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PRELIMINARY DEVELOPMENT AND VALIDATION OF A SCREENING TECHNIQUE FOR ENTRY INTO THE SECURITY POLICE CAREER FIELD

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A sample of 4,502 basic airmen, assigned to the security police career field, were administered an experimental battery consisting of biographical, attitudinal, and interest items. Aptitudinal scores and criterion data (in/out of service after completion of technical training) were retrieved from the airman record files. Multiple linear regression analyses were accomplished to determine the utility of aptitudinal and inventory data in predicting adaptability to the security police career field. The multiple correlations of the final selector composites derived from this study were .46 and .47. Since the small number of eliminees in the sample precluded cross-application of regression weights, it was recommended that further validation be accomplished to determine the reliability and stability of the predictor composites.

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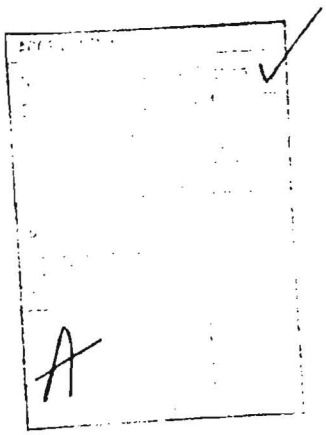
PREFACE

This research was conducted under project 7719, Selection and Classification Technology; task 771902, Methods for Increasing the Effectiveness of Personnel Programs.

Appreciation is expressed to MSgt Fred Brown and Amn Han Kwahk in the Computational Sciences Division for their professional and technical assistance in computer programming and accomplishment of the desired analyses.



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PRELIMINARY DEVELOPMENT AND VALIDATION OF A SCREENING TECHNIQUE FOR ENTRY INTO THE SECURITY POLICE CAREER FIELD

I. INTRODUCTION

Untimely attrition from military service represents a costly expenditure. With today's strict limitations on defense spending, concern has been focussed on ways to decrease costs associated with the separation of military personnel prior to the expiration of their normal obligated tour.

In 1974, the Air Force Inspector General (Security Police) identified attrition in the security police career field as a problem which required immediate attention. An unacceptable number of first-term security police were being identified as noneffective which necessitated their retraining or separation from service. A review of research in this area appears to indicate that the problems experienced by the Air Force in selecting effective security/law enforcement personnel also plague the other military services and civilian law enforcement agencies. Studies in the civilian sector have investigated the usefulness of aptitude, interest, personality, and situational tests in selecting police and reported varying degrees of success. Criteria used to evaluate the utility of these tests have ranged from training grades (i.e., academic performance), terminations from service, and performance ratings to specific performance measures such as awards, arrests, complaints, and career progression (Abbatiello, 1969; Blum, Goggin, & Whitmore, 1961; DuBois & Watson, 1950; Gottesman, 1969; Kent & Eisenberg, 1972; LaCouture, 1960; McAllister, 1970; Morman, Heinkey, Heywood, & Leddle, 1966; Nowicki, 1966; Rhead, Abrams, Trosman, & Margolis, 1968; Spencer & Nichols, 1971). For the most part, the findings have been far from definitive, and a majority of the studies have investigated only the relationships between aptitude/intelligence tests and scholastic achievement in a training environment rather than actual performance in the field. One of the most comprehensive studies in the selection of law enforcement personnel was initiated in 1966 by the Industrial Relations Center at the University of Chicago (Baehr, 1968; Baehr, Furcon, & Froemel, 1968; Furcon & Froemel, 1973; Furcon, Froemel, Franczak, & Baehr, 1971). While results were not overwhelmingly optimistic, these studies did indicate that certain paper-and-pencil tests provided a modicum of predictive validity against actual job performance criteria.

In response to the Air Force security police request for research assistance, the Air Force Human Resources Laboratory initiated research to develop a screening procedure for entry into the security police career field. The primary objective of the study was to develop an effective screening procedure which would reduce costs associated with separation of personnel who cannot adapt or cannot effectively perform security police duties; a concomitant goal of prescreening security police applicants would be to improve the quality of security and law enforcement services provided to Air Force facilities.

II. METHOD

The sample population consisted of 4,502 basic airmen who had been assigned during basic training to the security police career field or had received guaranteed assignments for these Air Force specialty codes (AFSC 81130/81230) prior to entry into service. Table 1 describes the sample population.

Table 1. Sample Population by AFSC/ Sex by In/Out Criterion

AFSC/Sex	Criterion		
	In	Out	Total
811XX – Male	2,593	237	2,830
812XX – Male	1,312	81	1,393
812XX – Female	260	19	279
Total	4,165	337	4,502

Based on results of previous research (Guinn, Johnson, & Kantor, 1975; LaChar, Sparks, & Larsen, 1974), several different types of paper-and-pencil test measures (personal history, attitudinal, interest) were administered to the sample population prior to entry into technical training. The specific test instruments used in the data collection included:

1. The History Opinion Inventory (HOI). This inventory, developed by Wilford Hall medical personnel, is a 160-item self-report inventory designed to tap dimensions of school adjustment, family stability, social orientation, emotional stability, bodily complaints, motivation and

expectations for achievement, and response toward authority (LaChar et al., 1974).

2. The Airman Assessment Inventory (AAI). This 152-item inventory includes information on personal and family background, educational and attitudinal data, employment history, personal problems, previous criminal involvement or experimentation with drugs prior to entry into service, and expressed satisfaction with the individual's assigned career field.

3. Vocational Interest Career Examination (VOICE). The VOICE is a 400-item general-purpose vocational interest inventory developed by the Educational Testing Service specifically for use by the Air Force in the assignment of enlisted personnel to occupational specialties (Echternacht, Reilly, & McCaffrey, 1973).

Aptitudinal scores and criterion data were retrieved from the airman record files maintained by the Computational Sciences Division of the Air Force Human Resources Laboratory. The criterion used for these analyses was in- or out-of-service after completion of technical training. The in-service group consisted of 4,165 individuals who were still on active duty at the completion of their technical training phase. The out-of-service group was comprised of those individuals who had been discharged from service prior to completion of technical training. Due to the small number of individuals who had actually been discharged from service at the time technical training was completed (N = 337), no attempt was made to group those discharged into more specific loss categories for analysis purposes.

Multiple linear regression analyses (Bottenberg & Ward, 1963) were accomplished to determine the usefulness of the aptitudinal and inventory response data in predicting adaptability to the security police career field. Based on the results of the regression analyses, an optimal set of predictors was selected to comprise a preliminary screening device. An optimum cutoff score in the predicted score range was determined which would maximize the identification of maladaptive security police personnel yet minimize the exclusion of potentially successful security policemen.

III. RESULTS AND DISCUSSION

Development of Predictor Composites

Inventory and aptitudinal data as shown in Table 2 were combined into 11 different regression models. Eleven AAI items were omitted from the analysis. These items, which pertained to race, sex, and expressed job satisfaction, were not considered appropriate or relevant for inclusion in a screening device. It was believed that using items related to race and sex in a screening procedure would be in violation of equal opportunity considerations. Furthermore, items pertaining to expressed job satisfaction could not be assessed at time of entry into the career field and would be useless in a screening procedure designed for use prior to entry into active duty. The VOICE items were compiled into 18 scales which had been previously developed on a large-scale validation study (Alley, Wilbourn, & Berberich, 1976).

Table 2. **Regression Analysis Variables**

Predictor Variables	
History Opinion Inventory (HOI) Items	100
Airman Assessment Inventory (AAI) Items	141
Vocational Interest Career Examination (VOICE) Scales	18
Armed Services Vocational Aptitude Battery Aptitude Indexes (M, A, G, E)	4
Armed Forces Qualification Test (AFQT) Percentile Score	1
Criterion Variable	
In/Out of Service after Completion of Technical Training	

The first series of regression analyses was accomplished to determine whether any one of the 11 models produced a statistically significant composite. Results of these analyses are presented in Table 3. All models reached a level of statistical significance at or beyond the .01 level.

Selection of an Optimal Test Composite

In developing a test composite for operational use as a screening device, an evaluation must be made of the potential savings to be accrued from the identification of possible eliminees against the additional costs and time required to utilize a more comprehensive screening procedure. The proposed screening battery developed for this

Table 3. **Summary of Regression Analyses**

Full Model[a]	R^2	Restricted Model	R^2	df_1	df_2	F
Model 1	.0138	–	.0000	5	4,496	12.5826*
Model 2	.1005	–	.0000	100	4,401	4.9172*
Model 3	.1577	–	.0000	141	4,360	5.7894*
Model 4	.0782	–	.0000	18	4,483	21.1284*
Model 5	.0417	–	.0000	1	4,500	196.0041*
Model 6	.0834	–	.0000	23	4,478	17.7062*
Model 7	.2185	–	.0000	264	4,238	4.4869*
Model 8	.1975	–	.0000	247	4,254	4.2398*
Model 9	.1875	–	.0000	246	4,256	3.9906*
Model 10	.1481	–	.0000	123	4,378	6.1875*
Model 11	.1870	–	.0000	164	4,337	6.0832*

[a]Predictor variables contained in regression models are as follows:
Model 1 - ASVAB (Mechanical, Electronics, General, Administrative Aptitude Indexes) and AFQT Score (5)
Model 2 - HOI Items (100)
Model 3 - AAI Items (136)
Model 4 - VOICE Scales (18)
Model 5 - LE Scale (1)
Model 6 - ASVAB, AFQT, VOICE (23)
Model 7 - HOI, AAI, VOICE, ASVAB, AFQT (259)
Model 8 - HOI, AAI, LE Scale, ASVAB, AFQT (242)
Model 9 - HOI, AAI, ASVAB, AFQT (241)
Model 10 - HOI, VOICE, ASVAB, AFQT (123)
Model 11 - AAI, VOICE, ASVAB, AFQT (159)

*$p < .01$.

study includes three additional tests which would increase the overall costs of the operational testing program. To minimize these potential costs, an effort must be made to eliminate tests and/or items which would not make significant contribution to the prediction of the in/out criterion.

The second series of regression analyses were designed to determine whether one or more of the test instruments could be eliminated without reducing the predictive accuracy of the overall screening technique.

Results of these analyses are contained in Table 4. Initially, an attempt was made to investigate the possibility of decreasing the number of VOICE scales by using only the Law Enforcement (LE) scale. However, the comparison between Model 7 and Model 8 indicated that the other VOICE scales make a unique and significant contribution over and above the LE scale alone. Based on this finding, subsequent analyses included all VOICE scales as possible predictor variables.

Table 4. **Summary of Regression Comparisons[a]**

Full Model	R^2	Restricted Model	R^2	df_1	df_2	F
Model 7	.2185	Model 8	.1975	17	4,237	6.6788*
Model 7	.2185	Model 9	.1875	18	4,237	9.3451*
Model 7	.2185	Model 10	.1481	141	4,237	2.7067*
Model 7	.2185	Model 11	.1870	100	4,237	1.7065*
Model 7	.2185	Model 1	.0138	259	4,237	4.2857*
Model 7	.2185	Model 6	.0834	241	4,237	3.0398*

[a]Predictor variables for specific models contained in Table 3.

*$p < .01$.

Regression models were then developed which would delete test measures one at a time (Models 9 through 11), and comparisons between these models were accomplished to determine whether one or more of the experimental tests could be deleted. The comparison of Model 7 versus Model 9 indicates that the VOICE scales cannot be deleted from the selection composite without a significant decrease in predictive accuracy. Similar comparisons between Models 7 and 10 and between Models 7 and 11 revealed that both the HOI and AAI items also made significant contributions to the prediction equation.

Based on these findings, it appears that a combination of all three experimental test measures along with aptitudinal data should be considered in developing an effective screening procedure for security police personnel.

Selection of a Minimum Number of Test Items

Based on the decision to include all three test measures in the final predictor composite, final regression analyses were directed toward an attempt to reduce the overall length of the screening tests by identifying the minimum number of variables which could be used without significantly lowering the predictive accuracy of the screening battery.

In accomplishing these analyses, additional constraints were imposed on the iterative regression computational process which would more nearly reflect the actual operational situation. For instance, all potential accessions are required to take the Armed Services Vocational Aptitude Battery (ASVAB). Therefore, in the development of an optimal number of predictors from Model 7, the ASVAB composites (Mechanical, Administrative, General, and Electronics) and Air Force Qualification Test (AFQT) percentile score were used as the first components in the predictor system. After the aptitudinal data were included in the preliminary predictor composite, all other predictor variables were considered for inclusion in the final composite if they made a unique and significant contribution. The final composite from this model contained a total of 158 variables: ASVAB and AFQT scores, 55 HOI items, 11 VOICE scales, and 87 AAI items. The multiple correlation of this composite was .46.

Since serious consideration is currently being given to including the VOICE in the Air Force operational classification and assignment process, a similar process was used to develop a composite from Model 7 including the VOICE scales along with ASVAB/AFQT data as the basic components in the predictor composite. The predictor composite from this analysis included a total of 166 variables: 54 HOI items, 89 AAI items along with the 5 aptitude scores and 18 VOICE scales. The multiple correlation for this composite was .47.

Due to the small number of eliminees, no attempt was made in this preliminary investigation to cross-apply the regression weights to determine the reliability and stability of the composites on another sample. A follow-on study using the in/out criterion after 9 to 12 months on the job will include cross-application procedures.

Identification of Security Police (81XXX) Eliminees

Based on the regression analysis, it appears that a Security Police (SP) Selection Composite could be developed from aptitude, interest, biographical, and personal history data which would identify potential failures. Although the regression equation developed from these analyses is statistically significant, statistical significance provides little information on the practical usefulness of the proposed selection composite. A more understandable evaluation of the SP composite (Model 7) is contained in Table 5. This table presents a comparison of the number of personnel correctly identified (i.e., hits) versus the number of personnel incorrectly identified (i.e., false positives and misses). Hits include those security policemen identified as successful who did, in fact, graduate from technical training and those identified as failures who were actually eliminated from military service. False positives are those identified by the selection composite as failures who actually graduated from technical training and were still on active duty. Misses are those eliminees identified as successful security police. Using the cutoff score of .63 for Model 7, 94% of the sample population who completed training were correctly identified. Only 1% of those individuals who successfully completed training were identified as potential failures. Although 78% of the actual failures would have been incorrectly identified, 22% of the failures would have been correctly identified as high-risk.

Although results of this study appear encouraging, it should be noted that the regression model represents only an initial effort in the development of a selection methodology for security police personnel.

Table 5. **Hit/Miss Table for Model 7**

Predicted Disposition	Actual Disposition: In Service		Out of Service		Total
In	4,131	99%	256	78%	4,387
	94% (Hits)		6% (False Positives)		100%
Out	34	1%	81	22%	115
	29% (Misses)		71% (Hits)		100%
Total	4,165	100%	337	100%	4,502

The possible monetary savings to be accrued from implementation of the SP composite can be demonstrated by using the sample population as an example. Using Model 7, the total number of security police personnel who were identified as potential graduates was 4,387; 4,131 or 94% were actually successful in completing their training program. Assuming that 4,165 (the actual number who did graduate from training) were required to meet operational commitments, a total input of 4,430 would have been required instead of 4,502. Instead of the original number of 337 eliminees, 266 would not have completed the training program. The original number of eliminees (337) represents an approximate loss of $1,068,290. The lowered number of eliminees represents a cost of $843,220, or a savings of $225,070. While the cost-avoidance associated with the sample population is somewhat small, the savings associated with the total input into training would amount to considerable savings over time (N = 9,268 for 1975).

Generally, a more intensive and refined screening procedure decreases the number of available personnel for selection. Since our selection instruments cannot make perfect predictions of success/failure in every instance, a large number of potentially successful personnel are identified as possible eliminees. When the number of applicants for entry into the Air Force exceeds the number required for manning, the impact of the loss of potentially productive personnel is minimized. On the other hand, if security police requirements for personnel exceed the number available for assignment, the use of a screening device to further limit the applicant pool becomes an important issue to consider.

Due to the small number of eliminees, no attempt was made to cross-apply the regression weights to another sample. It should be realized that the stability of these models in predicting success/failure on future samples is unknown at this time. A follow-up study is in progress which will investigate the stability and validity of the predictor composites when applied to a different sample. It should also be noted that the multiple correlation of the composite obtained on a sample population previously screened by an operational selection test is somewhat lower than if it had been computed on an unrestricted population. From these results, the two models appear to demonstrate practical utility in the selection of airmen into the security police field.

IV. SUMMARY AND CONCLUSIONS

The results of the regression analyses for the SP (81XXX) selection composite indicate that a screening procedure comprised of aptitudinal, interest, and personal history data has some practical value in the selection of quality security police. However, if availability of personnel for security police assignments decreases, the selection composites may be too stringent for operational use. In a favorable recruiting environment, the use of the SP Selection Composite as an operational screening procedure should be considered.

Prior to the operational use, it is considered mandatory that the final selection composite be cross-validated to additional samples of security police personnel to ascertain their stability and validity.

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