sample was drawn from a peripheral planned sub-community ( $N = 289$ ), Ataköy, and the second ( $N = 266$ ) from a traditional Bosphorus village, Arnavutköy, which is more centrally located. Residents of Ataköy tend to be more middle-class, while Arnavutköy is populated by traditional working-class, urban residents and new migrants from the Black Sea region. Very recently, Arnavutköy has begun to experience urban gentrification and displacement of the traditional population.

The CSS was administered to both samples and the total responses were factor analyzed and the factors were rotated to oblique simple structure. Six first-order factors were obtained including "Perceived Quality of Community Life", "Degree of Social Alienation", "Environmental Belonging and Quality", "Effectiveness of Local Political Institutions", "Excitement/Dullness", and "Care for Residences". The correlations of these factors were then subjected to second-order factor analysis.<sup>1</sup>

## RESULTS

Bartlett's Chi Square indicated that the correlation matrix contained significant systematic variance (Chi Square = 829.8,  $Z = 23.21$ ,  $p < .001$ ), so the variables were retained for factor analysis. Eigenvalues were calculated for the correlation matrix. The Scree Test (Cattell, 1968) indicated that two factors should be extracted and maintained for rotation. Both factors also met the Kaiser-Guttman criterion. An iterative principal axis solution was applied to the correlation matrix until communalities stabilized in the third decimal place. A Kaiser Varimax Orthogonal Rotation was applied to the factor matrix, followed by a Promax Oblique Rotation, resulting in an 33.3 percent .10 hyperplane. The resulting factor pattern is reproduced in Table 1. Items loading at .35 or greater were included in factor interpretation.

**Table 1**  
FACTOR PATTERN

First Order Factors	I	II
Perceived Quality of Community Life	-.85	-.17
Degree of Social Alienation	-.66	-.05
Environmental Belonging and Quality	-.42	.29
Effectiveness of Local Political Institutions	-.52	.11
Excitement/Dullness	.10	1.03
Care for Residences	-.65	.06

Interpretation of the second-order factors was relatively simple for this data set. Five of the six first-order factors loaded on the first second-order factor; thus, it is a "General Satisfaction" factor. The second is a unitary factor on which loaded the "Excitement/Dullness" first-order factor, so it was reproduced at the second-order. Further, it should be noted that the high loading obtained by the fifth first-order factor is most probably associated with the moderately high negative correlation between the two second-order factors ( $r = -.48$ ). It is not uncommon to obtain loadings greater than unity when a variable loads positively on two negatively correlated factors.

## DISCUSSION

Results from this analysis of the more abstract second-order community satisfaction factors differ substantially from any results obtained in previous studies. First, the number of factors is comparatively limited when viewed in light of studies on American and British samples. Second, while it is not unusual to obtain a general factor at the second-order in studies based on the CSS, this is the first time such a result has been obtained in relative isolation. As was noted above, previous versions of the CSS were found to have general factors as well as specific factors.

Traditionally, many planners and architects have preferred to consider community attachment and satisfaction as generalizable concepts. And, recently social psychologists (Rigby & Vreugdenhil, 1986) have attempted to develop measures which are at once detailed and generalizable. When coupled with previous research, these Turkish results show that extreme variation in substructures can be identified cross-culturally. Clearly, CS should be treated as a socially derived psychological construct which varies in specific form across populations and within populations over time.

What is most theoretically interesting in the CS construct is that its form, domain, and structure are mutable to fit circumstances of the people being studied. People seem to organize their perceptions of their community and its various elements in relationship to their current life situation as well as their more enduring cultural traditions. If this is so, then there would be little theoretical utility in seeking a more generalized measure of community satisfaction or perception. Instead, a much more interesting scientific issue involves explication of the specific CS structures within the individual community context and development of prediction models to explain the variations across contexts.

## FOOTNOTES

<sup>1</sup>It should be noted that the labels of first-order factors reflect their bipolarity. Thus "degree of social alienation" would vary (ideally) from a positive of "not alienated" to a negative of "very alienated." The loadings and details of the analysis of the first-order factors can be found in Bardo and Dökmeci (forthcoming).

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