Technical Report 1094

Prescreening Methods for Special Forces Assessment and Selection

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The Special Operations Proponency Office (SOPO) at the U.S. Army John F. Kennedy Special Warfare Center and School requested help from the U.S. Army Special Operations Command Psychological Application Directorate and the U.S. Army Research Institute in identifying prescreening tools to determine which soldiers would have the greatest chance of success in the Special Forces (SF) selection and training pipeline. Two studies were completed examining different methods for predicting performance in SF selection and training. Analyses focused on junior level enlisted soldiers, who have lower success rates than the non-commissioned officers.

Results indicated that Army Physical Fitness Test, previous branch type, Armed Services Vocational Aptitude Battery General Technical score, and airborne qualification provided optimal prediction of success in SF Assessment and Selection (SFAS). Soldiers in the highest prediction category achieved a select rate of 66%; whereas, soldiers in the lowest prediction category showed a success rate of only 24%.

Two methods were proposed to generate order of merit lists that would identify recruits with the highest potential for success in SFAS. This would allow SOPO to minimize recruitment of soldiers who have little chance of completing SFAS.

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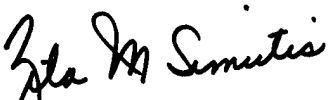
Manpower and Personnel

Foreword

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) conducts research on personnel performance and training in support of Army goals. A 1991 Memorandum of Agreement between ARI and U.S. Army Special Operations Command (USASOC) established a formal program of cooperative research to address the needs and concerns of Special Forces (SF). In order to accomplish this we work in collaboration with the USASOC Psychological Applications Directorate (PAD).

During fiscal year 1998, the PAD and ARI were working toward the development of longitudinal databases that would enable us to examine predictors of success in the SF selection and training pipeline. The current report utilizes those databases to identify prescreening tools that could be used to ensure that the soldiers with the best chances for success are recruited for the SF Assessment and Selection program (SFAS).

The objective of this report is to provide the Special Operations Proponency Office at the U.S. Army John F. Kennedy Special Warfare Center and School (USAJFKSWCS) with information and a method that could be used to maximize recruit performance in SFAS. The results of this report were briefed to the Commanding General of USASOC (LTG Tangney) and Commanding General of USAJFKSWCS (MG Bowra) in April of 1999.



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PRESCREENING METHODS FOR SPECIAL FORCES ASSESSMENT AND SELECTION

Executive Summary

Requirement:

The Special Operations Proponency Office (SOPO) at the U.S. Army John F. Kennedy Special Warfare Center and School (USAJFKSWCS) requested help from the U.S. Army Special Operations Command Psychological Application Directorate (PAD) and the U.S. Army Research Institute (ARI) in identifying prescreening tools that could be used to identify which soldiers have the greatest chance for success in the Special Forces (SF) selection and training pipeline. This information would allow SOPO to minimize recruitment of soldiers with little chance of completing Special Forces Assessment and Selection (SFAS), and allow slots to be filled by soldiers who have a greater probability of success.

Procedure:

A series of variables was chosen from the SFAS database which included variables that had either previously been shown to be related to success, or were currently collected as prescreening information by recruiters. Analyses focused on junior level enlisted soldiers (Specialist/Corporal) (SPC/CPL), who have lower success rates in SFAS than the non-commissioned officers. Two studies were completed using samples from different fiscal years to examine SPC/CPL performance in SF selection and training. The first study examined a point-based method of combining variables to predict success, and the second study examined an equation-based method of combining variables to predict success.

Findings:

Results indicated that the Army Physical Fitness Test (APFT), branch type, the Armed Services Vocational Aptitude Battery (ASVAB) General/Technical (GT) score, and airborne qualification provided optimal prediction of success in SFAS. Prediction models indicated that a soldier's scores on these key predictor measures could be used to identify soldiers who would have the best chances for success in SFAS. While success in SFAS was also related to higher scores on pull-ups, ASVAB Field Artillery scores, Wonderlic Personnel Test™ scores, and a greater number of years of education, these relationships were not as strong or were overlapping with those of the four key variables. One surprising finding was that SPC/CPLs with *fewer* years in service, and who were *younger*, showed higher rates of success in SFAS.

Unfortunately, a soldier's probability for success in the Special Forces Qualification Course (SFQC) was not predicted well by the available variables. Only branch type and airborne qualification were related to a soldier's success in the SFQC, although age contributed to predicting first-try graduation, and GT score was predictive of academic failures. These results do, however, strengthen the importance of branch type, airborne qualification, and GT score as pre-screening tools.

Using the key variables identified as critical, two methods were developed for creating an order of merit list to identify junior enlisted recruits with the highest potential for success in

SFAS. The first method was based on a point-assignment strategy, and the second was based on an equation model. Either method could be used to determine which candidates have the best chance for success in SFAS.

Utilization of Findings:

These results can be used by SOPO to inform decisions that are being made about the recruitment of junior enlisted soldiers for SFAS. They provide a method that could be used to generate an order of merit list that would rank order recruits based on their probability for success in the SFAS program. This information would enable recruiters to contact soldiers with the best chance for success, allow SOPO to minimize recruitment of soldiers with little chance of completing SFAS, and allow slots to be filled by soldiers who have a greater probability of success. Potentially, soldiers could be selected for the Assessment and Selection program based on their likelihood of success in the program. Improving select rates could potentially decrease the shortfall between accessions and losses to the force.

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Introduction

The Special Operations Proponency Office (SOPO) at the U.S. Army John F. Kennedy Special Warfare Center and School (USAJFKSWCS) has considered various proposals recently to identify methods to expand recruitment for the Special Forces Assessment and Selection (SFAS) program. In the early history of Special Forces there were junior enlisted soldiers both in training and in Special Forces units. In a sample taken in 1953 from the 10th Special Forces Group at Fort Bragg, NC, for example, 33% of the enlisted soldiers in the sample were Privates (PVT/PV2) or Privates First Class (PFC), 20% were corporals or sergeants, and 47% were higher level non-commissioned officers (NCOs) (Abelson, 1954)[1]. Information from SF training in the early 1980s suggests that even at that time there were junior enlisted soldiers attending SF training. Of the soldiers attending training for SF in FY79 through the fifth class of FY80, 43% were Privates, 26% PFC and CPL, and only 31% NCOs (George & Cassady, 1981). Statistics on the correlates of success, however, both in SF field performance and SF training, indicated that, as a group, the lower ranking soldiers tended to be somewhat less successful (Abelson, 1954; George & Cassady, 1981). This is not surprising, of course, since experience typically improves performance.

Under the current regulations, the lowest ranking Active Duty soldiers eligible to attend SFAS are Specialists and Corporals (SPCs/CPLs), and data have suggested that, as a group, these soldiers tend to be somewhat less successful in training than their NCO counterparts (Diana, Teplitzky, & Zazanis, 1995). In analyses of the most recent selection and training databases, for example, 41% of the SPCs/CPLs were selected from SFAS in FY98[2] as opposed to 51% of the NCOs (SFAS, 1998). For the Special Forces Qualification Course (SFQC), 34% of the SPCs/CPLs who started the SFQC between FY95 and FY97 graduated from the SFQC without any recycles, in contrast with 45% of the NCOs (Zazanis, 1998). Given that higher ranking soldiers will typically have had more opportunities for job-relevant experience, it is not surprising that higher ranking soldiers are somewhat more likely to succeed.

Despite the fact that higher ranking soldiers, as a group, have higher rates of success, junior level enlisted candidates (SPCs/CPLs) constitute a substantial number of the soldiers who go on to attend and graduate from the SFQC. Specifically, for the 1998 training year, SPCs/CPLs represented over 37% of all candidates attending SFAS, and contributed 33% of all the graduates. While the experience associated with higher rank is important, research has identified other factors that are more strongly associated with success in SF selection and training. One extremely strong predictor of success in SFAS, of course, is the soldier's score on the Army Physical Fitness Test (APFT) (Kilcullen, Chen, Brown, & Zazanis, in preparation). Other factors that have been related to success in selection and training include a soldier's previous branch type and Ranger qualification (Brooks, 1997; Zazanis & Lappin, 1998), and the number of pullups they can achieve (Zazanis, 1996). Thus, low ranking soldiers with higher scores on these other critical factors perform to the level of the higher ranking soldiers.

SOPO requested help from the U.S. Army Special Operations Command Psychological Application Directorate (PAD) and the U.S. Army Research Institute (ARI) in identifying

[1] Data from most older reports do not indicate whether samples were Active Duty only or both Active Duty and National Guard/Army Reserve combined; thus, percentages of junior enlisted soldiers in Active Duty components *only* may have been somewhat lower than those indicated.

[2] References to FY98 SFAS data in this paper include all FY98 classes except the final September class; data were not yet available for that class at the time of the analyses.

prescreening tools that could be used to identify which soldiers would be expected to have the greatest chance of success in the SF selection and training pipeline. This information could help recruiters identify soldiers to contact who have the best chances for success, would allow SOPO to minimize recruitment of soldiers with little chance of completing SFAS, and allow slots to be filled by soldiers who have a greater probability of success. Improving select rates could potentially decrease the shortfall between accessions and losses to the force.

A series of variables was chosen from the SFAS database which included variables that had either previously been shown to be related to success, or are information collected by recruiters. Based on previous research, it was predicted that the APFT would be the strongest predictor of success in SFAS (Kilcullen et. al., in preparation). Specific hypotheses beyond this regarding the relative importance of these predictors as prescreening tools were not made.

Method

The best way to identify predictors of success for junior level soldiers in the selection and training pipeline was to examine predictors of success for the lowest current rank, SPC/CPL. Two studies were completed to explore different procedures for creating prescreening tools.

Sample

Analyses for Study 1 used a sample of 990 active duty SPC/CPLs who attended SFAS and completed SFQC between FY90 and FY96. Within this sample, 36% (352 soldiers) successfully completed SFAS, and a total of 67 subsequently went on to successfully complete SFQC without recycle. Prescreening methods were then applied to a sample of 655 active duty SPC/CPLs who attended SFAS during FY98.

Study 2 used a sample of 508 active duty SPC/CPLs from SFAS FY98.[3] Because PT failures can be predicted with 100% accuracy from the soldier's APFT score, we removed 47 soldiers from the sample who were non-selects due to PT failures. Analyses for the SFQC used a sample of 309 active duty SPC/CPLs from SFQC FY95 through FY97. Information about rank and component for both of the samples was based on data from SFAS.

Predictors

Study 1 selected a series of seven variables from the SFAS database to predict success in SFAS: APFT score, age, years of education, time in service, Armed Services Vocational Aptitude Battery (ASVAB) General Technical (GT) score, Airborne qualification, and Wonderlic Personnel Test™ scores. Subjects were grouped into thirds along the dimensions of GT, time in service, APFT scores, and Wonderlic percentiles. These key predictors were ones that, with the exception of Wonderlic, are already part of the information that recruiters collect, and could easily be incorporated as prescreening tools in the recruiting process without major changes to recruiting operations. Wonderlic was included to explore its relationship with success in SFAS.

For Study 2, the list of variables was expanded to add four more variables from the SFAS database: prior branch type, pull-ups, the ASVAB Field Artillery (FA) score, and the Assembling Objects test. The Wonderlic was removed as a predictor for these analyses. As with the first study, soldiers were grouped into categories based on the distribution of scores in the SFAS

[3] Again, data from the 7-98 class was not available for inclusion in these analyses.

SPC/CPL population in order to examine success rates. In this study, categories were expanded to four for most variables. For the correlational analyses, although branch type is a categorical variable, numerical values can logically be assigned based on the similarity of skills to those in Special Forces. Infantrymen (11B) skills are the most similar, so they were coded as "3"; Career Military Field (CMF) 11, but not Infantrymen were coded as "2"; and all others were coded as "1".

While Ranger qualification has historically been a strong predictor of success, it was not examined in these analyses because only 8 of the SPC/CPLs in the SFAS sample and 15 of the SPC/CPLs in the SFQC sample were Ranger qualified. Similarly, not many other junior level enlisted soldiers would have already earned the Ranger tab.

Beyond these 11 variables, there are some new motivational and personality tests currently under investigation in SFAS and SFQC that may be able to help predict successful performance. Since these tests are still under investigation, they would have to be incorporated into the prescreening process at a later time. The first step is to make better use of the information we already have by determining the relative importance of the variables for predicting success.

Criteria

Both SFAS samples used select/non-select from SFAS as criteria. While there is often particular concern about soldiers who choose to voluntarily withdraw from the program, the distinction among the various reasons for non-selection from SFAS can be nebulous. For the purposes of this investigation, therefore, only the overall select/non-select criteria were examined.

For the SFQC analyses in the second study, three criteria were considered: (1) whether an individual graduated from his first attempt at the SFQC, (2) whether an individual graduated after multiple attempts at the SFQC, (3) whether an individual was relieved from the course for academic or other performance reasons.

Results

Study 1: SFAS Results

Of the 990 SPC/CPLs in the sample spanning training years 1990-1996, 36% of the candidates (352) were selected for attendance to the SFQC. Success in SFAS was related to APFT scores, time in service, Wonderlic score, and airborne qualification. The General Technical (GT) subscore from the Armed Services Vocational Aptitude Battery (ASVAB) was only marginally predictive of success rates, probably because of the severe restriction in the range of soldiers' scores, given that during this time period a GT score of 110 or higher was required. All of these measures, however, were able to improve the prediction from the base rate of 35% selects observed in the group as a whole. In combination, these variables provided a means to identify soldiers who were substantially more likely to succeed in SFAS.

Crosstabs

As predicted, APFT score showed the strongest relationship with selection from SFAS. SPC/CPLs who scored in the bottom third of the distribution for APFT (less than 228) had about a 20% chance of successfully completing the selection program. In contrast, those who scored in the top third of the distribution (greater than 245) had about a 50% selection rate (see Figure 1).

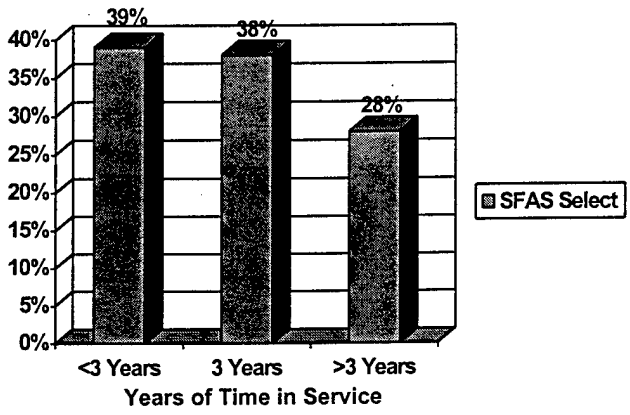

Figure 1. SFAS Outcome by APFT Performance Category

Airborne qualification and time in service also demonstrated a relationship with selection. SPC/CPLs who were Airborne qualified were considerably more likely to complete SFAS (41% success rate) than those without this training prior to SFAS attendance (29% success rate). In addition SPC/CPLs who had three or fewer years time in service were more likely to be selected from SFAS than those with four or more years time in service (38% vs. 27%, respectively) (see Figure 2).

GT score demonstrated a modest relationship with success in SFAS for this sample, despite the restriction in the range of scores. SPC/CPLs in the bottom third of the distribution for GT score (GT below 112) demonstrated a 32% selection rate; not considerably different from the 39% selection rate seen among soldiers in the top third of the distribution of GT scores (GT above 120). Again, it is likely that restriction of range effects have diminished the predictive effect of this measure.

With respect to the Wonderlic, soldiers were significantly less likely to be selected from the course if they earned a raw score below 20, which historically equates to below the 20th percentile for all SFAS candidates (see Figure 3).

Developing Prediction Categories

Study 1 explored a categorical approach to combining these variables in order to identify soldiers who would be most or least likely to complete SFAS. The intent was to develop a series of rules to assist recruiters in identifying whether a subject was likely to be successful or unsuccessful.

For the purposes of exploratory analyses, candidates were first categorized based on their scores for five key variables: APFT score, time in service, airborne qualification, GT score, and Wonderlic score. APFT, time in service, and airborne qualification were chosen because of their demonstrated relationships with success in SFAS. Despite demonstrating only a modest relationship with success, GT score and Wonderlic scores were used here because aptitude is currently a pre-selection factor used by recruiters. In addition, their statistical relationship with selection is likely to have been diminished by restriction of range effects.

Candidates were classified into top, middle, and bottom categories for APFT, time in service, and GT score. For Wonderlic, candidates' scores were dichotomized, being divided into raw score of less than 20 correct on the test and greater than or equal to 20 items correct. The raw score of 20 places a soldier's score at the 20th percentile using a set of norms based on SFAS candidates over the past decade. In other words, for a soldier to be rated in the low Wonderlic category, his performance had to be in the bottom 20% of scores obtained among SFAS candidates. Finally, Airborne qualification was also used as a dichotomous predictor.

We examined candidates' success rates based on different combinations of their scores for these five variables. Figure 4 demonstrates SFAS select rates for four different (not mutually exclusive) combinations of variable scores. Group 1 includes soldiers who scored the lowest on each of the variables; their GT score was less than 112, APFT less than 228, Wonderlic score was below the 20th percentile, they had more than 3 years time in service. This group showed an 8% success rate in SFAS for the FY90-FY96 sample.

Group 2 includes soldiers who had a GT score greater than 111, an APFT score greater than 227, and had 3 or fewer years time in service. This group achieved a 47% success rate. The third group includes soldiers in the top APFT group, that is, greater than 245, Wonderlic scores greater

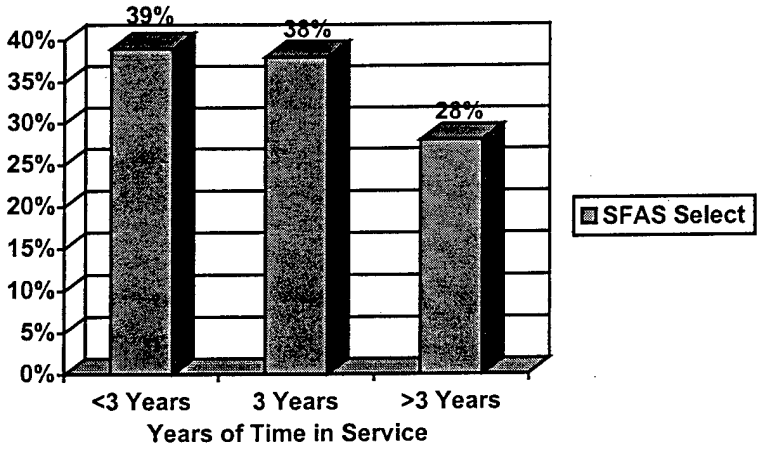

Figure 2. SFAS Outcome by Time in Service

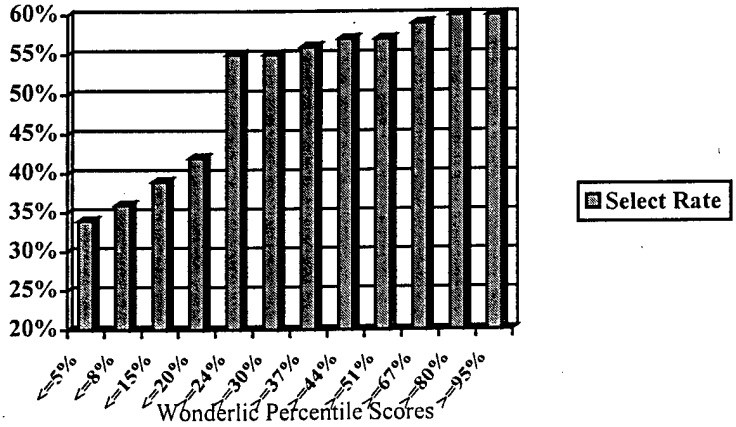

Figure 3. SFAS Outcome by Wonderlic Percentile Score

than or equal to the 20th percentile, and had less than three years time in service. This group demonstrated a success rate of 48% for the original FY90-FY96 sample.

In the final example, Group 4 represents the same standings as Group 3, but with the added value of attaching a requirement for airborne training. Thus, these soldiers have an APFT score greater than 245, Wonderlic greater than or equal to the 20th percentile, less than three years time in service, and are airborne qualified. This group demonstrated a success rate of 55% for the FY90-FY96 sample. Although Group 1 and Group 4 capture only a small percentage of soldiers (1.3% and 4.9%, respectively), these categories demonstrate how these variables could be used to determine the soldiers who are least or best suited for recruitment.

This category scheme was then applied to the FY98 SFAS data, shown in the second series in Figure 4. While the overall select rate for FY98 was somewhat higher, the same relative pattern of success can be seen across the four categories. Group 1showed an identical select rate of 8%, Groups 2 and 3 both showed a higher select rate of 64%, and Group 4 showed the highest select rate of 79%.

These category schemes represent only five variations of a much larger number of possible combinations of these five variables (GT, APFT, Wonderlic score, time in service, airborne qualification). The next step was to select a strategy that is user friendly and reasonably allows identification of those who have or do not have a reasonable chance of success in SFAS.

Developing an Order of Merit List

It would be possible, by assigning values to differing levels of performance across these variables, to develop a cumulative "Potential Success" score that could be used by recruiters to develop an order of merit list. Because recruiters do not have access to Wonderlic scores, only the other four variables examined in the previous category scheme were used to develop an order of merit list procedure. A proposed scheme is represented in Table 1. The scoring of the Potential Success index would be based on the total number of points generated from adding the category ratings for GT, APFT, time in service, and airborne qualification variables.

Table 1. Points Assigned for scores on key variables.

Variable	Low	Points	Mid Level	Points	High	Points
GT score	< 112	1	113-120	2	> 120	3
APFT	< 228	1	228-245	2	> 245	3
Time in Service	> 3yrs	1	3yrs	2	< 3yrs	3
Airborne	No	1	n/a		Yes	3

Assigning points to candidates using these rules results in a range of scores from a minimum of 4 to a maximum of 12. As an example, a soldier who has a GT score of 115, an APFT score of 250, 3 years time in service, and is not jump qualified, would earn a score of 8. Select rates for each of the scores on this index (4-12) were determined based on the FY98 sample and are shown in Figure 5. As shown in the graph, as the Potential Success score increases, there is a gradual increase in probability that a soldier will be selected. The data do, however, suggest a set of reasonable break points. For example, a score of 7 or lower is indicative of a relatively poor risk candidate (select rates below 35%). A score of 8 could be viewed as indicating a reasonable risk

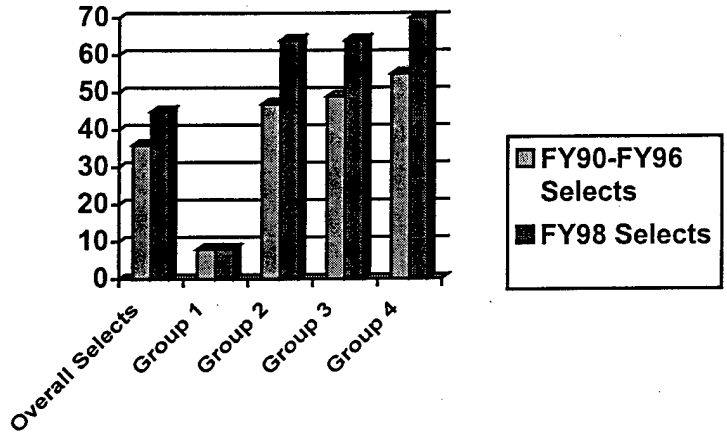

Figure 4. SFAS Outcome by Category

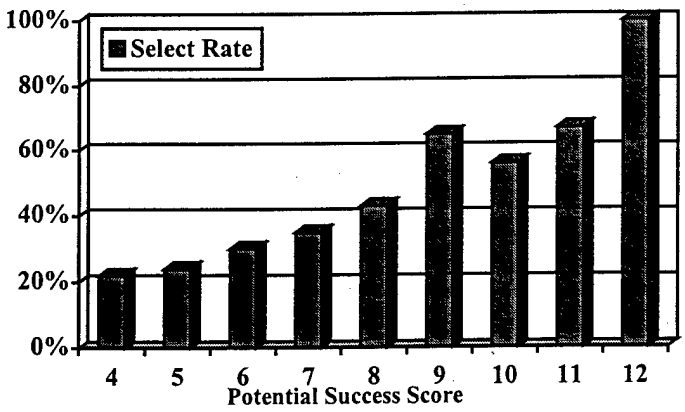

Figure 5. SFAS Outcome by Potential Success Index score

(select rate of 43%), and a score greater than 8 (select rates around 65%) would be considered to be the most qualified or lowest risk. Lowest risk candidates would then be preferentially selected for attendance at SFAS. Appendix A shows a sample rating sheet that the recruiter could use to categorize the subject using these four variables.

Summary: Study 1

Results from Study 1indicated that a SPC/CPL's chances for success in SFAS could be reasonably predicted by his APFT, GT, time in service, and airborne qualification, particularly when used in combination with each other. Using these variables we were able to categorize soldiers based on their potential for success in SFAS. This categorization indicated that soldiers in the lowest scoring categories (4 through 7) had select rates below 35%; whereas soldiers in the highest potential categories (9 through 12) demonstrated select rates above 55%, and as high as 100% selects. This scoring scheme is one method that could be used for identifying soldiers who are most likely to succeed in SFAS.

Study 2: SFAS Results

In the second study, data from FY98 were used to reexamine the success of these predictors using correlational analyses, and develop a statistical equation that could be used to predict success in the current SFAS program.

Correlations & Crosstabs

Of the 508 SPC/CPLs in this sample, 41% were selected. Although the overall selection rate in FY98 was slightly higher than that of the historical sample, as already demonstrated in Study 1, the pattern of results concerning the predictors of success in FY98 mirrored those from the FY90-FY96 sample in Study 1. Of the 11 variables that were examined in Study 2, APFT, pullups, GT, FA, branch type, and airborne qualification were significantly correlated with selection from the program (see Table 2). Correlations between selection and years in service, years of education, and age were not significant, although crosstabs suggest possible trends in their relationships. The relationship between SFAS select rates and each variable can be seen in Appendix B.

Table 2. Correlations of Predictors with SFAS Outcome

	r		r
Years Service	-.08	Years Education	.09
Age	-.06	Branch Type	.24**
Airborne	.15**	Pull-ups	.11*
ASVAB GT	.13**	ASVAB FA	.16**
APFT score	.19**		

* $p < .05$; ** $p < .01$

As expected, soldiers with higher APFT and pull-ups scores were more likely to be selected in SFAS. While higher ranking soldiers tend to perform better in SFAS as discussed in the introduction, within the sample of SPC/CPLs, soldiers with *fewer* years in service, and who were *younger than 22* years old had higher select rates. These results were similar to those found in the historical sample, although the relationship for time in service was more linear in this study. Soldiers with 14 or more years of education, and soldiers who scored higher on the GT and FA

tests also had somewhat higher select rates. Because the relationships between GT and selection and FA and selection were nearly identical, we only included GT in future analyses, since that is the measure that is currently used as a prerequisite.

Finally, soldiers who came to SFAS with airborne qualification, and soldiers who came from an Infantryman background (11B) had high select rates. Soldiers who came from CMF 11 (other than 11B) showed a moderate select rate, and soldiers from other combat arms branches or from non-combat arms branches had low select rates (see Appendix B). While it had been expected that the strongest predictor of success in SFAS would be APFT, the correlation between Branch type and success (.24) was significantly larger than between APFT and success (.19) ($t(458)=-2.889$, $p<.01$).

Logistic Regression

In order to determine the relative importance of each of these factors, the variables with significant zero order correlations with selection from SFAS were entered into a simultaneous regression analysis. A backward entry stepwise logistic regression was used to predict select or non-select from SFAS based on APFT, pull-ups, ASVAB GT, branch type, and airborne qualification.[4]

Results indicated that pull-ups did not contribute significantly to predicting selection in SFAS, but each of the other variables did (see Table 3). While the regression coefficient for airborne qualification was not significant at the .05 level, it was not recommended for removal, so was retained. By using APFT, branch type, GT score, and airborne qualification, we were able to correctly predict 77% of the soldiers who were not selected, and 49% of the soldiers who were selected, for an overall classification average of 64% correct.

Developing Weighted Scores

The results of the logistic regression were used to develop an equation that would allow us to predict a soldier's chances for success, based on his APFT score, branch type, GT score, and airborne qualification. The coefficients from the logistic regression procedure generated the following equation for the prediction of select/non-selects in SFAS: (.017*APFT) + (.5248*Branch type) + (.0284*GT score) + (.3841*Airborne qualification).[5] The resulting score distribution for FY98 data ranged from 6.77 to 10.31, with the quartile scores at the $25^{th} = 7.71$, $50^{th} = 8.12$, and $75^{th} = 8.57$.

Soldiers who scored in the top 25% on this composite predictor variable had a selection rate of 66%, while soldiers who scored in the bottom 25% had a 24% select rate (see Figure 6). Similar success rates were seen when the equation was cross-validated using SPC/CPL samples from FY97 and FY96 (see Figures 7 and 8).

[4] Results presented here treated these variables as continuous variables in the regression analyses for two reasons: (1) it is more parsimonious from the standpoint of the prediction equation, and (2) results that treated branch type and airborne qualification as categorical variables generated nearly identical results.
[5] Note that the coefficients in this equation are based on the raw scores for each variable, not standardized, and therefore cannot be directly compared to each other.

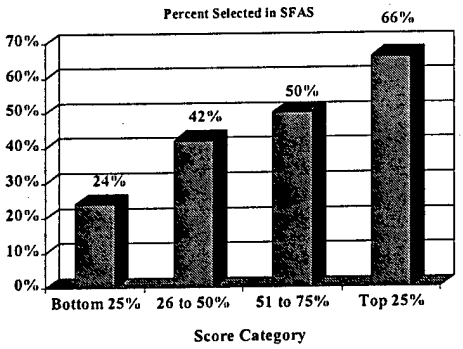

Figure 6. SFAS FY98 Selection Based on the Equation Model

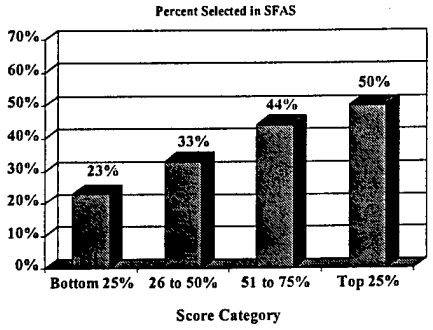

Figure 7. SFAS FY97 Selection Based on the Equation Model

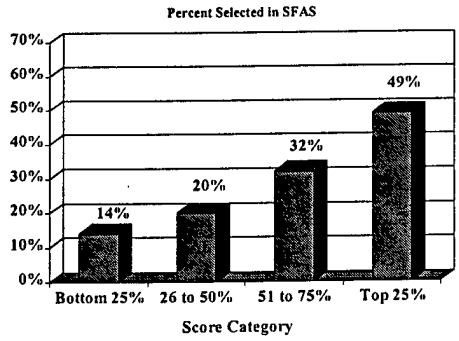

Figure 8. SFAS FY96 Selection Based on the Equation Model

Table 3. Backward Removal Stepwise Logistic Regression Analyses on Selection from SFAS

DV: Selection from SFAS

Entered IVs	b	Wald[a]	χ^2	df
Step 1: All variables				
APFT Score	.02	8.47**	46.85**	5
Pull-ups	.04	1.10		
Branch Type	.53	16.65**		
GT Score	.03	5.18*		
Airborne	.37	3.00		
Step 2: Pull-ups removed				
APFT Score	.02	11.30**	45.75**	4
Branch Type	.52	16.31**		
GT Score	.03	5.13*		
Airborne	.38	3.34		

Note:
[a] The Wald test is the logistic equivalent of a t-test
* $p < .05$; ** $p < .01$

Developing an Order of Merit List

This equation can be used to develop an order of merit list based on soldiers' scores. A simple computer program has been written that requests a candidate's APFT score, GT score, branch type, and airborne qualification status (Kilcullen, 1999). The program then uses the prediction equation to generate an order of merit list score for each candidate. These order of merit list scores can be entered in the recruiter's database, and ordered in ascending order at any time to identify the highest potential candidates in the database. If an individual improved his APFT score or gained airborne qualification, the score could be recalculated and changed in the database.

Study 2: SFQC Results

Of the 309 active duty SPC/CPLs in the SFQC sample, 34% graduated from their first attempt at the SFQC, 32% graduated after two or more attempts, 9% voluntarily withdrew, 12% were relieved from the course, and 13% were still in the pipeline. Overall, then, these analyses attempted to discover systematic factors that would predict why 63 soldiers (21%) were not successful, and 205 (66%) were successful.

Correlations & Crosstabs

Of the 11 predictor variables that were examined, the only variables that were significantly correlated with overall graduation from the course were branch type and airborne qualification (see Table 4). Thus, soldiers who were from 11-series MOS, especially 11B, and reported to SFAS with airborne qualification were more likely to graduate. Soldiers from 11-series MOS and soldiers who were *younger* were more likely to successfully graduate from their *first* attempt at the course. Finally, academic/performance failures were predicted by branch type, airborne qualification, and ASVAB GT score; that is, soldiers who scored higher on the ASVAB GT were

less likely to be academic failures in the SFQC. Graphs of these relationships can be seen in Appendix C.

Table 4. Correlations of Predictors with SFQC Overall Graduation ("Grad"), First-try Graduation ("First"), and Academic Failures ("Acad")

	Grad	First	Acad		Grad	First	Acad
Years Service	-.07	-.07	.08	Years Education	.03	-.03	-.07
Age	-.00	-.20**	.02	Branch Type	.16**	.13*	-.17*
Airborne	.16*	.11	-.14*	Pull-ups	-.03	.02	-.09
ASVAB GT	.09	.06	-.13*	ASVAB FA	.07	.03	-.12
APFT score	.00	.02	-.04				

* $p < .05$; ** $p < .01$

Logistic Regression

Predictors that were significantly correlated with overall graduation were entered into a simultaneous regression analysis in order to determine the relative importance of each of the factors. A backward entry stepwise logistic regression was used to predict overall graduation from the course and first try graduation. Results indicated that both branch type and airborne qualification contributed significantly to the prediction of SFQC graduation (see Table 5). Adding these variables, however, did not improve prediction of graduates in a practical sense; the results still indicated that the best statistical model would be to predict a 100% success rate.

Table 5. Backward Removal Stepwise Logistic Regression Analyses on Graduation from SFQC

DV: Graduation from SFQC

Entered IVs	b	Wald[a]	χ^2	df
Step 1: All variables				
Branch Type	.40	4.03*	10.85	2
Airborne Qualification	.63	3.65		

Note:
[a] The Wald test is the logistic equivalent of a t-test
* $p < .05$

The second analysis predicted first-try graduation, and was not any more successful in prediction (see Table 6). Of the 292 subjects in the analysis, 101 were first-try graduates and 191 were not, and none of the predictors were able to improve our prediction of which soldiers would be first-try graduates. A logistic regression was not completed for the academic failure variable because too few soldiers were academic failures.

Study 2: Summary

Results from the SFAS analyses in Study 2 supported those from Study 1. As found in Study 1, a SPC/CPLs chances for success in SFAS were predicted based on his APFT score, GT score, and airborne qualification. Study 2, however, found that a soldier's prior branch type was also a significant predictor of success in SFAS, and, in fact, demonstrated a higher correlation with

success than APFT scores. Using these four variables (Branch type, APFT, GT score, and airborne qualification), we were able to develop a prediction equation such that soldiers who scored in the top 25% had a select rate of 66%, and soldiers who scored in the bottom 25% had a select rate of 24%. A procedure was described that could be used to develop an order of merit list for junior enlisted soldiers slated to attend SFAS.

Table 6. Backward Removal Stepwise Logistic Regression Analyses on First-Try Graduation from SFQC

DV: First-try Graduation from SFQC

Entered IVs	b	Wald[a]	χ^2	df
Step 1: All variables				
Branch Type	.24	2.67	9.80*	3
Airborne Qualification	.46	3.13		
Age	-.46	2.17		
Step 2: Age removed				
Branch Type	.24	2.68	7.66*	2
Airborne Qualification	.46	3.16		
Step 3: Branch Type removed				
Airborne Qualification	.55	4.96*	4.99*	1

Note:
[a] The Wald test is the logistic equivalent of a t-test
* $p < .05$

The next question was to determine the relevance of these factors to predicting success in the SFQC. Unfortunately, a SPC/CPL's probability for success was not predicted well by the available variables. Only branch type and airborne qualification were related to a soldier's success in the SFQC, although age contributed to predicting first-try graduation, and GT score was predictive of academic failures. These results strengthens the importance of branch type, airborne qualification, and GT score as pre-screening tools, but not yet offer specific information concerning numerical values to assign to the order of merit list procedures.

Integrated Summary of Results

Results from both Study 1 and Study 2 emphasized the importance of APFT, ASVAB GT, and airborne qualification in the SF pipeline. In addition, Study 2 demonstrated the importance of branch type, both to success in SFAS as well as success in the SFQC. Both studies suggested that a soldier's scores on these key predictor measures could be used to determine which soldiers would have the best chances for success in SFAS, and each proposed a method for combining this information and developing an order of merit list to identify the highest potential soldiers.

Discussion

The intent of these analyses was to identify predictors that would be accessible to the recruiter for establishing an order of merit system for junior level enlisted soldiers. These results could be used to ensure that the highest potential soldiers are being contacted and recruited for SFAS, and

could potentially be used to assign the most qualified soldiers on a priority basis to SFAS. How the results are used will be determined largely by the availability of candidates for SFAS.

These results clearly indicated that lower ranking soldiers can succeed in the SF pipeline, and that they can actually perform quite well if they meet certain prescreening criteria. While lower ranking soldiers successfully complete training at a lower rate in the SF pipeline than non-commissioned officers, both APFT scores and previous branch type were stronger predictors of success in SFAS than rank. This is not surprising, since branch type and APFT are direct measures of skills and abilities that are relevant to successful performance in SFAS and SFQC. Taken together, APFT, branch type, GT score, and airborne qualification provided a strong distinction between soldiers who had high or low chances for success.

It was surprising to discover that soldiers with less time in service, and soldiers who were younger, had higher selection rates. This may be due to differential motivation in SPC/CPLs in their first versus second enlistment term who are seeking SF training; that is, soldiers who are more interested and motivated to join SF tend to join as early as possible. Also, in most occupational specialty groups (particularly combat arms), good soldiers are generally promoted to Sergeant before their fourth year of service. The group of SPC/CPLs with 4 or more years of time in service may contain a greater proportion of individuals who have not progressed to the next rank due to marginal performance or some type of disciplinary action.

Developing an Order of Merit List

The current data suggested that these variables could be used to ensure that the most qualified soldiers would be targeted for SF recruiting. In addition, the most qualified soldiers could potentially be given the first opportunities to attend SFAS. Two strategies were offered for accomplishing these goals. The first strategy used a point system to determine a soldier's Potential Success Score. Each of the nine Potential Success Scores was associated with an expected success rate. The second strategy used an equation to generate scores. Again, these scores were associated with expected success rates. Either of these strategies could be implemented to identify the soldiers most likely to succeed in SFAS.

At a minimum, this information could be used to target soldiers for recruiting who have the best chance for success, and advise a recruit regarding steps he could take to improve his chance for success. Specifically, marginally rated soldiers could be directed on improving their APFT scores, attending jump school, or studying and retaking the GT portion of the ASVAB as part of an academic remediation program. Beyond this, these methods could potentially be used to at least select out those soldiers who have the least chance of success in SF. For example, if the soldier who has applied only has a 25% chance of success in SFAS, he would not be allowed to attend. Further, a moderate cutoff rate could be set for selection of junior enlisted soldiers to attend SFAS, so soldiers would have at least a 40-50% chance of success, which would approximate the current overall success rate in SFAS.

Future Directions

Beyond the variables that were tested in these analyses, we are pilot-testing new measures in SFAS that could potentially be useful prescreening tools, such as measures of integrity, cognitive flexibility, and background reviews of criminal activity or financial problems. In addition, the Psychological Applications Directorate has recently begun collecting information on prior military course experience (other than airborne and ranger qualification) that requires some degree of intellectual or physical challenge. We expect that success in these courses (e.g., Expert

Infantry Badge, Expert Field Medical Badge, Air Assault, Pathfinder) will be correlated with a higher rate of success in SFAS.

Finally, these analyses examined the importance of previous branch type using the 11B, CMF11, and non-CMF11 categories. Some specific MOS, however, provide particularly relevant technical training for the parallel SF specialties; for example, 91B Medical Specialist skills correspond to those of 18D SF Medics. Future analyses could examine the relationship between previous MOS and success in SF selection and training at a more specific level, generating prediction models specific to each MOS. Another strategy would be a two-stage approach in which initial identification of soldiers is made based on the variables identified here, and classification is made based on more specific information such as specific prior MOS.

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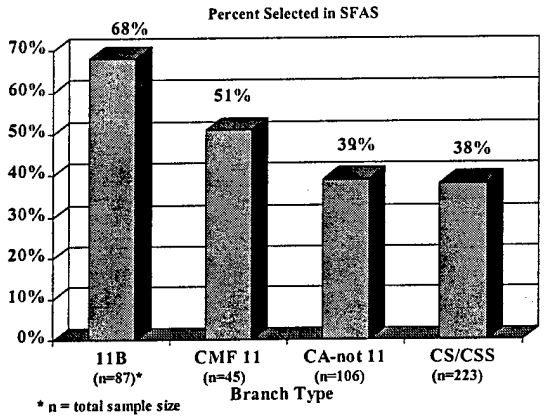
APPENDIX A
Sample Rating Sheet for Recruiters

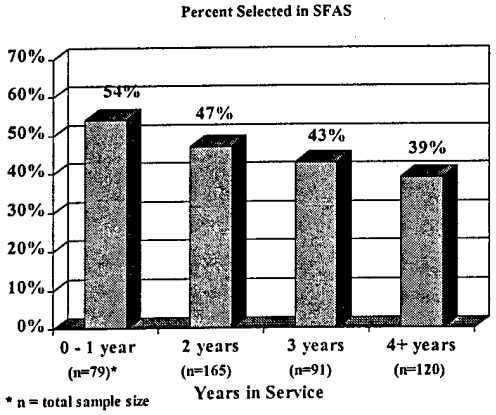
Assignment of Points			Total
1 point	2 points	3 points	
1) GT < 112	GT = 113 to 120	GT > 120	
2) APFT < 228	APFT = 228 to 245	APFT > 245	
3) Time in service > 3yrs	Time in service = 3yrs	Time in service < 3yrs	
4) Airborne = No		Airborne = Yes	
Decision Rules			Sum Total
1st Priority (Top recruit): Sum total = 9 to 12 points			
2nd Priority (Moderate recruit): Sum total = 8 points			
3rd Priority (Provide counseling/delay entry): Sum total = 4 to 7 points			

APPENDIX B
Study 2 Predictors of SFAS Selection

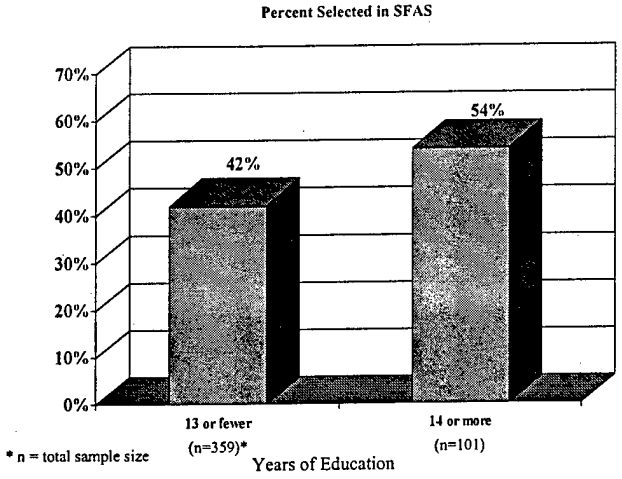
SFAS Select Rate by Branch Type



SFAS Select Rate by Years in Service

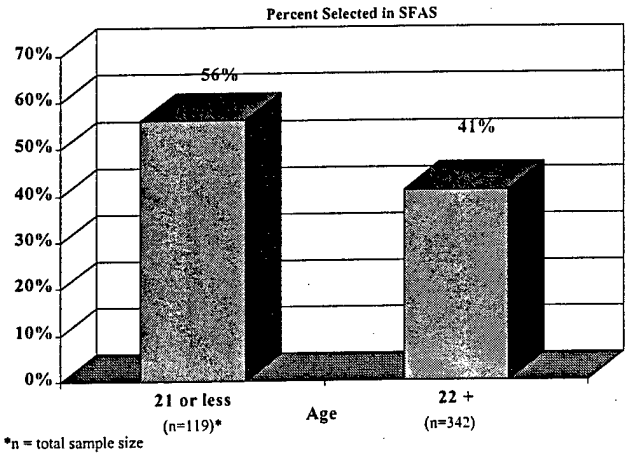


SFAS Select Rate by Years of Education



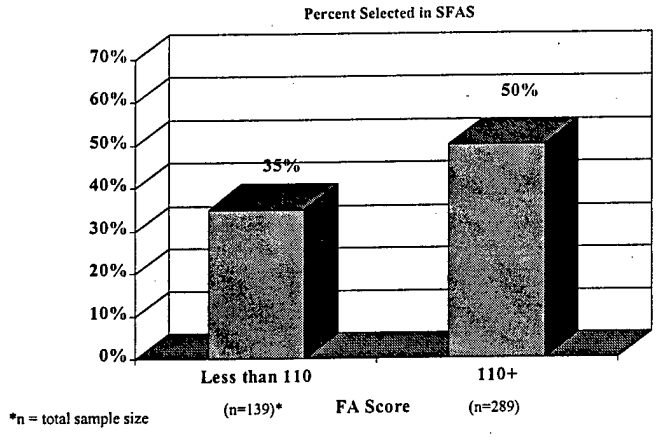
* n = total sample size

SFAS Select Rate by Age



*n = total sample size

SFAS Select Rate by FA Score



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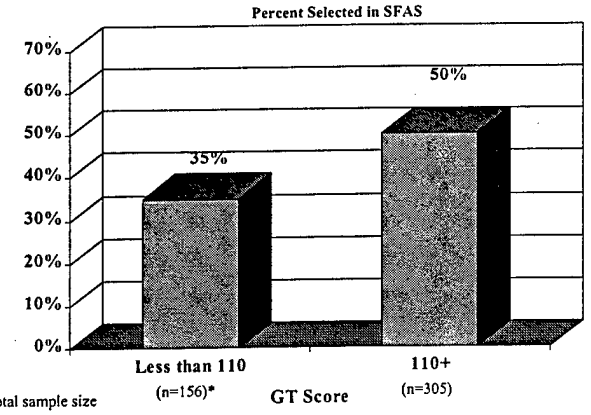
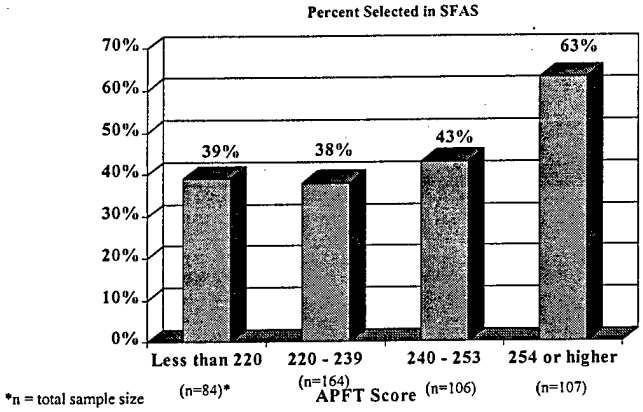
SFAS Select Rate by GT Score



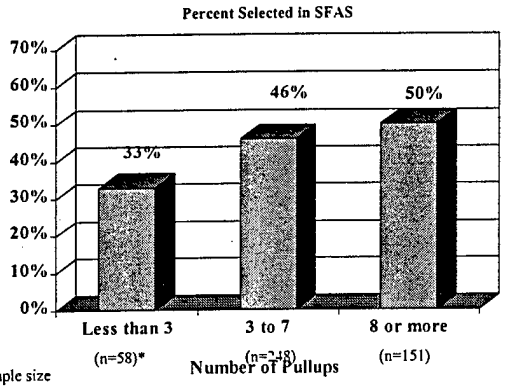
*n = total sample size

SFAS Select Rate by APFT Score



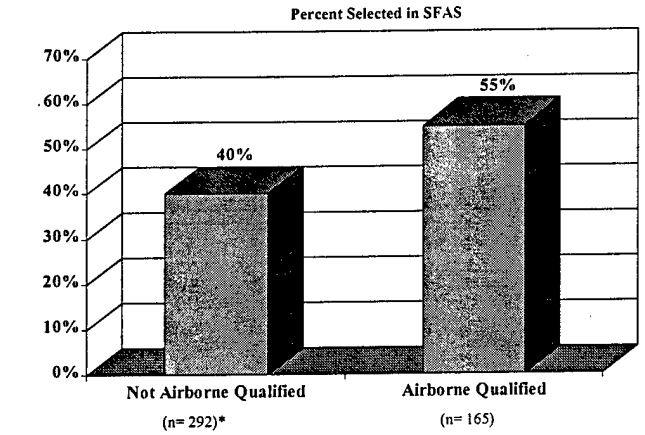
*n = total sample size

SFAS Select Rate by Pullup Score



*n = total sample size

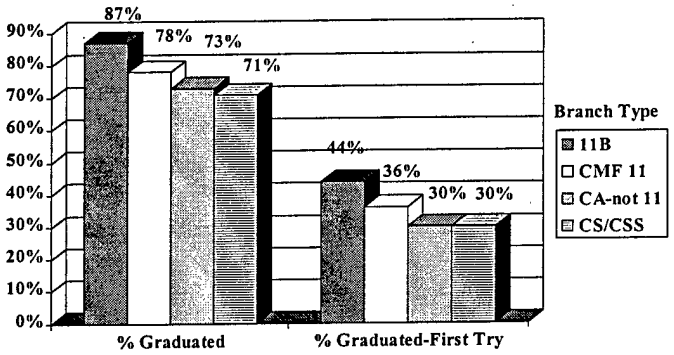
SFAS Select Rate by Airborne Status



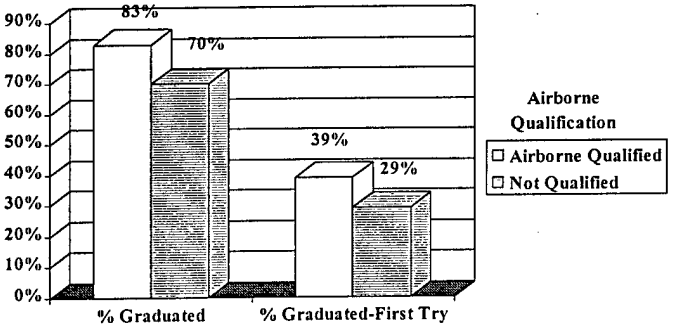
*n = total sample size

APPENDIX C
Study 2 Predictors of SFQC Outcomes

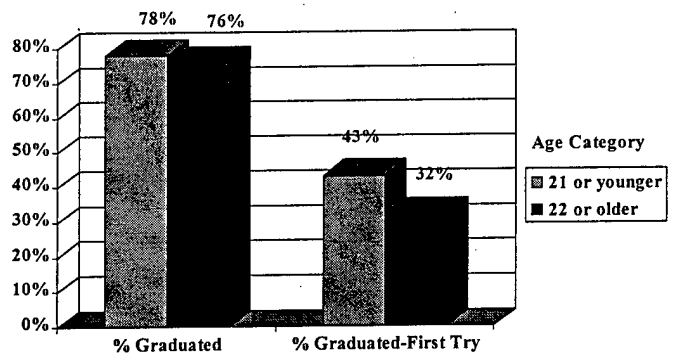
SFQC Overall Graduation and First Try Graduation Rates by Branch Type



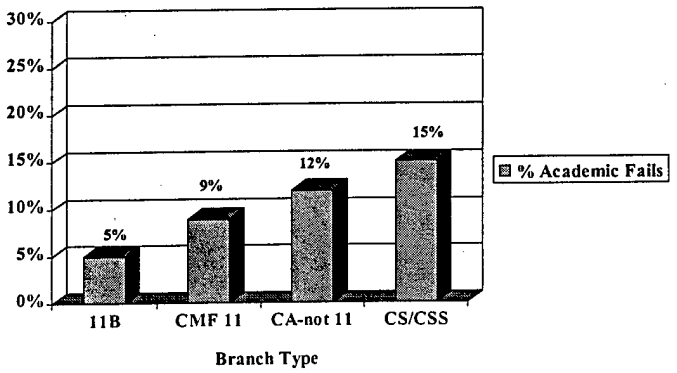
SFQC Overall Graduation and First Try Graduation Rates by Airborne Qualification



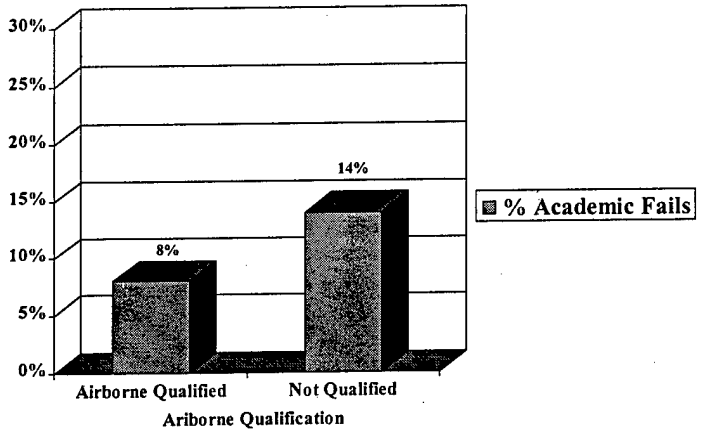
SFQC Overall Graduation and First Try Graduation Rates by Age



SFQC Academic Fails by Branch Type



SFQC Academic Fails by Airborne Qualification



SFQC Academic Fails by ASVAB GT Category