AFRL-HE-AZ-TR-1998-0077

UNITED STATES AIR FORCE RESEARCH LABORATORY

ENTRY TO USAF UNDERGRADUATE FLYING TRAINING

Joseph L. Weeks

Warren E. Zelenski

Training Effectiveness Branch
Warfighter Training Research Division
7909 Lindbergh Drive
Brooks Air Force Base TX 78235-5352

August 1998

AIR FORCE RESEARCH LABORATORY
HUMAN EFFECTIVENESS DIRECTORATE
WARFIGHTER TRAINING RESEARCH DIVISION
6001 South Power Road, Building 561
Mesa AZ 85206-0904

NOTICES

JOSEPH L. WEEKS
Project Scientist

DEE H. ANDREWS
Technical Director

LYNN A. CARROLL, Colonel, USAF
Chief, Warfighter Training Research Division

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	August 1998	Interim Report - April 1996 to May 1997

4. TITLE AND SUBTITLE

Entry to USAF Undergraduate Flying Training

5. FUNDING NUMBERS

C - F41624-95-D-5030-0005
PE - 62205F
PR - 1123
TA - B1
WU - 05

6. AUTHOR(S)

Joseph L. Weeks
Warren E. Zelenski

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Air Force Research Laboratory
Human Effectiveness Directorate
Warfighter Training Research Division, Training Effectiveness Branch
7909 Lindbergh Drive
Brooks Air Force Base TX 78235-5352

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Air Force Research Laboratory
Human Effectiveness Directorate
Warfighter Training Research Division
6001 South Power Road, Bldg 558
Mesa AZ 85206-0904

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

AFRL-HE-AZ-TR-1998-0077

11. SUPPLEMENTARY NOTES

Air Force Research Laboratory Technical Monitor: Dr Joseph L. Weeks, (210) 536-3922, DSN 240-3922

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

Undergraduate flying training qualification and selection standards are closely examined for each of the major points of entry. Individuals who qualified and were selected for pilot and navigator training in 1995, 1996, and 1997 are described by gender and racial/ethnic subgroup. Observed differences in selection ratios for gender and racial/ethnic subgroups are statistically evaluated. Results indicate that selection for flying training is not contingent on gender. Selection is not contingent on racial/ethnic status on most occasions. For the Air Force Academy, Class of 1996, and for the Reserve Officer Training Corps (ROTC), FY96 Board 1, pilot selection ratios for minority applicants are statistically significantly lower than those for majority applicants. Detailed analyses revealed that lower officership ratings, grade point averages, physical fitness test scores, and flight screening performance averages account for lower minority selection ratios on these occasions. Although cognitive ability test scores are used to express qualification minimums for some points of entry, ability test scores have little influence on pilot and navigator selection decisions. Recommendations are made to establish databases to allow observation of the limiting affects of flying training qualification standards and to revise ROTC selection procedures to minimize minority attrition during undergraduate flying training.

14. SUBJECT TERMS
AFOQT; Air Force Officer Qualifying Test; Personnel selection; Pilot selection; Pilot training; Navigator training; Training; UFT; Undergraduate flying training;

15. NUMBER OF PAGES
95

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION ABSTRACT
Unclassified	Unclassified	Unclassified	UL

CONTENTS

FIGURES

CONTENTS (Continued)

TABLES

CONTENTS (Continued)

PREFACE

This research is being conducted by the Air Force Research Laboratory, Human Effectiveness Directorate, Warfighter Training Research Division (AFRL/HEA), Training Effectiveness Branch, under Work Unit 1123-B1-05, Improvement of the Integrated Decision Modeling System and Application to Aircrew Selection.

In October 1995, HQ USAF/DP (Lt Gen Eugene Habiger) requested a study of aircrew selection procedures. The initiative was entitled "Selection of Warriors" and emerged from two considerations. First, racial/ethnic minorities display a higher rate of attrition from undergraduate flying training than majority candidates. Second, racial/ethnic composition projections of the national population, and social and political pressures to create a military representative of that population suggest that flying training applicant pools will be composed of greater proportions of racial/ethnic minorities. On these considerations, it was proposed that we examine selection procedures to identify improvements that would help minimize minority attrition during flying training.

In November 1995, HQ USAF/DP issued separate letters to the Unites States Air Force Academy (USAFA/CC) and Air Education and Training Command (AETC/CV) requesting support. In December 1995, a research proposal was submitted to USAF/DPI. By April 1996, Metrica, Inc. was awarded R&D contract F41624-95-D-5030-0005. Currently, selection data for undergraduate pilot and navigator training applicants are being collected. Metrica, Inc. is compiling these data for processing and analyses. This interim report provides information on progress to date.

Current and past members of this branch (Dr Joe Weeks, Maj Warren Zelenski , Capt Anne Duke, and Lt Lisa Harrigan) would like to thank Lt Gen Eugene Habiger for the privilege of conducting this research. In addition, we want to acknowledge the technical assistance provided by Dr Bryce Stone, Mr Jonathan Fast, Ms Sandra Cartagena, and Mr John Quebe of Metrica, Inc. and to thank those individuals who assisted in the information collection. These individuals include: Lt Gen Paul E. Stein (USAFA/CC); Maj Gen John C. Griffith (AETC/CV); Lt Col Dan Beatty and Maj Mike McLaughlin (AETC/XOTI); Maj Tom Gill (HQ AFROTC/RRFY); Maj Dave Bertrand and Maj Mike Warlick (AFRS/ROO); Maj Jim Curtis (AFPC/DPAOY3); Maj Larry Marvin, Maj Steve Tindall, and Capt Tim Tremper (619 TRSS); Capt Maurice Newton (USAFA/34 OSS); and Mr Curt Lambert (HQ USAF/DPPR).

Please direct questions to Joe Weeks, AFRL/HEAB, 7909 Lindbergh Drive, Brooks AFB, TX 78235; telephone (210) 536-3922; (DSN) 240-3922. Send e-mail to joseph.weeks@williams.af.mil.

ENTRY TO USAF UNDERGRADUATE FLYING TRAINING

SUMMARY

Entry to undergraduate flying training is considered from a broad perspective. Nine barriers to entry to pilot training and eight barriers to entry to navigator training are identified. In addition to a structural description of the entry process, demographic characteristics of potential applicants, qualified applicants, and selected candidates are described. Gender and racial/ethnic composition of the national population provides the context for considering the demographic composition of pools of individuals awarded bachelors degrees, officer accession pools, and pilot/navigator candidate pools. Comparisons of the composition of the national population with the base pool of individuals awarded bachelors degrees suggest that the college education requirement imposes a strong barrier to entry of minority members and a weak barrier for majority members and women. The choice of military employment represents a strong barrier for the accession of women but a relatively weak one for the accession of minorities. For most applicants, the choice of an aviation career and flying training qualification imposes stronger limits on entry than selection and flying training production barriers. Compared to officer accession pools, flying training candidate pools consist of a smaller percentage of women and racial/ethnic minorities and a greater percentage of White men. Examination of pilot and navigator candidate pools indicates greater gender and racial/ethnic diversity for navigator candidate pools.

Special focus is given to the selection process for the Air Force Academy (AFA), Reserve Officer Training Corps (ROTC), Officer Training School (OTS), and entry from active duty. The numbers of individuals in gender and racial/ethnic subgroups who were selected and not selected for pilot and navigator training in 1995, 1996, and 1997 were statistically evaluated. Results indicate that selection is not dependent on gender. Results indicate that selection is not dependent on racial/ethnic status except in two instances where minority applicants were found to have lower average values on key factors evaluated in the selection process. For AFA, Class of 96, and for ROTC, FY96 Board 1, pilot selection rates for minority applicants were statistically significantly lower than those for majority applicants. Detailed analyses revealed that lower officership ratings, grade point averages, physical fitness test scores, and flight screening performance averages accounted for lower minority pilot selection rates. Cognitive ability test scores have little influence on pilot selection decisions for the major producers of flying training candidates, ROTC and AFA.

The primary objective of this research effort was to examine selection procedures and recommend improvements that would help minimize minority attrition during undergraduate flying training. Selection data are being collected and analyzed to specify baseline selection policies for AFA, OTS, and the active duty points of entry. ROTC selection policy is fully specified in the form of the Categorization Order of Merit (COM) equation. Revisions to ROTC selection policy are suggested and tradeoffs identified for pilot selection but, in principle, they are also applicable to navigator selection. Recommendations to ROTC pilot qualification standards and selection policy follow:

(1) In accordance with AFROTCI 36-2013, minimum qualifying score on the Air Force Officer Qualifying Test (AFOQT) Pilot composite should continue to be the 25th percentile. Evidence indicates that AFOQT scores for racial/ethnic minority applicants are lower, on average, that those for majority applicants. Compared to the previously used 50th percentile minimum, a minimum qualifying score at the 25th percentile will allow for the qualification of greater numbers of minority applicants;

(2) in accordance with AFROTCI 36-2013, the AFOQT Pilot composite score should continue to be used in the COM equation. Compared to the previously used Verbal and Quantitative composites, the Pilot composite is a more valid indicator of pilot training performance; and

(3) the COM equation established by AFROTCI 36-2013 should be revised to increase the weight for the AFOQT Pilot composite so that the influence of potential for success in pilot training (AFOQT) and the influence of officer potential (Relative Standing Score) are equally balanced. Such a revision would reduce both minority attrition and overall attrition rates. However, review and evaluation of this recommendation should include consideration of two key tradeoffs. First, an increase in the COM weight for the AFOQT could result in lower minority selection rates. Although minority selection rates could be lower, those minority candidates selected would be less likely to be eliminated from training. Second, such a change in the COM equation could affect selection of cadets from some ROTC detachments. Detachments that submit applicants who have low AFOQT scores would experience low selection rates. Detachments that consistently fail to place cadets in flying training could become less attractive to prospective cadets. As a result, recruiting and detachment viability could be adversely affected in the long term.

Management of selection policy represents only one of several means of controlling flying training attrition. As the national population continues to diversify, and social and political pressures to create a military representative of that population persist, changes in the approach to flying training should be considered. If average ability levels of flying training candidates decline and attrition rates increase as the population continues to diversify, an adaptive approach to training is recommended. Adaptive training is a feedback-intensive approach that adjusts to individual student ability levels by providing more training time for students who encounter training difficulties. High minority attrition in flying training is a complex problem. It is unlikely that it will be minimized by a narrow approach based on management of selection policy alone. A multifaceted approach based on coordinated and integrated management of recruitment, qualification, selection, and training is recommended.

ENTRY TO USAF UNDERGRADUATE FLYING TRAINING

INTRODUCTION

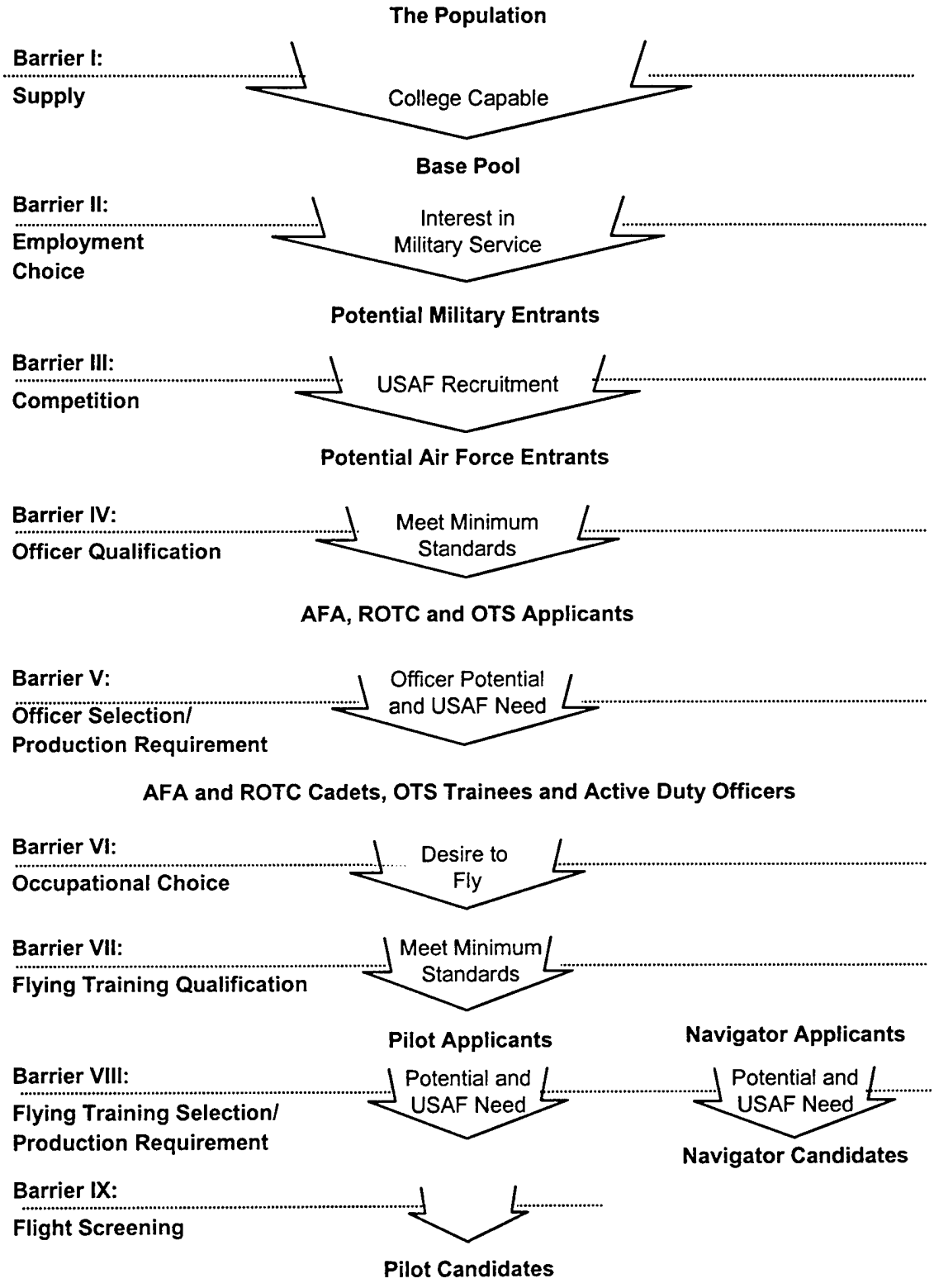
Entry to undergraduate flying training is a privilege reserved for those individuals who possess the physical, intellectual, and motivational characteristics deemed necessary to perform well as aviation officers. To assure that individuals who enter training possess required characteristics, barriers are erected across points of entry. Barriers to entry are conceived as a diverse set of constraints which originate in the individual (e.g., employment and occupational choice) and which are imposed on the individual (e.g., qualification standards). Eight barriers to entry to navigator training and nine barriers to entry to pilot training are identified. Figure 1 provides a simple, notional, but inclusive representation of the barriers to flying training. As depicted, barriers restrict the passage of individuals from the general population to the pools of pilot and navigator candidates. The barriers differ in strength (i.e., the effect to which they limit passage), and evidence indicates the strength of some barriers vary over minority subgroups.

Barriers to flying training entry are depicted as sequential events, however, the order of occurrence of these barriers varies over individuals. Many individuals confront the occupational choice barrier early in life--their choice of a flying career then drives their future choices for college education and military service. Other individuals choose employment with the Air Force as a means to finance their education and afterwards choose aviation as an occupational specialty. The order of occurrence of these barriers also varies over points of entry. Flight screening, for example, is a barrier encountered by all candidates for USAF pilot training. For entry through the Air Force Academy, flight screening is a qualification barrier encountered prior to selection. For all other points of entry, flight screening is encountered after selection.

Points of entry to undergraduate flying training are many—entry from active duty, the three commissioning programs, entry from the Air National Guard, Air Force Reserve and international sources. Points of entry examined in this study are limited to the Air Force commissioning sources (the Air Force Academy, AFA; the Air Force Reserve Officer Training Corps, ROTC; and the Air Force Officer Training School, OTS) and entry of active duty officers in accordance with procedures established by the Air Force Personnel Center (AFPC). The sequence of barriers depicted in Figure 1 is a general conceptual model for these points of entry.

The **supply barrier** limits the number of entrants from the general population to the base pool. The supply barrier consists of limitations which include age and educational standards. Because individuals may approach flying training while in the process of obtaining a bachelor's degree (AFA and ROTC) or after obtaining a bachelor's degree (OTS and active duty), the base pool is defined as "college-capable" individuals. College-capable individuals consist of those who have the financial means, opportunity, intellectual capacity and motivation to complete college. The **employment choice barrier** operates to partition the base pool into three groups: individuals who would not consider employment in the military, those who are interested in employment in either the private sector or the military, and those who are interested in

Figure 1. Barriers to Entry to Undergraduate Flying Training



employment only in the military. A **competition barrier** confronts individuals in the latter two groups. Recruitment offices from private sector companies and the military services attempt to influence individual employment choice as they compete for new employees. Individuals in these two groups are the focus of recruitment programs of both private sector companies and the services. This complex intersection of employment choice and recruitment effort is considered a competition barrier from the perspective of military recruitment.

Applicants to flying training must first qualify for officer commissioning. Officer accession procedures vary across commissioning sources (Brown, 1987; Smith, 1990; & Stokes, 1984). Recruitment for each source focuses on different groups of individuals. Qualification standards and selection factors vary, consequently, the **officer qualification barrier** varies in strength for each commissioning source. Individuals may have multiple opportunities to penetrate this barrier. An individual who fails to meet entry qualifications for the AFA may later be accessed through ROTC or OTS. A subset of qualified applicants to each commissioning source is selected for officer commissioning on the basis of officer potential and the needs of the Air Force expressed as an officer production requirement (e.g., the number of officers required annually). The selection process and subsequent successful completion of a commissioning program constitute the **officer selection/production requirement barrier**. Individuals may have several opportunities to negotiate the selection processes for different commissioning sources. Once selected, individuals generally have only one opportunity to attempt a commissioning program. Failure to successfully complete a commissioning program normally disqualifies an individual from seeking a commission through another source.

AFA cadets, ROTC cadets, OTS applicants, and active duty officers comprise the pool from which flying training applicants emerge. An **occupational choice barrier** distinguishes members of this pool with a desire to fly from those who do not. Individuals who desire to enter flying training must overcome **flying training qualification barriers**. Flying training qualification standards are different from those used for officer commissioning, they vary by point of entry and they are different for pilot and navigator training. Qualification standards include medical standards, anthropometric standards and, for some points of entry, ability test score minimums, and successful performance in flight screening. There are, no doubt, individuals who wish to fly but do not apply because they are aware they fail to meet qualification standards (e.g., exceed maximum height standards). There is no source of data that indicates how many individuals fall into this category. Other individuals apply, but their applications are rejected because they fail to meet qualification standards. Data on individuals in this category are perishable and diffused across many military personnel flights, ROTC detachments, and recruiting squadrons. Estimates of the independent strengths of the occupational choice and flying training qualification barriers were not possible with information available for this study.

Qualified applicants are selected for training on the basis of selection factors and Air Force needs expressed as pilot and navigator production requirements (e.g., the number of pilot and navigator training candidates required annually). The selection process and the number of training authorizations at each point of entry constitute the **flying training selection/production requirement barrier**. Selection boards consisting of rated officers convene at least annually for each point of entry. Board members evaluate applicants with respect to selection factors and these evaluations are used to rank order applicants. Selection status is typically determined by

applying production quotas against the rank ordered list of applicants. If the production requirement exceeds the number of qualified applicants, all applicants can be selected. For the next several years at the AFA, it is expected that pilot and navigator production requirements will exceed the number of qualified applicants. In this case, qualification is tantamount to selection. Conversely, if the number of applicants exceeds the production requirement, merit rank order, as determined by selection policy, is referenced to choose candidates. The strength of this barrier varies greatly from year to year and over points of entry. Individuals may have several opportunities to pass this barrier; officers not selected for flying training in their commissioning programs may later apply while on active duty.

Pilot candidates must successfully complete flight screening before entry to Specialized Undergraduate Pilot Training. As already noted, the **flight screening barrier** is encountered before selection by AFA cadets, and after selection by candidates from all other sources. For the AFA, flight screening is a qualification barrier. AFA pilot applicants must successfully complete flight screening to qualify to apply for pilot training and flight screening performance is one of several factors referenced during selection.

OBJECTIVES

In addition to providing a structural description of the entry process, the following objectives are addressed. The first objective is to determine the gender and racial/ethnic composition of subgroups selected and not selected for pilot and navigator training at each point of entry. The second objective is to take a close look at selection procedures and policies for the purpose of recommending improvements that could reduce minority flying training attrition. This interim report describes results for the first objective and for part of the second objective. For the second objective, the ROTC selection policy used for choosing pilot and navigator training candidates in FY96 is described and recommendations for improvement are suggested. For AFA Class of 1996, exploratory analyses from a preliminary effort to determine AFA pilot selection policy are discussed. Data are currently being collected and analyzed to fully specify pilot and navigator selection policies used by the AFA, OTS and AFPC (for active duty entry).

APPROACH

A broad perspective is adopted to identify all barriers to entry to flying training. Individuals selected as pilot and navigator candidates are considered in the context of the demographic composition of the national population, the base pool of individuals who receive bachelor's degrees, officer accession pools, and flying training applicant pools. When data were available, the strength of the limiting effects of barriers was estimated. The strength of barriers is indicated in two ways. In the first case, it is indicated by the difference between the percentage of individuals in a pool prior to and after barriers are imposed. For example, the difference between the percentage of minorities in the national population and the percentage of minorities in the pool of college graduates represents the limiting effects of opportunity, motivation, academic standards and financial requirements associated with obtaining a bachelor's degree. In some cases, the strength of barriers is represented as the ratio of the number of individuals in a pool after barriers are imposed to the number of individuals in the pool before barriers were imposed.

Data were not available to estimate the independent effects of flying training qualification standards. If data had been available, the strength of this barrier would have been expressed as a qualification ratio. Such a ratio would consist of the number of individuals who choose to apply for flying training and who satisfy all qualification standards (i.e., qualified applicants) over the total number of individuals who apply for flying training (i.e., total applicants). Although records were available for qualified applicants, records for individuals who apply for flying training but fail to satisfy qualification standards are not systematically maintained. This is a serious inadequacy in the study because it would have been desirable to produce a baseline estimate of the independent effects of qualification standards as a reference for future efforts to manage entry into flying training. To provide a rough idea of the limiting effects of qualification standards, the combined effects of occupational choice and qualification standards are estimated by the difference between the number of individuals in the officer accession pool and the flying training candidate pool. The relative contributions of occupational decisions and qualification standards to this difference are unknown.

Data were available to estimate the strength of the limiting effects of selection and production requirement barriers. Although occupational choice and qualification standards should be estimated independently, the limiting effects of selection and production requirements should be estimated jointly because the limiting influence of selection policy is dependent upon production requirement. When the production requirement, expressed as the number of flying training authorizations, exceeds the number of qualified candidates, selection policy has little influence. When the number of qualified applicants exceeds production requirements, selection policy has an important influence. The strength of the combined limiting effect of these barriers is expressed as a selection ratio. A selection ratio consists of the number of candidates selected over the total number of qualified applicants. A selection ratio of 1.00 indicates that all qualified applicants are selected and implies that the combined limiting effect of flying training selection and production requirements imposes no limit on entry. This occurred for AFA Class of 1997. There were a total of 425 flying training authorizations and 401 qualified applicants. All applicants were selected resulting in a selection ratio of 1.00 (i.e., 401/401). A selection ratio of 0.00 indicates that no applicants are selected and implies that selection and production requirements operate to prevent entry of all qualified applicants. Selection ratios indicate the effects of flying training selection and production requirements but provide no information concerning the limiting effects of preceding barriers. Observed differences in selection ratios for different gender and racial/ethnic subgroups are statistically evaluated and, when significant differences are detected, the selection process is examined in detail.

To collect data on flying training applicants and the selection process, Air Force Research Laboratory (AFRL) personnel attended and observed selection boards at the Air Force Academy, Headquarters AFROTC, Headquarters Air Force Recruiting Service, and the Air Force Personnel Center. At each site, AFRL observers witnessed instructions provided to board members, reviewed each organization's written directives, and collected applicant data to permit analysis in this and follow-on research.

RESULTS

An indication of the limiting effect of the supply barrier can be obtained by comparing the gender and racial/ethnic distribution in the general population with that for college graduates.

The relevant general population was identified as individuals from 17 to 24 years of age. Gender and racial/ethnic distribution within this age group was obtained from census projections for 1995 (Day, 1996). [Throughout this report, racial/ethnic minorities are identified using the same designations as agencies providing data in source documents. Racial/ethnic subgroups recorded by USAF points of entry differ, in some cases, from those reported by the U.S. Census Bureau. In this report, racial/ethnic minority subgroups are often combined into a single category, *minority*, to facilitate presentation of information or to create a group large enough to permit statistical analyses.]

The distribution of individuals receiving bachelor's degrees in the 1993-1994 school year (U.S. Department of Education, 1994) represented the base pool for officer commissioning. Table 1 presents estimates of the population and the base pool by gender and racial/ethnic subgroup. Women constituted 49% of the relevant population but received 55% of the bachelor's degrees awarded. These data suggest that the supply barrier consisting of educational attainment is a weak limit on the entry of women. It is estimated that Whites constituted 68% of the population, but received 79% of the bachelor's degrees. All racial/ethnic minorities combined constituted 32% of the relevant population, yet these groups received only 16% of the bachelor's degrees. The supply barrier consisting of educational achievement imposes a strong limit on the entry of racial/ethnic minorities. The American education system has been criticized for failure to provide sufficient numbers of qualified minorities for the military services (Scarborough, 1996). It is important to note that educational achievement is a function of both the intellectual capability and motivation to complete a baccalaureate program as well as the opportunity and financial means to do so. The data presented do not indicate the extent to which minority underrepresentation in the college graduate pool may be due to lack of ability or lack of opportunity.

The strengths of the employment choice and competition barriers may be impossible to determine with confidence. The Defense Manpower Data Center (DMDC) conducts an annual survey to track American youth's propensity for military enlistment (Defense Manpower Data Center, 1997). Survey respondents are asked "How likely is it that you will be serving on active duty in the {*name of service*}" for each of the services. The survey does not specifically query youths on their likelihood of entering commissioning programs. Table 2 summarizes the percentage of youths surveyed in 1996 who indicated they would "definitely" or "probably" serve in the Air Force or in any military service (composite propensity).

Table 2 reveals that Black and Hispanic men were roughly twice as likely as White men to indicate they would serve in the Air Force or any military service. Black and Hispanic women were roughly three times as likely as White women to indicate they would serve in the Air Force or any military service. Men displayed greater propensity toward military service than women, responding positively nearly twice as often. The employment choice barrier, as indicated by propensity to serve in the military, appears to be a weak barrier for the passage of racial/ethnic minority members to the pool of potential military entrants. Employment choice appears to impose a strong restriction on the number of women who seek military entry. The DMDC survey disclosed that members of all groups, with the exception of Black men, expressed a higher propensity to serve in the Air Force than in any other service. Black men indicated greatest propensity to serve in the Army. An additional finding is that propensity to serve among

all groups decreased with age and education. Respondents finishing high school indicated highest propensity to serve in the military.

Table 1. Estimates of Supply Pool and Base Pool Composition by Gender and Racial/Ethnic Subgroup

Groups	Women	Not of Hispanic Origin				Hispanic Origin[c]	Total Minority
		White	Black	American Indian[a]	Asian[b]		
Supply Pool, Youth Population - 17-24 Years of age[d]	**49%**	**68%**	14%	0.9%	3.7%	14%	**32%**
Base Pool, Bachelor's Degree Recipients, 1993-94[e]	**55%**	**79%**	7.0%	0.5%	4.7%	4.2%	**16%**[f]

[a] American Indian represents American Indian, Eskimo, and Aleut.
[b] Asian represents Asian and Pacific Islander.
[c] Persons of Hispanic origin may be of any race. The information on the total and Hispanic population was collected in the 50 States and the District of Columbia and does not include residents of Puerto Rico.
[d] Data extracted from Day, 1996. Projections of the population by age, sex, race, and Hispanic origin for the United States: 1995 to 2050, Table 2.
[e] Data from U.S. Department of Education, 1994. Number and percent distribution of degrees offered by institutions of higher education, by level of degree, control of institution, race / ethnicity and sex of recipient: 50 states and the District of Columbia, 1993-94, Table A-2.
[f] Some degree recipients had no reported racial/ethnic category; sum of White and Total Minority columns is less than 100%.

Table 3 presents USAF FY92-FY96 officer accessions from all sources by gender and racial/ethnic subgroup. Comparison of the base pool of college graduates in Table 1 and officer accessions in Table 3 provides a general indication of the combined limiting effects of employment choice, competition, qualification standards, and selection/production requirements for officer commissioning. Table 1 indicates individuals in racial/ethnic minority subgroups accounted for 16% of those awarded bachelor's degrees during the middle year of this period (1993-94). Table 3 indicates minority officer accessions ranged from 10% to 17% of total officer accessions over the five-year period. Table 3 provides proportions of racial/ethnic minority officer accessions that compare favorably with the proportion of minority members receiving bachelor's degrees. For this period, the same comparison for women is much different. Women received 55% of the bachelor's degrees while the proportion of women officer accessions ranged from 22% to 25%. Officer accessions represent the pool from which applicants who intend to enter flying training emerge. In general, pools of women and minority officers are small relative to majority officers. The number of women and minority officers are further reduced as a consequence of occupational choice, flying training qualification standards and selection/production requirement barriers.

Table 2. American Youth (Ages 16-24), Composite and USAF Specific Propensity to Serve by Gender and Racial/Ethnic Subgroup, Fall 1996

	Men			Women		
Type	White	Black	Hispanic	White	Black	Hispanic
Composite	15.2%	27.5%	39.3%	6.4%	18.9%	20.7%
USAF Specific	6.9%	10.8%	20.4%	3.1%	10.0%	10.6%

Data extracted from Defense Manpower Data Center (1997), Tables 3-11 and 3-12

The occupational choice barrier includes the limiting effects of interests and opportunity. Information was collected to estimate the independent limiting effect of occupational choice. Table 4 presents the gender and racial/ethnic distribution of students enrolled in a national sample of college and university aviation training programs in March 1996 (Metrica, Inc., 1996). These data provide an indication of interest in aviation free from the confounding influence of Air Force officer commissioning standards and flying training qualification standards. Racial/ethnic affiliation was determined by self report. During data collection, the racial/ethnic category "Other Minority" was defined as a residual category (i.e., not Black or Hispanic); the category was not created by collapsing other categories like American Indian or Asian. Therefore, the actual racial/ethnic affiliation of students who reported affiliation with the "Other Minority" category is unknown. Also, it should be noted that the percentage of students in the "Other Minority" category in Table 4 (7.1%) is a little larger than what would be expected on the basis of data provided in Table 1. American Indians and Asians make up 4.6 percent of the population of individuals 17 to 24 years of age and 5.2 percent of the base pool of bachelor's degree recipients. Notwithstanding these anomalies, the data are interesting because they fail to support a popular hypothesis about minority access to aviation experiences.

Comparisons of the base pool of college graduates in Table 1 and the pool of individuals enrolled in civilian aviation programs in Table 4 provide an indication of the limiting effect of occupational choice. Table 1 indicates that those awarded bachelor's degrees consist of 79% White students and 16% minority students. Table 4 indicates that aviation program enrollees consist of 81% White students and 19% minority students. The percentages of students who are awarded bachelor's degrees (16%) is assumed to be the same as the percentage of minorities enrolled in aviation programs (19%) except for sampling fluctuations. The data presented in Table 4 suggest that minority representation in college aviation programs is very similar to minority representation in college. This finding is surprising! The popular hypothesis is that recruitment of minorities into USAF aviation careers is not only hampered by the college degree requirement but also by minorities' lack of interest in and access to aviation experiences. If this hypothesis were true we would expect to observe a lower percentage of minorities enrolled in civilian aviation programs. This hypothesis is not supported by data collected in this study. Minority interest in and access to aviation experiences is similar to the percentage of "college capable" minorities. The tables also reveal that only 16% of the aviation program enrollees are women, while 55% of the individuals awarded bachelor's degrees are women. These

comparisons suggest that the occupational choice barrier imposes little or no limit on the entry of minorities but a strong limit on the entry of women.

The effects of flying training qualification standards vary by point of entry. Qualification standards common to all points of entry are medical and anthropometric standards (Appendix A). Medical standards are imposed to ensure aviators are physically capable of performing duties in conditions encountered in flight. Certain disqualifying conditions are known to be gender or race related (e.g., color vision deficiencies occur nine times more often among males than females; sickle cell anemia primarily afflicts individuals of African ancestry). Although records of medical examinations are maintained for each applicant examined, there is no consolidated medical examination data base which permits determination of the frequencies of disqualifying

Table 3. Officer Accessions by Gender and Racial/Ethnic Subgroup, FY92-FY96

Group	FY92	FY93	FY94	FY95	FY96
Total Accessions[a]	4,838	4,753	4,890	5,015	4,696
White, Non-Hispanic	4,319 (89%)	4,103 (86%)	4,298 (88%)	4,324 (86%)	3,891 (83%)
Black, Non-Hispanic	242 (5.0%)	310 (6.5%)	238 (4.9%)	290 (5.8%)	354 (7.5%)
Hispanic	50 (1.0%)	108 (2.3%)	97 (2.0%)	93 (1.9%)	107 (2.3%)
Other Minorities	227 (4.7%)	232 (4.9%)	257 (5.3%)	308 (6.1%)	344 (7.3%)
Total Minorities	519 **(11%)**	650 **(14%)**	592 **(12%)**	691 **(14%)**	805 **(17%)**
Women	1,044 **(22%)**	1,054 **(22%)**	1,151 **(24%)**	1,128 **(23%)**	1,170 **(25%)**

Note. For any given year, the total number of individuals in all subgroups exceeds the total number of accessions because of double counting in the case of multiple subgroup membership. For example, Black women would be counted once for membership in the Black subgroup and counted again for membership in the subgroup of women. Data provided by HQ USAF/DPPR.

[a] Total accessions include cross-service academy transfers.

medical conditions among gender and racial/ethnic subgroups. The independent limiting effect of medical standards on gender and racial/ethnic subgroup cannot be determined.

Anthropometric standards, expressed as maximum and minimum standing and sitting height, limit the range of body sizes of entrants to flying training. These standards have been used as specifications for the design of aircraft crew stations and equipment; manufacturers must ensure their products can accommodate the full range of expected operator sizes. Zehner (1996) estimates that current anthropometric standards would limit only 6% of the male military population from eligibility for pilot training, but would limit 55% of the female military population. Zehner estimates current standards would limit 18% of Black males and 83% of the Black female military population from eligibility for pilot training. Therefore, anthropometric standards probably impose a weak limit on the entry of men to flying training but a strong limit on the entry of women. The barrier is stronger for minority applicants than for White applicants. Zehner (1996) indicates that new Air Force aircraft, such as the T-6 Texan II trainer, are being designed to accommodate a wider range of body sizes. As these aircraft come into service, current anthropometric standards may be relaxed to allow greater numbers of women and racial/ethnic minority members to qualify for training. Additional qualification standards and the effects of the flying training selection/production barrier are discussed for each point of entry in the pages that follow.

Table 4. College/University General Aviation Program Enrollment, Spring 1996

by	Total	Women	White	Black	Hispanic	Other Minority	Total Minority[a]
Count	1,358	216	1,103	94	64	97	255
Percent	100%	**16%**	81%	6.9%	4.7%	7.1%	**18.8%**

Note. Data represents a national sample of 23 college/university aviation programs accredited by the Aviation Accrediting Association, Auburn, Alabama.

[a] Black, Hispanic and Other minorities combined

Air Force Academy (AFA)

Table 5 presents AFA officer accessions, FY92-FY96, by gender and racial/ethnic subgroup. Percentages in the last column describe FY96 accessions only. Of the 909 officers commissioned from the AFA class of 1996, 178 were racial/ethnic minority members and 119 were women. The percentage of racial/ethnic minority accessions (20%) is greater than the percentage of minorities in the base pool of college graduates (16%) but much less than the percentage of minorities in the general population (32%) presented in Table 1. A subset of the members of the class of 1996 applied for and qualified for pilot training. A subset of these applicants was selected as pilot candidates. The relative proportions of minorities and women among those allowed passage into the pilot applicant and pilot candidate pools were reduced through the effects of the occupational choice, flying training qualification, and selection/production requirement barriers.

AFA Pilot Entry. For AFA cadets who choose pilot training, qualification includes reference to medical standards, anthropometric standards, and successful performance in a flight screening program. A subset of AFA pilot qualification standards is presented in Appendix A.

Flight screening consists of flight instruction in a single-engine, propeller-driven, low-wing aircraft capable of aerobatic maneuvers. Only the AFA requires applicants to complete flight screening for qualification prior to meeting a selection board. For other points of entry, individuals must complete flight screening after selection. AFA pilot training qualification standards are also unique in the omission of a standard used at all other points of entry--attainment of minimum scores on the Air Force Officer Qualifying Test (AFOQT).

AFA cadets who apply for pilot training and satisfy all qualification standards are evaluated for selection during their senior year. The AFA pilot selection board convenes annually in January (and at other times, as needed) on site at the AFA to select candidates who will graduate in June. The selection board consists of six or seven AFA faculty members and a non-AFA representative. All members are pilots. Board members are provided instruction on the selection process, then evaluate hundreds of applicants' selection folders over a 3-4 day period.

Applicant selection folders contain a Cadet Administration Management Information System (CAMIS) sheet, evaluations by faculty members and an optional letter written by the cadet. The CAMIS sheet provides detailed information in the following categories: personal data, academic performance, military performance, athletic performance, honors data, flight screening performance, participation in airmanship and aviation courses, involvement in clubs, probation history, and AFOQT scores. Although AFOQT scores are not used for qualification, pilot training applicants are required to take the AFOQT and these scores are provided to the selection board. The extent to which AFOQT scores are referenced in the selection process has not been documented. Selection board members are not provided explicit information that indicates the racial/ethnic and gender identity of applicants, although narrative statements in cadet evaluations may denote cadet gender.

Board members are instructed to adopt the "whole-person concept" as the basis for evaluating applicants. The whole-person concept requires that evaluation not be based on a

Table 5. AFA Officer Accessions by Gender and Racial/Ethnic Subgroup, FY92-FY96

Group	FY92	FY93	FY94	FY95	FY96	FY96 Percent
Total Accessions	1,053	956	1,000	975	909	-
White, Non-Hispanic	902	769	840	835	731	80%
Black, Non-Hispanic	74	72	47	54	70	[a]
Hispanic	0	71	69	37	62	(20%)[a]
Other Minority	77	44	44	39	46	[a]
Women	131	105	124	114	119	13%

Note. Total accessions include cross-service academy transfers. A double counting procedure is used so the sum of subgroups for a fiscal year will not equal total accessions. Data provided by HQ USAF/DPPR.

[a] Individuals in Black, Hispanic, and Other minority subgroups were combined to calculate FY96 percent.

single criterion, but rather on all information that describes the cadet's potential as an officer and potential success in pilot training. Board members are instructed to score each applicant's record on a 6- to 10-point scale using 0.5 point increments. The relative importance of selection factors is not prescribed, but is left to the discretion of individual board members. If a board member scores an applicant much differently than other board members (i.e., greater than 1.5 points difference), the divergent rating is resolved by rescoring the applicable record. Board member scores for each applicant are averaged, and average scores are used to construct a rank ordered list of all applicants. Selection status is determined by applying production quotas against the rank ordered list.

Figure 2 illustrates the limiting effect of barriers to entry to pilot training for AFA Class of 96. The racial/ethnic and gender compositions of the officer accession pool, the pilot training applicant pool, and candidate pool are described by percentage bar graphs. For clarity, only two racial/ethnic categories are depicted: Majority, consisting of White men and women, and Minority, consisting of men and women reported as Black, Hispanic, Asian, or Other minority. Percentages are used to facilitate comparisons across subgroups and across points of entry. Because the numbers of individuals in gender and racial/ethnic subgroups are small, percentages should be interpreted with reference to the number of individuals in associated ratios. Numbers

of applicants and candidates, and selection ratios by gender and racial/ethnic subgroup are presented in table form at the bottom of Figure 2.

At the top of Figure 2, the 1996 AFA officer accession group is provided as a frame of reference to judge the combined limiting effects of occupational choice and flying training qualification barriers. Two selection boards were convened for the class of 1996. A supplemental board was convened in March (Board 2) to consider cadets who had not completed flight screening at the time of the January board (Board 1). The March board scored records of those cadets not having flight screening grades in January and rank ordered these cadets along with nonselects from the January board. The January board, which considered a much larger number of applicants than the March board, is discussed in this paper.

Differences in the size of applicant and candidate pools illustrate the limiting effects of pilot training selection/production requirement barrier (See table at bottom of Figure 2). For Class of 96, Board 1, the total selection ratio (.86) indicates that most applicants were selected. The applicant pool included 25 racial/ethnic minority applicants and 23 women. After flying training selection and production requirement barriers were imposed, the pool of pilot training candidates included 14 racial/ethnic minority candidates and 22 women. Relative to the selection ratio for the total applicant group, subgroup selection ratios indicate that smaller proportions of racial/ethnic minority applicants were selected and a higher proportion of women was selected. The likelihood that differences in subgroup selection ratios are due to chance variations or non-chance factors is examined elsewhere in this paper. More detailed descriptions of the applicant and candidate pools for this board are presented in Appendix B, Table B1.

AFA Navigator Entry. For the AFA, navigator training qualification includes reference to medical and anthropometric standards. Unlike pilot applicants, navigator applicants are not required to complete flight screening. Although pilot and navigator qualification are based on similar attributes, standards for navigator qualification are less rigorous than those for pilot qualification. A subset of AFA navigator qualification standards is presented in Appendix A.

AFA cadets who apply for navigator training and satisfy qualification standards are evaluated for selection during their senior year. The AFA navigator selection board convenes annually in January (and at other times, as needed) after the pilot selection board has adjourned (the board must consider some applicants who applied for, but were not selected for pilot training). The selection board usually consists of AFA faculty members who are rated navigators. Board members are provided instruction on the selection process, then evaluate applicants' selection folders.

Applicant selection folders contain the same documents as pilot applicant folders: CAMIS sheet, evaluations by faculty members, and an optional letter written by the cadet. Navigator applicants are not required to take the AFOQT. AFOQT scores and flight screening performance grades are masked in records of cadets who had previously competed for selection for pilot training. Selection board members are not provided explicit information that indicates the racial/ethnic and gender identity of applicants

The selection process--in terms of evaluating applicants on the whole-person concept, the dual objective of selection for success as an officer and for success in flying training, the use of a

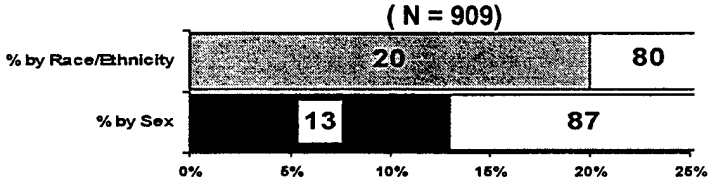
6- to 10-point scoring scale, and the procedure for handling divergent ratings--is the same as that followed for pilot selection. The relative importance of selection criteria is not prescribed, but is left to the discretion of individual board members. Average selection board scores for each applicant are used to construct a rank ordering for selection.

Figure 3 illustrates the limiting effect of barriers to entry to navigator training for the AFA class of 1996. Differences in the size of applicant and candidate pools illustrate the limiting effects of the navigator selection/production requirement barrier. The total selection ratio (.74) indicates that selection and production requirement barriers imposed a moderately weak limitation on entry. The navigator applicant pool included 14 racial/ethnic minority applicants and one woman. After selection and production goal barriers were imposed, the pool of candidates included 10 racial/ethnic minority candidates and one woman. For navigator training, selection ratios differed by applicant subgroup. The likelihood that differences in total and subgroup selection ratios are due to chance variations is examined elsewhere in this paper. More detailed descriptions of the applicant and candidate pools for this board are presented in Appendix B, Table B4.

Figure 2. Applicant Pool and Selection Ratios for Pilot Training, AFA, Class of 96, Board 1

Barrier V: Officer Potential and USAF Need
Officer Selection/ Production Requirement

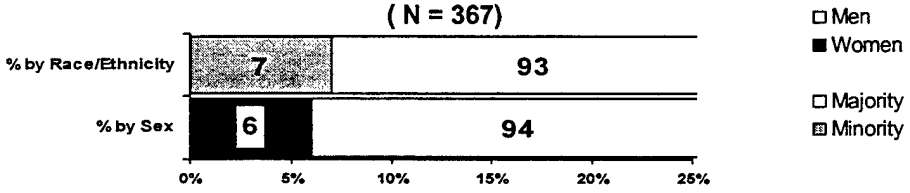
FY 96 AFA Officer Accessions (N = 909)



Barrier VI: Desire to Fly
Occupational Choice

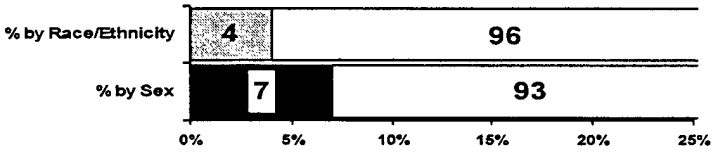
Barrier VII: Meet Minimum Standards
Flying Training Qualification

Applicant Pool (N = 367)



Barrier VIII: Potential and USAF Need
Flying Training Selection/ Production Requirement

Candidate Pool (N = 317)



	*Total**	*Black*	*Other Minority*	*Women*	*Unknown*	*Majority Total*	***Minority Total***
Applicants	367	11	14	23	1	341	**25**
Candidates	317	6	8	22	1	302	**14**
Selection Ratios	**.86**	**.55**	**.57**	**.96**	**1.00**	**.89**	**.56**

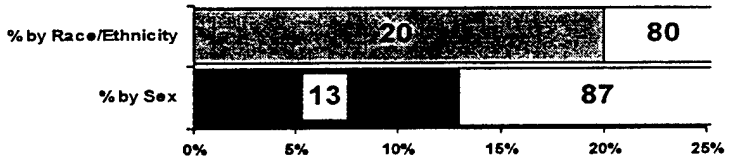
* Double counting procedures were employed; numbers and percentages may exceed total

Figure 3. Applicant Pool and Selection Ratios for Navigator Training, AFA, Class of 96

Barrier V: Officer Potential and USAF Need

Officer Selection/ Production Requirement

FY 96 AFA Officer Accessions (N = 909)



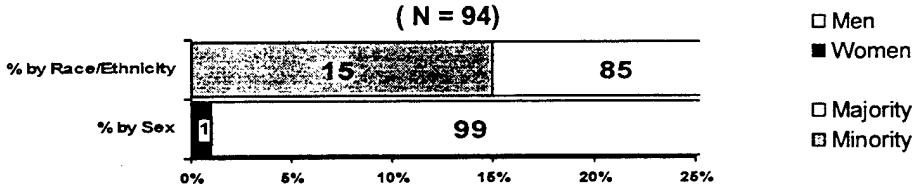
Barrier VI: Desire to Fly

Occupational Choice

Barrier VII: Meet Minimum Standards

Flying Training Qualification

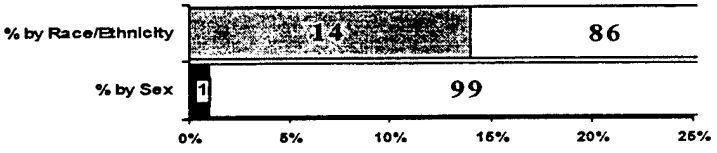
Applicant Pool (N = 94)



Barrier VIII: Potential and USAF Need

Flying Training Selection/ Production Requirement

Candidate Pool (N = 70)



	*Total**	*Black*	*Other Minority*	*Women*	*Unknown*	*Majority Total*	*Minority Total*
Applicants	94	5	9	1	0	80	14
Candidates	70	3	7	1	0	60	10
Selection Ratio	.74	.60	.78	1.00	0	.75	.71

* Double counting procedures were employed; numbers and percentages may exceed total

Officer Training School (OTS)

Table 6 presents OTS officer accessions for FY92-FY96, by gender and racial/ethnic subgroup. Percentages in the last column describe FY96 accessions only. Of the 638 officers commissioned through OTS in FY96, 79 were racial/ethnic minority members and 94 were women. The percentage of racial/ethnic minority accessions (12%) who entered through OTS is lower than the percentage of minorities in the base pool of college graduates (16%) and much lower than the percentage of minorities in the general population (32%) presented in Table 1.

OTS Pilot Entry. For OTS applicants who desire pilot training, qualification includes reference to age limits, medical standards, anthropometric standards, educational achievement, and minimum AFOQT scores (Air Force Instructions 36-2205 and 48-123, Air Education and Training Command Instruction 36-2002). Unlike the AFA and like all other points of entry, OTS requires minimum AFOQT scores for qualification. AFOQT minimum scores differ depending on whether or not the applicant possesses a private pilot license (i.e., licensed general aviation pilots can qualify with lower scores). AFOQT minimum scores are specified for the Verbal, Quantitative, Pilot, and Navigator-Technical composites. A partial list of OTS pilot qualification standards is presented in Appendix A.

As a group, OTS pilot applicants are more diverse than AF applicants. Typically, they are older, are college graduates, and may have significant civilian flying experience. Many have prior military experience, typically as active duty Air Force enlisted members. OTS selection boards convene quarterly at Headquarters Air Force Recruiting Service at Randolph AFB. A rated officer selection panel reviews application folders of individuals who have applied for pilot training. The rated officer selection panel consists of three pilots, all colonels or colonel-selects, invited from operational units. Panel members are provided instruction on the selection process, then review and evaluate applicants' selection folders over a several day period.

Applicant selection folders include extensive biographical data, educational information, college transcripts, employment history, history of legal violations, records of civilian flying time, copies of the applicant's civilian pilot certificate and FAA medical certificate (if applicable), personal recommendations, Enlisted Performance Reports (if active duty enlisted), supervisor's assessment (of enlisted members) or recruiter's assessment (if civilian), AFOQT scores, and Pilot Candidate Selection Method (PCSM) score. PCSM score is the output of an equation which combines measures of civilian flying experience, the AFOQT Pilot composite score, and scores from a computer-based battery of tests (the Basic Attributes test, or BAT) into a percentile score predictive of success in undergraduate pilot training (Carretta & Ree, 1993). Selection board members are provided explicit information that indicates the racial/ethnic and gender identity of applicants.

Relative to other points of entry, OTS flying training selection folders contain the greatest number of documents to describe the qualities of applicants. Unlike the AFA, where flying training applicants can be evaluated within a common framework of performance in AFA academics and the cadet wing, OTS board members must evaluate applicants with diverse backgrounds, consequently a much greater information processing load is imposed on OTS selection board members.

Table 6. OTS Officer Accessions by Gender and Racial/Ethnic Subgroup, FY92-FY96

Group	FY92	FY93	FY94	FY95	FY96	FY96 Percent
Total Accessions	357	368	630	802	638	-
White, Non-Hispanic	331	332	564	691	559	88%
Black, Non-Hispanic	16	23	28	48	33	[a]
Hispanic	3	6	20	27	28	(12%)[a]
Other Minority	7	7	18	36	18	[a]
Women	53	43	90	112	94	15%

Note. A double counting procedure is used so the sum of subgroups for a fiscal year will not equal total accessions. Data provided by HQ USAF/DPPR.
[a] Individuals in Black, Hispanic, and Other minority subgroups were combined to calculate FY96 percent.

OTS board members are instructed to adopt the whole-person concept as the basis for evaluating applicants. Unlike AFA and ROTC, OTS rated officer selection panels are tasked with simultaneously selecting candidates for suitability for commissioning and for potential to succeed in flying training. Panel members are instructed to score applicant records on a 6 to 10-point scale using 0.1 point increments. Panel members are provided with a scoring policy that implies the relative importance of three selection factors. The instructions suggest "experience", as evidenced by civilian or military employment and outside activities, be scored 0-3 points; "education and aptitude", evidenced by academic history and AFOQT scores, be scored 0-3 points; and "potential and adaptability", evidenced by recommendations, be scored 0-4 points. The authors' observations of three OTS selection boards indicate board members may reject the suggested weighting scheme in preference for a more holistic approach. Divergent ratings are resolved by rescoring applicable records. Board member scores for each applicant are averaged, and average scores are used to construct a rank-ordered list of applicants. Selection status is determined by applying a production quota against the rank-ordered list. After selection, OTS pilot candidates must successfully complete a medical examination, flight screening and Officer Training School to enter pilot training.

Applicants not selected for pilot training may be considered for commissioning in other specialties (navigator, technical, etc.) if they qualify and choose to do so . Alternately, applicants not selected for pilot training may be considered a second time by the next quarterly selection

board, or may reapply at a later date. Consecutive OTS selection boards have significant overlap in pilot applicant pools.

As previously indicated, when the number of qualified applicants exceeds production requirements, selection policy comes into play. Entry of OTS applicants into the pilot candidate pool is a prime example of this case. Figure 4 illustrates the limiting effect of selection and production requirement barriers on entry to pilot training for OTS during FY96, Quarters 1 and 2. These barriers imposed a strong limit on entry. The total selection ratio for the two selection boards (0.05) indicates that few applicants were selected. There was a total of 340 qualified applicants and 16 flying training authorizations permitting the selection of only 16 candidates. The applicant pool included 26 racial/ethnic minority applicants and 20 women. After selection and production goal barriers were imposed, the candidate pool included no racial/ethnic minority members or women resulting in subgroup selection ratios of 0.00. The likelihood that differences in total (0.05) and subgroup selection ratios (0.00) was due to chance could not be evaluated because the numbers of individuals in "selected" and "not selected" categories by gender and racial/ethnic subgroup were too small to yield statistically meaningful results. If such analyses were reasonable and non-chance differences detected, it would still be desirable to conduct additional analyses to compare majority and minority subgroups on key selection factors to explore the underlying reasons for differences in selection ratios (e.g., Were selection ratios lower for minority applicants because minority applicants scored lower on key selection factors?). Detailed descriptions of the applicant and candidate pools for these boards are presented in Appendix B, Tables B6 and B7.

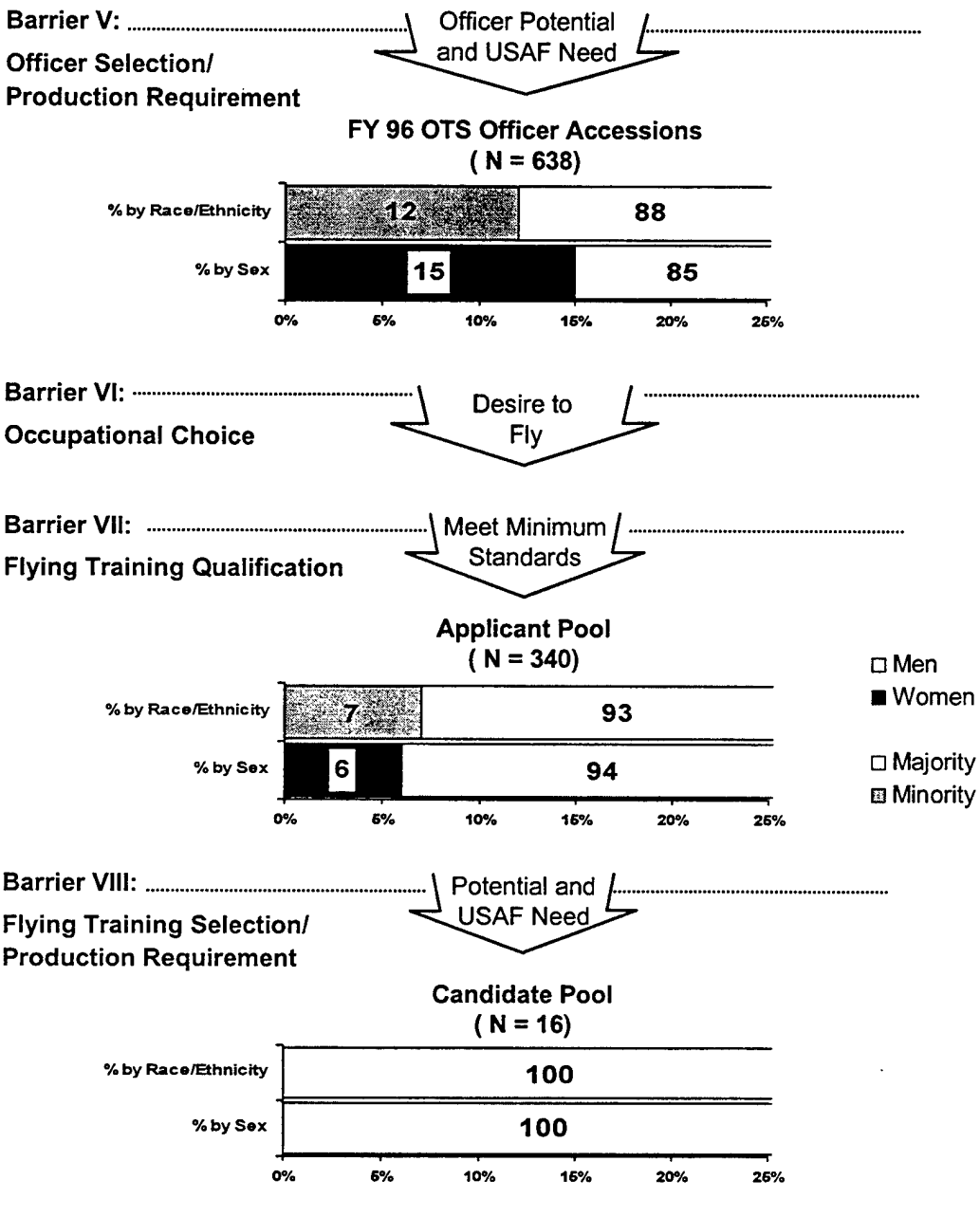
OTS Navigator Entry. For OTS applicants who desire navigator training, qualification includes reference to age standards, medical standards, anthropometric standards, educational achievement and minimum AFOQT scores (Air Force Instructions 36-2205 and 48-123, Air Education and Training Command Instruction 36-2002). AFOQT minimum scores for navigator qualification are specified for Verbal, Quantitative, Pilot and Navigator-Technical composites. Although pilot and navigator qualification is based on consideration of the same attributes, standards for navigator qualification are not as rigorous. A partial list of OTS navigator qualification standards is presented in Appendix A.

Navigator applicants are evaluated during quarterly OTS selection boards by the rated officer selection panel, the same panel that scored pilot applicant records. Applicant folders include the same types of information included in pilot application folders, with the exception of the PCSM score. The scoring process--in terms of the whole-person concept, the dual objective of selection for success as an officer and for success in navigator training, use of the 6 to 10-point scale, and resolution of divergent scores--is the same as that used for pilot selection. Average selection panel member scores for each applicant are used to construct a rank ordering for selection.

The pool of navigator applicants includes pilot applicants not selected for pilot training who applied for navigator training as a second occupational choice. There is significant overlap between pilot and navigator applicant pools, particularly in times when pilot selection ratios are low.

Figure 5 illustrates the limiting effect of barriers to entry to navigator training for OTS during FY96, Quarters 1 and 2. The total selection ratio (.32) indicates that approximately one third of the applicants were selected. The applicant pool included 25 racial/ethnic minority applicants and 31 women. After navigator selection and production requirement barriers were imposed, the candidate pool included 4 racial/ethnic minority members and 12 women. Subgroup selection ratios indicate lower selection rates for racial/ethnic minority applicants and higher selection rates for women. The likelihood that differences in subgroup selection ratios are due to chance variations or nonchance factors is examined elsewhere in this paper. The number of individuals who applied and were selected is provided by gender and racial/ethnic subgroup and is presented in Appendix B, Tables B8 and B9.

Figure 4. Applicant Pool and Selection Ratios for Pilot Training, OTS, FY96 Quarter 1 & 2



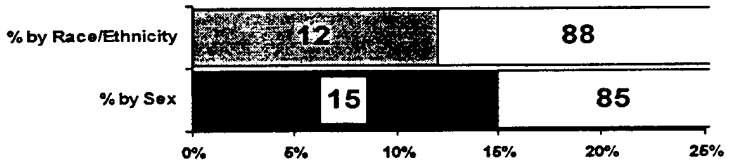
	*Total**	*Black*	*Other Minority*	***Women***	*Unknown*	*Majority Total*	***Minority Total***
Applicants	340	9	17	**20**	0	314	**26**
Candidates	16	0	0	**0**	0	16	**0**
Selection Ratio	**.05**	**.00**	**.00**	**.00**	**.00**	**.05**	**.00**

* Double counting procedures were employed; numbers and percentages may exceed total

Figure 5. Applicant Pool and Selection Ratios for Navigator Training, OTS, FY96 Quarter 1 & 2

Barrier V: Officer Potential and USAF Need
Officer Selection/ Production Requirement

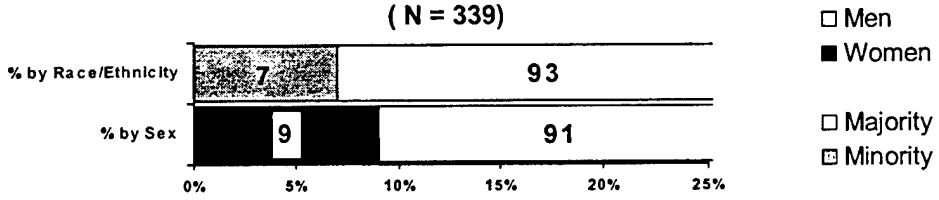
FY 96 OTS Officer Accessions (N = 638)



Barrier VI: Desire to Fly
Occupational Choice

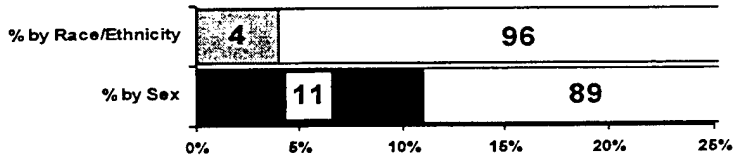
Barrier VII: Meet Minimum Standards
Flying Training Qualification

Applicant Pool (N = 339)



Barrier VIII: Potential and USAF Need
Flying Training Selection/ Production Requirement

Candidate Pool (N = 110)



	Total*	Black	Other Minority	Women	Unknown	Majority Total	Minority Total
Applicants	339	4	21	31	0	314	25
Candidates	110	1	3	12	0	106	4
Selection Ratio	.32	.25	.14	.39	.00	.34	.16

* Double counting procedures were employed; numbers and percentages may exceed total

Active Duty

Individuals may enter flying training from active duty after commissioning from any source. The pool eligible for entry to flying training from active duty consists of nonrated line officers and navigators (who may apply for pilot training) who will not exceed age 27 $^{1}/_{2}$ by the time they enter flying training and who are not otherwise disqualified (Air Force Instruction 36-2205). Officers in this pool have all previously been excluded from entry to flying training through the effects of occupational choice, flying training qualification, or flying training selection/requirement barriers. The vast majority of officers in this pool are nonrated line officers holding ranks of second or first lieutenant. An estimate of gender and racial/ethnic subgroup representation in this pool is presented in Table 7.

Active Duty Pilot Entry. Active duty officers may apply for pilot training through the Air Force Personnel Center (AFPC). Qualification is based on age standards, medical standards, anthropometric standards, and minimum AFOQT scores (Air Force Instruction 36-2205). A subset of qualification standards for active duty applicants is presented in Appendix A.

The AFPC selection board currently convenes twice a year at HQ AFPC, Randolph AFB. The board consists of a president (the Vice Commander of AFPC), a chairman (a colonel from AFPC), and two lieutenant colonels who are current or former flying squadron commanders. The selection board conducts three application-scoring sessions. In the first session, USAF navigators are considered for pilot training. In the second, nonrated officers are considered for pilot training, and in the third, nonrated officers are considered for navigator training. Board members may review and score hundreds of application folders.

Application folders contain an Officer Application for Flying Training, Officer Performance Reports (OPRs), training reports, citations accompanying military decorations, a career brief (i.e., a computer-generated document describing the officer's commissioning and assignment history), and the PCSM score. The Officer Application for Flying Training includes descriptive data on the applicant, AFOQT scores, private flying experience, commander's recommendation, OPR senior rater recommendation, and the senior rater's ranking of the applicant among all other applicants from the same organization. Selection board members are provided explicit information that indicates the racial/ethnic and gender identity of applicants.

The process used by the selection board is similar to those employed for AFA and OTS selection boards. Board members are instructed to adopt the whole-person concept as the basis for evaluating applicants. Board members are instructed to score each applicant's record on a 6 to 10-point scale using 0.5 point increments. The relative importance of selection factors is not prescribed, but is left to the discretion of individual board members. Divergent ratings are resolved by rescoring the applicable record. Board member scores for each applicant are averaged, and average scores are used to construct a rank-ordered list of all applicants. Selection status is determined by applying production quotas against the rank-ordered list.

Figure 6 illustrates the limiting effect of barriers to entry to pilot training from active duty for FY96. The flying training selection/production requirement barrier severely limited the entry of active duty applicants to pilot training. The total selection ratio (.15) indicates that most applicants were not selected. The pilot applicant pool included 53 racial/ethnic minority

Table 7. USAF Active Duty 2nd and 1st Lieutenants by Gender and Racial/Ethnic Subgroup, as of 31 March 1996

Group	Nonrated Line Officers		Nonrated Line Officers and Navigators	
Total	10,889	-	11,063	-
White, Non-Hispanic	9,195	84.4%	9,350	84.5%
Black, Non Hispanic	661	6.1%	669	6.0%
Hispanic	205	1.9%	208	1.9%
American Indian[a]	34	0.3%	35	0.3%
Asian[b]	193	1.8%	197	1.8%
Other/Unknown	601	5.5%	604	5.5%
Women	1,647	15.1%	1,652	14.9%

Note. Data extracted from Air Force Personnel Center/DPSAI (1996)
[a] American Indian represents American Indian, Eskimo, and Aleut.
[b] Asian represent Asian and Pacific Islander

applicants and 25 women. After selection and production goal barriers imposed limits on entry, the pool of candidates included six racial/ethnic minority members and one woman. Subgroup selection ratios indicate that, relative to the total group, smaller percentages of women and racial/ethnic minority applicants were selected. The likelihood that these differences were caused by chance variations or non-chance factors is discussed elsewhere in this paper. The number of individuals who applied and were selected for pilot training from active duty in FY96 are presented in Appendix B, Table B10.

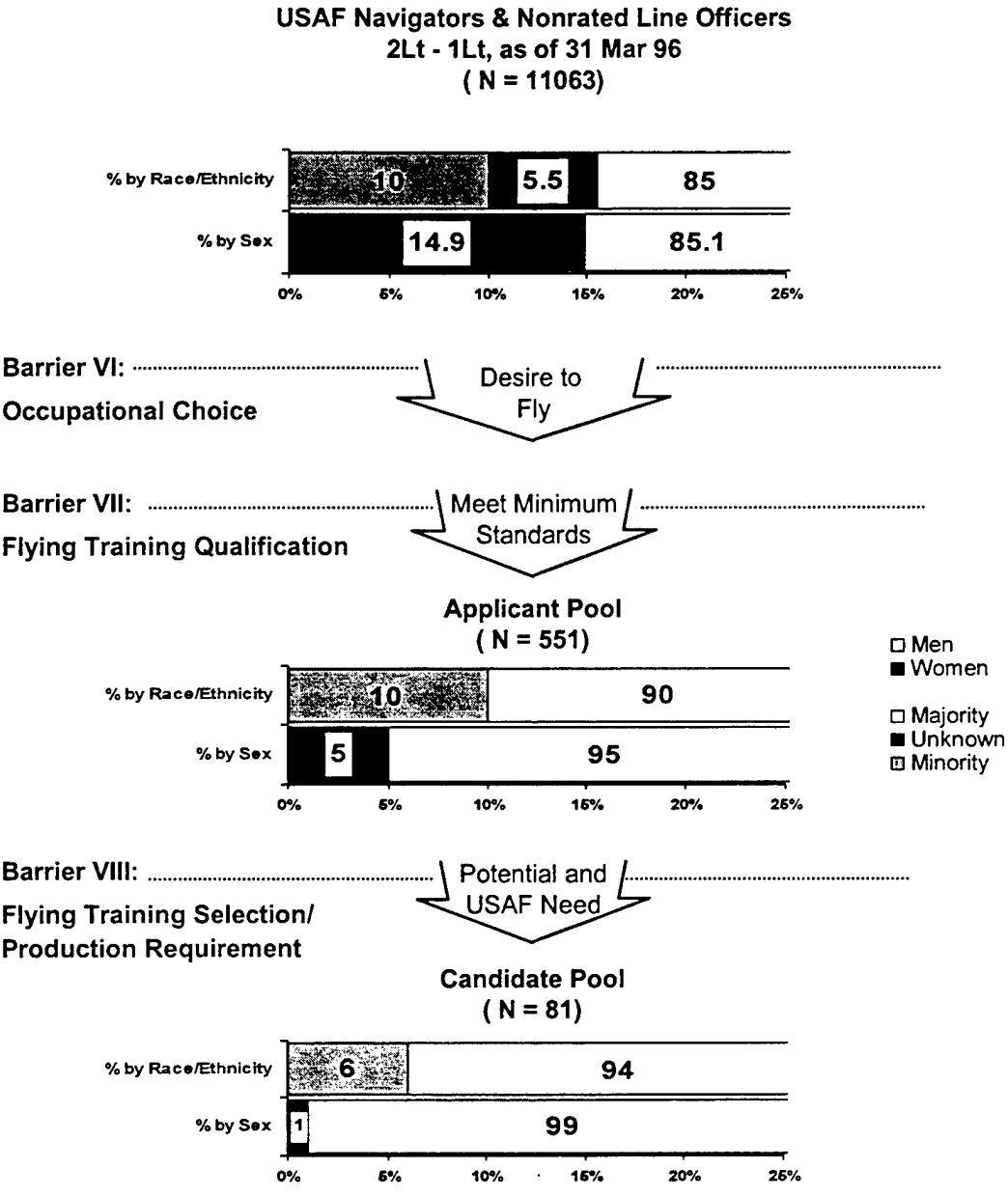
Active Duty Navigator Entry. For active duty officers who apply for navigator training, qualification is based on age standards, medical standards, anthropometric standards, and minimum AFOQT scores (Air Force Instruction 36-2205). A subset of qualification standards for active duty applicants is presented in Appendix A.

Navigator applicant records are evaluated and scored by the same board members who scored pilot applicant records. Navigator applicants are scored in the third and final scoring session performed by the board. The applicant pool includes many nonrated officers who listed navigator training as a second choice, but were not selected for pilot training. Application folders include the same information contained in pilot application folders, with the exception of PCSM scores (applicants who apply only for navigator training are not required to take the Basic

Attributes test and do not have PCSM scores). Applicant records are scored in the same manner prescribed above for the pilot selection board.

Figure 7 illustrates the limiting effects of barriers to entry to navigator training from active duty for FY96. The total selection ratio (.41) indicates less than half of all applicants were selected. The applicant pool consisted of 24 racial/ethnic minority applicants and 9 women. After selection and production requirement barriers imposed limits, the pool of candidates consisted of 11 racial/ethnic minority members and 7 women. Subgroup selection ratios indicate that, relative to the total applicant group, selection rates for women and other minority applicants were higher. The likelihood that these differences were caused by chance variations or nonchance factors is discussed elsewhere in this paper. More detailed descriptions of the applicant and candidate pools for this board are presented in Appendix B, Table B12.

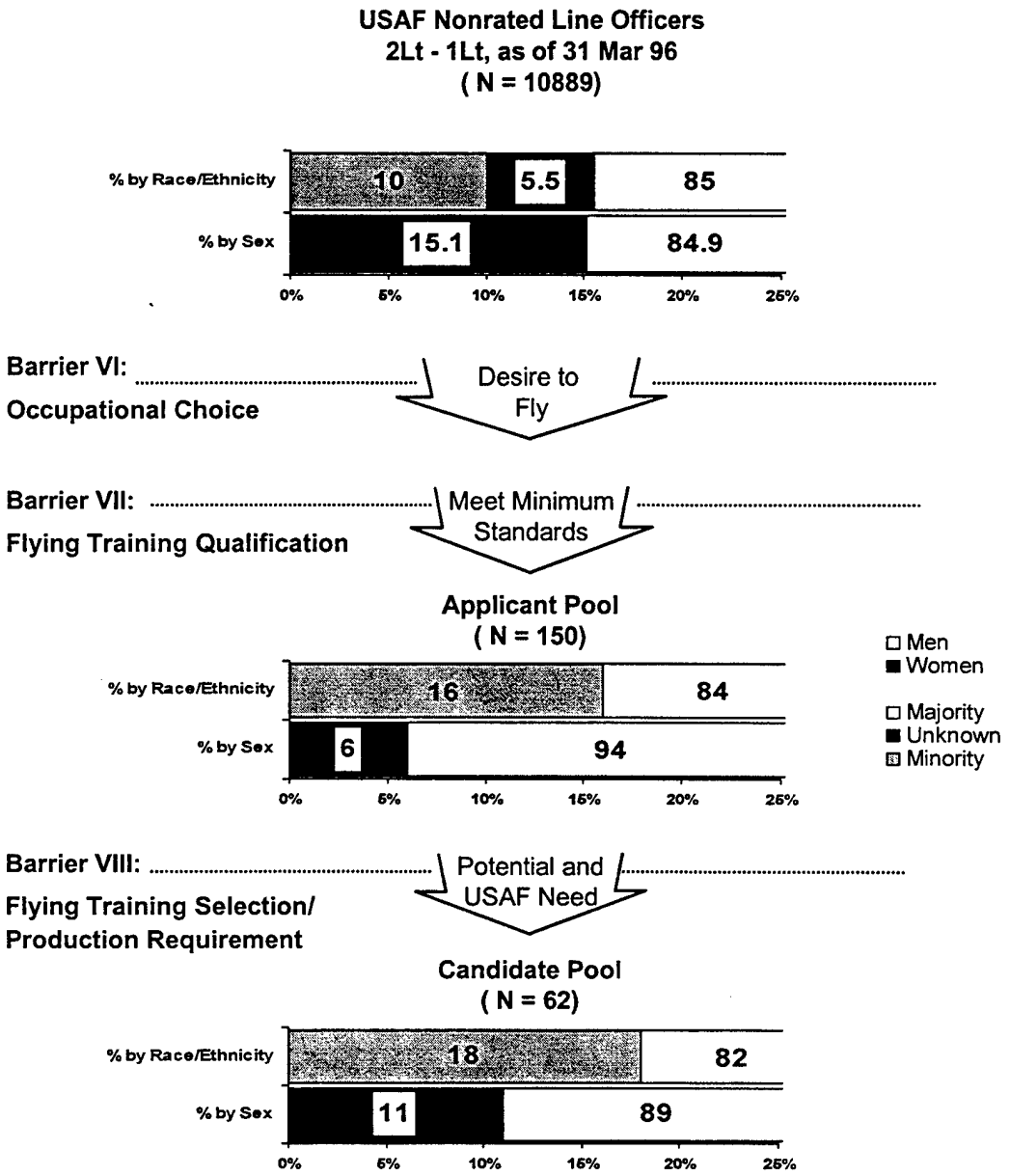
Figure 6. Applicant Pool and Selection Ratios for Pilot Training, Active Duty, FY96



	*Total**	*Black*	*Other Minority*	*Women*	*Unknown*	*Majority Total*	***Minority Total***
Applicants	551	16	37	25	0	498	53
Candidates	81	1	5	1	0	75	6
Selection Ratio	.15	.06	.11	.04	.00	.15	.11

* Double counting procedures were employed; numbers and percentages may exceed total

Figure 7. Applicant Pool and Selection Ratios for Navigator Training, Active Duty, FY96



	*Total**	*Black*	*Other Minority*	*Women*	*Unknown*	*Majority Total*	***Minority Total***
Applicants	150	7	17	9	0	126	**24**
Candidates	62	2	9	7	0	51	**11**
Selection Ratio	**.41**	**.29**	**.53**	**.78**	**.00**	**.40**	**.46**

* Double counting procedures were employed; numbers and percentages may exceed total

Reserve Officer Training Corps (ROTC)

Table 8 presents ROTC officer accessions for FY92-FY96, by gender and racial/ethnic subgroup. Of the 1,662 officers commissioned through ROTC in FY96, 327 (20%) were members of racial/ethnic minorities and 319 (19%) were women. The percentage of minority accessions compares favorably to the percentage of minorities in the base pool of college graduates (16%) presented in Table 1. Among all commissioning sources, ROTC provides the largest pools of women and racial/ethnic minority accessions.

ROTC Pilot Entry. ROTC pilot applicants are cadets in their junior year of college who have been previously admitted to the Professional Officers Course (POC). For ROTC cadets who wish to attend pilot training, qualification is based on age standards, medical standards, anthropometric standards, and minimum AFOQT scores. Unlike the AFA and like OTS and AFPC (i.e., active duty), ROTC requires minimum AFOQT scores for qualification. For the boards described in this paper, AFOQT minimum scores were specified for four of the five AFOQT composite scores (Pilot, Navigator, Verbal, and Quantitative) by AFROTC Regulation 45-13 and AFROTC Instruction 36-13 (Draft). AFROTC Instruction 36-2013, dated 1 February 1997, has since reduced the minimum required scores for the AFOQT Pilot and Quantitative composites. A partial list of ROTC pilot qualification standards is presented in Appendix A.

There are nearly 150 college and university ROTC detachments that can provide applicants. ROTC detachment commanders' assessments of cadets play a major role in the selection, or categorization, of ROTC cadets for flying training. Although the categorization process is accomplished through a central categorization board at HQ AFROTC, the process can be considered somewhat decentralized due to the impact of each detachment commander's recommendations.

The ROTC categorization board convenes annually in February (and other times; as needed) at HQ AFROTC, at Maxwell AFB. The board categorizes cadets who will graduate in the following fiscal year into rated categories. Board members are rated, field grade officers from HQ AFROTC. The approach to selection is different from that used by other sources. Categorization board members are not required to manually review the contents of hundreds of application folders like members of AFA, OTS, and active duty selection boards. The categorization process is supported by preprocessing of applicant data to create a preliminary rank ordering of applicants. As a result, the information load on ROTC board members is reduced, and the relative importance of selection factors is uniformly applied for all applicants.

The algorithm that supports the selection process combines selection factor scores for each cadet into a single score referred to as the Categorization Order of Merit (COM) score. The algorithm assigns importance weights to each selection factor value for each cadet to produce a COM score. COM scores are used to construct a single ranking of applicants from all detachments. For ROTC applicant samples described in this research, selection factors included an evaluation of the cadet's officer potential by the detachment commander, college grade point average, AFOQT Verbal and Quantitative composite scores, and a physical fitness test score. The AFOQT Pilot composite score was used for qualification but was not included in the COM algorithm (AFROTC Regulation 45-13). ROTC has since revised the COM algorithm for pilot

Table 8. ROTC Officer Accessions by Gender and Racial/Ethnic Subgroup, FY92-FY96

Group	FY92	FY93	FY94	FY95	FY96	FY96 Percent
Total Accessions	1,930	2,258	1,932	1,844	1,662	-
White, Non-Hispanic	1,738	1,967	1,685	1,550	1,335	80%
Black, Non-Hispanic	69	133	92	107	131	[a]
Hispanic	43	26	6	14	12	(20%)[a]
Other Minority	80	132	149	173	184	[a]
Women	252	403	336	329	319	19%

Note. A double counting procedure is used so the sum of subgroups for a fiscal year will not equal total accessions. Data provided by HQ USAF/DPPR.
[a] Individuals in Black, Hispanic, and Other minority subgroups were combined to calculate FY96 percent.

selection to incorporate the AFOQT Pilot composite score in place of the Verbal and Quantitative composites (AFROTCI 36-2013).

Categorization board members are presented with applicant information in spreadsheet format, with a single row of information for each applicant. Data presented includes applicant name and detachment; gender, race, and ethnicity; COM score and its components; all five AFOQT composite scores; indication of whether the applicant has a civilian pilot license; record of field training awards; academic major; and PCSM score. ROTC pilot applicants are required to take the BAT, and a PCSM score is provided to the selection board.

Applicants are listed in order from first to last on the basis of COM score. The production requirement is applied to produce an initial cut line. The categorization board reviews the list considering all information presented, and may accept the rank-ordered listing or adjust the rank ordering on the basis of selection criteria independent of the COM score. Board members pay particular attention to cadets in the vicinity of the cut line where fractional differences in COM score can mean the difference between selection and non-selection.

Two categorization boards were assembled for the FY96 year group to address changing production requirements. Figure 8 illustrates the limiting effects of barriers to pilot training for individuals selected by the first categorization board for this group, ROTC FY96 Board 1. The total selection ratio (.79) indicates that most applicants were selected. The applicant pool included 36 racial/ethnic minority applicants and 22 women. After selection and production goal

barriers were imposed, the resulting pool of candidates included 23 racial/ethnic minority members and 17 women. Subgroup selection ratios indicate that, relative to the total group, smaller percentages of racial/ethnic minority applicants were selected. The likelihood that this difference was caused by chance variations is discussed elsewhere in this report. Detailed descriptions of the applicant and candidate pools for this board are presented in Appendix B, Table B14.

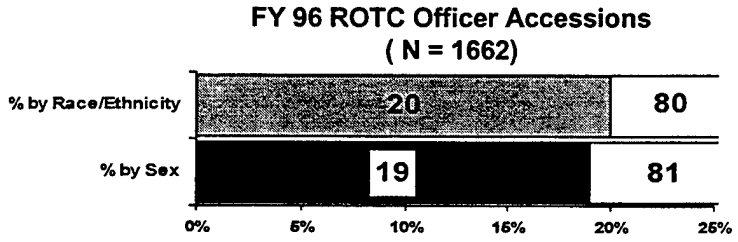
ROTC Navigator Entry. For ROTC cadets who choose navigator training, qualification is based on age standards, medical standards, anthropometric standards, and minimum AFOQT scores. Unlike the AFA, and like OTS and active duty points of entry, ROTC requires minimum AFOQT scores for qualification. For the boards described in this paper, AFOQT minimum scores were specified for four of the five AFOQT composite scores (Pilot, Navigator, Verbal, and Quantitative) by AFROTC Regulation 45-13 and AFROTC Instruction 36-13 (Draft). AFROTC Instruction 36-2013 has since reduced the minimum AFOQT Quantitative composite score. A partial list of ROTC navigator qualification standards is presented in Appendix A.

Like applicants at all other points of entry, many ROTC cadets apply for navigator training as a second choice to pilot training. Thus, the categorization board considers cadets for navigator training after it has identified cadets to meet pilot production requirements. The categorization process--in terms of preprocessing applicant data to form COM scores and rank, board member review of applicant data, and board acceptance or adjustment of rank order--is the same as described for pilot categorization. Navigator selection factors include officer potential (as assessed by the detachment commander), college grade point average, physical fitness, and AFOQT scores. The AFOQT navigator composite score was used for qualification but was not included in the COM algorithm. For FY96 categorization boards, the COM algorithm that supported navigator selection used the same selection factors and selection factor weights as the COM algorithm used for pilot selection. ROTC has since revised the COM algorithm for navigator selection to incorporate the AFOQT Navigator composite score in place of the Verbal and Quantitative composites (AFROTCI 36-2013).

Two categorization boards were assembled for the FY96 year group to address changing production requirements. Figure 9 illustrates the limiting effect of barriers to entry to navigator training for individuals selected by ROTC FY96 Board 1. The total selection ratio (.76) indicates that most navigator training applicants were selected. The applicant pool included 31 racial/ethnic minority applicants and 24 women. After selection and production goal barriers were imposed, the candidate pool included 23 minority members and 19 women. Subgroup selection ratios indicate that, relative to the total group, similar percentages of racial/ethnic minority applicants and women were selected. Detailed descriptions of the applicant and candidate pools for this board are presented in Appendix B, Table B17.

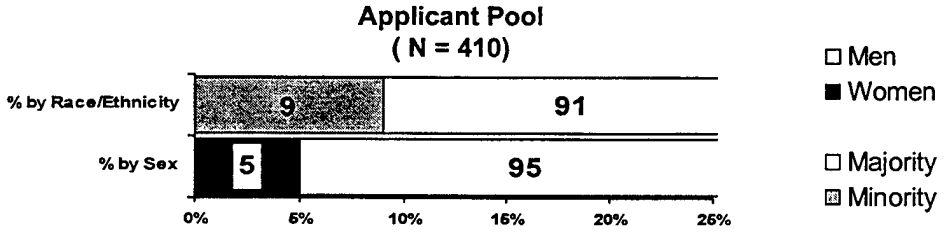
Figure 8. Applicant Pool and Selection Ratios for Pilot Training, ROTC FY96 Board 1

Barrier V: Officer Selection/ Production Requirement — Officer Potential and USAF Need

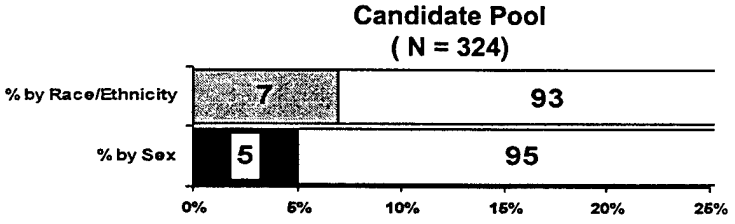


Barrier VI: Occupational Choice — Desire to Fly

Barrier VII: Flying Training Qualification — Meet Minimum Standards



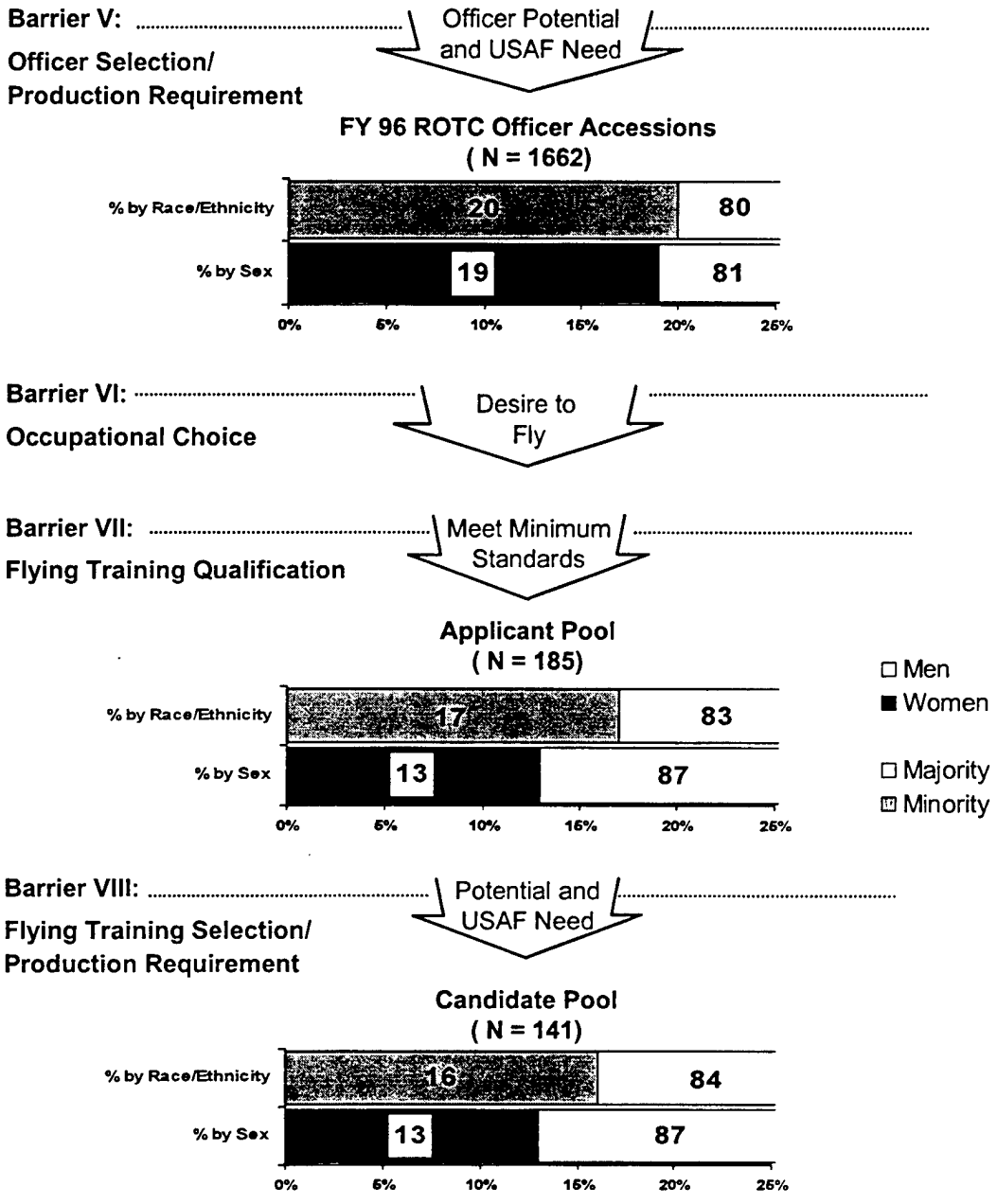
Barrier VIII: Flying Training Selection/ Production Requirement — Potential and USAF Need



	*Total**	*Black*	*Other Minority*	***Women***	*Unknown*	*Majority Total*	***Minority Total***
Applicants	410	8	28	**22**	0	374	**36**
Candidates	324	3	20	**17**	0	301	**23**
Selection Ratio	**.79**	**.38**	**.71**	**.77**	**.00**	**.80**	**.64**

* Double counting procedures were employed; numbers and percentages may exceed total

Figure 9. Applicant Pool and Selection Ratios for Navigator Training, ROTC, FY96 Board 1



	Total*	Black	Other Minority	Women	Unknown	Majority Total	Minority Total
Applicants	185	7	24	24	0	154	31
Candidates	141	3	20	19	0	118	23
Selection Ratio	**.76**	**.43**	**.83**	**.79**	**.00**	**.77**	**.74**

* Double counting procedures were employed; numbers and percentages may exceed total

Evaluation of Differences in Selection Ratios

Figures 2 through 9 described pilot and navigator applicant and candidate pools and selection ratios for selected occasions for each point of entry. Appendix B provides data from which selection ratios can be calculated for several additional occasions. Table 9 presents a summary of selection ratios for Figures 2 through 9 and for data presented in Appendix B.

The largest pools of qualified minority and women pilot applicants were provided by ROTC and active duty. ROTC provided the largest pool of qualified minority navigator applicants. ROTC and OTS provided the largest pools of qualified women navigator applicants. For pilot training, the highest selection ratios occurred for AFA (.86) and ROTC (.86); the lowest selection ratios occurred for OTS (.05) and active duty (.05). For navigator training, the highest selection ratios occurred for ROTC (.76, .90, .83) and lower selection ratios occurred for AFA, OTS, and active duty. The AFA and ROTC produced the largest numbers of pilot candidates; ROTC provided the most navigator candidates.

Data presented in Table 9 indicate that pilot and navigator selection ratios for gender and racial/ethnic subgroups differ. These differences could be due to chance variations (i.e., the true difference is zero), non-chance factors (i.e., a true difference exists due to gender or racial/ethnic affiliation), or both. To determine the role of chance, differences in selection ratios were evaluated with an inferential statistic known as chi-square (χ^2). A non-significant chi-square indicates that observed differences are most likely due to chance variations. A significant chi-square indicates that observed differences are most likely due to both chance variations and non-chance factors.

The intent was to calculate chi-square statistics for 2 by 2 contingency tables to address two separate questions for each point of entry and each selection board. The first question was whether or not selection was dependent on gender. The second question was whether or not selection was dependent on racial/ethnic status. To address the second question, racial/ethnic subgroups were combined to form a minority subgroup large enough to allow statistical analyses. In addition, men and women were combined in majority and minority subgroups to ensure that group sizes were as large as possible. The majority group consisted of White men and women. The minority group consisted of men and women identified as Black, Hispanic, Asian and members of Other racial/ethnic groups. Although it could be argued that combining men and women could impose a gender confound on analyses, results would not have been different if women had been held out of racial/ethnic comparisons, as you will see. Despite this artifice, there were several instances where the expected number of selects or non-selects from a subgroup was less than 10. In these instances, a correction (i.e., Yate's correction for continuity) was applied to avoid inferential errors (Guilford, 1965). The chi-square statistic could not be applied on several occasions for which the expected numbers of selects or non-selects was two or less (e.g., OTS).

Table 10 presents results of the evaluation of differences in selection ratios. For all of the occasions examined, chi-square values indicate that observed differences in pilot and navigator selection rates for men and women are of a size that could be attributed to chance variations. Hence, we would not expect a gender confound to influence comparisons of majority and minority selection rates with women included in majority and minority samples. Pilot and

navigator selection was not contingent on gender. Observed differences in pilot and navigator selection rates for minority and majority applicants could be attributed to chance variations on all but three occasions. Chi-square values for three pilot selection boards (AFA Class of 96, Boards 1 and 2, and ROTC FY96, Board 1), indicate differences in pilot selection rates for minority and

Table 9. Selection Ratios by Type of Training, Source and Occasion

Type/Source/Occasion	Total	Men	Women	Majority	Minority
Pilot, AFA, 95[a]	295/466 (.63)	285/450 (.63)	10/16 (.63)	279/433 (.64)	13/26 (.50)
Pilot, AFA, 96 B-1[b]	317/367 (.86)	295/344 (.86)	22/23 (.96)	302/341 (.89)	14/25 (.56)
Pilot, AFA, 96 B-2	58/108 (.54)	56/105 (.53)	2/3 (.67)	55/94 (.59)	3/14 (.21)
Pilot, ROTC, FY96 B-1	324/410 (.79)	307/388 (.79)	17/22 (.77)	301/374 (.81)	23/36 (.64)
Pilot, ROTC, FY96 B-2	58/127 (.46)	50/115 (.43)	8/12 (.67)	46/101 (.46)	12/26 (.46)
Pilot, ROTC, FY97	466/541 (.86)	435/505 (.86)	31/36 (.86)	416/485 (.86)	50/56 (.89)
Pilot, OTS, FY96 Q1&2	16/340 (.05)	16/320 (.05)	0/20 (.00)	16/314 (.05)	0/26 (.00)
Pilot, Active Duty, FY95[c]	25/475 (.05)	23/436 (.05)	2/31 (.06)	24/408 (.06)	1/59 (.02)
Pilot, Active Duty, FY96	81/551 (.15)	80/526 (.15)	1/25 (.04)	75/498 (.15)	6/53 (.11)
Nav, AFA, 95[d]	94/139 (.68)	92/132 (.70)	2/7 (.29)	87/128 (.68)	7/11 (.64)
Nav, AFA, 96	70/94 (.74)	69/93 (.74)	1/1 (1.00)	60/80 (.75)	10/14 (.71)
Nav, ROTC, FY96 B-1	141/185 (.76)	122/161 (.76)	19/24 (.79)	118/154 (.77)	23/31 (.74)
Nav, ROTC, FY96 B-2	64/71 (.90)	61/68 (.90)	3/3 (1.00)	49/55 (.89)	15/16 (.94)
Nav, ROTC, FY97	153/185 (.83)	136/164 (.83)	17/21 (.81)	134/160 (.84)	19/25 (.76)
Nav, OTS, FY96 Q1&2	110/339 (.32)	98/308 (.32)	12/31 (.39)	106/314 (.34)	4/25 (.16)
Nav, Active duty, FY95[e]	27/154 (.18)	22/140 (.16)	3/10 (.30)	22/124 (.18)	11/24 (.12)
Nav, Active Duty, FY96	62/150 (.41)	55/141 (.39)	7/9 (.78)	51/126 (.40)	11/24 (.46)

[a] Racial/ethnic status unknown for 7 applicants; 3 of these applicants were selected.
[b] Racial/ethnic status unknown for 1 applicant; 1 selected.
[c] Gender and racial/ethnic status unknown for 8 applicants; 0 selected.
[d] Racial/ethnic status unknown for 5 applicants; 1 selected.
[e] Gender and racial/ethnic status unknown for 4 applicants; 2 selected.

majority applicants were too large to be attributed to chance variations alone. On these occasions, pilot selection appears to be contingent on minority status or contingent on factors related to minority status. The chi-square statistic provides a yes or no answer to the question of chance variation, but provides no information to identify factors that underlie nonchance variation. As a result, pilot selection processes for ROTC and the AFA were examined in detail.

Table 10. Evaluation of Selection Ratios for Gender and Racial/Ethnic Subgroups by Type of Training, Source and Occasion

Type/Source/Occasion	Men/Women χ^2	Majority/Minority χ^2
Pilot, AFA, 95	.038	1.628
Pilot, AFA, 96 B-1	1.052	**18.270 ****
Pilot, AFA, 96 B-2	-	**5.330 ***
Pilot, ROTC, FY96 B-1	.004	**4.499 ***
Pilot, ROTC, FY96 B-2	1.513	.003
Pilot, ROTC, FY97	.060	.266
Pilot, OTS, FY96 Q1&2	-	-
Pilot, Active Duty, FY95	-	1.053
Pilot, Active Duty, FY96	1.581	.278
Nav, AFA, 95	3.412	.001
Nav, AFA, 96	-	.012
Nav, ROTC, FY96 B-1	.021	.003
Nav, ROTC, FY96 B-2	-	-
Nav, ROTC, FY97	.007	.447
Nav, OTS, FY96 Q1&2	.610	2.571
Nav, Active duty, FY95	-	.233
Nav, Active Duty, FY96	3.767	.069

Note. Degree of Freedom = 1 for all χ^2 s
A dash (-) indicates that χ^2 was not computed because an expected frequency was 2 or less.
* Statistically significant. Probability is less than 5% that differences were due solely to chance variations ($p < .05$)
** Statistically significant. Probability is less than 1% that differences were due solely to chance variations ($p < .01$)

Examination of ROTC Pilot Selection Procedures

The pilot candidate selection process used by ROTC differs from those used by all other sources in that the rank ordering of applicants is accomplished by means of a fully specified and documented method, the Categorization Order of Merit. Whereas other points of entry require selection board members to use their own discretion in prioritizing and weighting applicant attributes to score applicant records, ROTC provides board members with a rank-ordered listing of applicants based on predetermined weights applied to a fixed number of attributes. The number of pilot training slots available to ROTC determines where in the ranked list an initial cut line is drawn. Categorization board members review the list considering all information presented, and may accept the rank-ordered listing or adjust the rank ordering on the basis of selection criteria independent of the COM score.

For this study, Headquarters AFROTC/RRFY provided the authors with applicant information from the FY96, FY97, and FY98 categorization boards. In addition, an Air Force Research Laboratory observer attended the FY97 categorization board to witness and document the board's proceedings. On-site observations and board data confirm that categorization boards made few changes to COM ranking to change applicants' selection status. For the FY97 board, a single applicant was advanced from her COM-determined ranking and placed higher in the rank order. This move did not effect her selection status. She was not selected for training, but her move provided her better standing as an alternate in the event more training slots became available. Data from FY96, Board 1, indicate that two applicants just below the initial cut line were selected for pilot training, displacing two applicants immediately above the initial cut line. All four applicants involved were White men, with COM scores differing by a fraction of a point. The selection factors considered by this board that warranted departure from COM order are not known, but were apparently independent of gender or minority status.

Because cadet rank order as determined by COM score was the basis of selection for most candidates, differences in rank order are considered to be the primary reason for differences in majority and minority selection ratios. For the majority applicant subgroup, rankings ranged from 1 to 410 with a median rank of 202. For the minority applicant subgroup, the rankings ranged from 11 to 404 with a median rank of 243. The difference in pilot selection ratios for majority (.80) and minority (.64) applicants was due to the fact that a greater proportion of minority applicants occupied less favorable rank positions.

Because COM scores were used to construct cadet rank order, components of the COM score were examined to identify those that contributed more strongly to the significant difference in pilot selection ratios for minority and majority subgroups. The COM score consists of an evaluation of the cadet's officer potential provided by the detachment commander, educational achievement expressed as grade point average (GPA), verbal (V) and quantitative (Q) scores from the AFOQT, and a physical fitness test score (PFIT). In providing the officer potential evaluation, the detachment commander is instructed to adopt the whole-person concept and to rank the cadet relative to all other cadets in the detachment. Rankings are adjusted to take into account differences in class size across detachments and the adjusted value is expressed as a Relative Standing Score (RSS). For ROTC FY96 Board 1, the following equation was used to produce COM scores for both pilot and navigator applicants (AFROTC Regulation 45-13; D. S. Hager, personal communication, 5 March 1996):

$$\mathbf{COM} = 6.625\ (\mathbf{RSS}) + 6.8750\ (\mathbf{GPA}) + 0.025\ (\mathbf{PFIT}) + 0.0947\ (\mathbf{V}) + 0.0947\ (\mathbf{Q})$$

The coefficients in the equation indicate that the components are not weighted equally. Because the scale and range of the COM component variables differ, the coefficients themselves do not necessarily indicate the relative importance of components. The relative importance of COM components should be considered to identify those that have the strongest influence on cadet rank order and the selection decision. Even though there may be a large majority and minority difference for a given COM component, if the component has only a minor influence on COM score, it would have only a minor influence on cadet rank order and the pilot selection process.

Table 11 presents the range of allowable values for each COM component, the range of possible COM scores, and the contribution of each COM component. The RSS variable is formed by transforming cadets' detachment commander-assigned class ranks and class size to a 5 to 10-point scale (5.0 and 10.0 values are lower and upper limits on RSS, attainable only for infinitely large class size). GPA, PFIT, AFOQT-V and Q each have lower bounds established as either commissioning or pilot training qualification standards. The lower bounds on each of the COM components result in a minimum attainable COM greater than zero (55.636) and restricts the values of COM to a 69.364 point range. The relative contribution of each COM component is presented in Table 11 as a percentage of this range.

Table 11. Categorization Order of Merit (COM) Component Ranges and Percent Contribution to COM

Component	Weight	Range	Percentage of COM Range
RSS	6.6250	5.0 - 10.0	47.8%
GPA	6.8750	2.00 - 4.00	19.8%
PFIT	0.0250	180 – 500	11.5%
V	0.0947	15[a] – 99	11.5%
Q	0.0947	30[a] – 99	9.4%
COM	-	55.636 - 125.000	100%

[a] Lower AFOQT scores are possible with approved waiver.

RSS is clearly the largest determinant of COM score, accounting for nearly half of the variability in COM. GPA and RSS together account for nearly two thirds of the variability in COM, while PFIT and AFOQT V and Q have relatively little influence. These contributions are established by standard policy--they are determined by the coefficients in the COM equation and the allowable ranges of COM components. They are not unique to any particular set of applicants.

Contributions of COM components may be examined from another point of view, one that considers relationships between COM components. A correlation coefficient (r) is commonly used to express the degree of linear relationship between two variables, where $r = 1$ describes a perfect, positive linear relationship and $r = 0$ implies no linear relationship (although a nonlinear relationship may exist). Table 12 presents correlation coefficients describing the relationships between COM components and COM for pilot applicants considered by ROTC

Table 12. Relationship Between COM and COM Components (Pearson Correlation Coefficients, *r*) for ROTC Pilot Applicants, FY96 Board 1

	COM	RSS	GPA	PFIT	AFOQT_V	AFOQT_Q
COM	1.000	.921**	.639**	.437**	.290**	.325**
RSS		1.000	.441**	.335**	.045	.085
GPA			1.000	.168**	.133**	.178**
PFIT				1.000	-.054	.000
AFOQT_V					1.000	.452**
AFOQT_Q						1.000

** Correlation is statistically significant at the 0.01 level (2-tailed) ($p < .01$).

FY96 Board 1. Correlations between COM components are not determined *a priori*, but are functions of the distribution of scores among this particular group of applicants. Not surprisingly, all COM components are significantly correlated with COM. Correlations range from moderate (.290, .325) for the AFOQT composite scores to extremely strong (.921) for RSS. The strong correlation between Relative Standing Score and COM indicates that variations in RSS alone account for nearly 85% of the variation ($r^2 = .848$) in Categorization Order of Merit. Additional analysis indicates that RSS and GPA together account for over 91% of the variation in COM (multiple $R^2 = .915$). In this instance, RSS appears to be a greater determinant of COM than figures in Table 11 would indicate. This is due largely to the relationship between RSS and other COM components. Table 12 shows that RSS is moderately correlated with GPA ($r = .441$) and PFIT ($r = .335$), but poorly correlated with AFOQT scores ($r = .045$; $r = .085$). Applicant qualities indexed by the RSS score may be regarded as "overlapping" those measured by GPA and PFIT. RSS appears to be independent of AFOQT scores.

The relationships between RSS and other COM components described here represent the aggregate relationships found for one particular group of applicants. These applicants belonged to 102 different detachments, each with a different detachment commander, each commander, perhaps, with a different schema for ranking cadets in his or her detachment. In determining cadet ranking (the basis for RSS), commanders are instructed to "consider the cadet's officership qualities, participation in cadet corps activities, academic performance, and any other pertinent information" (AFROTC Regulation 45-13). It is not surprising, and probably unavoidable, that detachment commanders' assessments of cadets are related to or influenced by GPA and physical fitness test scores. Because each commander may apply his or her own judgment in determining cadet ranking within a detachment, cadet ranking and hence, RSS, must be considered a subjective measure. The great influence of RSS on COM results in a selection process in which each detachment's top cadets can occupy favorable positions in the COM rank ordering.

The second most influential component in the COM equation is GPA, college cumulative grade point average. GPA may be considered an objective measure of academic performance, but it is important to note that GPAs used in the COM equation are not baselined to account for differences in educational standards across institutions nor differences in academic difficulty across academic disciplines. (By contrast, the AFA has common core academic and military courses which provide a common metric for comparing cadets.) GPA can be regarded as an objective, but unstandardized measure. The three components with the least influence on COM, physical fitness test score, AFOQT Verbal Composite score, and AFOQT Quantitative Composite score, are scores from standardized tests and may be regarded as objective measures.

Because candidate selection is based on cadet rank order which, in turn, is based on COM score, the COM components that have the greatest influence on rank order would have the greatest influence on candidate selection. This information can be used to simplify examination of the reasons for observed differences in minority and majority pilot selection ratios. Table 13 presents average COM component scores for total minority and majority subgroups, for applicants selected, and for applicants not selected by majority and minority subgroup. Statistical evaluations of the differences between averages were conducted to examine the similarity of RSS, GPA, PFIT, and AFOQT values. To minimize the chance of inferential decision errors possible when making multiple comparisons, the Bonferroni approach (Keppel, 1991) was used. This approach provided for specification of a per comparison error rate which insured that the error rate for the set of comparisons did not exceed either the .01 or .05 level.

Inspection of majority and minority average values for each of the COM components reveals that majority applicants received slightly higher relative standing scores than minority applicants. Majority applicants attained slightly higher academic grade point averages than minority applicants. Majority applicants scored slightly higher on physical fitness tests than minority candidates and majority applicants attained higher AFOQT Verbal and Quantitative scores than minority applicants. Although none of these differences were found to be statistically significant, the overall effect of these differences, when expressed in the COM equation, caused a greater proportion of minority applicants to occupy lower positions in the cadet rank order.

Table 13. ROTC FY 96, Pilot Selection Board 1, Means (*M*) and Standard Deviations (*SD*) of COM Components for Applicants Selected and Applicants Not Selected, by Majority and Minority Subgroup

COM Component		Majority (MAJ)[a]	Minority (MIN)[b]	SEL MAJ[c] - MIN[d]	MAJ SEL[c] - NOTSEL[e]	MIN SEL[d] - NOTSEL[f]
RSS	*M*	8.18	7.87	8.71 - 8.85	**8.71 - 6.02 ***	**8.85 - 6.13 ***
	SD	1.40	1.49	.97 .67	.97 .59	.67 .71
GPA	*M*	2.98	2.87	3.07 - 3.04	**3.07 - 2.64 ***	**3.04 - 2.58 ***
	SD	.43	.42	.42 .38	.42 .30	.38 .33
PFIT	*M*	337.6	318.3	349.0 - 345.0	**349.0 - 290.0 ***	345.0 - 289.0
	SD	79.5	68.9	76.1 70.4	76.1 75.6	70.4 58.0
AFOQT_V	*M*	59.21	54.56	60.94 - 53.83	**60.94 - 52.08 ***	53.83 - 55.85
	SD	22.5	20.1	21.9 20.9	21.9 23.9	20.90 19.5
AFOQT_Q	*M*	65.26	61.69	66.69 - 65.74	**66.69 - 59.36 ***	65.74 - 54.54
	SD	18.9	19.2	18.5 17.0	18.5 19.5	17.0 21.5

Note. The statistical test was an independent sample, one-tailed, t test.
[a] $n = 374$; [b] $n = 36$; [c] $n = 301$; [d] $n = 23$; [e] $n = 73$; [f] $n = 13$; * $p < .005$

For minority and majority applicants who were selected (SEL/MAJ-MIN), differences in RSS, GPA, PFIT, and AFOQT average values were found to be due to chance variations. This outcome indicates that the selection process resulted in pilot training candidates that were similar in terms of officer potential (RSS), grade point averages, physical fitness (PFIT), and AFOQT scores regardless of majority or minority status. For majority applicants selected and majority applicants not selected (MAJ/SEL-NOTSEL), differences were found to be statistically significantly different. This outcome indicates that the 73 majority applicants (20%) not selected had significantly lower RSS, GPA, PFIT, and AFOQT values than the 301 majority applicants (80%) selected. For minority applicants selected and minority applicants not selected (MIN/SEL-NOTSEL), average RSS and GPA values were statistically significantly different indicating that the 13 minority applicants (36%) not selected had significantly lower RSS and GPA values than the 23 minority applicants (64%) selected.

Exploratory Analyses of AFA Pilot Selection Procedures

The AFA approach to pilot selection is different from the ROTC approach in several ways. AFA selection boards play a greater role in the selection process. For the AFA, each board member must review information for hundreds of applicants, determine selection policy in terms of the relative importance of selection factors and consistently apply that policy to produce an overall rating for each applicant. Board members use a 6 to 10-point scale to score applicant records in increments of .5 points. Scores are averaged over board members to produce an Average Board Rating for each applicant. The Average Board Rating is used to construct a ranking for all applicants and selection is accomplished top down.

A unique feature of the AFA selection process is that selection boards are provided information not available to pilot selection boards at other points of entry. This information consists of flight screening performance evaluations. Flight screening evaluations are believed to be more valuable for selection decisions than ability test scores because flight screening provides measures of performance more similar to that required in undergraduate jet training.

Homogeneity of educational standards is another unique aspect of AFA's flying candidate selection process. All other points of entry consider applicants from many different academic institutions with widely varying standards and curricula. Although AFA cadets pursue different academic majors, an underlying core of academic and military courses provides a common yardstick for comparison of individual performance. Because common educational achievement criteria define GPA for AFA applicants, GPA has a more standardized meaning than that used to evaluate applicants from other points of entry.

The AFA approach to selection allows board members to use their own judgment in determining the relative importance of selection factors. Board members' individual policies may differ, may vary from one year to the next, and may vary during the course of a several-day scoring session. For ROTC, a single selection policy is explicitly specified in the form of the COM equation. Because AFA's selection policy is not explicitly stated, different analytical approaches were necessary to examine selection procedures. For the AFA it is necessary to specify policy for each board member and the aggregate policy for the entire selection board. To do this, policy-capturing analyses are being conducted to determine pilot and navigator selection policy. Similar studies are also being conducted to determine selection policies for OTS and active duty selection boards.

For this study, the AFA 34th Operations Support Squadron provided selection board instructions for pilot and navigator boards and applicant information for the Classes of 1995, 1996, and 1997. AFRL observers attended the 1996 and 1997 pilot and navigator boards to witness and document proceedings. Observers provided questionnaires to board members that solicited information on what they felt were the most important and least important factors in their individual scoring procedure. Board member responses to these questionnaires guided the selection of variables for the following analyses. However, final conclusions concerning factors that contributed to difference in majority and minority pilot selection rates for the Class of 96 should be delayed until results of AFA policy capturing analyses are ascertained.

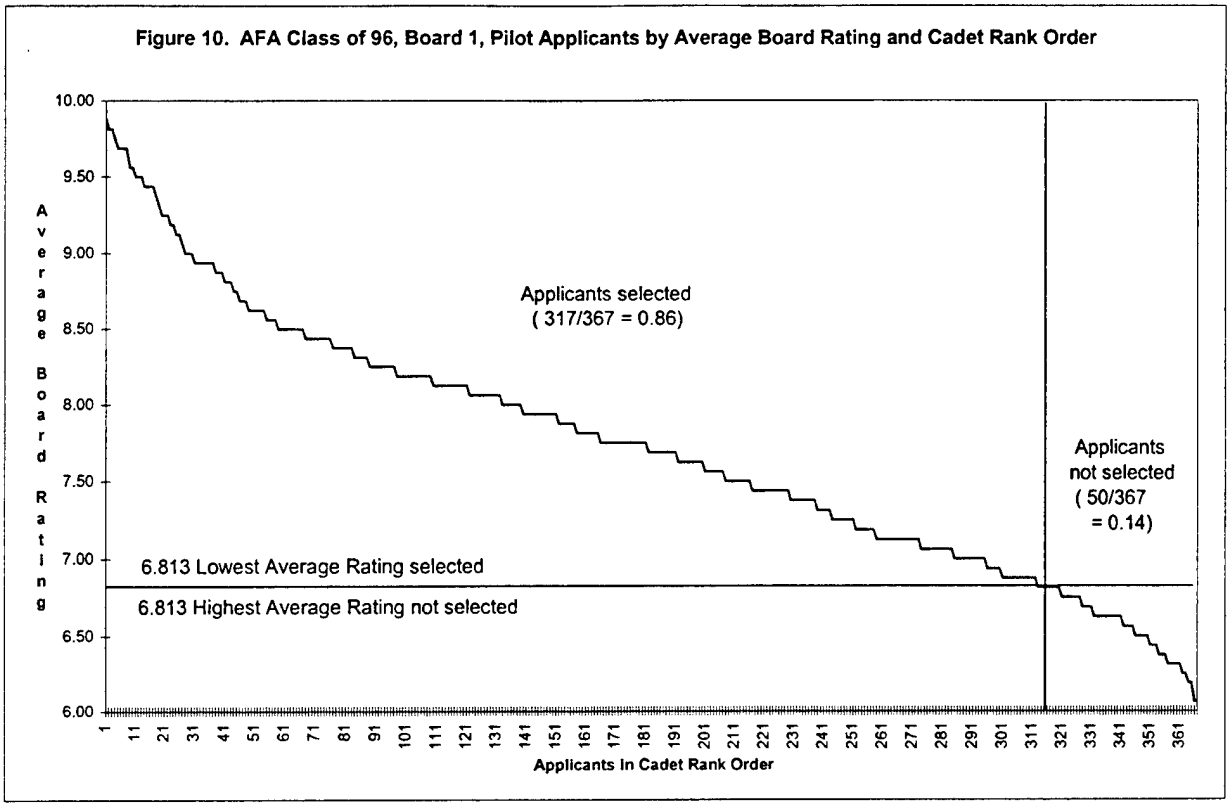


Figure 10 presents a plot of Average Board Rating against resultant cadet rank order for all pilot applicants evaluated by AFA Class of 96, Board 1. Pilot candidates were uniformly selected according to cadet rank order constructed on the basis of Average Board Rating. A total of 317 candidates were selected from 367 applicants yielding a total selection ratio of .86. Because cadet rank order was the basis of candidate selection, differences in majority and minority pilot selection ratios were due to differences in rank order. For the majority applicant subgroup, the rankings ranged from 1 to 367. For the minority applicant subgroup, the rankings ranged from 82 to 366.

Figure 11 presents Average Board Ratings by cadet rank order for the majority applicant subgroup. The total applicant pool included 341 (93%) majority applicants. In the majority subgroup, 302 applicants (89%) were selected and 39 applicants (11%) were ranked below the lowest Average Board Rating selected.

Figure 12 presents Average Board Ratings by cadet rank order for the minority applicant subgroup. The total applicant pool included 25 (7%) minority applicants and one applicant of unknown race and ethnicity. In the minority subgroup, 14 applicants (56%) were selected in cadet rank order and 11 applicants (44%) who were not selected were ranked below the lowest Average Board Rating selected.

Figures 11 and 12 indicate that all pilot candidates were selected in cadet rank order constructed from Average Board Rating. Difference in cadet rank order for majority and minority applicants was the main reason for differences in majority and minority selection ratios. For the majority applicant subgroup, 11% occupied rank positions below the lowest Average

Figure 11. AFA Class of 96, Board 1, Majority Pilot Applicants by Average Board Rating and Cadet Rank Order

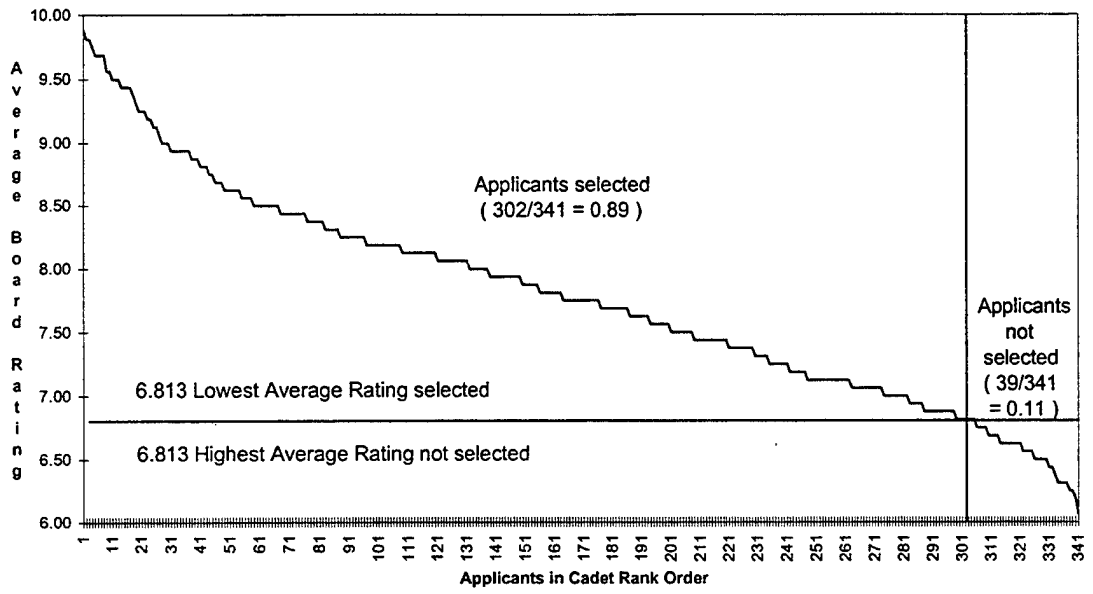
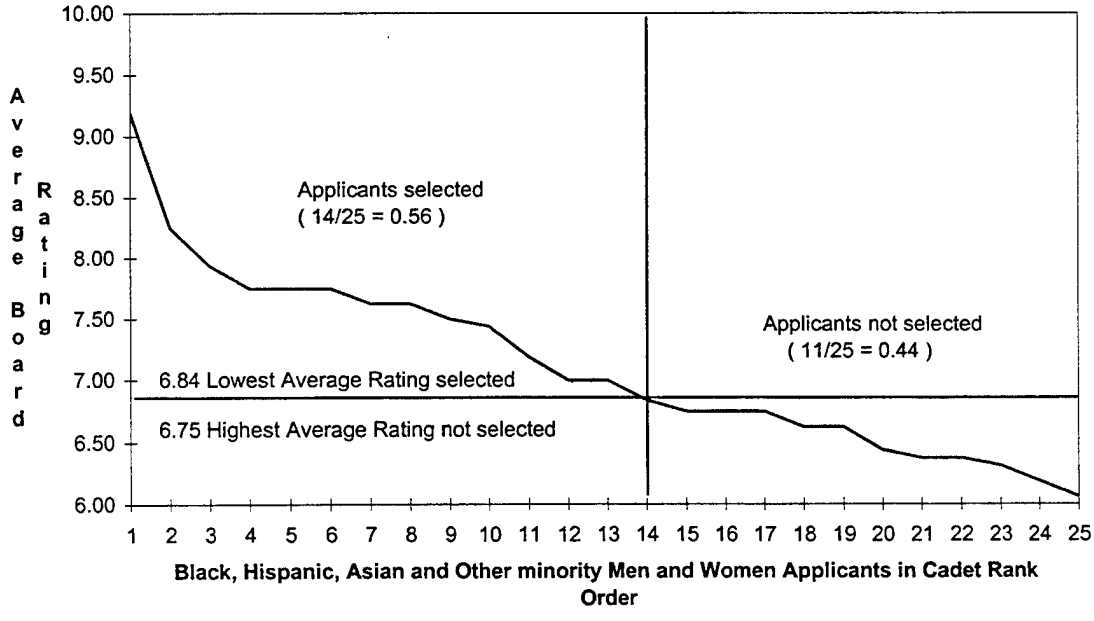


Figure 12. AFA Class of 96, Board 1, Minority Pilot Applicants by Average Board Rating and Cadet Rank Order



Board Rating selected. For the minority applicant subgroup, 44% occupied rank positions below the lowest Average Board Rating selected.

Because selection was based on rank order, exploratory correlational analyses were conducted to identify factors that could have influenced rank order and therefore differences in majority and minority pilot selection rates. A bivariate correlation was computed and a scatterplot constructed to illustrate the relationship between chosen selection factors and rank order determined by average board rating (SELECT-RANK). The criterion or dependent variable, SELECT-RANK, is a composite variable generated by first dividing applicants into those selected for pilot training and those not selected and then within each group ranking applicants in descending order by average board rating. The sample used for these analyses was obtained by consolidating applicant samples from AFA Class of 96, Boards 1 and 2 ($N = 475$). Although selection boards were separated in time, the same members comprised both boards.

Figure 13 presents a graphic representation of the relationship between SELECT-RANK and average board rating. The extremely strong relationship between SELECT-RANK and average board rating ($r^2 = 0.97$) indicates that average board rating was the main determinant of cadet rank order. Questionnaire responses indicated that board members referenced different factors to score applicants. Factors that were listed as most important by a majority of board members were cumulative grade point average (GPA), military performance average (MPA), and performance in the flight screening program. AFOQT scores were almost unanimously indicated as the least important selection factors, however a few board members commented that test scores were useful as tie breakers between otherwise equally worthy applicants. The analyses that follow pertain to selection factors most commonly cited by board members in their questionnaire responses.

Figure 14 illustrates the relationship between SELECT-RANK and cumulative grade point average. Grade point average values range from a minimum of 2.0 to a maximum of 4.0. The squared correlation indicates that 61% of the variability in SELECT-RANK can be attributed to grade point average.

Figure 15 illustrates the relationship between SELECT-RANK and cumulative military performance average (MPA). Military performance average values range from a minimum of 2.0 to a maximum of 4.0. The squared correlation indicates that 52% of the variability in SELECT-RANK can be attributed to military performance average.

Figure 16 illustrates the relationship between SELECT-RANK and Overall Performance Rating in Flight Screening (FLIGHT). Flight screening performance ratings range from a minimum of 1 to a maximum of 9, awarded in one-point increments. The squared correlation ($r^2 = 0.39$) indicates that 39% of the variability in SELECT-RANK can be attributed to FLIGHT.

Figure 17 illustrates the relationship between the AFOQT Pilot composite score and SELECT-RANK. The squared correlation ($r^2 = 0.10$) indicates that the influence of this AFOQT score on SELECT-RANK is weak. Analyses of the Verbal and Quantitative scores of the AFOQT indicated similar weak relationships (i.e., Verbal: $r^2 = 0.11$; Quantitative: $r^2 = 0.10$).

Although AFOQT scores are provided to AFA pilot selection boards, AFOQT scores appear to have little relationship to pilot selection decisions.

Figure 13. Relationship between AFA Cadet Rank Order by Select Status (SELECT/RANK) and Average Board Rating

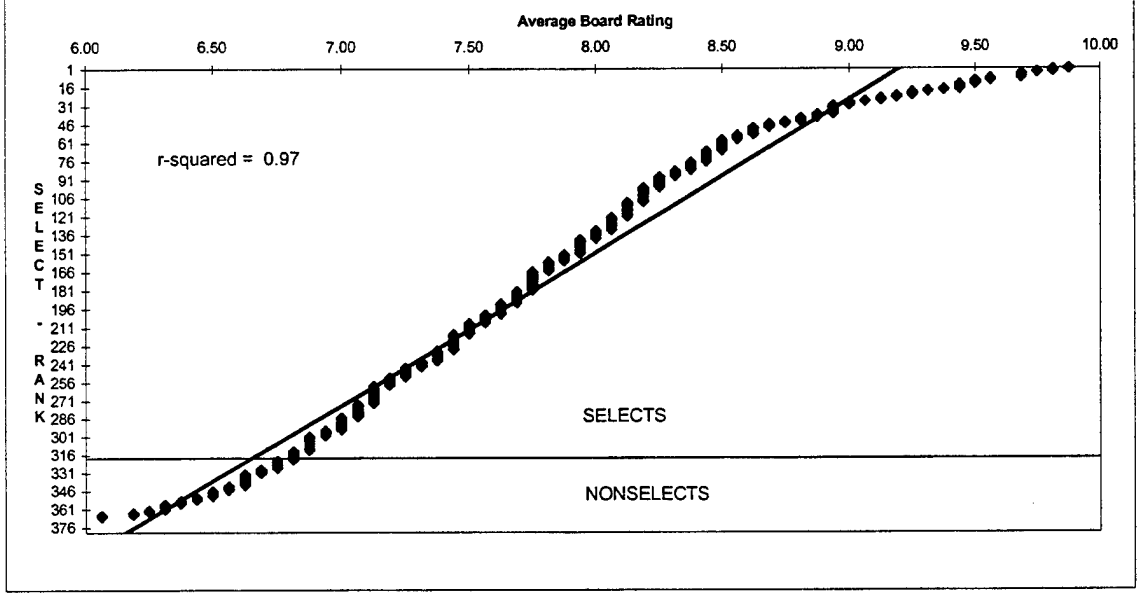
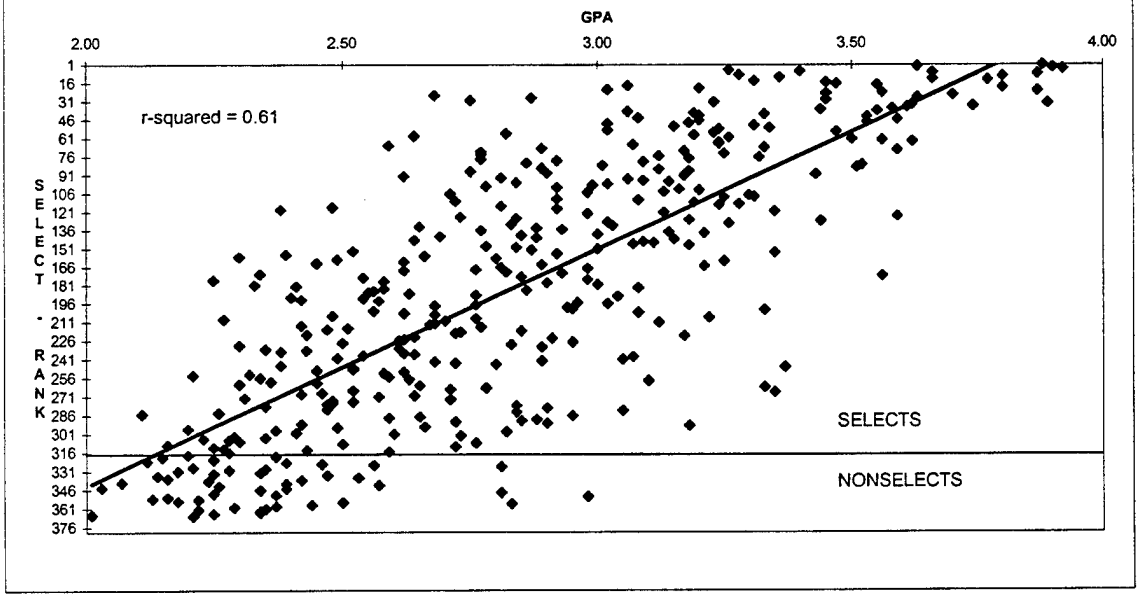


Figure 14. Relationship between AFA Cadet Rank Order by Select Status (SELECT/RANK) and Cumulative Grade Point Average (GPA)



Figures 14, 15 and 16 illustrate the influences of the more important selection factors on cadet rank order and the AFA pilot selection decision. Overall, exploratory analyses did not reveal a single factor that had an overwhelmingly strong influence on the pilot selection decision.

Figure 15. Relationship between AFA cadet Rank Order by Select Status (SELECT/RANK) and Cumulative Military Performance Average (MPA)

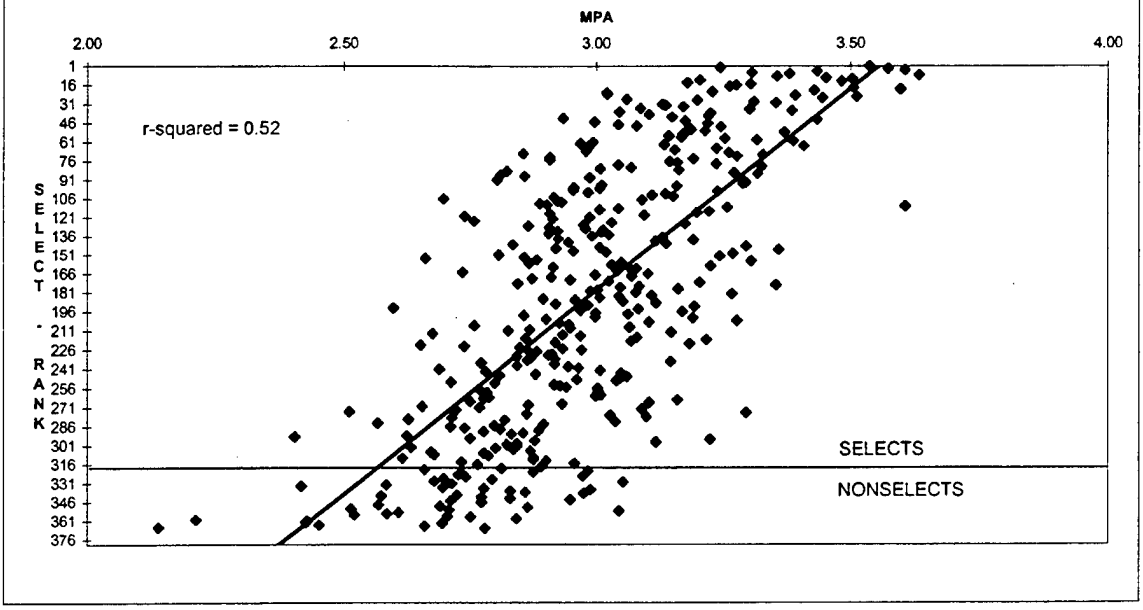


Figure 16. Relationship between AFA Cadet Rank Order by Select Status (SELECT/RANK) and Overall Performance Rating in Flight Screening (FLIGHT)

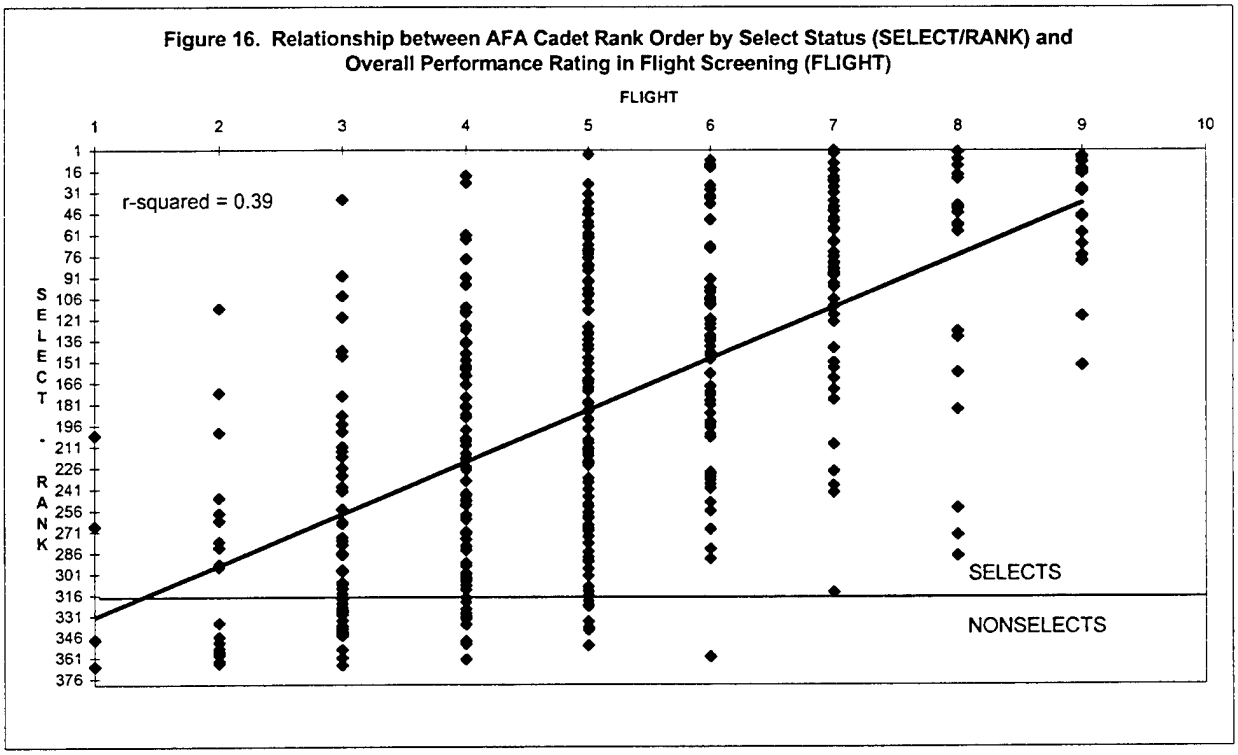
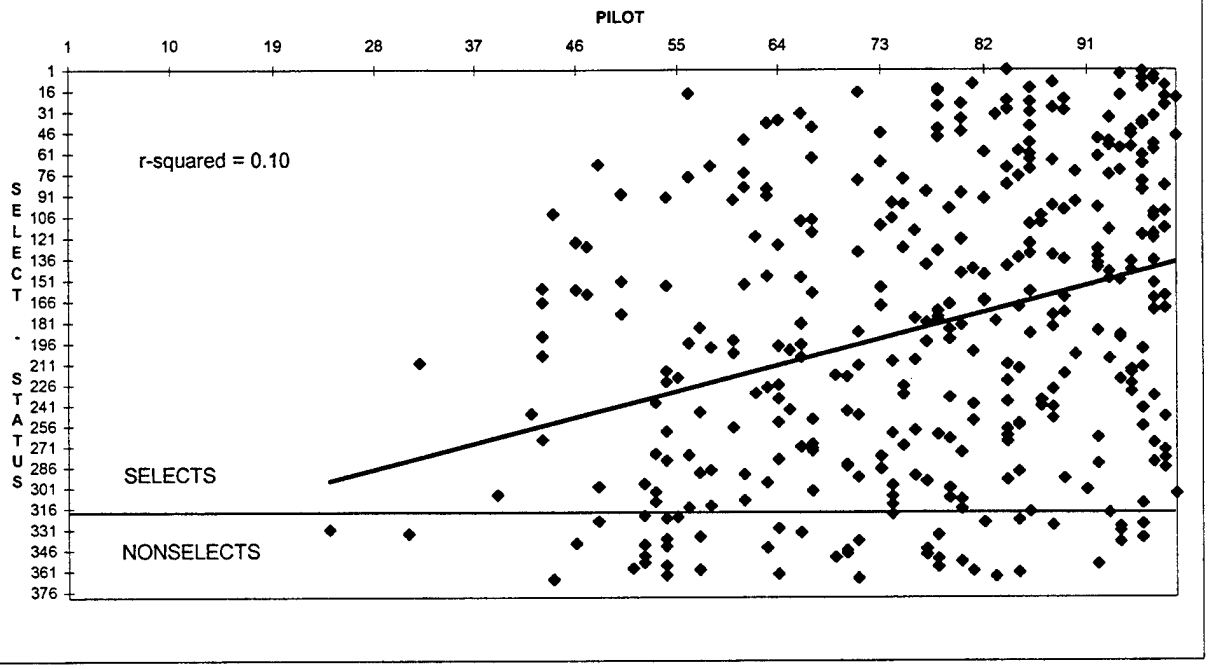


Figure 17. Relationship between AFA Cadet Rank Order by Select Status (SELECT/RANK) and AFOQT - Pilot Score (PILOT)



Academic grade point average, military performance average, and Flight Screening Performance average had moderately strong influences on the selection decision, and ability test scores from the AFOQT had little or no influence as indicated by Figure 17. The relative importance of these selection factors can be used to identify reasons for differences in majority and minority pilot selection rates for the Class of 96.

Table 14 presents differences in average scores for the strongest selection factors identified in the exploratory analyses--GPA, MPA, and FLIGHT--for pilot applicants selected and applicants not selected by majority and minority subgroup. As for the ROTC analyses, statistical analyses of average score differences were conducted while controlling for error rate for the set of comparisons.

For majority and minority applicants selected for pilot training (SEL/MAJ-MIN), majority applicants had higher GPA, MPA, and FLIGHT scores, on average, than minority applicants. These differences were not statistically significant and can be attributed to chance variations. For majority applicants selected and not selected for pilot training (MAJ/SEL-NOTSEL), differences in GPA, MPA, and FLIGHT were found to be statistically significantly different. This outcome indicates that the 39 majority applicants (11%) not selected had significantly lower GPA, MPA, and FLIGHT values than the 302 majority applicants (89%) selected. For minority applicants selected and not selected (MIN/SEL-NOTSEL), average GPA, MPA, and FLIGHT scores were found to be significantly different. The 11 minority applicants (44%) not selected had statistically significantly lower GPA, MPA, and FLIGHT values than the 14 minority applicants (56%) selected for pilot training.

In summary, exploratory analyses of the AFA pilot selection process for the Class of 96, Board 1, indicate that a greater proportion of minority applicants occupied lower rankings as determined by average board rating. Academic grade point average, military performance average, and flight screening performance appear to be key selection factors that influenced applicant ranking. Regardless of racial/ethnic affiliation, selected applicants scored significantly lower than non-selected applicants on each of these three factors.

Table 14. AFA Class of 96, Pilot Selection board 1, Means (*M*) and Standard Deviations (*SD*) of Critical Selection Factors for Applicants Selected and Applicants Not Selected, by Majority and Minority Subgroup

Selection Factor		SEL MAJ[a] - MIN[b]	MAJ SEL[a] - NOTSEL[c]	MIN SEL[b] - NOTSEL[d]
GPA	*M*	2.92 – 2.65	**2.92 - 2.36 ****	**2.65 - 2.24 ****
	SD	.41 .25	.41 .26	..25 .13
MPA	*M*	3.03 – 2.93	**3.03 - 2.74 ****	**2.93 - 2.63 ****
	SD	.22 .19	.22 .18	.19 .23
FLIGHT	*M*	5.35 – 4.86	**5.35 - 3.27 ****	**4.86 - 3.27 ***
	SD	1.72 1.41	1.72 1.19	1.41 1.10

Note. The statistical test was an independent sample, one-tailed, t test.
[a] $n = 302$; [b] $n = 14$; [c] $n = 39$; [d] $n = 11$; * $p < .005$. ** $p < .001$

DISCUSSION/RECOMMENDATIONS

Population projections suggest that the United States of America will be one of the most racially and ethnically diverse countries in the world. Projections of population growth rates indicate that minority subgroups will constitute much greater proportions of the total population. Projections indicate that from 1990 to 2050 the Hispanic population will increase from 9.0 to 21.1%, the Black population will increase from 11.7 to 15.0%, the population of Other minorities will increase from 3.6 to 11.2%, and the White population will decrease from 75.7 to 52.7% (Murdock, 1995). In addition to increased racial/ethnic diversity, the labor force will include more women. Changes in labor force participation rates from 1975 to 1990 have indicated that women constitute an ever-increasing percentage of the labor force. This trend is expected to continue in the future (Murdock, 1995). Projected changes in the gender and racial/ethnic composition of our work force signal the importance of equal opportunity policies and directives. Such changes pose challenges to the USAF and other services. Today and in the future, personnel recruitment, selection, and training will need to be sensitive to the needs of a diverse work force to assure that the USAF represents the American public in 2050.

The first objective of this study was to provide a comprehensive description of the process of entry to undergraduate flying training and snapshots of the minority composition of flying training candidate pools to serve as a supporting benchmark for management initiatives to accommodate greater diversity in the workplace. To provide this frame of reference, a structural description of the current entry process was provided and barriers that limit entry to flying training were identified. The pattern of limitations to entry imposed by these barriers was examined for the base pool of college graduates, accession pools, and flying training applicant pools. Data presented in Table 1 concerning the age-appropriate population and the base pool indicate that the bachelor's degree requirement imposes different limiting effects by subgroup. The population consisted of 49% women, yet examination of the base pool of college graduates indicated that women were awarded 55% of all bachelor's degrees. The population consisted of 58% majority members and the base pool consisted of 69% majority members. The population consisted of 32% minority members and minority members were awarded 16% of all bachelor's degrees. Comparisons of the composition of the population with the base pool suggest that the college education requirement imposes a strong limit on minority members and a weak limit on majority members and women.

Comparisons of the base pool of college graduates (Table 1) with officer accession pools (Table 3) provided an indication of the combined limiting effect of employment choice, recruitment competition among the services, officer qualification/selection standards, and officer production requirement barriers. The base pool of college graduates consisted of 16% minorities and the percentage of minorities in officer accessions pools varied from 10% to 17% over the period FY92 to FY96. The base pool consisted of 55% women and the percentage of women in officer accessions pools varied from 20% to 25% over the same period. These comparisons suggest that the combined effects of all of these barriers impose a strong limit on the accession of women and a diminishing limit on accession of minority members.

Table 15. Estimates of Barrier Strength, FY 1996

Point of Entry/ Type Training	N Accessions	Occupational Choice & Flying Training Qualification[a]	N Applicants	Selection/ Production Requirement[b]	N Candidates
AFA Pilot	909	542/909 (60%)	367	50/367 (14%)	317
AFA Nav	909	815/909 (90%)	94	24/94 (26%)	70
ROTC Pilot	1,662	1252/1662 (75%)	410	86/410 (21%)	324
ROTC Nav	1,662	1447/1662 (89%)	185	44/185 (24%)	141
Active Duty Pilot	11,063	10,512/11,063 (95%)	551	470/551 (85%)	81
Active Duty Nav	10,889	10,739/10,889 (99%)	150	88/150 (59%)	62
OTS Pilot	638	298/638 (47%)	340	324/340 (95%)	16
OTS Nav	638	299/638 (47%)	339	229/339 (68%)	110

Note. Number of accessions, applicants, and candidates extracted from Figures 2 - 9.

[a] The limiting effects of these two barriers combined are indicated by the percentage of accessions limited from entry to the applicant pool.

[b] The limiting effect of this barrier is indicated by the percentage of applicants limited from entry to the candidate pool.

In addition to considerations of the variable strength of barriers by subgroup, general patterns were observed that relate to the relative strength of combinations of barriers. Although lack of information prevented an estimate of the independent limiting effects of flying training qualification standards, it is possible to estimate the combined limiting effect of occupational choice and qualification standards by comparing the number of accessions to the reduced number of individuals in flying training applicant pools. Table 15 presents estimates of the strength of combinations of barriers based on the data presented in Figures 2 through 9. For example, the combination of occupational choice and flying training qualification standards restricted 60% (542/909) of the AFA accessions from entry to the pool of 367 AFA pilot applicants. The combination of selection and flying training production requirements limited entry of 14% (50/367) of the AFA pilot applicants from entry into the pool of 317 AFA pilot candidates. Similar limitations can be observed for ROTC. The pattern that emerges is that, for the major producers of flying training candidates--AFA and ROTC, the combination of occupational choice and flying training qualification imposes a stronger limit on entry than the combination of selection and flying training production requirements. Examination of the reduction in personnel across accessions, applicant, and candidate pools in Figures 2 through 9 indicate that this pattern also exists for gender and racial/ethnic subgroups and is more pronounced for entry to pilot training than for entry to navigator training.

Patterns of limitations imposed by these barriers had marked effects on the composition of flying training applicant pools. Compared to accessions pools, flying training candidate pools consist of smaller percentages of women and racial/ethnic minorities and a greater percentage of

White men. Comparisons of the composition of pilot candidate pools with the composition of navigator candidate pools indicate greater gender and racial/ethnic diversity in navigator candidate pools. For example, over all points of entry for 1996, pilot candidate pools consist of 0% to 7% racial/ethnic minorities, and navigator candidate pools consist of 4% to 18% minorities. Gender composition displays a similar pattern. Pilot candidate pools consist of 0% to 7% women, and navigator candidate pools consist of 1% to 13% women (see Figures 2 through 9).

The second objective of this study was to examine pilot and navigator selection procedures to identify improvements that would help minimize minority attrition during undergraduate flying training. McLaughlin (1996) provided average flying training attrition data for all causes for active duty personnel over the period FY91 to FY95. These data indicate that during this period, total attrition for pilot training was 17.0%. For women, it was 16.9%; for Blacks, 27.9%; for Hispanics, 36.0%, and for Other minority candidates, it was 21.7%. Also during this period, total attrition for navigator training was 10.9%. For women, it was 5.7%; for Blacks, 11.4%; for Hispanics, 7.2%, and for Other minority candidates, it was 16.7%. The percentages indicating attrition for minority subgroups are based on small numbers (i.e., less than 100 students for the minority subgroup) and therefore should not be regarded as stable estimates of true values. However, the order relationships indicated by these data probably do represent a stable pattern. Members of racial/ethnic minority subgroups are eliminated from flying training at higher rates than members of the majority subgroup. This pattern is regarded as a serious problem by those who appreciate the need to have minority members in positions of leadership after completion of flight training.

In view of this concern, selection procedures were examined to identify improvements that would help minimize minority attrition in flying training. Although the problem concerns minority attrition, recommended improvements apply to the problem of attrition in general and do not uniquely apply to minority attrition. The approach for this objective is to define, evaluate and recommend improvements by point of entry. Selection data are being collected and analyzed to fully specify selection policies for AFA, OTS, and the entry of active duty personnel. Until baseline selection policies are specified for these points of entry, evaluation will be delayed. Because ROTC selection policy is fully specified in the form of the Categorization Order of Merit (COM) equation, evaluation was possible and recommendations for improvement are suggested. ROTC selection policy is a good place to begin. McLaughlin (1996) indicates that, from FY91 to FY95, total pilot training attrition by ROTC candidates was 19.4% compared to 17.6% for OTS and 15.4% for the AFA. From FY90 to FY95, total navigator training attrition by ROTC candidates was 16.1% compared to 8.7% for OTS and 7.4% for the AFA. During this period, pilot and navigator training attrition was highest for ROTC. The following discussion focuses on an examination of and improvements to ROTC pilot qualification standards and selection policy; however, in principle, the recommendations are applicable to ROTC navigator selection.

By way of providing background information, it should be noted that there have been recent changes in ROTC flying training qualification and selection policy during the course of this study. AFROTCR 45-13 (dated 15 December 1992) established policy and standards which were revised by AFROTCI 36-2013 (dated 1 February 1997). The result of these changes was that qualification minimums for entry into pilot training were reduced. The minimum score on

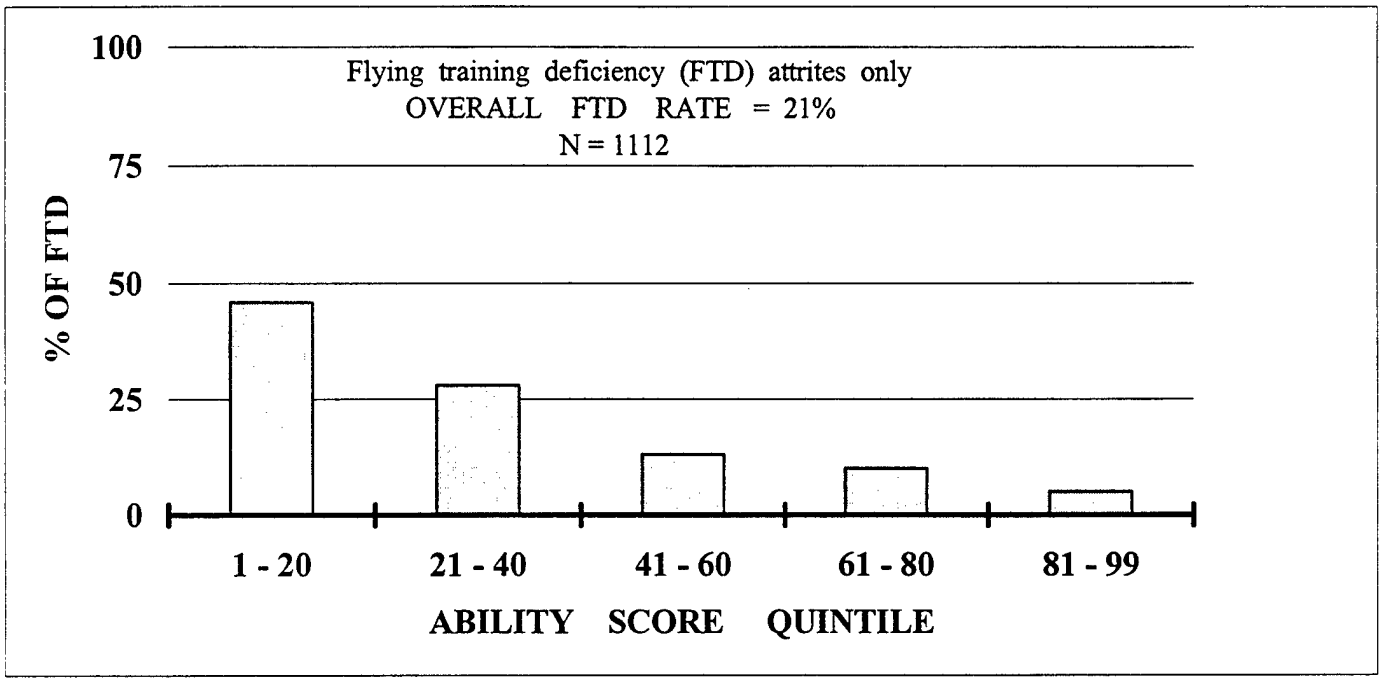
minimum score on the Pilot composite was reduced from the 50th to the 25th percentile. Selection factors included in the COM equation were also changed. Both the Verbal and Quantitative AFOQT test score composites were replaced with the Pilot composite and new COM weights were established. The revised COM weighting scheme preserves the strong influence of RSS (i.e., Detachment Commander's officership rating) and establishes a minor influence for the AFOQT Pilot composite.

Given recent changes in ROTC qualification and selection policy, we expect higher pilot training attrition rates for ROTC candidates than those described by McLaughlin (1996). This expectation is based on the reduction in the AFOQT qualification minimum, studies of the relationship between ability measures like the AFOQT and pilot training attrition, and the deemphasis of ability (i.e., the Pilot Composite of the AFOQT) in the current COM equation. Arth, Steuck, Sorrentino, and Burke (1990) demonstrated that the AFOQT is a valid predictor of both pilot and navigator training and that lower scores are associated with lower pilot training performance. Carretta and Ree (1993) analyzed the validity of components of the Pilot Candidate Selection Method (PCSM) and concluded that although components consisting of flying experience, psychomotor skills, and attitude toward risk incremented prediction, the AFOQT Pilot composite was the best single predictor of pilot training attrition. The value of ability as a predictor of flying training deficiency attrition has been conclusively demonstrated. Analyses consistently show that correlations between flying training deficiency attrition and ability as measured by test scores from the AFOQT and PCSM range from approximately negative .20 to negative .35. Figure 18 illustrates such a relationship and shows the percentage of flying training deficiencies for groups of students who score at successive twenty-point segments across the ability test score continuum (Note. Ability is represented by the pilot composite score, information processing skills, psychomotor skills and flying experience). The figure indicates that pilot training failures decrease as candidates' ability test scores increase.

In view of the de-emphasis of AFOQT and emphasis of RSS in the ROTC COM equation, it is important to examine the validity of RSS (detachment Commander's officership rating) as a predictor of pilot training performance. If RSS is a valid predictor of pilot training performance so that cadets with higher officership ratings tend to be successful in pilot training, then the emphasis on RSS would result in high quality candidates likely to be successful officers and successful in flying training. However, the evidence does not support such an expectation. Analyses were conducted for a sample of 400 ROTC cadets for whom both officership ratings and undergraduate pilot training outcomes were available. The objective was to determine the validity of officership rating as a predictor of attrition expressed as graduation or elimination from pilot training for reasons associated with flying training deficiency. The correlation between officership rating and pilot training attrition was .01. There was no relationship between officership rating and pilot attrition. In the context of selection, this means that knowledge of officership rating provides no indication of performance in pilot training. Individuals with high officership ratings are as likely to be successful in training as be unsuccessful. So what does this mean for pilot selection policy?

Even though an applicant displays superior officership, it is no guarantee that the applicant will possess the ability to be successful in pilot training. Even though an applicant

Figure 18. Relationship between Flying Training Deficiency Attrition and Ability Test Scores



possesses superior ability, it is no guarantee that the applicant will display the integrity, responsibility and leadership to be a successful officer. To select successful officers and to minimize attrition, officership and ability should be balanced in pilot selection policy. If high student quality is defined as a student who is likely to be a successful officer and successful in pilot training, current selection policies are not producing the highest quality candidates. Today, pilot candidate ability levels are lower on the average than what they would be if selection policies assigned equal importance to ability and officership. Candidates who enter training with lower ability are most likely contributing to attrition.

In view of the objective to reduce pilot training attrition for minority candidates, the following revisions to ROTC qualification standards and selection policy are suggested:

(1) in accordance with AFROTCI 36-2013, the minimum qualifying score on the Air Force Officer Qualifying Test (AFOQT) Pilot composite should continue to be the 25th percentile. Evidence indicates that AFOQT scores for racial/ethnic minority applicants are lower, on average, than those for majority applicants. Compared to the previously used 50th percentile minimum, a minimum qualifying score at the 25th percentile will allow for the qualification of greater numbers of minority applicants,

(2) in accordance with AFROTCI 36-2013, the AFOQT Pilot composite score should continue to be used in the COM equation. Compared to the previously used Verbal and Quantitative composites, the Pilot composite is a more valid indicator of pilot training performance,

(3) the COM equation established by AFROTCI 36-2013 should be revised to increase the weight for the AFOQT Pilot composite so that the influence of potential for success in pilot training (AFOQT) and the influence of officer potential (Relative Standing Score) are equally balanced. Such a revision would reduce both minority attrition and overall attrition rates.

Although balancing the influence of RSS and AFOQT in the COM equation would result in selection of candidates more likely to succeed in pilot training, two critical tradeoffs should be considered prior to adopting this recommendation. Carretta (1996) conducted analyses of AFOQT scores for over one quarter million applicants for commissioning and concluded that average AFOQT scores for minority applicants were more than one standard deviation lower than those for majority applicants. A COM equation that balances the influence of RSS and AFOQT would produce lower COM scores for applicants with lower AFOQT scores. Lower COM scores would result in lower rank positions in the overall COM ranking and reduced chances of being selected. If a greater proportion of minority applicants occupy lower rank positions because of lower AFOQT scores, they may not be selected and this could result in adverse impact.

The second tradeoff associated with balancing the influence of RSS and AFOQT in the COM equation involves AFROTC detachment viability. Stokes (1984) identified a cadet quality dilemma that operates for ROTC. He points out that, by law, ROTC detachments must remain viable in order to continue operation. Viability is defined in terms of the number of cadets committed to commissioning by legal contract each year. The dilemma is that the importance of ROTC detachment viability and associated emphasis on cadet recruitment can be counterproductive to recruiting high quality cadets. The opportunity to attend USAF pilot training is one of the strongest incentives that the ROTC detachment commander has to attract high quality students. Revisions to the COM equation so as to balance the influence of RSS and the AFOQT would result in lower COM rankings for cadets with low AFOQT scores. If a ROTC detachment submits pilot training applicants who have low AFOQT scores relative to cadets from other detachments, this would result in less favorable rank positions for cadets from that detachment and reduce their probability of selection for pilot training. If over a period of time, a given ROTC detachment consistently submits pilot training candidates with low AFOQT scores and receives no pilot training authorizations, there could be adverse affects on cadet recruitment and, as a result, detachment viability could be threatened.

A major limitation of this study was the failure to estimate the independent limiting effect of flying training qualification standards. Although the combined effects of occupationa' choice and flying training qualification barriers were estimated, it would be necessary to separate their influences and reference the independent limiting effect of qualification standards to effectively manage entry into flying training. Zehner's (1996) analysis of anthropometric standards emphasizes the importance of monitoring the effect of flying training qualification standards. He estimates that anthropometric standards would have been the cause of disqualification of 55% of

the female population and 83% of the Black female population considered in his study. The reason for the failure to estimate the independent limiting effects of qualification standards was lack of data. Information that indicates the number of individuals who apply but fail to qualify for flying training and the reasons for disqualification is not systematically preserved. To effectively manage entry to flying training, managers could use feedback on the limiting effect of flying training qualification standards. Therefore, it is recommended that for each point of entry and for pilot and navigator training separately, a non-qualifying applicant database be developed to include racial/ethnic and gender identity of applicants who fail to qualify and reason(s) for disqualification.

Careful management of selection policy represents only one of several means of controlling minority flying training attrition. As the national population continues to diversify and social and political pressures to create a military representative of that population persist, changes in the approach to flying training should be considered as a long-term strategy for controlling flying training attrition. Evidence indicates that student ability, as indexed by tests of cognitive ability, is related to flying training performance. Evidence indicates that ability levels of racial/ethnic minority applicants are lower than ability levels of majority applicants on the average. If average ability levels of flying training candidates decline and attrition rates increase as the population continues to diversify, an adaptive approach to training is recommended (Ross & Rakow, 1981; Tennyson, 1981; Johansen & Tennyson, 1983; Breuer & Hajovy, 1987; Fabiani, Buckley, Gratton, Coles, Donchin, & Logie, 1989; Frederiksen & White, 1989; Mane, Adams, & Donchin, 1989; Snow, 1992). Adaptive training is a feedback-intensive approach that adjusts to individual student ability level by providing more training time for students who encounter training difficulties. An evaluation of the current Specialized Undergraduate Pilot Training program has been accomplished and improvements based on adaptive training have been recommended (Andrews, Edwards, Mattoon, Thurman, Shinn, Carroll, Bowden, Moor, & Nelson, 1995, 1996; Mattoon, 1995). High minority attrition in flying training is a complex problem. It is unlikely that it will be minimized by a narrow approach based on management of selection policy alone. A multifaceted approach based on coordinated and integrated management of recruitment, qualification, selection and training is recommended.

REFERENCES

AETCI 36-2002 (April, 1995). *Recruiting procedures for the Air Force.* Randolph AFB, TX. Headquarters, Air Education and Training Command.

Air Force Personnel Center/DPSAI (1996). *Officer demographics* [On-line]. Available: http://136.149.142.85/analysis/demograf/demo.html; accessed 21 May 96

AFI 36-2013 (August, 1994). *Officer Training School (OTS) and airman commissioning programs.* Washington, DC: Headquarters, United States Air Force.

AFI 36-2019 (May, 1994). *Appointment to the United States Air Force Academy.* Washington, DC: Headquarters, United States Air Force.

AFI 36-2205 (August, 1996). *Applying for flying and astronaut training programs.* Washington, DC: Headquarters, United States Air Force.

AFI 48-123 (November, 1994). *Medical examination and standards.* Washington, DC: Headquarters, United States Air Force.

AFROTCI 36-2013 (February, 1997). *AFROTC allocations management.* Maxwell AFB, AL: Headquarters, Air Force Officer Training Corps.

AFROTCR 45-13 (December, 1992). *AFROTC weighted professional officer course selection system.* Maxwell AFB, AL: Headquarters, Air Force Officer Training Corps.

AFROTC 36-13 (Draft dated 1 January, 1996). AFROTC Selection and Categorization. Maxwell AFB, AL: Headquarters, Air Force Officer Training Corps.

Andrews, D. H., Edwards, B.J., Mattoon, J.S., Thurman, R.A., Shinn, D.R., Carroll, L.A., Bowden, P., Moor, W.C., & Nelson, B.G. (1995). *Potential modeling and simulation contributions to Air Education and Training Command flying training: Specialized Undergraduate Pilot Training* (AL/HR-TR-1995-0157, AD A318 042). Mesa AZ: Armstrong Laboratory, Human Resources Directorate, Aircrew Training Research Division.

Andrews, D. H., Edwards, B.J., Mattoon, J.S., Thurman, R.A., Shinn, D.R., Carroll, L.A., Bowden, P., Moor, W.C., & Nelson, B.G. (1996). *Potential modeling and simulation contributions to Air Education and Training Command flying training: Specialized Undergraduate Pilot Training - Executive Summary* (AL/HR-TR-1996-0041, AD A318 042). Mesa AZ: Armstrong Laboratory, Human Resources Directorate, Aircrew Training Research Division.

Arth, T.O., Steuck, K. W., Sorrentino, C.T., & Burke, E.F. (1990). *Air Force Officer Qualifying Testing (AFOQT): Predictors of undergraduate pilot training and undergraduate navigator training success* (AFHRL-TP-89-52, AD A221 674). Brooks Air Force Base, TX: Air Force Human Resources Laboratory, Manpower and Personnel Research Division.

Breuer, K., & Hajovy, H. (1987). Adaptive instructional simulations to improve learning of cognitive strategies. *Educational Technology*, 29(5), 29-32.

Brown, D.C. (1987). *Military Officers: Commissioning sources and selection criteria* (Final Report 87-42, HumRRO FR-PRD-87-42). Human Resources Research Organization, Alexandria, VA.

Carretta, T.R. (1996). *Group differences on U.S. Air Force pilot selection tests* (AL/HR-TP-1996-0026). Brooks Air Force Base, TX: Armstrong Laboratory, Human Resources Directorate, Manpower and Personnel Research Division.

Carretta, T.R. & Ree, M.J. (1993). *Pilot candidate selection method (PCSM): What makes it work?* (AL-TP-1993-0063, AD A262 871). Brooks Air Force Base, TX: Armstrong Laboratory, Human Resources Directorate, Manpower and Personnel Research Division.

Day, J.C. (1996). *Population Projections of the United States by Age, Sex, Race, and Hispanic Origin: 1995 to 2050, U.S. Bureau of the Census, Current Population Reports (P25-1130).* Washington DC: U.S. Government Printing Office.

Defense Manpower Data Center (1997). *Youth attitude tracking study 1996: Propensity and advertising report* (DMDC Report No. 97-016).

Fabiani, M., Buckley, J., Gratton, G., Coles, M.G.H., Donchin, E. & Logie, R. (1989). The training of complex task performance. *Acta Psychologica*, 71, 259-299.

Fast, J.C., Cartagena, S., Barucky, J. & Zelenski, W. (1997, October). *Selection of pilot and navigator candidates.* Paper presented at the 39th annual meeting of the International Military Testing Association, Sydney, Australia.

Frederiksen, J.R. & White, B.Y. (1989). An approach to training based on principled task decomposition. *Acta Psychologica*, 71, 89-146.

Guilford, J.P. (1965). *Fundamental Statistics in Psychology and Education* (4th ed). New York: McGraw-Hill.

Johansen, K.J., & Tennyson, R.D. (1983). Effect of adaptive advisement on perception in learner-controlled, computer-based instruction using a rule-learning task. *Education Communications and Technology Journal*, 31 (4), 226-236.

Keppel, G. (1991). *Design and analysis: A researcher's handbook* (3rd ed.). New Jersey: Prentice Hall.

Mane, A.M., Adams, J.A., & Donchin, E. (1989). Adaptive and part-whole training in the acquisition of a complex perceptual-motor skill. *Acta Psychologica*, 71, 179-196.

Mattoon, J.S. (1995). *Reasons for implementing modeling and simulation technologies in Specialized Undergraduate Pilot Training* (AL/HR-TR-1995-0078, AD A316 977). Mesa AZ: Armstrong Laboratory, Human Resources Directorate, Aircrew Training Research Division.

McLaughlin, M. (1996). [Briefing to the Tuskeegee Airmen Institute/ USAF Air Education and Training Command Working Group]. Unpublished raw data.

Metrica, Inc. (1996). [Survey of enrollment in college and university aviation programs]. Unpublished raw data.

Murdock, S.H. (1995). *An America challenged: Population changes and the future of the United States*. San Francisco: Westview.

Ross, S.M., & Rakow, E.A. (1981). Learner control versus program control as adaptive strategies for selection of instructional support on math rules. *Journal of Educational Psychology*, 73(5), 745-753.

Scarborough, R. (1996, May 7). Pentagon studies find no reason for lack of black pilots. *Washington Times*, p. 3.

Smith, R.P. (1990). *Improved officer assessment, selection, placement, and promotion* (Research Report No. AU-ARI-86-15). Maxwell Air Force Base, Montgomery, AL: Air University, Airpower Research Institute.

Snow, R. (1992). Aptitude Theory: Yesterday, today, and tomorrow. *Educational Psychologist*, 27 (1), 5-32.

Stokes, R.W., Jr. (1984). *Preserving the lambent flame: Traditional values and the USAF officer accession program* (Research Report No. AU-ARI-83-8). Maxwell Air Force Base, Montgomery, AL: Air University, Airpower Research Institute.

Tennyson, R.D. (1981). Use of adaptive information for advisement in learning concepts and rules using computer-assisted instruction. *American Educational Research Journal*, 18(4), 425-438.

United States Air Force Academy (1996). *1996-97 Catalog.* USAF Academy, CO: US Government Printing Office.

United States Department of Education, National Center for Education Statistics (1994). *Integrated Postsecondary Education Data System, "Completions" survey 1993 - 1994 and "Consolidated" survey 1994*, Washington DC: U.S. Government Printing Office.

Weeks, J.L., Zelenski, W.E., & Carretta, T.R. (1996). Advances in USAF pilot selection. *Advisory Group for Aerospace Research & Development: AGARD Conference Proceedings - 588. Selection and Training Advances in Aviation* (pp. 1.1-1.11). Linthicum Heights, MD: NASA Center for Aerospace Information.

Zehner, G.F. (1996). Assessment of anthropometric accommodations in aircraft cockpits and pilot body size selection criteria. *Advisory Group for Aerospace Research & Development: AGARD Conference Proceedings - 588. Selection and Training Advances in Aviation* (pp. 2.1-2.6). Linthicum Heights, MD: NASA Center for Aerospace Information.

Appendix A

Qualification Standards for Commissioning and Flying Training

Medical Standards

For Commissioning:

All candidates for commissioning, regardless of source, must pass a standard medical examination as described in Air Force Instruction (AFI) 48-123, Medical Examinations and Standards.

For Flying Training:

Flying training candidates must pass a Flying Class I (pilots) or Flying Class IA (navigators) physical as described in AFI 48-123.

Anthropometric Standards

For Commissioning:

Men: Not less than 60 inches or greater than 80 inches height
Women: Not less than 58 inches or greater than 80 inches height

For Flying Training:

All: Not less than 64 inches or greater than 77 inches height
Pilot: Not less than 34 inches or greater than 40 inches sitting height
Navigator: Not less than 33 inches or greater than 40 inches sitting height

Test Score Standards

For Commissioning:

Officer Training School (OTS) and Reserve Officer Training Corps (ROTC) applicants must achieve an Air Force Officer Qualifying Test (AFOQT) Verbal score of 15 or greater, and a Quantitative score of 10 or greater for entry into OTS or the ROTC Professional Officer Course (AFI 36-2013, AFROTCI 36-2013).

Air Force Academy (AFA) cadets are not required to take the AFOQT for Academy admission or commissioning, but must achieve "satisfactory results" on the Scholastic Achievement Test (SAT) or the American College Testing (ACT) Assessment for admission (AFI 36-2019).

For Flying Training:

OTS, ROTC, and Active Duty pilot applicants must take the Basic Attributes Test (BAT), however, there are no minimum score requirements (AFI 36-2013, AFROTCI 36-2013, AFI 36-2205). AFA pilot applicants and navigator applicants from any source are not required to take the BAT.

AFOQT score requirements differ for each point of entry. Minimum required scores are presented in Table A1.

Table A1. Minimum AFOQT Composite Scores For Flying Training Candidates, by Source

	Minimum AFOQT Composite Scores				
Pilot Candidates	Pilot (P)	Navigator (N)	P+N	Verbal	Quantitative
OTS w/pilot's license[a]	25	10	50	15	10
OTS w/o pilot's license[a]	50	50	60	15	10
ROTC (prior to 1997)[b]	50	10	60	15	30
ROTC (1997 and later)[c]	25	10	50	15	10
Active Duty[d]	25	10	50	none	none
AFA	none	none	none	none	none
Navigator Candidates	Pilot (P)	Navigator (N)	P+N	Verbal	Quantitative
OTS[a]	10	25	50	15	10
ROTC (prior to 1997)[b]	10	25	50	15	30
ROTC (1997 and later)[c]	10	25	50	15	10
Active Duty[d]	10	25	50	none	none
AFA	not tested	not tested	not tested	not tested	not tested

[a] AFI 36-2013; [b] AFROTCR 45-13; [c] AFROTCI 36-2013; [d] AFI 36-2205

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix B

Flying Training Selection Board Data

Table B1. AFA Class of 96 Pilot Candidate Selection Board 1, January 1996 Pilot Training Applicants and Selects (Candidates), by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	319	22	341
Black	11	0	11
American Indian	-	-	-
Asian	-	-	-
Hispanic	-	-	-
Other Minority	13	1	14
Unknown	1	0	1
Total	344	23	367

SELECTS	Men	Women	Total
White	281	21	302
Black	6	-	6
American Indian	-	-	-
Asian	-	-	-
Hispanic	-	-	-
Other Minority	7	1	8
Unknown	1	-	1
Total	295	22	317

Note. Race data extracted from Uniform Officer Record database maintained by the Air Force Research Laboratory/HE (formerly Armstrong Laboratory/HRCX).

Source: 34th Operation Support Squadron (USAFA)

Table B2. AFA Class of 96 Pilot Candidate Selection Board 2, March 1996 Pilot Training Applicants and Selects (Candidates), By Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	91	3	94
Black	7	0	7
American Indian	-	-	-
Asian	-	-	-
Hispanic	-	-	-
Other Minority	7	0	7
Unknown	0	0	0
Total	105	3	108

SELECTS	Men	Women	Total
White	53	2	55
Black	2	-	2
American Indian	-	-	-
Asian	-	-	-
Hispanic	-	-	-
Other Minority	1	-	1
Unknown	-	-	-
Total	56	2	56

Note. Race data extracted from Uniform Officer Record database maintained by the Air Force Research Laboratory/HE (formerly Armstrong Laboratory/HRCX).

Source: 34th Operation Support Squadron (USAFA)

Table B3. AFA Class of 95 Pilot Candidate Selection Board Pilot Training Applicants and Selects (Candidates), By Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	417	16	433
Black	14	0	14
American Indian	-	-	-
Asian	-	-	-
Hispanic	-	-	-
Other Minority	12	0	12
Unknown	7	0	7
Total	450	16	466

SELECTS	Men	Women	Total
White	269	10	279
Black	7	-	7
American Indian	-	-	-
Asian	-	-	-
Hispanic	-	-	-
Other Minority	6	-	6
Unknown	3	-	3
Total	285	10	295

Note. Race data extracted from Uniform Officer Record database maintained by the Air Force Research Laboratory/HE (formerly Armstrong Laboratory/HRCX).

Source: 34th Operation Support Squadron (USAFA)

Table B4. AFA Class of 96 Navigator Candidate Selection Board Navigator Training Applicants and Selects (Candidates), by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	79	1	80
Black	5	0	5
American Indian	-	-	-
Asian	-	-	-
Hispanic	-	-	-
Other Minority	9	0	9
Unknown	0	0	0
Total	93	1	94

SELECTS	Men	Women	Total
White	59	1	60
Black	3	-	3
American Indian	-	-	-
Asian	-	-	-
Hispanic	-	-	-
Other Minority	7	-	7
Unknown	-	-	-
Total	69	1	70

Note. Race data extracted from Uniform Officer Record database maintained by the Air Force Research Laboratory/HE (formerly Armstrong Laboratory/HRCX).

Source: 34th Operation Support Squadron (USAFA)

Table B5. AFA Class of 95 Navigator Candidate Selection Board Navigator Training Applicants and Selects (Candidates), by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	121	7	128
Black	6	0	6
American Indian	-	-	-
Asian	-	-	-
Hispanic	-	-	-
Other Minority	5	0	5
Unknown	0	0	0
Total	132	7	139

SELECTS	Men	Women	Total
White	85	2	87
Black	2	-	2
American Indian	-	-	-
Asian	-	-	-
Hispanic	-	-	-
Other Minority	5	-	5
Unknown	-	-	-
Total	92	2	94

Note. Race data extracted from Uniform Officer Record database maintained by the Air Force Research Laboratory/HE (formerly Armstrong Laboratory/HRCX).

Source: 34th Operation Support Squadron (USAFA)

Table B6. OTS Selection Board 9603 (FY96 Quarter 1)
Pilot Training Applicants and Selects (Candidates),
by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	164	12[b]	176
Black	4	0	4
American Indian	1	0	1
Asian	1	0	1
Hispanic[a]	6	1[b]	6[b]
Other Minority	3	0	3
Unknown	0	0	0
Total	179	12[b]	191

SELECTS	Men	Women	Total
White	5	0	5
Black	0	-	0
American Indian	0	-	0
Asian	0	-	0
Hispanic[a]	0	0	0
Other Minority	0	-	0
Unknown	-	-	-
Total	5	0	5

Note.
[a] Includes individuals of Puerto Rican or Mexican descent
[b] Includes one individual identified as having both European and Mexican origins. Individual was counted only once in row and column totals.

Source: AFRS/ROO

Table B7. OTS Selection Board 9604 (FY96 Quarter 2)
Pilot Training Applicants and Selects (Candidates),
by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	132[b]	6	138
Black	4	1	5
American Indian	1	0	1
Asian	1	0	1
Hispanic[a]	3[b]	1	3[b]
Other Minority	1	0	1
Unknown	0	0	0
Total	141[b]	8	149

SELECTS	Men	Women	Total
White	11	0	11
Black	0	0	0
American Indian	0	-	0
Asian	0	-	0
Hispanic[a]	0	0	0
Other Minority	0	-	-
Unknown	-	-	-
Total	11	0	11

Note.
[a] Includes individuals of Puerto Rican or Mexican descent.
[b] Includes one individual identified as having both European and Mexican origins. Individual was counted only once in row and column totals.

Source: AFRS/ROO

Table B8. OTS Selection Board 9603 (FY96 Quarter 1)
Navigator Training Applicants and Selects (Candidates),
by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	166[b]	19[b]	185
Black	1	0	1
American Indian	0	0	0
Asian	0	0	0
Hispanic[a]	10[b]	2[b]	8[b]
Other Minority	7	0	7
Unknown	0	0	0
Total	182[b]	19[b]	201

SELECTS	Men	Women	Total
White	43	6	49
Black	0	-	0
American Indian	-	-	-
Asian	-	-	-
Hispanic[a]	2[c]	1[c]	1[c]
Other Minority	3	-	3
Unknown	-	-	-
Total	46[c]	6[c]	52

Note.
[a] Includes individuals of Puerto Rican, Mexican, or Cuban descent.
[b] Includes two men and two women identified as having both European and Mexican origins. Individuals were counted only once in row and column totals.
[c] Includes one man and one woman identified as having both European and Mexican origin. Individuals were counted only once in row and column totals.

Source: AFRS/ROO

Table B9. OTS Selection Board 9604 (FY96 Quarter 2)
Navigator Training Applicants and Selects (Candidates),
by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	119	12	131
Black	3	0	3
American Indian	0	0	0
Asian	0	0	0
Hispanic[a]	3	0	3
Other Minority	3	0	3
Unknown	0	0	0
Total	128	12	140

SELECTS	Men	Women	Total
White	51	6	58
Black	1	-	1
American Indian	-	-	-
Asian	-	-	-
Hispanic[a]	0	-	0
Other Minority	0	-	0
Unknown	-	-	-
Total	52	6	58

Note.
[a] Includes individuals of Puerto Rican or Mexican descent.

Source: AFRS/ROO

Table B10. Active Duty Flying Training Selection Board, FY96 Pilot Training Applicants and Selects (Candidates), by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	475	23	498
Black	15	1	16
American Indian	1	0	1
Asian	3	0	3
Hispanic	1	0	1
Other Minority	31	1	32
Unknown	0	0	0
Total	526	25	551

SELECTS	Men	Women	Total
White	74	1	75
Black	1	0	1
American Indian	1	-	1
Asian	0	-	0
Hispanic	0	-	0
Other Minority	4	0	4
Unknown	-	-	-
Total	80	1	81

Note. Gender and racial/ethnic data extracted from Uniform Officer Record database maintained by the Air Force Research Laboratory/HE (formerly AL/HRCX).

Source: AFPC/DPAOY3

Table B11. Active Duty Flying Training Selection Board, FY95 Pilot Training Applicants and Selects (Candidates), by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	383	25	408
Black	18	2	20
American Indian	5	0	5
Asian	2	1	3
Hispanic	1	0	1
Other Minority	27	3	30
Unknown	8[a]	0[a]	8[a]
Total	444	31	475

SELECTS	Men	Women	Total
White	22	2	24
Black	1	0	1
American Indian	0	-	0
Asian	0	0	0
Hispanic	0	-	0
Other Minority	0	0	0
Unknown	0	0	0
Total	23	2	25

Note. Gender and racial/ethnic data extracted from Uniform Officer Record database maintained by the Air Force Research Laboratory/HE (formerly AL/HRCX).

[a] Gender and racial/ethnic data was unavailable for eight applicants. These individuals are presumed to be men and are presented in the corresponding column.

Source: AFPC/DPAOY3

Table B12. Active Duty Flying Training Selection Board, FY96 Navigator Training Applicants and Selects (Candidates), by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	119	7	126
Black	7	0	7
American Indian	0	0	0
Asian	1	0	1
Hispanic	1	0	1
Other Minority	13	2	15
Unknown	0	0	0
Total	141	9	150

SELECTS	Men	Women	Total
White	46	5	51
Black	2	-	2
American Indian	-	-	-
Asian	0	-	0
Hispanic	0	-	0
Other Minority	7	2	9
Unknown	-	-	-
Total	55	7	62

Note. Gender and racial/ethnic data extracted from Uniform Officer Record database maintained by the Air Force Research Laboratory/HE (formerly AL/HRCX).

Source: AFPC/DPAOY3

Table B13. Active Duty Flying Training Selection Board, FY95 Navigator Training Applicants and Selects (Candidates), by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	117	7	124
Black	7	0	7
American Indian	0	0	0
Asian	0	0	0
Hispanic	1	0	1
Other Minority	15	3	18
Unknown	4[a]	0[a]	4[a]
Total	144	10	154

SELECTS	Men	Women	Total
White	20	2	22
Black	0	-	0
American Indian	-	-	-
Asian	-	-	-
Hispanic	0	-	0
Other Minority	2	1	3
Unknown	2[a]	-[a]	2[a]
Total	24	3	27

Note. Gender and racial/ethnic data extracted from Uniform Officer Record database maintained by the Air Force Research Laboratory/HE (formerly AL/HRCX).

[a] Gender and racial/ethnic data was unavailable for four applicants and two selects. These individuals are presumed to be men and are presented in the corresponding column.

Source: AFPC/DPAOY3

Table B14. ROTC FY96 Categorization Board 1
Pilot Training Applicants and Selects (Candidates),
by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	352	22	374
Black	8	0	8
American Indian	1	0	1
Asian	4	0	4
Hispanic[a]	11	0	11
Other Minority	12	0	12
Unknown	0	0	0
Total	388	22	410

SELECTS	Men	Women	Total
White	284	17	301
Black	3	-	3
American Indian	1	-	1
Asian	3	-	3
Hispanic[a]	7	-	7
Other Minority	9	-	9
Unknown	-	-	-
Total	307	17	324

Note.
[a] Includes individuals of Puerto Rican or Mexican descent.

Source: AFROTC/RRFP

Table B15. ROTC FY96 Categorization Board 2
Pilot Training Applicants and Selects (Candidates),
by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	90	11	101
Black	4	0	4
American Indian	2	0	2
Asian	4	0	4
Hispanic[a]	6	0	6
Other Minority	9	1	10
Unknown	0	0	0
Total	115	12	127

SELECTS	Men	Women	Total
White	38	8	46
Black	1	-	1
American Indian	1	-	1
Asian	2	-	2
Hispanic[a]	3	-	3
Other Minority	5	0	5
Unknown	-	-	-
Total	50	8	58

Note.
[a] Includes individuals of Puerto Rican or Mexican descent.

Source: AFROTC/RRFP

Table B16. ROTC FY97 Categorization Board Pilot Training Applicants and Selects (Candidates), by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	455	30	485
Black	19	2	21
American Indian	2	0	2
Asian	11	1	12
Hispanic[a]	8	2	10
Other Minority	10	1	11
Unknown	0	0	0
Total	505	36	541

SELECTS	Men	Women	Total
White	391	25	416
Black	17	2	19
American Indian	2	-	2
Asian	10	1	11
Hispanic[a]	7	2	9
Other Minority	8	1	9
Unknown	-	-	-
Total	435	31	466

Note.
[a] Includes individuals of Puerto Rican or Mexican descent.

Source: AFROTC/RRFP

Table B17. ROTC FY96 Categorization Board 1
Navigator Training Applicants and Selects (Candidates), by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	137	17	154
Black	5	2	7
American Indian	0	1	1
Asian	6	0	6
Hispanic[a]	8	2	10
Other Minority	5	2	7
Unknown	0	0	0
Total	161	24	185

SELECTS	Men	Women	Total
White	105	13	118
Black	1	2	3
American Indian	-	0	0
Asian	5	-	5
Hispanic[a]	6	2	8
Other Minority	5	2	7
Unknown	-	-	-
Total	122	19	141

Note.
[a] Includes individuals of Puerto Rican, Mexican or Cuban descent.

Source: AFROTC/RRFP

Table B18. ROTC FY96 Categorization Board 2
Navigator Training Applicants and Selects (Candidates), by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	52	3	55
Black	5	0	5
American Indian	1	0	1
Asian	2	0	2
Hispanic[a]	5	0	5
Other Minority	3	0	3
Unknown	0	0	0
Total	68	3	71

SELECTS	Men	Women	Total
White	46	3	49
Black	5	-	5
American Indian	1	-	1
Asian	2	-	2
Hispanic[a]	5	-	5
Other Minority	2	-	2
Unknown	-	-	-
Total	61	3	64

Note.
[a] Includes individuals of Puerto Rican or Mexican descent.

Source: AFROTC/RRFP

Table B19. ROTC FY97 Categorization Board Navigator Training Applicants and Selects (Candidates), by Gender and Racial/Ethnic Subgroup

APPLICANTS	Men	Women	Total
White	142	18	160
Black	8	1	9
American Indian	0	1	1
Asian	6	1	7
Hispanic[a]	2	0	2
Other Minority	6	0	6
Unknown	0	0	0
Total	164	21	185

SELECTS	Men	Women	Total
White	119	15	134
Black	6	1	7
American Indian	-	1	1
Asian	5	0	5
Hispanic[a]	1	-	1
Other Minority	5	-	5
Unknown	-	-	-
Total	136	17	153

Note.
[a] Includes individuals of Mexican descent.

Source: AFROTC/RRFP