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CRITERION DIMENSIONS OF ADAPTABILITY TO PILOT TRAINING

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CRITERION DIMENSIONS OF ADAPTABILITY TO PILOT TRAINING

A factor analysis of 22 variables obtained for aviation cadets during pilot training revealed five interpretable factors: Peer Respect, Peer Acceptance, Military Conformity, Academic Achievement, and Flying Achievement. Several of these could be matched with factors extracted in an earlier study, indicating relatively stable behavior dimensions. Hypotheses derived from the construct of adaptability were supported by comparison of factor scores for groups of subjects classified according to training outcome as pass, ability fail, motivational fail, or emotional fail. This was considered evidence for the validity of the construct.

In the attempt to define criterion variables for validating tests in an Air Force pilot selection research program (9), a complex construct called *adaptability* has been postulated to account for certain behavior observed during and subsequent to training. The term *adaptability* refers to those characteristics of an individual which are related primarily to motivational and emotional factors and which contribute to the adequacy of his continued adjustment to military flying. In this sense, it must be distinguished from ability or skill factors which also contribute to the total behavioral variance.

Previous research and theoretic considerations (8, 9) have indicated that failure in pilot training may be attributed predominantly to lack of ability or adaptability. The criterion behavior considered relevant to the adaptability construct in the training situation includes assessments of those motivational or emotional factors thought to be related to training outcome, with the characterization of such outcomes based on an inference from a number of specific variables.

A factor analysis by Kubala(5) of criterion variables collected during pilot training on subjects who successfully completed training revealed a number of orthogonal factors. It was felt that these factors could be related to failures in training when the latter were grouped as being due principally to ability, motivational, or emotional causes. Since no independent derivation of these categories was available, at the time, for training failures, the differences between the

factor scores of these groups could not be analyzed.

The present investigation was designed to avoid this limitation. Ignoring the contributions of situational factors for which no adequate measuring devices were available, and including information on both pass and fail subjects, it was hoped that two questions about training level data could be answered.

First, could the factor structure of training level variables found in the earlier study be duplicated using training level data collected on a new and broader sample at a different training location two years subsequent to the first? Insofar as the variables in the new sample are similar to the original, this question would be answered by a comparison of factor structures. If answered in the affirmative, then stable behavioral dimensions, transcending sample and superficial situational changes, would be demonstrated.

Second, and more important, could the relationships between the factors and independently derived classifications of training outcome (pass, ability fail, motivational fail, emotional fail) be predicted by means of measures representing the adaptability construct? If this could be done, the validity of the construct (3, 4) would be supported and some dimensions of adaptability identified, which could provide criteria for validation of psychologic tests.

PROCEDURE

Sample

The 792 subjects forming the basic sample were aviation cadets in Classes 54-M to 56-E

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who entered primary flight training at Graham A Base, Marianna, Fla., between July 1953 and November 1954. All were between the ages of 19 and 28 and had already been preselected by a rigorous physical examination and a battery of aptitude tests. From these, 377 subjects having relatively complete data on all the variables considered in the study were selected for intensive analysis. Subsequent analyses, based on findings with the smaller group, utilized the total sample.

Variables

A total of 23 variables, representing information collected prior to, during, or at the end of flight training, were studied. These may be grouped as:

1. Composite scores resulting from relatively objective measuring devices or objectively verifiable characteristics of the subjects.

2. Evaluations of the subjects by (a) peers, (b) superiors, or (c) experts (13).

Most of the variables represented data available by the end of the primary phase of flight training (approximately the first six months). However, data for two variables, Pass-Fail in flight training and Faculty Board Classification, were not available in their entirety until the completion of the basic phase of training (approximately the last six months).

Because they were used to evaluate the validity of the criterion dimensions and the adaptability construct, the Faculty Board Classifications (FBC) may be considered the most important single variable in the study. Consequently, a detailed description is warranted.

Should a student in flying training be considered for elimination, he would meet a board composed of officers representing the faculty of the flying school to which he has been assigned. This *Faculty Board* interviews the student and his instructors, and considers all available evidence relevant to the student's status in the training program. After deliberation, the board decides whether the student should be eliminated or returned to training, recommends for or against training in some other aircrew specialty, and determines the official cause of failure. The verbatim transcript of the deliberations, together with supporting documents, constitutes the faculty board proceedings.

It has been found (2) that these proceedings contain sufficient information to permit reliable classification of each failure as being due to ability, motivational, or emotional deficiencies.[1] Such classifications were made for failures in the present study independently of all the other variables investigated.

A description of the procedure used to derive the Faculty Board Classifications is presented in table I. Descriptions of the other variables are contained in table II.

Treatment of data

Intercorrelations of all variables except Faculty Board Classifications were factored and rotated to approximate simple structure by an electronic computer programed for the Thurstone centroid method of factoring (10) and the quartimax method of rotation (6). The factoring program permitted iteration of the centroid solution in order to stabilize the communality estimates. Adjustments of the quartimax rotations were made graphically, without knowledge of the identity of the variables, to obtain better orthogonal simple structure.

After interpretation of the factors and computation of factor scores, subjects were grouped as either pass or, on the basis of their Faculty Board Classification, as ability, motivational, or emotional failures. Hypotheses concerning differences in factor scores between the different groups were examined for all subjects by one-way classification analysis of variance. However, since the faculty boards convened during primary training might have had access to some of the information represented in the variables composing the factor scores, complete independence of the Faculty Board Classification and the other variables was assured by repeating the analysis using only pass subjects and eliminees from the later, basic training phase.

RESULTS

The findings are presented in two parts. The first covers the results of the factor analysis, interpretation of the factors, and comparison of the factors with those extracted in the earlier study (5). The second, describes the

[1] A fourth category of elimination, Administrative, did not occur frequently enough to justify its inclusion in analyses involving the FBC. Subjects for whom no faculty boards were available were also omitted.

evaluation of the hypotheses derived from consideration of the factor structure and the adaptability construct.

Factor analysis

Eight factors were extracted from the intercorrelations of the 22 variables. Nineteen iterations were required to stabilize the communality estimates to meet an arbitrary criterion for a change of less than .005 in the estimates for each variable. At this point the largest value in the residual correlation matrix was .04.

The factor loadings resulting from graphic adjustment of the quartimax solution are presented in table III. Italicized loadings indicate those variables which were combined to estimate a factor score. Tables giving the matrix of intercorrelations, the original centroid loadings, and the quartimax loadings are presented in the appendix.

Factor I. The 12 Military Aptitude Ratings (MAR) and Buddy Ratings (BR) had their heaviest loadings on this factor with 7 having

loadings greater than .50. Examination of the definitions given in table II for the most heavily saturated variables — MARs of Judgment, Leadership, and Growth-Potential and BRs of General Officer Aptitude, Adjustment, Combat Stress Tolerance, and Bailout — suggested that the factor reflected a respectful attitude on the part of peers toward those men endowed with these attributes. The fact that age had a relatively large positive loading on this factor agreed with the interpretation since older men were probably perceived as exhibiting superior judgment, leadership, and so on. Isolation of another peer factor independent of this one, gave further support to the interpretation. Consequently, the name given the present factor was *Peer Respect.*

In the earlier factor analysis, a similar factor was defined by Military Aptitude Ratings based upon a rating form (1) different from that used in the present analysis. Again age had an appreciable positive loading on the factor. Therefore, in spite of the difference in rating

TABLE I

Faculty Board Classification system

Failure category	Method of classification*
AE-Ability	Students who are apparently well motivated to complete training, with little or no evidence of fear or apprehension of flying, and are clearly eliminated because of inability to meet flying or academic standards.
ME-Motivational	Students clearly evidencing a lack of motivation to complete training although apparently possessing adequate ability and indicating little or no fear or apprehension of flying. Most frequently includes (1) repeated violators of training rules and (2) self-initiated elimination indicating lack of motivation.
EE-Emotional	Students clearly evidencing fear or apprehension of flying or exhibiting disabling personality inadequacies. Most frequently includes (1) self-initiated eliminations because of "fear of flying," (2) self-initiated eliminations where flight surgeon has indicated failure to be due to disabling personality inadequacies, and (3) other eliminations where evidence indicates real cause to be fear or apprehension of flying.
Ad.E-Administrative	Students receiving hardship or compassionate discharge or eliminated for physical causes where motivation, ability, and emotional status appear adequate.

*These descriptions are condensations of those actually used by the raters (2).

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TABLE II
Description of variables

Objective

Age: Age on start of pilot training.

Pilot Stanine: A score representing an estimate of a subject's aptitude for flying derived from a battery of paper-and-pencil and psychomotor tests. Scores presented on a stanine scale: high score = much aptitude.

Officer Quality (OQ) Stanine: A score representing an estimate of a subject's officerlike qualities derived from the same battery of tests as the Pilot Stanine. Sometimes interpreted as a measure of intelligence. Scores presented on a stanine scale: high score = much officerlike quality.

Pass-Fail: Pass cases successfully completed the U. S. Air Force pilot training program; fail cases did not. Passes score as 1, fails as 0.

Academic Average: Represents a subject's relative standing in his class in academic coursework at time of graduation or elimination from primary training. Scores presented on a stanine scale: high score = good achievement.

Demerits: Based on the total number of demerits awarded during primary flight training, it reflects the student's relative standing with respect to classmates at time of graduation or elimination from primary flight training. Scores presented on a stanine scale: high score = few demerits.

Solo Time: Indicates the total number of hours flown solo during the first 20 hours of primary training. Scores presented on a stanine scale: high score = much solo time.

Peer Ratings

Buddy Ratings (BR): At the end of the fourth week of training each trainee is asked to nominate approximately 20 percent of the men in his squad as being best and 20 percent as being worst on 7 traits. The algebraic sum (each high nomination scores +1, each low as −1) of each man's nominations by his squadmates is determined. Sums are converted by squad to a stanine scale: high score = many high nominations. The trait descriptions for the high end of the scale are:
1. *Like-Dislike:* Whom do you like the most?
2. *Officer Aptitude:* Who will make the best Air Force Officer? A good Air Force officer is one under whom you would take pride in serving, and whom you trust to make decisions which would affect your assignment, safety, and well-being.
3. *Adjustment:* Who are the best adjusted? (That is, the men who, to the greatest degree, handle their personal problems well, seem basically happy, get along well with others, and show the fewest signs of excessive worry and anxiety.)
4. *Combat Stress Tolerance:* Who are the men least likely to "crack up" under the emotional strain of combat? Imagine that your squad is serving in a fighter-bomber squadron engaged in combat over enemy territory. Make your nominations in terms of this situation.
5. *Bailout:* Think of the following situation: If you had to bail-out over enemy territory, which members of your squad would you select to lead the group back to safety?
6. *Team Cooperativeness:* In selecting a team for some sport, imagine all men in your squad have exactly the same ability. Your selection should be based on the tendency of each man to cooperate with other team members, to work with the team as a unit, and to subordinate himself to the goals and the operation of the team as a whole. You want men on your team who could do this.
7. *Familiarity:* Whom do you know best?

Military Aptitude Ratings (MAR): These ratings are obtained at the end of 6, 12, 18, and 24 weeks of training. The nominating system is used and scores are derived in a manner similar to the Buddy Rating: high stanine score = many high nominations. Scores for the first three traits listed below are those from the first rating at the end of 6 weeks. The last score, Cooperation, is an average of all available ratings on this trait.
1. *Judgment:* The ability to grasp a situation, think clearly, and develop correct and logical conclusions.
2. *Leadership:* The ability to organize and obtain the cooperation of others and to direct their efforts effectively.
3. *Growth Potential:* The capacity to handle jobs of increased scope and greater responsibility. Includes such qualities as capacity to learn rapidly, personality, self-improvement efforts, special abilities, training, and record of accomplishments.
4. *Cooperation:* The ability and willingness to work in harmony for and with others.

Superior Ratings

Instructor Rating: Officer instructors of the Tactical Department are requested to rate each man in squads under his supervision on an over-all basis as: 4 — Outstanding, 3 — Satisfactory, 2 — Questionable, or 1 — Unsatisfactory.

Expert Ratings

Military Aptitude Rating — Tactical Officer: The tactical officer in charge of military training is requested to rank the top and bottom 25 percent of each squad on over-all officer potential. These are obtained at the same time, but independently of, the peer Military Aptitude Ratings and supposedly take into account the same four traits. The sum of all available tactical officer ratings are converted to a stanine scale: high score = good rating.

Sum C score: Grade slips for the first ten flights of primary pilot training are reviewed and all comments by the instructor critical of the student's performance are categorized. The sum of these criticisms is the score: high score = many criticisms.

Medical Rating: A psychologist evaluated a summary of each subject's medical history during primary training. Excessive symptomatology was considered indicative of possible psychosomatic reactions to training. Ratings run from 1 (good medical history) to 5 (very poor medical history).

TABLE III

*Rotated factor loadings and communalities**

Variables	Factor								h²
	I	II	III	IV	V	VI	VII	VIII	
1. Age	31	-12	-08	05	-06	-35	-10	16	28
2. Pilot Stanine	17	-16	-07	39	38	-19	-01	-04	40
3. OQ Stanine	10	-04	-08	60	04	03	14	08	41
4. Pass-Fail	17	01	13	24	42	44	-02	-02	48
5. Academic Average	13	02	11	87	06	02	-04	01	79
6. Demerits	13	00	50	19	-04	03	-01	02	30
7. Instructor Rating	21	09	46	12	02	12	-11	-06	31
8. Medical Rating	-10	-26	-14	-17	02	-11	10	22	20
9. MAR Judgment	88	-11	14	10	05	-06	15	-08	86
10. MAR Leadership	87	-15	11	00	08	01	15	02	82
11. MAR Growth Potential	85	02	02	-09	03	-01	20	-07	78
12. MAR Cooperation	66	34	37	01	-01	-03	19	-04	73
13. MAR Tactical Department	62	-03	57	08	06	02	11	00	74
14. BR Like-Dislike	78	37	06	-09	-08	05	-01	13	78
15. BR Officer Aptitude	89	-08	14	01	-04	-03	-02	-01	82
16. BR Adjustment	83	06	02	00	05	03	-21	07	75
17. BR Combat Stress Tolerance	83	-10	-01	-01	11	-03	-37	04	85
18. BR Bailout	89	-12	03	02	01	02	-18	03	84
19. BR Team Acceptance	74	36	10	-04	-13	08	01	00	71
20. BR Familiarity	38	-11	-04	07	00	03	-11	57	50
21. Solo time	14	05	02	05	59	08	00	11	39
22. Sum C score	-24	06	-04	-12	-59	00	02	03	43

*Decimal points have been omitted. Loadings in bold face type are for variables used to compute factor scores.

forms, the evidence seemed sufficient to conclude that a similar factor had been identified in two independent studies.

Factor II. Variables with the highest positive loadings on this factor were MAR Cooperation, BR Like-Dislike, and BR Team Acceptance. The definitions of these variables given in table II suggested an orientation toward the group and an interest in working in harmony with others. This implied a reciprocal acceptance by peers.

The negative loading of Medical Rating fitted this interpretation. It is logical, in the context of the pilot training program, that men with fewer medical complaints would be perceived as being more acceptable on a team, and more likeable and cooperative.

The impression of general acceptability, or likability, as an associate, inherent in the principal defining variables of this factor, suggested that this represented a secondary dimension of peer evaluation independent of the more clearly defined Peer Respect Factor. Therefore, it was named the *Peer Acceptance Factor.*

Relative to the earlier analysis, the factor probably was confounded in the peer factor extracted in that investigation.

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Factor III. The defining variables for this factor were Demerits, Instructor Rating, NAR Tactical Department, and NAR Cooperation. Inasmuch as deme·ts were awarded by a man's tactical officer and a man with many demerits was likely to be perceived by peers and instructors as less cooperative, the grouping of variables was understandable. It is plausible to assume that a man who was resistant to the demands of the training situation would have a low score on this factor. Therefore, it was called the *Military Conformity Factor*.

The earlier analysis revealed a similar factor with saturations on Demerits, Instructor Ratings, NAR Tactical Department, and an evaluation by a psychologist of subjects' motivation.

Factor IV. Heavy loadings on Academic Average and Officer-Quality Stanine supported this factor as representing academic achievement. The next two heaviest loadings, those of Pilot Stanine and Pass-Fail, confirmed the interpretation. The factor was called *Academic Achievement* and considered to represent an ability dimension.

In the earlier analysis an almost identical factor was defined by Officer Quality Stanine, Pilot Stanine, and Academic Average.

Factor V. The only variables having sizeable loadings on this factor were Sum C, Solo Time, Pilot Stanine, and Pass-Fail. The obvious conclusion was that this represented the ability dimension of *Flying Achievement*.

A factor identified by variables similar to the present ones was extracted in the earlier analysis.

Factor VI. Only two appreciable loadings were found on this factor—those of Age and Pass-Fail. Since Age also had a large loading on the Peer Respect Factor and Pass-Fail loaded on both the Flying Achievement and Academic Achievement Factors, this factor was interpreted as a minor dimension reflecting only the tendency for older men to fail the program more frequently than younger trainees. No name was given to the factor.

Factor VII. This was interpreted as an instrumental factor resulting from the presence in the analysis of two very similar, but independently obtained, sets of ratings. The interpretation followed from the finding that all the MARs had positive loadings, all but one of

the Buddy Ratings had negative loadings, and that these two sets of ratings generally had higher loadings on the factor than did the other variables.

Factor VIII. Medical Rating and BR Familiarity were the only variables with loadings greater than .20. Although any interpretation of this factor is extremely tenuous, it might possibly represent an element of notoriety in the perception of certain men by their peers, inasmuch as those men who have the worst medical histories may have become more familiar to their classmates as a result of their frequent visits to the dispensary and their numerous complaints. This factor also was not named.

Evaluation of the adaptability construct

Following the factor analysis, scores for the five interpretable factors were computed for all subjects in the total sample having the required data. Any variable to be used to estimate a factor score and not already in stanine form was rescaled to have a mean and standard deviation approximately equal to those of the stanine scale. Factor scores were then obtained by algebraic combination of the unweighted scores (12) on the appropriate variables.

Consideration of the adaptability construct and the defining variables for each factor score permitted the formulation of four specific hypotheses about the largest and smallest means within each factor for subjects categorized as pass, or ability, motivational, or emotional fail. The hypotheses, with their rationales, were:

1. Since subjects with the greatest ability and adaptability should be among those who completed the training program, the pass group should have the largest mean of any group on all factors.

2. Since the Flying Achievement and Academic Achievement Factors were considered ability dimensions, and since ability failures are expected to reflect defective ability primarily, the ability fail group should have the smallest mean of any group on these two factors.

3. Previous research (2) indicated that men classified as emotional failures (poor adaptability) tended to be eliminated relatively early in the training program. Such men should be very evident to peers in the close associations of the competitive pilot training environment soon after entry. Since both sets of peer ratings used in the present study were obtained within the first six weeks of training,

it was hypothesized that the emotional fail group should have the smallest means of any group on the Peer Respect and Peer Acceptance Factors.

4. Unlike the emotional failures, men who have been classified as failing for lack of motivation tended to be eliminated late in the training program and, on measures derived from flying performance, look much like pass subjects (2). Even so, they are obviously exhibiting insufficient adaptability to the demands of the situation which may be reflected in an overt lack of conformity apparent to others and producing sanctions such as demerits. Hence, the motivational fail group should have the smallest mean of any group on the Military Conformity Factor.

Variance analyses with all subjects. The F values for comparison of the means of the pass, ability fail, motivational fail, and emotional fail groups for each factor separately were all significant at less than the .01 level. In every instance the groups with the largest and smallest means were those that had been hypothesized. Table IV contains the F value, the means, and the number of subjects in each group for each factor.

Variance analyses with pass and basic fail subjects. By category of failure, approximately 74 percent of emotional, 61 percent of ability, and 48 percent of motivational fails were eliminated prior to basic training. This left a maximum of 7 emotional, 42 ability, and 29 motivational fails to be compared with the pass subjects. Table IV contains the F values, the means, and the number of subjects in each group for each factor.

Because of the small number of subjects in the emotional fail group, the results of this analysis were not expected to be as unequivocal as those with all failures included. The

TABLE IV

Factor score means and F values from analysis of variance comparisons of pass with total fail groups and basic fail groups

Factor		Pass	Total failures			F	Basic failures			F
			Ability	Motivational	Emotional		Ability	Motivational	Emotional	
Peer Respect	$\overline{X}$	36.5	30.8	31.6	25.2	14.61‡	31.9	35.2	28.0	3.15*
	σ^2	140.4	133.3	196.5	114.7		129.1	190.3	133.7	
	N	580	108	55	25		42	28	7	
Peer Acceptance	$\overline{X}$	10.3	9.4	9.5	8.4	4.29†	9.7	10.2	9.0	.57
	σ^2	13.2	11.1	17.5	12.5		11.3	17.6	13.0	
	N	580	108	56	26		42	29	7	
Military Conformity	$\overline{X}$	21.5	19.6	17.5	18.6	22.35‡	19.9	18.6	18.4	7.25‡
	σ^2	16.4	18.3	27.5	23.4		21.9	21.9	17.0	
	N	583	108	55	26		42	28	7	
Academic Achievement	$\overline{X}$	10.2	7.9	8.9	9.4	17.92‡	8.4	9.3	8.3	4.77†
	σ^2	9.7	8.2	10.0	11.6		9.2	10.0	5.2	
	N	583	108	56	27		42	28	7	
Flying Achievement	$\overline{X}$	10.7	7.1	10.0	8.3	44.64‡	8.6	10.8	11.0	5.76‡
	σ^2	9.1	11.3	9.2	13.1		5.8	9.4	7.3	
	N	583	107	50	20		42	28	7	

* Significant at less than the .05 level.

† Significant at less than the .01 level.

‡ Significant at less than the .001 level.

instability of a mean based upon only 7 cases can cause difficulty in interpretation of the findings. As an attempt to further evaluate the hypotheses, the over-all analysis of variance tests were supplemented with t-tests comparing individual pairs of means using the Scheffe criterion (7) to evaluate the significance of the t-ratios. In this manner the differences between the means of the predicted high and low groups on each factor could be examined.

Differences between the means on the Peer Respect Factor were significant at less than the .05 level. In conformity with the hypotheses, the pass group had the largest mean and the emotional fail group, the smallest. However, none of the differences between the pairs of means was significant according to the Scheffe criterion.

Although the analysis of variance revealed that the group differences on the Peer Acceptance Factor were not significant, the rank order of the means was in the predicted direction. Again the pass group had the largest and the emotional fails the smallest mean.

The over-all test of the Military Conformity Factor indicated that the group means differed at the .001 level of significance. Pass subjects had the largest mean and the emotional and motivational fail groups had the smallest. Of the various contrasts of pairs of means only that between the pass and motivational fail groups reached an acceptable level of significance ($P < .01$), supporting the hypotheses about this factor.

On the Academic Achievement Factor the over-all differences among the means were significant at less than the .01 level. The pass group had the largest mean, as predicted, but the emotional fails had a slightly smaller mean than the ability fails. On the other hand, the only significant difference between pairs of means was that between the pass and ability fail groups ($P < .01$) which seemed to support the hypotheses concerning this factor.

The Flying Achievement Factor means differed significantly at the .001 level. According to prediction, the ability fails had the smallest mean, but the emotional fail group had a somewhat larger mean than the passes. However, again only the contrast between the means of the pass and ability fail groups was significant

($P < .01$) lending further support to the hypotheses involving this factor.

DISCUSSION AND CONCLUSIONS

Both questions which motivated the present research have been answered in the affirmative.

A definite congruence has been demonstrated between several factors extracted in this investigation and those found in the previous study. Even though differences in the variables included in the two analyses precluded the possibility of finding complete factor comparability, the fact that similar factors were found supports the conclusion that relatively stable behavioral dimensions, transcending sample and superficial situational changes, account for behavior of pilot trainees.

Agreement among the different characterizations of adaptability, derived from the factor structure and the adaptability construct, support the validity of the construct (3). Within the limits of the study, it has been possible to define operationally three dimensions of adaptability, Peer Respect, Peer Acceptance, and Military Conformity and two dimensions of ability, Flying Achievement and Academic Achievement. Through confirmation of the hypotheses concerning the relationships between these dimensions and groups of subjects classified as pass, ability fail, motivational fail, and emotional fail, it may be concluded that useful criteria of adaptability have been isolated.

Further evaluation of the adaptability dimensions is necessary. It is of particular importance to determine the relation of individual differences among the pass subjects to posttraining adaptability assessments. Fortunately, there is evidence (5, 11) that factors corresponding to the Peer Respect and Military Conformity Factors, as computed in the original study, were marginally, but significantly, related in the expected direction to posttraining evaluations of adaptability. Differences in the methods of collecting the defining variables in the two studies demand caution in generalizing these findings; but it is encouraging that scores for the earlier factors did relate as predicted to a later criterion. In addition, an unpublished investigation of Officer Effectiveness Reports has revealed a significant correlation in the predicted direction between demerits accrued

during primary training and later ratings of effectiveness.

On the basis of these findings the Military Conformity and the Peer Respect Factor have been combined to form a composite Adaptability Index. This index, together with the other factor scores, can be used to structure samples in order to achieve better control for research purposes.

earlier study, indicating relatively stable behavior dimensions.

Hypotheses derived from the construct of adaptability were supported by comparison of factor scores for groups of subjects classified according to training outcome as pass, ability fail, motivational fail, or emotional fail. This was considered evidence for the validity of the construct.

SUMMARY

A factor analysis of 22 variables obtained for aviation cadets during pilot training revealed five interpretable factors: Peer Respect, Peer Acceptance, Military Conformity, Academic Achievement, and Flying Achievement. These could be matched approximately, except for Peer Acceptance, with factors extracted in an

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APPENDIX

TABLE A
*Intercorrelations**
(N = 377)

Variables	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. Age	146	048	-123	073	018	019	067	281	258	212	132	121	101	271	271	510	314	159	227	-010	-027
2. Pilot Stanine		267	193	160	236	020	-038	217	202	186	099	132	-012	133	13?	210	176	000	094	239	-332
3. OQ Stanine			??7	93?	068	038	099	164	072	161	059	101	006	086	070	050	079	025	156	065	-132
4. Pass-Fail †				260	129	193	-129	188	195	195	133	239	081	125	184	170	178	118	092	332	-317
5. Academic Average					256	192	-176	224	166	191	140	220	058	156	138	124	157	092	085	118	-191
6. Demerits						280	-102	208	177	197	257	342	125	198	177	073	115	179	036	057	-048
7. Instructor Rating							198	222	200	284	338	383	206	245	218	199	236	205	044	0?4	-092
8. Medical Rating								-091	-047	-133	-178	-129	-155	-081	-084	-084	-091	-1?9	097	-015	012
9. MAR Judgment									822	796	632	636	623	811	704	688	761	683	281	148	-239
10. MAR Leadership										766	606	602	628	802	682	692	781	5?9	329	16?	-241
11. MAR Growth Potential											672	660	645	761	637	609	683	623	253	121	223
12. MAR Cooperation												660	634	590	520	463	508	677	141	092	-141
13. MAR Tactical Officer Rating													484	632	493	495	565	494	210	111	-209
14. BR Like-Dislike														685	673	603	657	728	314	109	-121
15. BR Officer Aptitude															754	730	904	632	333	099	-219
16. BR Adjustment																775	754	641	368	167	-249
17. BR Combat Stress Tolerance																	823	555	393	147	-269
18. BR Bailout																		610	385	124	-229
19. BR Team Acceptance																			224	026	-056
20. BR Familiarity																				103	-077
21. Solo time																					-388
22. Sum C score																					

*Decimal points have been omitted.

†Correlations with Pass-Fail are point biserial; all others are product-moment.

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TABLE B

*Centroid factor loadings**

Variables	Factor								h^2
	I	II	III	IV	V	VI	VII	VIII	
1. Age	262	228	-224	212	-078	-051	-156	-172	2782
2. Pilot Stanine	296	-341	-344	120	112	-159	-016	-172	4051
3. OQ Stanine	237	-354	-182	292	-159	-208	133	153	4102
4. Pass-Fail	336	-441	-070	-279	094	133	146	207	4808
5. Academic Average	395	-589	-107	300	-366	-182	136	016	7896
6. Demerits	281	-226	305	149	-085	185	-110	-029	2995
7. Instructor Rating	345	-194	312	-058	-098	193	-045	-064	3109
8. Medical Rating	-169	160	-234	157	167	107	-128	-080	1954
9. MAR Judgment	861	186	025	156	188	-026	121	-047	8527
10. MAR Leadership	827	252	-027	100	232	051	086	044	8248
11. MAR Growth Potential	823	151	163	104	169	-070	073	019	7763
12. MAR Cooperation	701	118	427	-030	058	-152	-114	045	7308
13. MAR Tactical Officer Rating	733	-050	335	122	124	207	-100	-024	7347
14. BR Like-Dislike	713	379	168	-197	-118	-156	-068	142	7822
15. BR Officer Aptitude	838	296	027	069	047	079	079	-066	8135
16. BR Adjustment	788	280	-099	-152	-084	035	030	-049	7450
17. BR Combat Stress Tolerance	784	284	-242	-162	-085	143	042	-209	8521
18. BR Bailout	827	302	-146	-033	-026	127	118	-091	8367
19. BR Team Acceptance	684	315	252	-157	-118	-154	036	103	7045
20. BR Familiarity	382	174	-325	090	-187	173	-246	280	4933
21. Solo time	255	-295	-234	-288	253	-038	-177	078	3927
22. Sum C score	-357	313	248	199	-292	025	097	084	4287

*Decimal points have been omitted.

TABLE C

Quartimax loadings[*]

Variables	Factor								h²
	I	II	III	IV	V	VI	VII	VIII	
1. Age	296	100	-114	051	-060	-355	-081	169	2767
2. Pilot Stanine	161	175	-099	395	382	-184	-013	-039	4033
3. OQ Stanine	090	031	-091	604	044	024	144	069	4093
4. Pass-Fail	185	-007	105	237	422	447	-026	-002	4792
5. Academic Average	158	-015	090	866	057	025	-042	002	7891
6. Demerits	197	-001	470	192	-040	026	010	-011	2980
7. Instructor Rating	272	-074	424	118	020	128	-115	-081	3094
8. Medical Rating	-117	218	-112	-169	022	-128	133	242	1941
9. MAR Judgment	892	130	006	105	042	-044	139	-074	8512
10. MAR Leadership	879	144	-020	-004	072	014	156	031	8238
11. MAR Growth Potential	844	-007	088	088	028	-007	190	-104	7757
12. MAR Cooperation	709	-316	274	014	-013	-034	177	-145	7296
13. MAR Tactical Officer Rating	694	042	476	082	054	028	107	-039	7336
14. BR Like-Dislike	779	-393	-040	-088	-075	030	-002	070	7810
15. BR Officer Aptitude	896	082	024	014	-044	-022	-022	018	8130
16. BR Adjustment	825	-070	-088	004	054	021	-197	097	7445
17. BR Combat Stress Tolerance	823	085	-118	-013	107	-035	-360	108	8496
18. BR Bailout	880	115	-094	021	013	023	-178	090	8349
19. BR Team Acceptance	744	-354	002	-033	-130	078	009	-045	7048
20. BR Familiarity	363	002	-058	072	023	-023	-034	592	4923
21. Solo time	136	-060	-003	054	598	070	017	073	3913
22. Sum C score	-238	-077	-006	-120	-591	000	026	040	4279

[*]Decimal points have been omitted.

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