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Is There Such a Thing As Overall Satisfaction With Military Life? A Factor Analysis of Marine Corps Data

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Is There Such a Thing As Overall Satisfaction With Military Life? A Factor Analysis of Marine Corps Data

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ABSTRACT

This research contribution attempts to determine the number of dimensions in which satisfaction with military life should be measured. The analysis used a correlation matrix of satisfaction measures for Marine respondents to the 1985 DOD Member Survey and performed a standard factor analysis on that matrix. Three distinct dimensions of Marine satisfaction, having to do with personal fulfillment in the military, military family stability, and military fringe benefits, were identified.

EXECUTIVE SUMMARY

In applied social research, it often is desirable to attempt to reduce the apparent dimensionality of behavior to a manageable few basic factors. The classic example of this kind of dimensional reduction is found in the history of psychometry, in which performance on a number of cognitive tasks ("tests") has been considered to be the manifestation of a conceptual variable representing general intelligence. But, in fact, nearly all of the social sciences have sought to measure abstract conceptual variables on the basis of multiple measures. Standard references list as examples studies of political orientation, socio-economic status, and emotional traits, among others.

A key variable in a recent study of Marine Corps family programs was whether family services, such as programs to treat domestic violence, substance abuse, separation during deployment, or other family problems, contribute significantly to the overall satisfaction of Marines with military life, and whether this effect on satisfaction has an impact on retention decisions. Overall satisfaction was measured by an ordinally scaled variable, taking as values "dissatisfied," "neither satisfied nor dissatisfied," and "satisfied." Implicit in that earlier study is an important assumption, however. The basic assumption is that conceptually there is such a thing as overall satisfaction with the military (specifically the Marine Corps), as opposed to merely some statistical "average" of a number of specific kinds of satisfaction. The distinction is important because if only specific kinds of satisfaction (e.g., economic, family stability) exist, a model of retention that includes only one specific factor, such as economic well-being, may yield biased predictions if other specific factors also are important in determining retention.

The study described in this paper determines the number of important dimensions in which Marine satisfaction with military life should be measured, or more specifically, whether it is meaningful to discuss satisfaction as a single variable. The basic approach used was to form a correlation matrix for 18 different measures of Marine satisfaction with military life (from the 1985 DOD Member Survey) and to factor that correlation matrix, using the standard factor analysis model, into three dimensions. When the factor axes are suitably transformed (rotated), it is apparent that no general dimension of satisfaction can be identified. In that sense, there is no such thing as overall satisfaction, except as an "average" of specific kinds of satisfaction with military life. Instead, there appear to be three specific dimensions of satisfaction, having to do with personal fulfillment in the military, military family stability, and military fringe benefits.

The results are noteworthy because they suggest that economic factors, on which current retention models depend, are only part of the retention story and that military personnel policies bearing on family stability and personal satisfaction may be important as well. The results also provide an example of the proposition that that which can be measured (i.e., average, or "overall," satisfaction) need not have independent existence, and therefore one should be cautious in using measures of conceptual variables.

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INTRODUCTION

A key variable in a recent study of Marine Corps family programs [1] was whether family services contribute significantly to the overall satisfaction of Marines with military life. Overall satisfaction was measured by an ordinally scaled variable, taking as values "dissatisfied," "neither satisfied nor dissatisfied," and "satisfied." Implicit in that analysis was an important assumption, however. This basic assumption is that conceptually there is such a thing as overall satisfaction with the military (specifically the Marine Corps), as opposed to merely some statistical "average" of a number of specific kinds of satisfaction.

This paper discusses the dimensionality of satisfaction with military life, using data from the 1985 DOD Member Survey, in the framework of specific, versus general, factors in the correlation of a number of variables measuring satisfaction with specific aspects of military life. After introducing the basic statistical model for factor analysis, the empirical results of such an analysis are presented, and conclusions drawn. The paper concludes with some observations on specific, versus general, factors, and on the utility of specific factor scores for future analysis of the Marine data from the 1985 DOD Member Survey.

BACKGROUND

In applied social research, it often is desirable to attempt to reduce the apparent dimensionality of behavior to a manageable few basic factors. (It will be clear from the context in the remainder of this paper whether "factor" is to be understood in its common usage, as opposed to its statistical interpretation as the factoring of a correlation matrix.) The classic example of this kind of dimensional reduction is found in the history of psychometry, in which performance on a number of cognitive tasks ("tests") has been considered to be the manifestation of a conceptual variable representing general intelligence. But, in fact, nearly all of the social sciences have sought to measure abstract conceptual variables on the basis of multiple measures. Harman [2] lists as examples studies of political orientation, socioeconomic status, and emotional traits, among others.

Why, one may ask, do these benighted researchers not simply go out and ask people directly about these conceptual variables? Surely one can, with sufficient wit and diligence, construct a data collection instrument that focuses efficiently on intelligence, or political orientation, or socioeconomic status, or emotional traits? Aside from all of the usual problems of measuring variables that cannot be observed directly with multiple indicators (Joreskog [3 and 4]), there is, unfortunately, the much deeper issue of which conceptual variables are relevant, or for that matter, exist at all. The very fundamental problem is that one can hypothesize the existence of some conceptual variable, such as satisfaction with military life, with which any reasonable set of measures will exhibit some correlation. For example, one can ask Marines (as the DOD Survey does) whether they are satisfied overall with military life and obtain sensible answers that may reflect a combination of perceptions about very specific aspects of military life, even if there is no such thing as general satisfaction.

That problem, of course, has beset survey-based social research for a long time without ever being satisfactorily resolved. An interesting history of the social sciences probably could be written as attempts to deal with the theoretical basis for much of human behavior on the one hand, and the ease with which one can construct empirical measures of variables that may not have any independent existence. Yet the problem for the most part becomes important only when social scientists occasionally lapse into believing that data can somehow *identify* theoretical variables, rather than simply measure them. Stephen Jay Gould [5] has termed this the "error of reification," that is, of supposing that something like intelligence or satisfaction really exists objectively simply because a measure can arbitrarily be constructed.

A powerful statistical tool for relating abstract conceptual variables to observable measures is factor analysis. In the basic factor analysis model, developed formally below, the correlations among observable measures are used to estimate the extent to which these measures are correlated with a set of conceptual variables. The pattern of correlations among observable measures can suggest the number of conceptual variables represented by those measures, and the degree to which those latent variables are correlated with each other. Thus, factor analysis can help discern the dimensionality of the underlying space of conceptual variables. However, it is important to understand that factor analysis can do no more than

examine the dimensionality of the underlying space: it cannot offer any assurance that the dimensions of the space, or "factors," have any external theoretical validity or independent existence.

The remainder of this paper describes the formal basis for the factor analysis model and reports the results of a factor analysis of satisfaction data from the DOD Member Survey. The results of the factor analysis are important for two reasons. First, if satisfaction with military life has a series of specific factors, rather than a single general factor, it is statistically more efficient to use those specific factors in analysis, in the sense that more of the available information can be used. Second, if satisfaction has specific factors, manpower policies aimed at retention and other goals can be more specifically targeted.

FACTOR ANALYSIS MODEL

The "factor" in factor analysis often has been reified in the minds of social scientists to the status of a set of theoretically valid variables. But, in a literal sense, factor analysis means nothing more than a mathematical "factoring" of a correlation matrix among measurement variables. Such a factoring mathematically describes a subspace (usually of smaller dimension than the number of measures) together with a basis for that subspace that can be interpreted as the factors (or conceptual variables) that account for most of the observed variation among the measurement variables.

Formally, one can represent the factor analysis model as follows (a good reference is Morrison [6]):

$$x = \Lambda y + \varepsilon , \qquad (1)$$

where the vector x represents the observed measurement variables, the vector y is the set of conceptual variables or "common factors," and the vector ε represents residual variation in the observed variables not accounted for by the common factors. Since these variables usually are expressed in standardized form, the matrix Λ is the matrix of correlations between the x and y variates. The correlation matrix of the observed measurement variables is Σ, where

$$\Sigma = \Lambda \Lambda^T + \Psi . \qquad (2)$$

The residual variance matrix Ψ is assumed to be diagonal. (The notation Λ^T denotes the transpose of Λ.)

Writing the model in terms of equation 2 makes it obvious that the goal of factor analysis is to factor the observed correlation matrix into a basis for a k-dimensional subspace of R^m, where m is the rank of Σ that minimizes the residual variation ψ. Such a k-dimensional factoring will be optimal in the sense that the reproduced correlation matrix (Λ^*) will be closer to Λ than any other (Λ^*) matrix based on k factors. If as many common factors are used as there are observed measurement variables (more correctly, as the rank of the correlation matrix Σ), there is no residual variation Ψ and the model degenerates into a principal components model.

Once the common factors (i.e., the basis for the k-dimensional subspace of R^m) have been identified, the correlations of each of the measurement variables with each common factor can be plotted. Figure 1 represents a typical plot of this kind. Because the factoring identifies orthogonal dimensions (i.e., vectors in the basis of the subspace) of maximum reduction of residual variance, the first "factor" accounts for the greatest such reduction, the second "factor" accounts for the second greatest reduction, and so on. Thus, in figure 1 the observed measurement variables have the greatest overall positive correlation with the first factor and have both negative and positive correlations with the second factor.

However, the factorization of the correlation matrix Σ is determined only up to orthogonal linear transformations. *Any* orthogonal linear transformation of Λ will account for the same reduction in residual variance. Formally, if G is an orthogonal matrix representing an orthogonal transformation of Λ,

$$\begin{aligned} \Lambda G\,(\Lambda G)^T &= \Lambda G G^T \Lambda^T \qquad (3) \\ &= \Lambda \Lambda^T \\ &= \Sigma - \Psi . \end{aligned}$$

Thus, with no loss of structure, the factor solution Λ can be orthogonally transformed, which is equivalent to a rotation of the factor axes.

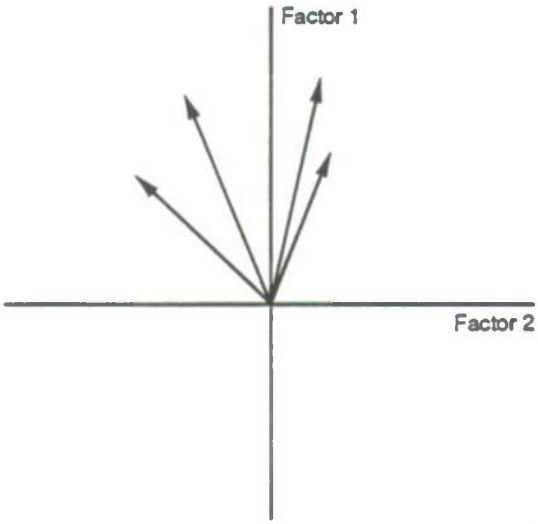

Figure 1. Correlation vectors in factor space

Consider figure 2. The principal factor solution has the first factor highly correlated with the measurement variables. But the measurement variables also are highly correlated with factor 2, with some being positively and some being negatively correlated with this factor. If one rotates the factor axes in a way suggested by the dotted lines, one can identify two new common factors such that one group of measurement variables is highly correlated only with one factor and the remaining measurement variables are highly correlated only with the other factor. In this kind of situation, it is natural to conclude that two distinct, or *specific*, factors are represented by the correlation matrix Σ.

Conversely, in figure 1 there is no obvious rotation of the factor axes that will identify specific factors. In this case, it is natural to suppose that there is a single *general* factor that "explains" most of the structure of the observed correlation matrix Σ.

As Gould [5] remarks, the lesson to be learned from this kind of comparison is that while any well-behaved correlation matrix Σ can be factored, one must be careful about the interpretation of the factors as theoretical constructs. In particular, every correlation matrix Σ can be factored into an arbitrary number of dimensions (less than the rank of Σ), and the first such factor will have the highest average correlation with the measurement variables. This does not imply, however, that there is any latent variable with a particular theoretical interpretation represented by that first factor. If an appropriate transformation reveals two or more specific factors, the general factor has no meaning other than as a metric for a general scale for the measurement variables. Intuitively, the situation is similar to a sample that may or may not contain values of a variable close to the average value.

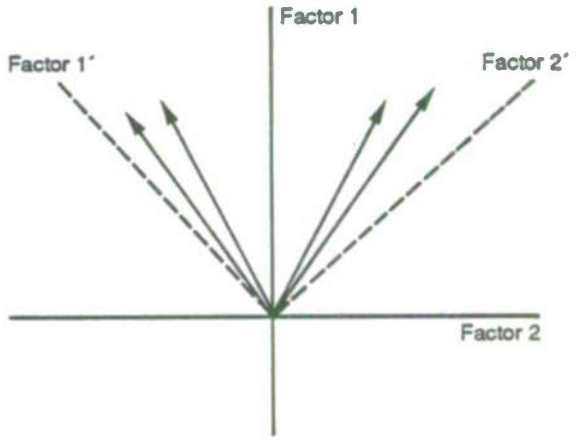

Figure 2. Rotation of basis vectors in factor space

This discussion therefore suggests an empirical means for determining whether satisfaction with military life is a distinct conceptual variable or merely a scale for specific perceptions about military life. If one can identify a series of measures of specific aspects of military life, a correlation matrix Σ can be formed and factored, and the pattern of correlations of these measurement variables with the factors can be examined. If there are measurement variables that are highly correlated with particular factors, such as in figure 2, above, then one would tend to reject the hypothesis that a single general factor explains most of the observed correlation.

DATA

The data used for this study are the same used in the original study of Marine Corps Family Programs. The 1985 DOD Member Survey was based on a random stratified sample of all military members who were on active duty on 30 September 1984. The primary

sampling stratum was branch of service; other strata within service were sex and, for enlisted personnel only, length of service (4 to 47 months of service, and 48 months or more). Within these strata, members were selected randomly. By using a stratified sample design, it was possible to obtain larger samples of officers and females than would be drawn using an unstratified sample, thus permitting more precise analyses of these groups. A 10-percent random sample of Marine respondents to the 1985 DOD Member Survey was drawn to yield a data set of approximately 1,700 observations.

Table 1 lists the variables used in this analysis together with descriptive statistics. The first group of variables are ordinal scales for satisfaction with 18 different aspects of military life, including job characteristics, family pressures, pay and benefits, and affective variables. Also used in the analysis are variables measuring length of service, months separated from one's family in the preceding year, and the scaled ordinal response for overall satisfaction.

FACTOR ANALYSIS OF SATISFACTION MEASURES

Preliminary analysis of the correlation matrix Σ for the 18 satisfaction variables suggested that a three-dimensional initial factoring might be appropriate. (The three largest eigenvalues of Σ are significantly different from all of the remaining 15 eigenvalues, which suggests that additional factoring

Table 1. Variables used in analysis

Variable	Mean	Standard deviation	Minimum	Maximum
Satisfaction with:				
Personal freedom	3.4	1.1	1	5
Friendships	3.9	0.9	1	5
Work group	3.8	0.9	1	5
Assignment stability	3.4	1.0	1	5
Pay and allowances	3.0	1.1	1	5
Environment for families	3.1	1.0	1	5
Frequency of moves	3.2	1.0	1	5
Retirement benefits	3.3	1.0	1	5
Opportunity to serve country	4.3	0.8	1	5
Job in military	3.6	1.2	1	5
Promotion opportunity	3.0	1.3	1	5
Job training	3.3	1.1	1	5
Job security	3.9	0.9	1	5
Working conditions	3.4	1.1	1	5
VEAP benefits	3.1	1.0	1	5
Medical care	3.3	1.2	1	5
Dental care	3.1	1.3	1	5
Commissary services	3.5	1.0	1	5
Other variables:				
Length of service	9.0	6.2	0	46
Months separated in past year	3.5	4.0	0	12
Overall satisfaction	4.9	1.7	1	7
Number of observations	1,755			

will not reduce the residual variance much.[1]) Table 2 presents so-called factor loadings (correlations of the factors with the measurement variables) for each of the three factors. It certainly appears from table 2 that there is one general factor with which all of the measurement variables are strongly correlated and two specific factors with which they are much more weakly correlated. Figure 3 reinforces this impression graphically. The measurement variables are strongly correlated with factor 1 and barely correlated with factors 2 and 3. (The factor axes are scaled as correlations, from −1.0 to 1.0; thus, the coordinates of each measurement variable give its correlation with the two factors.)

An orthogonal rotation of the factor axes changes this conclusion rather dramatically, however. As shown in table 3, the rotated factor loadings (i.e., the correlations of the measurement variables with the new basis vectors for the subspace) suggest that each rotated factor is highly correlated with a somewhat different set of measurement variables. Factor 1 is highly correlated with Marine satisfaction with personal freedom, friendships, work group, opportunity to serve one's country, job performance, promotion opportunity, job training, and job security. Factor 2 is highly correlated with the satisfaction measures for assignment stability, pay and allowances, environment for families, frequency of PCS moves, and retirement benefits. Finally, factor 3 is highly correlated with the satisfaction measures for medical care, dental care, and commissary services, and to a lesser extent, with the satisfaction measures for pay and allowances and VEAP benefits. Thus, factor 1 seems to represent a dimension of personal satisfaction measuring the more

Table 2. Unrotated principal factor loadings

Measurement variable	Factor 1	Factor 2	Factor 3
Satisfaction with:			
A. Personal freedom	0.577	−0.165	−0.116
B. Friendships	0.548	−0.105	0.004
C. Work group	0.609	−0.226	0.039
D. Assignment stability	0.615	−0.061	−0.251
E. Pay and allowances	0.576	0.223	−0.186
F. Environment for families	0.557	0.022	−0.209
G. Frequency of moves	0.463	0.074	−0.346
H. Retirement benefits	0.512	0.130	−0.185
I. Opportunity to serve country	0.470	−0.146	0.113
J. Job in military	0.587	−0.286	0.182
K. Promotion opportunity	0.557	−0.140	0.060
L. Job training	0.618	−0.127	0.182
M. Job security	0.520	−0.139	0.180
N. Working conditions	0.662	−0.156	0.125
O. VEAP benefits	0.413	0.217	0.019
P. Medical care	0.491	0.486	0.168
Q. Dental care	0.345	0.515	0.194
R. Commissary services	0.411	0.361	0.080

NOTE: Factor loadings can be interpreted as the correlation between the factor (basis vector of factored subspace of the correlation matrix) and each measured variable.

1. The first six eigenvalues of Σ are: 5.64, 1.75, 1.13, 0.96, 0.87, and 0.85. The proportions of variance accounted for by these six eigenvalues are: 0.31, 0.10, 0.06, 0.05, 0.05, and 0.05.

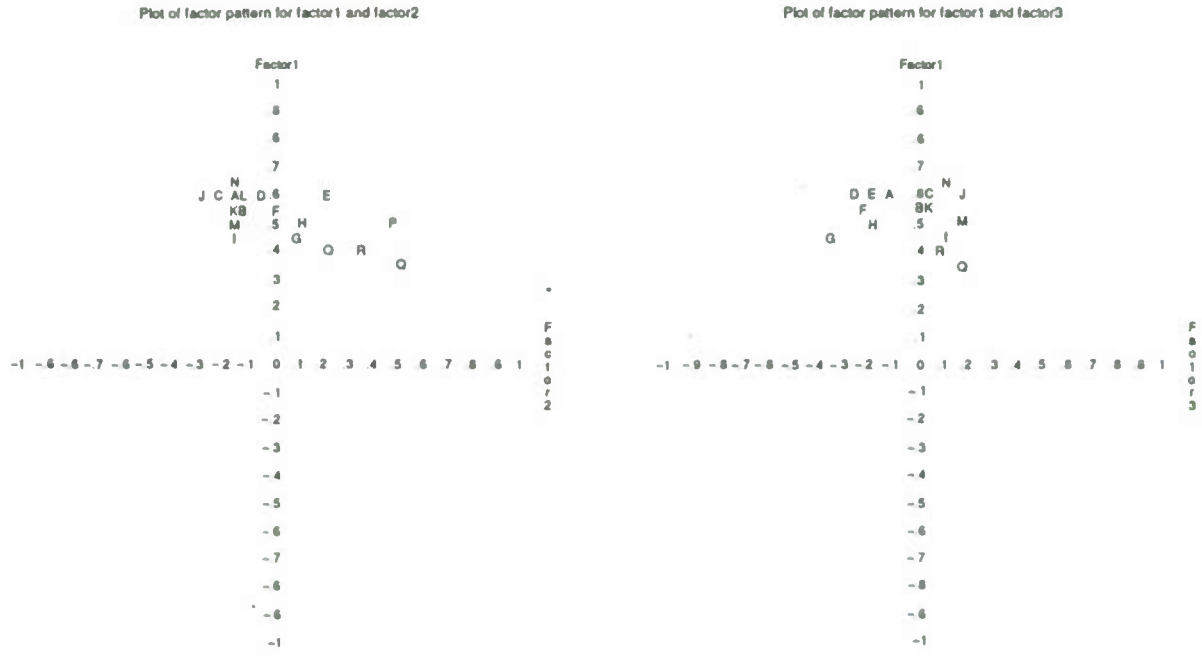

Figure 3. Unrotated factor patterns

Table 3. Rotated principal factor loadings

Measurement variable	Factor 1	Factor 2	Factor 3
Satisfaction with:			
A. Personal freedom	0.460	0.397	0.065
B. Friendships	0.458	0.284	0.144
C. Work group	0.582	0.279	0.080
D. Assignment stability	0.376	0.538	0.121
E. Pay and allowances	0.222	0.483	0.366
F. Environment for families	0.305	0.477	0.180
G. Frequency of moves	0.152	0.546	0.138
H. Retirement benefits	0.225	0.441	0.261
I. Opportunity to serve country	0.469	0.148	0.114
J. Job in military	0.659	0.143	0.069
K. Promotion opportunity	0.507	0.240	0.137
L. Job training	0.596	0.171	0.216
M. Job security	0.529	0.120	0.166
N. Working conditions	0.619	0.240	0.190
O. VEAP benefits	0.192	0.222	0.363
P. Medical care	0.168	0.159	0.672
Q. Dental care	0.057	0.061	0.645
R. Commissary services	0.139	0.181	0.504

NOTE: Factor loadings can be interpreted as the correlation between the factor (basis vector of factored subspace of the correlation matrix) and each measurement variable.

affective aspects of military service, factor 2 a dimension of satisfaction related to family satisfaction, and factor 3 a dimension of satisfaction related to military fringe benefits.

Figure 4 illustrates these correlations with respect to the rotated factor axes. In the first panel of figure 4, one can see the grouping of the "personal fulfillment" measurement variables toward factor 1 and the "family stability" variables toward factor 2. The "fringe benefits" variables correlate poorly with both factors 1 and 2. In the second panel of figure 4, the grouping of measurement variables toward factors 1 and 3 is even more distinct. In this case, of course, it is the "family stability" variables that correlate poorly with the factor axes.

The factor loadings or correlations can be transformed into a set of standardized regression coefficients for each factor, using the relation:

$$y = x\ (\tilde{\Lambda}\,\tilde{\Lambda}^T + \Psi)^{-1}\,\tilde{\Lambda}\ . \qquad (4)$$

(The tilde denotes the estimated value of the parameter, e.g., $\tilde{\Lambda}$ is the estimated factor loading matrix Λ.) This relation was used to construct three factor scores for each observation in the data set. The score is simply the "predicted value" of each factor for each observation and represents in this case a scale for Marine member satisfaction in each of the three dimensions identified. The correlations of these factor scores with several other variables are reported in table 4. As one might expect, the scaled overall satisfaction variable is correlated most highly with factor 1 and somewhat less highly with factor 2. However, the weakness of the correlation of factor 3 with overall satisfaction suggests that when respondents gauged their overall satisfaction with military life they generally were not thinking in terms of fringe benefits. Length of service tends to be positively correlated with the personal and family dimensions of satisfaction with military service and negatively correlated with the compensation dimension. Finally, there is some indication that Marines who have been separated from their families are less likely to be pleased with the family and compensation dimensions of military service.

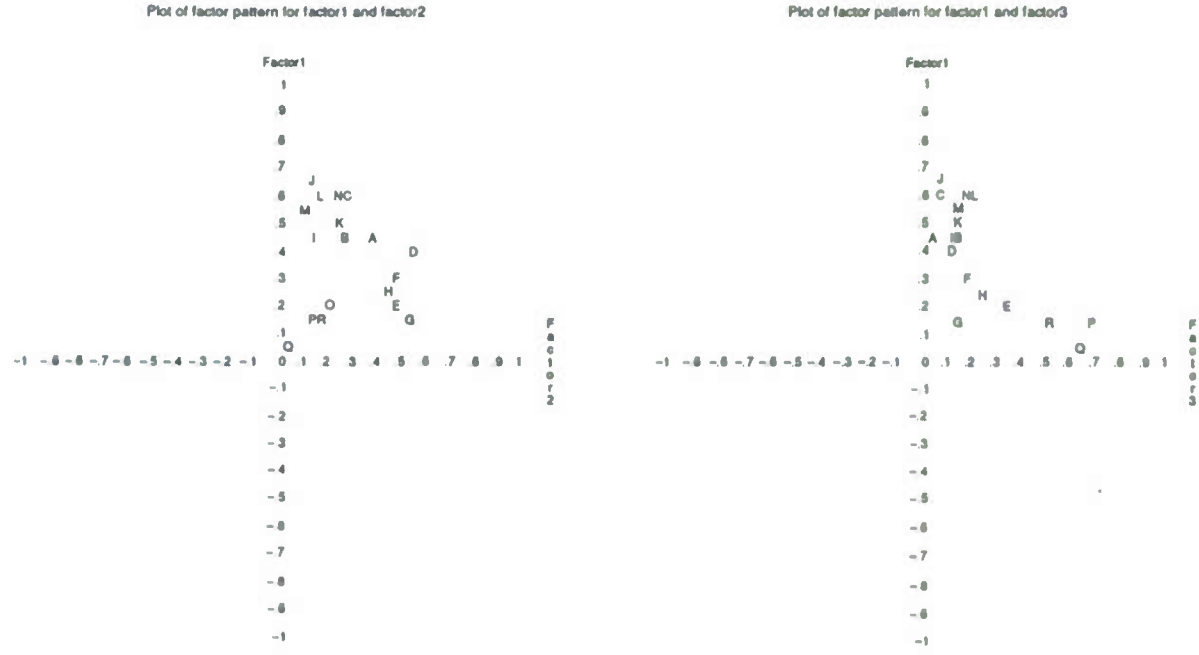

Figure 4. Rotated factor patterns

Table 4. Correlations of factor scores with other key variables

Variable	Factor 1	Factor 2	Factor 3
Length of service	0.288	0.100	–0.194
Months separated from family in past year	0.009	–0.087	–0.114
Scaled overall satisfaction with military life	0.545	0.405	0.214

SUMMARY AND CONCLUSIONS

This paper set out to determine the number of important dimensions in which Marine satisfaction with military life should be measured, or more specifically, whether it is meaningful to discuss satisfaction as a single conceptual variable. The basic approach was to form a correlation matrix for some 18 different measures of Marine satisfaction with military life from the 1985 DOD Member Survey and then factor this correlation matrix into three dimensions. It was unclear from the untransformed factors so identified whether one factor represents some general dimension of overall satisfaction. However, when the factor axes are orthogonally transformed (rotated), it is apparent that no such general dimension can be identified. In this sense, the question posed by the title of the paper must be answered: "No, there is no such thing as overall satisfaction, except as an 'average' of specific kinds of satisfaction with military life." Instead, there appear to be three distinct, specific dimensions of Marine satisfaction, or "factors," having to do with affective attachment to the military, military family stability, and military compensation and benefits.

Why are these results important, or even interesting? As remarked earlier in this paper, it is important to understand the dimensions in which Marines are satisfied with military life for at least two reasons. First, this dimensionality suggests that different facets of human behavior explain different aspects of individual dedication to the service and readiness, or even the decision to remain in the military. Thus, different models of behavior may be appropriate in different situations. Or, alternatively, to the extent that different aspects of human behavior are not analytically separable, models need to be correspondingly richer to account for interdependencies among types of motivation. Second, and more important, this dimensionality has policy implications, in terms of how best to allocate resources to retain dedicated troops. The results presented above, for example, suggest that economic factors are only part of the retention story and that military personnel policies bearing on family stability may be important as well. Among the findings of [1] is the conclusion that Marines are influenced by the availability of family services when deciding whether to remain in the military.

In the end, this kind of exercise may be most valuable because it forces one to focus on the complexity of behavior and to accept the limits of models for analysis and policy prescription. The reminder that it is easier to construct a measure (such as an overall satisfaction scale) than to identify what is to be measured (such as the specific dimensions of member satisfaction), and that it is deceptively easy to believe that what is measured is real, often is unwelcome but nonetheless provides the focus that at least sometimes leads to increased understanding.

REFERENCES

[1] CNA Report 139, *A Study of Marine Corps Family Programs*, by Edward S. Cavin, Feb 1988

[2] H.H. Harman. *Modern Factor Analysis (2nd edition).* Chicago: University of Chicago Press, 1967

[3] K.G. Joreskog. "Structural Equation Models in the Social Sciences: Specification, Estimation, and Testing." In P.R. Krishnalah (ed.), *Applications of Statistics.* Amsterdam: North-Holland Publishing Co., 1977

[4] K.G. Joreskog and A.S. Goldberger. "Estimation of a Model with Multiple Indicators and Multiple Causes of a Single Latent Variable," *Journal of the American Statistical Association* 70, 1975

[5] S.J. Gould. *The Mismeasure of Man.* New York: W.W. Norton and Co., 1981

[6] D.F. Morrison. *Multivariate Statistical Methods.* New York: McGraw-Hill, Inc., 1976

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This research contribution attempts to determine the number of dimensions in which satisfaction with military life should be measured. The analysis used a correlation matrix of satisfaction measures for Marine respondents to the 1985 DOD Member Survey and performed a standard factor analysis on that matrix. Three distinct dimensions of Marine satisfaction, having to do with personal fulfullment in the military, military family stability, and military fringe benefits, were identified.

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