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Psychological and Organizational Factors Related to Attrition
and Performance in Marine Corps Recruit Training

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Raymond W. Novaco
University of California, Irvine

Irwin G. Sarason
University of Washington

Thomas M. Cook
University of California, Irvine

Gregory L. Robinson
University of California, Irvine

Francis J. Cunningham
San Diego State University

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Summary

Three separate but interrelated studies were conducted as part of a project concerned with attrition and performance during Marine Corps recruit training. The principal focus of the studies contained in the present report was the influence of organizational factors, particularly the effects of training units.

Our research on attrition departs from most previous investigations by the attention it gives to the objective properties of the organizational environment and the analysis of attrition in terms of the interrelated workings of all elements in the recruit training process. The research is guided by theories of psychological stress which emphasize the environmental context of behavior and the need for individuals to develop skills relevant to adapting to and meeting the challenges of environmental demands. In this regard, the present work was conducted in conjunction with the development of a stress coping skills intervention module for recruits at the San Diego Marine Corps Recruit Depot (MCRD).

We view attrition as a complexly determined phenomenon within a system. We sought to map rates, forms, and patterns of attrition in order to understand its nature in general and to determine the degree to which attrition results from factors or conditions that are psychologically related and therefore might potentially be influenced by a psychological intervention. We pursued these objectives by beginning with an analysis of archival data on attrition over a one-year period. We then conducted a case analysis of psychologically related discharges. These efforts led to an extensive study of a cohort of recruits through the training cycle. We tracked the influence of demographic, aptitude, and training unit factors on attrition and performance. The principal methods and findings of these studies are given below.

Attrition Description Project

The characteristics of attrition according to component, type of discharge, separation code, age, AFQT score, recruiting error code, battalion, and total days at MCRD were tabulated from monthly archival data over a one-year period. A "type of attrition" classification was created based on separation codes that distinguished medical/erroneous enlistment attrition from psychological/behavioral attrition. Relative to total attrition of 2,925 recruits over a one-year period, 41.7% fell into the medical/erroneous enlistment group and 42.9% were psychological/behavioral attriters. The remaining 15.4% were classified as "other attriters." The medical and psychological groups were not found to differ in age, education, AFQT score, or component (regular or reserve).

It was found that differential training completion percentages existed across the three battalions studied, and among components within battalions. While one battalion had an 84.4% completion rate, for another the rate was 89.4%. These findings suggest the importance of training unit differences.

Case Analysis of Psychological/Behavioral Discharges

The case analysis investigation concerned a one-third random sample (N=205) of psychological/behavioral attriters over a seven-month period in order to understand more fully the attributes of this group so as to plan attrition-reducing psychological interventions. The majority (58%) of attrition of this type occurs prior to Phase 2 of training. It was thought that it might be possible to identify recruits who attrite for psychological reasons as a function of platoon changes or occasions of correctional action. However, psychological/behavioral attriters could not be so identified or anticipated.

Analysis of the demographic factors of race and education were conducted for the sample of cases. There were no significant differences in percentages of psychological/behavioral attrition due to race. High school graduates had a lower frequency of cases of psychological/behavioral attrition than would be expected from the yearly accessions.

A tabulation of command evaluation remarks recorded in the cases of the sample found that the most common evaluation remarks are "lacks self-discipline," "immature," and "unmotivated" - each occurring as a descriptor in 75% of the cases. The tabulation of clinical remarks resulted in no salient regularities.

When the sample was examined with regard to the battalion recommending discharge, striking differences emerged. One battalion which accounts for 37.9% of yearly accessions and 32.8% of yearly attrition was found to account for 49.3% of the cases in the psychological/behavioral sample. This finding again points to the influence of training units on attrition.

Cohort Testing

The October 1978 cohort and a one-third randomly selected test sample from this cohort were studied through the training cycle. The testing involved stress-related personality measures which will be the subject of subsequent reports. The present report focused on the results of demographic, aptitude, and training unit influences on attrition and performance during training. The cohort and sample were evaluated for comparability with yearly attrition rates and rates for types of discharges, and it was found that the cohort and sample were highly representative.

The pattern of results on the effects of demographic and aptitude variables on attrition and performance (marksmanship, physical fitness, oral and written test of military knowledge) indicates that these variables either

have little statistical and even less practical significance for the prediction of attrition and/or performance. The effects of greatest magnitude were obtained for weight at processing (attriters with non-medical separation codes were more than 12 pounds heavier than recruits who graduate or attrite for medical reasons) and birth order (attrition rates were 6.0% for oldest, 13.3% for middle, and 18.8% for youngest) on the personal/demographic dimensions. With regard to aptitude measures, ASVAB combat aptitude score (graduates score higher than do attriters across all discharge types) showed the strongest relationship.

The primary findings of the project concern the effect of training units. Attrition was found to vary from 0% to 28% across platoons in the cohort. Attrition was calculated from a careful tracking of recruits in the cohort and by relating discharges to the platoon of which the recruit was initially a member. An experimental factor called ATTRITVAR was created from a tertile partitioning of the distribution of platoon attrition rates. This factor formed a classification of platoons as low (0% - 9%), medium (10% - 13%), or high (14% - 28%) in attrition. The ATTRITVAR groupings permitted testing hypotheses about differential attrition as a function of 1) differences in initial composition of platoons at forming, and 2) differences in the striving for high performance standards.

The results indicate that variation in platoon attrition rate is not a function of initial composition factors. No statistically significant differences were found for the ATTRITVAR groups on any demographic or aptitude measures. The results also indicate that there is no empirical support for the belief that training units have high attrition rates because of their performance standards. There is no discernible relationship between the attrition and performance of training units at the ATTRITVAR or individual

platoon level. This can be observed from the ranking of training units according to attrition rate and the performance scores on marksmanship, physical fitness, oral test, and written test. Only in the case of the physical fitness test (PFT) is high attrition associated with high performance. However, this finding is ambiguous because the high attrition group also has a high number of recruits who "miss" PFT and because the platoon ranked first on PFT is in the low ATTRITVAR group.

The major question raised by this research is: which dimensions of training units are responsible for the differential rates of attrition? Subsequent reports will be concerned with the social environment of platoons as reflected in changes in stress-related personality measures of recruits over the training cycle. A replication of the cohort tracking with regard to training unit influences is presently being conducted with regard to the April 1979 cohort that will examine the effects of training unit characteristics on attrition and performance.

Psychological and Organizational Factors Related to Attrition and Performance in Marine Corps Recruit Training

Background Research

Predicting first term attrition among enlisted military personnel has proved to be a perplexing problem. An extensive review by Hand, Griffeth, and Mobley (1977) reveals that considerably more research has been concerned with re-enlistment than with attrition prior to the completion of obligated service and that the prediction of re-enlistment decisions has been far more successful than have efforts to account for attrition. In general, attrition research has placed greater emphasis on person variables (demographic and aptitude measures) than on organizational variables and has failed to examine the interaction of these two sets of factors (Hand et al., 1977; Mobley, Hand, Baker, & Meglino, 1978). Furthermore, the kinds of organizational variables that have been examined have largely relied on self-report measures and have not adequately indexed the role of the social environment.

Specific to Marine Corps recruit training, recent research concerned with attrition can be found in reports by Sims (1977), Greenberg, Murphy, & McConeghy (1977), and that of Mobley and his colleagues (Mobley, Hand, Logan, & Baker, 1977; Mobley et al., 1978). Sims (1977) summarized previous studies of psychological or person variables and constructed several sets of predictors ("profiles") using a test battery administered to a sample of over 3,000 recruits. At best, Sims' profiles (aptitude measures, education, and age) were able to account for 10% of the variation in attrition, which is comparable to the results of other investigations that used similar kinds of predictors. The Greenberg et al. (1977) project studied 1,100 military personnel but only 150 of which were Marine recruits. Of this subsample, 100 were attriters.

Analyses conducted to differentiate attriters from adjusted recruits found several individual difference variables that accounted for small proportions of variance. However, the generalizability of their findings is seriously limited by a number of methodological weaknesses in the study - attrition was defined as "being discharged for misconduct," the attrition sample was non-random, the sample size was quite small, and the data were entirely derived from exit interviews.

The work of Mobley and his colleagues has been guided by theories of organizational management and employee turnover (Mobley, Griffeth, Hand, & Meglino, 1977). More specifically, the research of these investigators has been guided by a role choice model which is a variation of the generalized expectancy models used in the study of organizational behavior (Vroom, 1964; Lawler, 1973; Mitchell, 1974). Mobley and his associates have used longitudinal designs in their research, and their first report (Mobley, Hand, Logan, & Baker, 1977) focused on the assessment of the values, expectations, and intentions of the recruits at the beginning of recruit training. Their second report (Mobley, Hand, Baker, & Meglino, 1978) is concerned with the prediction of attrition on the basis of their role choice measures, as well as demographic factors. They studied approximately 2,000 recruits at Parris Island MCRD accessed during August, 1976. This sample was found to have a 12% attrition rate.

In comparing recruit training graduates with attriters, Mobley et al. (1978) found no significant differences for race or age and small but statistically significant differences related to education, marital status, and mental aptitude. (Graduates had 0.4 years more education, had a 3% higher total percentage married, and were 3.5 points higher on the Armed Forces Qualification Test.) Clearly the demographic variables used had little predictive value vis-à-vis attrition. The best single predictor of attrition

was the recruits' initial expectation of completion ($r = .22$). However, an aggregate of seven expectation/intention/role attraction variables plus education succeeded in accounting for only 10% of the variance in attrition.

Considering the existing studies on personality and organizational variables, the task of predicting attrition is indeed difficult. Yet it does seem that most approaches taken in analyzing the attrition problem have been limited to only some of the relevant variables. The work of Sims (1977) is limited by its restriction to aptitude and demographic factors. The Greenberg et al. (1977) study only examined a small sample of Marine recruits and had other methodological limitations. Neither of these projects was theoretically directed, and they lacked systematic analysis. The work of Mobley and his colleagues is guided by a theoretical model and is longitudinal in approach but their assessment of organizational variables relies entirely on the reported perceptions of the recruits themselves.

Framework for the Present Investigation

Our study of Marine Corps Recruit Training attrition is guided by theories of psychological stress and coping which emphasize person-environment transactions (Lazarus & Launier, 1978; Novaco, 1979; Sarason & Johnson, 1979; Spielberger & Sarason, 1978). Stress is viewed as a condition of imbalance between demands and resources. It comes about when environmental demands (stressors) exceed the person's resources for coping with those demands. Coping refers to adaptive efforts made in response to perceived environmental challenges or threats. Within our general framework, stress is viewed as a result of a continuous interplay of exchanges between the person and the environment over time. As such, it is a hypothetical condition that is manifested by a variety of adverse health and behavioral consequences (stress reactions).

The analysis of recruit training attrition in terms of psychological stress was undertaken in conjunction with the development of an intervention module on stress coping skills. The rationale for the intervention project is that since a sizeable percentage of attrition (approximately 40%) is believed to occur for psychological/behavioral reasons and since the recruit training environment is surely one of exposure to high intensity demands, a significant proportion of those psychological/behavioral discharges, as well as some medical discharges, may be due to deficiencies in stress coping skills. The work on the intervention project is currently in progress and will be the subject of a subsequent report. However, prior to conducting an intervention, considerable information was needed on the nature of attrition in recruit training at the organizational level and at the psychological level that was unavailable in existing reports.

Without exception, existing research reports provide either little or no information about system level factors, that is, the objective characteristics of an organization. There is a great need for data on attrition in terms of its periodicity, its proportionate distribution across discharge categories or separation codes, and its relationship to the characteristics of training units. Because of our own interests concerning psychological stress, we felt the need to go beyond the usual demographic, aptitude, and personality variables and to identify system variables that might bear on attrition.

Our analysis of attrition and its psychological correlates involved a series of interrelated data-gathering efforts. These consisted of the following projects: 1) an attrition description analysis that mapped the characteristics of attrition according to race, period, discharge category, separation code, component, battalions, recruiting districts, aptitudes, and demographics; 2) a case analysis of psychological/behavioral discharges to more closely examine attrition patterns in the category with respect to demographic, aptitude,

and system factors, as well as clinical and command evaluations; 3) a cohort testing of a one-third random sample of the recruits accessed in the month of October of 1978. This involved measurement of stress-related personality variables on the first day of processing, midway through training, and prior to graduation. Demographic and aptitude measures were obtained, as well as routine performance measures on marksmanship, physical fitness, and military knowledge and drill instructor ratings of recruits; 4) a training unit analysis of organizational level factors bearing on attrition in the October cohort. This analysis examined attrition as hypothetically related to the training unit in terms of an experimentally constructed aggregate factor and at the level of platoons; 5) a process monitoring of training events consisting of interviews with recruits and training personnel, and, importantly, a visual and audio catalogue of events from the start of processing to the change-over to the training unit (which occurs after approximately three days in the training environment). As part of this effort, a group of ten recruits were studied in depth for their reactions, reflections, and suggested strategies for the successful completion of training; and 6) a comparative analysis of the April 1979 cohort on the organizational variables studied in 4) above, and an examination of the effects of changes in the training atmosphere implemented in March, 1979 by directive from Marine Corps Headquarters.

The present report is concerned with the first four tasks, although the personality variables will be the subject of subsequent reports and are not presented here. Similarly, the work conducted with regard to the other tasks will be separately reported. The principal findings presented here concern mappings of the nature of attrition as a system phenomena and its relationship to demographic variables, aptitude measures, training units, and performance criteria.

Method

Design

Each research task described above involved a separate study design and subject sample. The "attrition description" analysis, aimed at mapping characteristics of attrition according to system variables, involved archival data on all attriters (2,925 recruits) for the period of May, 1977 to April, 1978. The "case analysis" was performed on a one-third random sample of all psychological/behavioral discharges (205 recruits) occurring in a seven-month period from January through June, 1978. The "cohort testing" involved a one-third random sample of all recruits accessed in October of 1978. Repeated measurements were performed on this sample of 597 recruits at three time periods - on the first day of processing (T_1), midway through training (T_2), and just prior to graduation (T_3).

The statistical designs used in the above investigations involved a variety of cross-tabulation, regression, and analysis of variance methods. System variables (e.g., component, separation code, and type of discharge) and demographic variables were used as blocking factors in the analyses to investigate whether systematic differences were related to such groupings.

The "training unit" analyses focused on the cohort testing sample but also included all recruits (1,468) accessed in October, 1978. To study the influences of organizational units, an attrition category variable (ATTRITVAR) was created that consisted of a three-level classification of training units on the basis of their attrition rate (low, medium, high) relative to the overall frequency distribution. Thus, ATTRITVAR was constructed from a tertile partitioning of the distribution of attrition rates across training units. This index was then used as a blocking factor in our analyses.

Procedure

The monthly Rosters of Recruits Discharged/Released served as the primary data source for the "attrition description" analysis. Our interest was in mapping attrition according to a number of variables contained in these monthly rosters - these being component, training phase at separation, type of discharge, separation code, age, AFQT score, recruiting error code (DCAT), training days completed (T days), and total days at MCRD. These data were obtained for all recruits, coded, and computer analyzed. The accession rates were also obtained for the one-year period under study and were used to compute attrition rates for the comparative analyses done to examine system factors.

The recruits discharged in a particular month, of course, do not represent the attrition for the recruits accessed in that month (the month's cohort must be tracked individually to calculate that rate). Since our "attrition description" analyses are not concerned with monthly rates, the fact that the data derive from the monthly rosters does not constitute a problem in that regard. Because data based on roster information concerning "phase at separation" and training days completed was not systematic enough for our purposes, we were unable to perform structural analyses on these variables.

The "case analysis" was conducted by abstracting case files on psychological/behavioral discharges. Case information was coded on a form that included sections on demographic data, the system variables studied earlier, the company/battalion evaluation, and clinical remarks. The 205 cases in the analysis were obtained by selecting the file of every third case of a psychological/behavioral discharge from an alphabetized file of discharged recruits. The study period was a seven month interval from January 1, 1978 to June 30, 1978.

The "cohort testing" sampled one-third of the recruits accessed in October, 1978 by randomly selecting 10 days of the month and testing the recruits processed on those days. The testing involved the administration of the following psychological scales related to stress: 1) the Life Experiences Survey (Sarason, Johnson, & Siegel, 1973) which is designed to measure life change events that have been associated with stress and subsequent illness; 2) the Test Anxiety Scale (Sarason, 1978); 3) the Nowicki-Strickland (1973) Internal-External Control scale which measures generalized expectations for control over reinforcement; 4) an anger inventory (Novaco, 1975) that assessed proneness to provocation; 5) a measure of sensation-seeking (Zuckerman, Kolin, Price, & Zoob, 1964); 6) a measure of problem-solving skills (MEPS) (Spivack & Shure, 1976) that assessed the respondent's ability to determine means-ends relationships and to formulate alternative means to achieving desired outcomes. The MEPS scales were modified for our research purposes by constructing scenarios that pertain specifically to the recruit training environment; and 7) a Recruit Background and Attitude Survey (RBAS) constructed for this project. The RBAS consists of a 100 item instrument to assess a variety of attitudes related to the military, as well as personal background items, each rated on a five-point Likert scale. The data concerning this set of personality scales will be the subject of a future report.

Demographic and personal background data obtained in the cohort testing consisted of information on home town size, education level, race, family background, birth order, ratings of the quality of home life and of school experiences, and aptitude measures obtained from the Recruits Administrative Management System (RAMS) accession files. These include scores on the Armed Forces Qualification Test (AFQT) and several subscales of the Armed Services Vocational Aptitude Battery: general technical (ASVAB-GT), combat orientation (ASVAB-CO), and general information (ASVAB-GI).

The performance data on rifle marksmanship score, physical fitness test score, and the oral and written tests of military knowledge were obtained from training regiment archives according to platoon rosters. In addition, senior drill instructors were asked to rate all recruits in their platoon on a set of performance dimensions. This was done one or two days after graduation. The rating dimensions were motivation, cooperation, intelligence, and overall performance. The ratings were performed on a five-point scale from "unsatisfactory" to "outstanding." Explicit instructions were given to consider a rating of 3 to correspond to the average recruit, so as to anchor the ratings.

Results

ATTRITION DESCRIPTION ANALYSIS

Component

The regular or reserve status of recruits was found to have some bearing on the rate of attrition, as reservists have a slightly lower attrition rate. The percentages for accessions and discharges for the two components are presented in Table 1 along with means for age, education, and AFQT score. The difference in educational level is statistically significant ($p < .003$), but from a practical standpoint is of little value. While there is a slight tendency for regular recruits to have a lower proportion of honorable discharges (81.2%) than do the reservists (85.4%), the components do not differ significantly in the distribution across type of attrition (medical/erroneous enlistment, psychological/behavioral, and other).

Discharge Category

When the attriters are grouped according to type of attrition, as can be seen in Table 2, the medical/erroneous enlistment group does not differ from the psychological/behavioral group in age, education, or AFQT score. As

Table 1

Component Attrition Rates and Means for Age, Education
and AFQT Scores for Year Attrition Population

Component	Percent of Year Accession	Percent of Year Attrition	Attrition Rate	Age	Education	AFQT
Regular	81.2	32.3	12.1	18.96	11.41	53.95
Reserve	18.8	17.7	11.3	18.98	11.28	53.61

Table 2

Means for Age, Education and AFQT Scores as a
Function of Type of Attrition for Year Attrition Population

Type of Attrition	N	Age	Education	AFQT
Medical/Erroneous Enlistment	1220	18.88 (2.06)	11.39 (1.02)	54.09 (16.10)
Psychological/Behavioral	1255	18.80 (1.99)	11.37 (1.10)	53.20 (17.14)
Other	450	19.65 (2.44)	11.41 (1.19)	55.25 (15.54)

NOTE: Numbers in parentheses are standard deviations.

indicated above, the crosstabulation of type of discharge with component resulted in no significant differences in distribution.

Recruiter Error

Those attriters for whom discharge was judged to be related to recruiter error, as opposed to Armed Forces Enlistment and Examination Station (AFELS) error or neither, are significantly lower in AFQT score and education but not in age, as can be seen from Table 3.

Battalions - Training Unit Effects

When accessions and discharges were examined for the three battalions in the Recruit Training Regiment at San Diego MCRD, it was found that differential training completion percentages existed across battalions and between components within battalions. While one battalion had an 84.4% completion rate, another had an 89.4% completion rate. Within the latter battalion, the completion rate was 90.5% for regular recruits and 84.7% for reservists. This is contrasted with the fact that the completion percentage was higher for reservists than for regular recruits in both of the other battalions.

These findings were suggestive of differences in attrition as a function of the environment of training units. However, because recruits can be discharged from a battalion other than the one to which they were accessed and because this process might fluctuate randomly, the obtained differences cannot be attributed unequivocally to training units. Although the sample and time period were both sizeable (24,481 recruits over a one-year span), a careful tracking of attriters and the performance of non-attriters is needed to identify training environment influences. The battalion, moreover, may be too large a unit of analysis for investigating such effects.

Table 3

Means for Age, Education and AFQT Score as a Function of
Recruiter Error Code for Year Attrition Population

Recruiter Error Code	N	Age	Education	AFQT
Recruiter Error	139	18.86 (2.26)	10.86 (1.18)	49.08 (12.55)
AFEES Error	116	18.92 (2.16)	11.34 (1.08)	55.84 (17.29)
Neither Responsible	2435	18.95 (2.08)	11.41 (1.06)	53.95 (16.64)
Defect Noted Not Disqualified	29	19.21 (1.90)	11.55 (1.06)	56.07 (17.31)

NOTE: Numbers in parentheses are standard deviations.

Summary of Attrition Description Analyses

The analyses of archival data on attrition over a 12-month period were limited by the unavailability of valid data on training days and phase at separation. The analyses that were conducted frequently found there were no significant differences between the categorical groupings examined. Yet, when considering the grouping factors studied, particularly component and discharge category, the absence of differences across groupings is useful information. It can be noted that reservists, who are not different in age, AFQT score, or education in comparison to regular recruits, are no more likely to attrite than are regular recruits. In fact, their attrition rate is lower, and they receive a slightly higher proportion of honorable discharges. It was also found that those recruits who attrite for psychological/behavioral reasons do not differ on demographic or aptitude measures from those who are discharged for medical/erroneous enlistment reasons.

The possibility that the training unit environment may influence attrition was noted in finding that differential completion rates occur across battalions. Subsequent investigation has pursued the training unit effects which have been found to be quite striking, as reported below.

Comparison with Parris Island MCRD

A comparison of the San Diego and Parris Island MCRD's attrition data was tabulated for the months of January and April of 1978. Across months, there are no significant differences in means for age, education, AFQT score, or total days at the training base. The principal difference found in the comparative analysis was with regard to separation code. As can be seen in Table 4, for both months sampled there were roughly twice the number of medical/erroneous enlistment (JFC1) discharges occurring in San Diego than at Parris Island. The reverse is true for training failure (JFG9) discharges. The most likely explanation for these differences is that they reflect some differential

Table 4

Comparison of San Diego MCRD and Parris Island MCRD Attrition Data
for January and April of 1978

Month by MCRD Location	N	Age	Education	AFQT	Total Days at MCRD	JFC 1 Discharges	JFG 9 Discharges
<u>January</u>							
San Diego	213	18.73	11.16	55.71	50.74	35%	13%
Parris Island	303	19.12	11.21	50.34	55.88	14.5%	35%
<u>April</u>							
San Diego	260	19.08	11.27	54.55	54.65	47%	15%
Parris Island	255	19.15	11.24	50.73	53.90	27%	31%

use of the separation codes by the two depots.

CASE ANALYSES OF PSYCHOLOGICAL/BEHAVIORAL DISCHARGES

The principal audience for a psychological intervention on stress coping skills is the population of recruits who attrite for psychological reasons. The case analyses were conducted to more fully understand the attributes of this group and to provide information that might guide us in constructing the experimental intervention and selecting its timing.

The majority (58.0%) of psychological/behavioral attrition occurs prior to Phase 2 of training. For our sample (N=205) of attriters, frequencies of separation across training phases were distributed as follows: 13 (6.3%) during processing, 106 (51.7%) during Phase 1, 61 (29.8%) during Phase 2, and 25 (12.2%) during Phase 3. Since a sizeable proportion of attrition for psychological reasons occurs during the initial stages of training, an optimal time for an intervention may be during the processing period.

It might be thought that those recruits who do attrite for psychological reasons could be identified as high risk cases as a function of their movement in and out of organizational units such as when changing platoons or being sent to correctional custody. However, it was found that 62.9% of the attriters did not change platoons at all and another 27.8% changed platoons only once. Similarly, 66.8% of our sample of 205 psychological/behavioral attriters spent no time in correctional custody (CCP) and 25.4% were in CCP only once. Therefore, the psychological/behavioral attriters cannot be identified or anticipated on the basis of the occurrence of platoon changes or having been sent to CCP.

Demographic Factors

When the sample is partitioned on education level (high school graduates versus non-graduates), it is found that 62.9% of the sample are non-high school

graduates. This can be compared with the fact that non-graduates constitute 42.0% of the yearly accessions and 55.0% of the yearly attrition. Put another way, high school graduates represent 58.0% of the yearly accessions, 45% of the yearly attrition, and 37.1% of the psychological/behavioral attrition in our sample. However, the case analysis study period concerned the months of January to July and the number of high school graduates tends to be lower during these months.

The racial distribution in our sample closely matches the distribution according to race for total accessions and total attrition. These data are contained in Table 5. Compared to the percentage of total attrition, there are no differences in psychological/behavioral attrition as distributed according to race. However, it can be seen that Caucasians account for 6.3% more of the psychological/behavioral attrition sample than is their proportion of the total accessions, while those categorized as "other" (neither Black nor Caucasian) constitute 6.3% less than their proportion. There are no significant differences for race or age, in the percentage of recruits who change platoons, or in ASVAB scores. In parallel to the overall population, Caucasians do have higher AFQT scores, but for the case analysis sample, significant differences ($p < .02$) were found for educational level with the Black group having the highest mean.

Case Evaluation Remarks

The tabulation of command evaluation remarks entered in the case file of the psychological/behavioral attriters is presented in Table 6. Since these are non-exclusive categories, the tallies sum to more than 100%. It can be seen that the most common evaluative remarks are, "lacks self-discipline," "immature," and "unmotivated" - each of these descriptors was applied to over

Table 5

Frequencies and Percentages of Psychological/Behavioral Attrition
According to Race and Comparisons with Year's Accessions and Attrition

Race	Psychological/Behavioral Attrition Sample N	Percentage of Sample	Percentage of Year Accessions	Percentage of Year Attrition
Caucasian	155	75.6	69.3	73.5
Black	37	18.0	13.1	18.9
Other	13	6.4	12.6	7.6
Total	205	100.0	100.0 (N=24,480)	100.0 (N=2,492)

Table 6
Tabulation of Command Evaluation and Clinical Remarks for the
Case Sample of Psychological/Behavioral Attritions

Remark	Frequency	Percentage of Cases in Which Remark Noted
<u>Command</u>		
Unclean	30	14.6
Unstable	84	41.0
Lacks Self Discipline	167	81.5
Slow Learner	42	20.5
Immature	156	76.1
Suicidal	29	14.1
Disobedient	91	44.4
Unmotivated	170	82.9
Failed Disciplinary Standards	90	43.9
Defective Attitude	99	48.3
Awarded Non-Judicial Punishment	84	40.9
Failed Physical Fitness Test	63	30.7
<u>Clinical</u>		
Previous Psychological History	28	13.7
Family Instability	43	21.0
School Problems	28	13.7
Psychosomaticism	52	25.4
Suicidal Gestures/Ideation	50	24.4
Nervous Tension	28	13.7
Can't Take Yelling/Orders	12	5.9

NOTE: The number of cases = 205. The frequencies sum to more than this total and the percentages sum to more than 100.0 because more than one remark category was often used.

75% of the cases.

There were no striking findings in the tabulation of clinical evaluation remarks. The most frequent comments are "psychosomaticism" (25.4%), suicidal gestures/ideation (24.4%), and "family instability" (21.0%). Previous psychiatric history was noted in 13.7% of the cases.

Training Units - Battalion Effects

The frequencies and percentages of the psychological/behavioral attrition sample as a function of battalion recommending discharge are contained in Table 7 along with comparative percentages for total accessions and discharges. It can be seen that there are striking differences in the distribution across battalions. The Third Battalion accounts for 37.9% of the total accessions and 32.8% of the total attrition, but it accounts for 49.3% of the cases in the sample of psychological/behavioral attriters. This finding further suggests that the environment of training units may bear significantly on attrition. This became the principal hypothesis pursued in conjunction with the cohort testing.

COHORT TESTING

Cohort and Sample Representativeness

The representative nature of the October cohort and the test sample vis-à-vis yearly attrition can be seen from the tabulations in Table 8. The discharge rates for the October cohort (11.92%) and for the testing sample (11.72%) are closely comparable to that for the one year period (11.95%). Furthermore, the rates for medical/erroneous enlistment discharges and for psychological/behavioral discharges are also very similar. The October cohort is within 0.2 percentage points of the yearly rate for both discharge categories and the sample is within 0.4 and 0.3 percentage points for the respective categories.

Table 7

Psychological/Behavioral Case Sample Frequencies and Percentages
 According to Battalion Recommending Discharge with Comparisons
 to Percentage of Year's Accessions and Attrition

Battalion	Frequency of Cases in Sample	Percentage of Sample	Percentage of Year's Accessions	Percentage of Total Attrition
1	54	26.3	30.9	39.3
2	49	23.9	31.2	27.9
3	101	49.3	37.9	32.8
Total	204	99.5	100.0	100.0

NOTE: The Battalion for one case in the sample was unknown.

Table 8

Accessions and Discharges for the Test Sample,
Cohort, and Year Population

Group	Total Accessions	Total Discharges	Medical/ Erroneous Enlistment Discharges	Psychological/ Behavioral Discharges	Other Discharges
Year Population (May 1977 - April 1978)	24,480	2,925 (0.1195)	1,220 (0.0498)	1,255 (0.0513)	450 (0.0184)
Cohort (October 1978)	1,468	175 (0.1192)	76 (0.0518)	73 (0.0497)	26 (0.0177)
Test Sample (October 1978)	597	70 (0.1172)	32 (0.0536)	29 (0.0486)	9 (0.0151)

NOTE: The values in parentheses are the discharge rates for that category.

Therefore, the October cohort and the test sample can be considered to be representative of the yearly population with regard to attrition.

Demographic Factors and Attrition

A variety of demographic and background variables were examined for their association with whether a recruit graduated (N=513) or attrited (N=74). The analyses were performed as crosstabulations for categorical variables. Analyses of variance were performed for measurement level variables where graduated/attrited constituted the grouping factor. The set of variables examined consisted of age, education, race, hometown size, sibling order, parental marital status, parental caretaker(s), height, weight, and experience in contact sports.

There were no significant differences in age between graduates and attriters, but consistent with the archival analyses, the attriters were slightly older (0.28 years). While no significant differences were found for height, there were significant differences ($p < .006$) between graduates ($\bar{X} = 152.5$ pounds) and attriters ($\bar{X} = 160.3$ pounds) in weight at the time of processing. Participation in contact sports was not found to be significantly related to attrition.

No differences in attrition rate were associated with race, hometown size, or parents' marital status. However, the classification of the recruits' birth order as oldest (N=149), middle (N=309), or youngest (N=112) was significantly associated, $\chi^2 (2) = 9.88, p < .007$, with attrition. The attrition rates for these groups were 6.0%, 13.13%, and 18.8%, respectively. Parental caretaker was also found to be significantly associated with attrition. $\chi^2 (2) = 7.94, p < .02$, as those recruits raised by their fathers (N=23) had a comparatively high attrition rate (30.4%). Although the cell size here is small, this finding

is bolstered by differences in performance measures reported below. Those graduated recruits who were raised by their fathers tend to have slightly lower performance scores.

Educational background was initially partitioned according to six categories: college graduates (N=3), some college (N=72), high school graduate (N=277), vocational school graduate (N=13), high school equivalency test (N=41), and non-high school graduate (N=176). The uneven cell sizes did not permit useful crosstabulations with attrition, therefore a regrouping was done according to whether or not the recruit was a high school graduate, excluding the vocational school group (0% attrition) and the high school equivalence group (19.5%) attrition. The attrition rate for the high school graduates is 4.1% lower than for those not graduating high school, but the difference is not statistically significant. Thus, for our sample, which was found to be representative of the October cohort and yearly attrition patterns, educational level cannot be said to have had an effect on attrition.

Aptitude Measures and Attrition

There were no significant differences in AFQT score between recruits who graduated ($\bar{X} = 55.60$) and those who attrited ($\bar{X} = 54.26$). However, significant differences, $F(1, 585) = 14.05, p < .0002$, were obtained for ASVAB combat aptitude scores. Graduates scored higher ($\bar{X} = 99.59$) than did attriters ($\bar{X} = 90.49$). A smaller but also significant ($p < .02$) difference was found for ASVAB general information scores, as graduates ($\bar{X} = 9.80$) scored higher than did attriters ($\bar{X} = 8.95$). There were no significant differences between graduates ($\bar{X} = 102.44$) and attriters ($\bar{X} = 99.19$) on ASVAB general technical score.

Training Outcome

Recruit training outcomes were partitioned into a four category classification: graduated, medical/erroneous enlistment attrition, psychological/behavioral attrition, and other attrition. This was done to permit further differentiation among recruits according to the demographic and aptitude variables considered above. There were no significant associations of training outcome with hometown size, athletic history, or family structure, nor did the training outcome groups differ in ratings of quality of home life or school experiences. The physical and aptitude characteristics of the test sample are presented in Table 9 according to training outcome. Overall there is little that differentiates the attrition groupings, although these groupings clarify previous effects for weight and combat aptitude. It can be seen that the obtained effects for weight are not attributed to those receiving medical discharges and that the lower combat aptitude scores for attriters occur across each attrition type but are especially low for those classified as other than medical or psychological.

Demographic Factors and Performance

For those recruits who graduated, marksmanship, physical fitness, and military knowledge performance scores were obtained from standard forms in Regimental archives. Drill instructor ratings were performed immediately after graduation.

The demographic variables of hometown size, birth order, parents' marital status, caretaker, and contact sport history had no significant effects on any of the performance measures. Yet, despite the absence of significant group differences, the results have a characteristic worth noting. This is the fact that, across virtually all of the performance measures, the group

Table 9

Physical and Aptitude Characteristics of Recruits as a
Function of Training Outcome for the Cohort Sample

Training Outcome	N	Age	Weight	AFQT	ASVAB-CO	ASVAB-GI	ASVAB-GT
Graduated	513	18.68 (1.71)	152.50 (21.75)	55.60 (16.71)	99.59 (19.40)	9.80 (2.90)	102.44 (16.77)
Medical/Erroneous Enlistment Attrition	33	19.30 (2.53)	154.09 (22.74)	53.64 (15.95)	90.03 (21.66)	9.36 (2.79)	98.64 (17.30)
Psychological/ Behavioral Attrition	30	18.60 (2.19)	164.53 (29.59)	55.83 (16.93)	92.57 (18.01)	8.83 (2.40)	101.00 (14.32)
Other Attrition	11	18.91 (1.45)	167.18 (35.54)	51.82 (22.28)	86.18 (23.63)	8.00 (3.49)	95.91 (21.39)

NOTE: Figures in parentheses are standard deviations. The effects for weight are significant $F(3, 582) = 4.08, p < .007$, and are unrelated to height, as all groups have the same mean of 69 inches. The differences in ASVAB-CO (combat orientation) are significant, $F(3, 582) = 4.97, p < .002$.

means on the particular measure are very similar when any of these demographic factors are used as the grouping variable. For example, with regard to rifle range scores which have a total sample mean of 205.01 and standard deviation of 11.52, the largest deviation from the total sample mean for any level (group) of any of the above demographic factors is 2.1 points. The largest deviation across all factors occurs with regard to contact sport history and physical fitness test score, where a difference of one-third of the standard deviation separates the highest from the lowest group mean. Group means were often identical to the first decimal place on several test measures. To be sure, this pattern of similarity reflects the effects of training. But, in addition, the proximity of means found on these demographic factors calls attention to obtained differences in means found elsewhere on the same performance measures.

There were no significant differences for educational levels on rifle range, physical fitness, oral test, or written test scores. This is striking considering the latter two measures. On the written test, each educational level group scores within one-eighth of a standard deviation from the mean across groups. However, educational level effects did emerge in the drill instructor ratings, as significant differences were found across groups on ratings of intelligence ($p < .002$), motivation ($p < .01$), cooperation ($p < .04$), and overall performance ($p < .0001$). These effects are largely a function of the low scores of the non-high school groups relative to the other groups. However, while statistically significant, these differences are actually quite small - e.g., on overall performance, the non-high school group mean differs from the grand mean by 0.30 points (on a five-point scale) and by 0.66 points from the highest group mean (that for recruits having attended college).

There were no significant differences in drill instructor ratings as a function of race. Small but statistically significant differences did obtain for rifle range ($p < .001$), physical fitness ($p < .04$), and oral test ($p < .003$) scores. Caucasians performed better on the rifle and oral tests than did non-Caucasians, but the reverse was true for physical fitness. Again, it must be emphasized that these obtained differences are very small in absolute terms (e.g., on oral test, $\bar{X} = 96.54$ versus $\bar{X} = 95.04$ and $\bar{X} = 95.03$).

Aptitude and Performance

The aptitude measures (AFQT, ASVAB-CO, ASVAB-GI, and ASVAB-GT) were intercorrelated with the cluster of performance indices. The pattern of correlations is one of small magnitude coefficients. Of the 44 correlations computed, half are significant at $p < .01$ and half of these have magnitudes of $r = .20$ or higher. However, none are greater than $r = .27$ which is the coefficient for the relationship between ASVAB-CO and rifle marksmanship score. No aptitude measure correlates higher than .05 with physical fitness score. The average correlation with both oral and written test is .21, and with regard to drill instructor ratings the highest correlations occur for the ratings of intelligence (average $r = .20$). Thus, while aptitude test scores are significantly correlated with some performance indices, their magnitude is too small to be of predictive value.

Training Units and Attrition

Pursuing our findings from the system description and case analysis projects, the influence of training units was closely examined in the cohort testing. The recruits who were sampled fell into a total of 15 platoons. The attrition rate for each platoon was computed by tracking all discharges from

the October cohort (not just the testing sample). When a discharge occurred, the attrition was charged to the original unit at time of entry. The logic for this procedure is that most attrition occurs early in the training cycle and it seemed desirable to control for the possibility that "poor" recruits may be transferred to other units.

The distribution of attrition according to platoon units is striking. As reported above, the cohort attrition rate is 11.7%, but the range in attrition as a function of platoon is from 0% to 28.0%. While the recruit composition might be thought to vary in quality as platoons form (this was not the case for our sample, see analyses below), this variation in attrition rates pointed to the role of the social environment of the training unit as a major determinant of attrition. This hypothesis seemed even more plausible when it was found that the five platoons with the highest attrition rates were all in one company.

To conduct the analyses on training unit influences, an experimental grouping factor "ATTRITVAR" was created. This factor was defined as a three-level factor formed by aggregating platoons into low, medium, and high attrition groups according to a tertile division of the attrition rate distribution. The tertile groups had the following rates: low = 0% to 9%; medium = 10% to 13%; high = 14% to 28%. A crosstabulation of ATTRITVAR with training outcome for the test sample is presented in Table 10. It can be seen that the ratio of medical to psychological/behavioral attrition reverses from the low to the high ATTRITVAR group. This lends further support to the training unit hypothesis. It was further found by analyses of crosstabulations that despite these differences in attrition rate and discharge category there were no differences according to ATTRITVAR for instances of assignment to Physical Conditioning Platoon (PCP) and Correctional Custody Platoon (CCP). Thus, attrition is occurring in the high attrition groups without the use of correctional alternatives.

Table 10

Crosstabulation of Training Outcomes as a Function
of ATTRITVAR Groupings

Training Outcome	<u>ATTRITVAR</u>			Total
	Low	Medium	High	
Graduated	36.33 (186)	28.91 (148)	34.77 (178)	100.00 (512)
Medical/Erroneous Enlistment Attrition	27.27 (9)	30.30 (10)	42.42 (14)	100.00 (33)
Psychological/Behavioral Attrition	13.33 (4)	30.00 (9)	56.67 (17)	100.00 (30)
Other Attrition	9.09 (1)	27.27 (3)	63.64 (7)	100.00 (11)

NOTE: The numbers in parentheses are the cell frequencies. The test of association is significant, $\chi^2 (6) = 13.26, p < .04$.

In order to attribute attrition to training unit environments, we must first account for the possible influence of initial composition variables. To examine whether demographic and/or aptitude variables were responsible for the differences in platoon attrition, crosstabulations and ANOVA's were performed on the ATTRITVAR groupings. No statistically significant differences were found in the ANOVA's for age, height, weight, AFQT, ASVAB-GI, ASVAB-CO, or ASVAB-GT. In this regard, it should be recalled that with the large sample size very small differences in means were resulting in statistically significant F ratios. Thus, the ATTRITVAR groups are to be considered very comparable on these dimensions.

No statistically significant χ^2 effects resulted from the crosstabulation of ATTRITVAR with hometown size, parents' marital status, caretaker, race, educational level, or experience in contact sports. A marginally significant effect, $\chi^2 (4) = 9.40, p = .052$, was obtained for birth order. As may be recalled, this factor was previously found to be related to attrition, as youngest children had higher attrition rates. Here, there is a larger number ($N=52$) of youngest born in the high ATTRITVAR groups than in the low and middle ATTRITVAR groups. However, since the number is only 13 more than the number of youngest born in the low ATTRITVAR group, the difference in birth order distribution cannot possibly account for the difference in attrition rates associated with platoons.

From these analyses, we can conclude that the variation in platoon attrition rate is not a function of initial composition factors. No statistically significant differences were found for the ATTRITVAR groups on any aptitude or demographic factor. Given the sample size and the fact that it was previously found that mean differences of small magnitudes were statistically significant, any beta error in these analyses can be of no practical importance.

ATTRITVAR AND PERFORMANCE

According to one theory, attrition results from the striving for high performance standards. According to this view, reduction in attrition can be achieved only at the expense of lowered quality in performance. Upon finding that training units vary widely in attrition rate and that this variation cannot be accounted for on the basis of initial composition at forming, the salient question is what is it about the training unit that accounts for significant differences in attrition? An obvious hypothesis is that the differences are a result of the performance standards of unit leaders, whereby low achieving recruits are excluded (by some as yet to be specified process) from high achieving units.

The first step in the analysis was to examine performance on rifle, PFT, oral test, and written test as a function of ATTRITVAR groupings. These data are presented in Table 11. The performance standards hypothesis would predict that the performance means would be a linear function of ATTRITVAR such that increases in ATTRITVAR level would be associated with increases in performance. The results indicate that while this is the case for PFT score, $F(2, 435) = 11.60$, $p < .0001$, it is not true for the other performance measures. There are no significant group differences in marksmanship (where the high attrition group has the lowest mean). There are statistically significant differences on oral test ($p < .0002$) and written test ($p < .0001$). However, the high attrition group did poorest on the oral test and was intermediate on the written test. In fact, the middle attrition group mean on written test is significantly higher ($p < .001$) than that for the high attrition group.

Presented in Table 12 are the performance rankings of the ATTRITVAR groups across the four performance measures. From these rankings it is clear that there is no simple relationship between attrition and performance. That is,

Table 11

Performance Means as a Function of ATTRITVAR

ATTRITVAR	Marksmanship	Physical Fitness	Oral Test	Written Test
Low	205.21 (12.31)	220.04 (32.55)	96.41 (4.03)	84.76 (9.99)
Medium	206.07 (11.41)	228.84 (36.69)	96.77 (4.59)	94.81 (4.34)
High	203.65 (10.55)	238.32 (30.97)	95.10 (4.32)	89.85 (7.57)

NOTE: The ANOVA tests of group means are significant for physical fitness ($p < .0001$), oral test ($p < .002$), and written test ($p < .001$). The standard deviations are given in parentheses.

Table 12

Performance Rankings Based on ATTRITVAR

ATTRITVAR	Marksmanship Score	Physical Fitness Test	Oral Test	Written Test	No. Missing Rifle Test	No. Missing PFT
Low	2	3	2	3	9	4
Medium	1	2	1	1	9	8
High	3	1	3	2	14	13

NOTE: The "No. Missing" column refers to the number of recruits who did not have performance scores on the particular test involved for that ATTRITVAR group.

there is no empirical support for the belief or hypothesis that training units have high attrition rates because of their high performance standards.

Furthermore, it can be seen that on the one measure in which the high attrition group did have highest performance (PFT scores) the results are ambiguous in view of the finding that the high ATTRITVAR group had a higher number of recruits (13) who missed the PFT test. This is more than three times the number who did so in the low ATTRITVAR group. Similarly, the high ATTRITVAR group had the highest number of recruits missing performance on the rifle range. One might speculate that recruits who are expected to do poorly are being exempted from the performance tests so as not to depress the platoon scores.

The findings concerning performance on the ATTRITVAR groupings are representative of results at the individual platoon level. Performance rankings for platoons are contained in Table 13, where it can be seen that no high attrition platoon has a superior ranking across performance measures. For example, while platoon "O" (attrition rate = .28) ranks second in PFT, it is eleventh on marksmanship, thirteenth on oral test, and fourteenth on written test. Surely, one cannot conclude that this platoon's high attrition rate results from a process leading to the rejection of uniformly poor performers. Furthermore, such a process is not particularly associated with PFT since the highest ranking platoon on PFT is platoon "E" which is the low ATTRITVAR group.

Given these findings concerning the differences in attrition attributable to training units, the question remains as to what is it about the training unit environment that results in high attrition without a corresponding increase in performance and without differences in initial composition. One possibility that appears in our data is that unit size has a bearing on attrition. The low ATTRITVAR platoons, as can be seen in Table 13, are on the average larger in size than the platoons in the other ATTRITVAR groupings.

Table 13

Performance Rankings and Unit Size of ATTRITVAR Platoons
Ordered According to Attrition Rate

ATTRITVAR	Attrition Rate	Rifle Rank	PFT Rank	Oral Test Rank	Written Test Rank	# in Platoon	
	<u>Platoon</u>						
Low	A	.00	7.5	9	3	10	40
	B	.04	7.5	13	2	11	80
	C	.06	4	15	11	15	90
	D	.09	9	11	5	13	90
	E	.09	8	1	4	7	80
Medium	F	.10	2	10	15	6	50
	G	.11	1	14	1	3	90
	H	.12	10	4	10	8	58
	I	.12	6	8	7	1	40
	J		13	3	6	9	40
High	K	.14	5	5	14	12	45
	L	.15	12	7	8	4	66
	M	.15	14	6	12	5	65
	N	.18	3	12	9	2	50
	O	.28	11	2	13	14	45

However, this explanation is limited in that platoon "A" (attrition rate = .00) is a very small platoon and that while the average size of the high ATTRITVAR platoons ($X = 54.4$) is considerably smaller than that for the low ATTRITVAR platoons ($X = 76.6$), the medium ATTRITVAR platoons ($X = 55.6$) are also small. Thus although the middle and high ATTRITVAR platoons are of comparable size, their mean attrition rates still differ -- viz. 11% and 18% respectively.

A potential source of information regarding the platoon environment might be the drill instructor ratings of recruits according to the ATTRITVAR groupings. An analysis of variance performed on the group means is significant ($p < .05$) for each of the drill instructor ratings. For each rating dimension (motivation, cooperation, intelligence, and overall performance) the mean for the low ATTRITVAR group is higher than the means for the middle and high ATTRITVAR groups. The latter two groups are similar across dimensions. Although the noted differences are statistically significant, the magnitudes are of the order of 0.2 units. The low ATTRITVAR means are approximately 3.45 for motivation, intelligence, and overall performance and is 3.65 for cooperation. Recalling that the rating scale was anchored at 3.0 for the average recruit, the drill instructors of low attrition platoons tend to rate their recruits higher above the "average recruit" than do drill instructors of the middle and high attrition units. Given the performance data, this difference in perception cannot be thought to be based on differences in achievement on the standard criteria. Examination of the rating data at the platoon level does not provide any further clarification of these effects.

Discussion

Three interrelated studies were conducted regarding attrition and performance among Marine Corps recruits. The results of the investigations direct attention to the relationship between training unit influences and attrition. Findings concerning training unit effects emerged from analyses of organizational-

level factors and systematic tracking of recruits through the training cycle of a cohort of recruits.

The results indicate that training unit environments are associated with considerable variation in attrition which is neither attributable to differences in performance achievements among units nor to differences in the initial composition of the units. The findings were obtained with a cohort and test sample which were found to be representative of yearly attrition in terms of total rate and of rates across discharge categories. While the overall attrition rate was approximately 12%, platoons were found to vary in attrition from 0% to 28%. The construction of the ATTRITVAR experimental factor enabled us to examine the "performance standards" and "initial composition" hypotheses concerning why attrition occurs. The fact that these common explanations for attrition are not supported points to the environments of training units as primary sources of attrition.

The present findings are not informative about precisely which dimensions and processes of training units are linked with attrition. Preliminary analyses were conducted with regard to unit size and drill instructor perceptions of recruits. However, the similarity of the middle attrition and high attrition platoons on these factors weighs against their explanatory value in accounting for attrition.

Attrition occurs as a function of the interrelationship of a number of factors in the training process. Given the transactional perspective of stress that guides our research, we assume that the relationships involved are dynamic ones. The present report grows out of our efforts to identify relevant variables in the causal process. The training unit environment has emerged as a key factor. Subsequent reports will deal with changes in cognitive, affective, and personality factors that occur over the training cycle as associated with ATTRITVAR. These changes may provide important clues about the nature of training unit environments.

Concerning the topic of relevant variables, demographic and aptitude measures seem to have less of an impact on attrition than might be expected. These measures had only slight relationships to performance on the Marine Corps' standard measures. When statistically significant effects involving them were obtained, they were usually not of practical significance. The two variables which were found to have the highest magnitude of differences associated with them were birth order and ASVAB combat aptitude.

Associated with the finding that demographic and conventional aptitude measures have little influence on attrition and performance is the fact that they have even less predictive value. This can be seen to occur for several reasons. First, on an a priori basis with regard to attrition, the fact that the base rate for attrition during training is relatively low (12%) thereby limits one's ability to predict its occurrence in general, but particularly with tests administered prior to training. To be of practical value, a test or test battery would have to have a predictive accuracy of greater than 90%, given that it would take that much to improve on the base rates (88% success) plus some cost involved in administration. Secondly, aptitude test scores are bound to have low correlations with attrition and performance because recruits have already been selected on the basis of aptitude. Those who fall in the low range on the aptitude dimension have been excluded by selection, thus eliminating people who have a high risk of failing. The fact that such a high percentage of recruits succeed suggests that the selection process does what it is intended to do. A third point is that the training process is effective. Despite differences on demographic factors, recruits become highly comparable in their performance. In addition to conveying that demographic factors do not exert influence on performance, the similarity of performance scores means indicates the effectiveness of training. Given these conditions, attempts to predict attrition from demographic and aptitude indices by means

of multiple regression analyses, as has been done in previous research, can be seen as exercises in futility.

The present project has differed from previous research by virtue of its attention to the objective characteristics of the organizational environment and its approach to recruit training in terms of system processes. The stress framework that guides our research emphasizes the role of the environmental context of behavior. While the findings contained in the present report might seem to bear little resemblance to traditional stress research, our work can be seen as a first step toward the identification of relevant variables associated with attrition as a stress-related phenomena.

Stress, in our view, is a condition resulting from an imbalance between environmental demands and resources (personal and social) for coping. Manifestations of stress occur not just when demands are high but when resources for coping are not commensurate with the demands. Marine Corps recruit training is a process involving intense environmental demands - as it should be and will continue to be. However, the training process can be viewed in terms of 1) exposure to military demands involved, and 2) development of recruits' capability for effective performance under stressful conditions. Our findings on training unit differences in attrition suggest that some training units may do significantly better at developing stress-coping proficiencies than do others.

One hypothesis growing out of our results is that the organizational climates of training units are of central importance. The differential attrition rates may be a direct function of the particular way training is conducted by the drill instructor team and also by the command personnel at the series, company, and even battalion level. We are currently pursuing this hypothesis in the "comparative analysis" of the April 1979 cohort which was mentioned earlier. The training personnel involved in the April 1979 cohort have been designated according to their ATTRITVAR membership in the

October cohort. Thus, even though the particular drill instructor teams do not necessarily repeat, the new teams can be composed of drill instructors having the same previous ATTRITVAR code. This is partly due to the fact that the ATTRITVAR groupings were not independent of battalions. Two battalions were represented in the test sample, one having a 13.1% attrition rate and the other having a 7.4% attrition rate. By studying the April 1979 cohort we are attempting to replicate the findings obtained for October and thereby gauge how robust are the training unit effects, as well as determine their association to leadership factors.

For the reasons given above, we do not find it surprising that pre-training test scores of recruits are relatively low in predictive value. Our findings do point to organizational factors as important in both recruit performance and attrition. Further research might show that joint study of psychometric and organizational factors might be of predictive utility. Perhaps the clearest implication of the findings reported in this report is the need for a better understanding of those organizational factors that impinge on and influence recruits. With an improved understanding of these factors may come clues to organizational changes that would increase performance and decrease attrition.

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