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NAVY ENLISTMENT: AN ANALYSIS OF MILITARY ENTRANCE PROCESSING STATIONS MEDICAL FAILURES

by

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In a given month up to 20% of the applicants sent to a Military Entrance Processing Station (MEPS) by a recruiter do not enlist in the Navy. There are many reasons for these failures and they represent an expense. The thesis concerns medical failures, which can account for up to half of those applicant losses. Its objective centers on the analysis of the medical disqualifications that occurred at the MEPS. This analysis is broken into two main areas. The first is to differentiate between those Navy applicants who failed and those who did not fail to enter service on medical grounds. The second is to differentiate between those applicant characteristics which have stronger or weaker relationships toward weight failures, which represent the most common medical failure. To achieve these objectives the analysis focuses on all Department of Defense recruits who screened for service in the United States Navy during Fiscal Year 1995. The important factors, revealed by the analysis, are the main effects such as sex, race, age etc. Significant differences between the levels of a factor can be discovered when comparing the individual MEPS regions. Through this analysis a snapshot of applicant characteristics and medical failures is provided. It may aid Navy recruiting policy makers to revise applicant medical policies and procedures.

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NAVY ENLISTMENT: AN ANALYSIS OF MILITARY ENTRANCE PROCESSING STATIONS MEDICAL FAILURES

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ABSTRACT

In a given month up to 20% of the applicants sent to a Military Entrance Processing Station (MEPS) by a recruiter do not enlist in the Navy. There are many reasons for these failures and they represent an expense. The thesis concerns medical failures, which can account for up to half of those applicant losses. Its objective centers on the analysis of the medical disqualifications that occurred at the MEPS. This analysis is broken into two main areas. The first is to differentiate between those Navy applicants who failed and those who did not fail to enter service on medical grounds. The second is to differentiate between those applicant characteristics which have stronger or weaker relationships toward weight failures, which represent the most common medical failure. To achieve these objectives the analysis focuses on all Department of Defense recruits who screened for service in the United States Navy during Fiscal Year 1995. The important factors, revealed by the analysis, are the main effects such as sex, race, age etc. Significant differences between the levels of a factor can be discovered when comparing the individual MEPS regions. Through this analysis a snapshot of applicant characteristics and medical failures is provided. It may aid Navy recruiting policy makers to revise applicant medical policies and procedures.

THESIS DISCLAIMER

The reader is cautioned that models and computer programs developed in this research may not have been exercised for all cases of interest. While every effort has been made, within the time available, to ensure that the models provide accurate results and the programs are free of computational and logic errors, they must be further validated and verified. The completion of these tasks is left for further research. Any application of these models and programs without additional validation and verification is at the risk of the user.

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EXECUTIVE SUMMARY

In a given month up to 20% of the applicants sent to a Military Entrance Processing Station (MEPS) by a recruiter do not enlist in the Navy. There are many reasons for these failures and they represent an expense. The failures for medical reasons, which can account for up to half of those applicant losses, is the main concern of this thesis. It is broken into two main areas. The first is to discriminate between those Navy applicants who failed and those who did not fail to enter service on medical grounds. The second is to differentiate applicant characteristics which have stronger or weaker relationships toward failures due to weight. This represents the most common medical failure. The analysis focuses on all Department of Defense recruits who screened for service in the United States Navy during Fiscal Year 1995. This was the most recent fiscal year of data available at the start of this study.

Data used in this study originated from the MEPCOM edit file maintained at Department of Defense Data Center in Monterey, California. The file contained 355,690 Department of Defense records of which 92,279 records were Navy applicants. Of the Navy records 8,776 contained a medical failure code, or a 9.5% medical failure rate of first time Navy applicants. The most common failure, weight, accounted for 2,719 failures. The weight failures represent about 31% of all medical failures. An applicant is coded as having a weight failure for being either overweight or out of body fat standards or both.

Exploratory analysis combined with hypothesis testing of the data are performed to evaluate the relationships between the available covariates and medical failures for each MEPS region. The factors include sex, age, educational achievement, race and dependent status. Generalized linear models are developed to determine both the relationships between those Navy applicants who failed and those who did not fail to enter service due to medical reasons and to see which applicant characteristics have stronger or weaker relationships with weight failures. Specifically, log-linear models are developed to describe association patterns among the categorical variables.

The exploratory analyses reveals that the sex of an applicant appears to be significantly related to both medical and weight failures. It also reveals, for medical failures, that the race of an applicant is also significant in most regions. Age, educational background and marital status of an applicant are significant, for medical failures, in only a few regions. For weight failures the race, age, educational background and marital status of an applicant are not significant in any region.

The analysis of medical and weight failures shows that, except for a few regions, the interaction of factors are not significant. Overall such factors are important enough to be included in the models, but when viewed individually they are not significant. For example, there is little difference in failure rates between hispanic female applicants who have a college background and white male applicants who are presently in high school.

This thesis provides a snapshot of current applicant medical failure characteristics. It may aid in the review of recruiting policy and procedures. Current data collection and reporting is insufficient to provide the more thorough analysis that is needed for this problem. With a more accurate database and yearly reviews, this approach to looking at medical failures could provide the information needed by policy makers.

I. INTRODUCTION

Since the introduction of the All Volunteer Force in July 1973, the Navy has put much effort into analyzing the reasons behind personnel attrition.[1] While attrition has been studied extensively, little attention has been given to the recruiting process before an applicant enters into the Delayed Entry Program (DEP). Applicants are filtered in two ways for DEP enrollment: by recruiters and by the Military Entrance Processing Stations (MEPS). In a given month up to 20% of the applicants sent to a MEPS by a recruiter do not enlist in the Navy. This thesis is concerned with medical failures; they can account for up to half of those applicant losses. Specifically, the analysis looks at identifying those applicant characteristics that have stronger and weaker relationships with medical failures.

A. CONVERSION RATE

The motivation of this Thesis's analysis comes from a need of the Navy to develop appropriate Measures of Effectiveness (MOE) of their "MEPS conversion rate." A MEPS conversion rate is defined as follows:

$$\left. \textit{Total Navy Applicants Entering Service} \middle/ \textit{Total Navy Applicants Screened} \right. .$$

The overall goal is a continual evaluation and then the raising of the conversion rate through recruiter training and/or policy changes. The *Total Navy Applicants Screened* is a function of the number sent to the MEPS by the recruiters. Thus it would seem that if the recruiters put more applicants through the MEPS the conversion rate would increase. But more applicants could actually lower the conversion rate if a large majority of them are unqualified to serve in the military and fail a MEPS evaluation. The *Total Navy Applicants Entering Service* is a function of screening policies and a recruiter's ability to pre-screen an applicant properly. Here a conversion rate increase would occur by lowering the number of applicants sent to the MEPS who are not

[1] Personnel attrition occurs during both the Delayed Entry Program (DEP) and the first term of enlistment.

qualified. This can occur either if changes are made in appropriate applicant enlistment requirements, or if the recruiter's pre-screen vigilance is improved.

Sending an applicant for screening is an investment for both the recruiter and the applicant. The Navy can better serve its new recruits by raising the MEPS conversion rate. But, before new policies and MOE of these policies can be established, we need to develop a clearer understanding of the conversion rate. There are two fundamental questions concerning the medical failures that the Navy needs to address in order to develop more appropriate MOE:

- Do the recruiters perform a sufficiently comprehensive medical screening ?
- Are the medical standards presently in-place causing a loss of potential enlistments?

While this thesis does not attempt to answer those questions it does provide an analysis to aid Navy policy makers on the present state of applicant medical failures.

B. APPLICANT SCREENING

An applicant's ability to complete his or her initial term of service is evaluated through a series of specific steps. Figure 1.1 below shows the sequence that an applicant takes to reach the start of his first term of enlistment. The recruiter makes contact and conducts an interview before sending an applicant to the MEPS for processing. Then, the part of the process that is highlighted in Figure 1.1 is typically accomplished at a MEPS.[2] After completing the MEPS evaluation, most recruits enter into the DEP[3] prior to being shipped to Boot Camp.

1. Recruiter Medical Screening

Recruiters contact the youth labor force from which the Navy fills its ranks. The main objective of the recruiter is to recruit personnel who have the ability and motivation to serve through an initial term of enlistment. An applicant's screening consists of questions about criminal background, education and medical history. A central theme in most studies on medical failures is that the improvement of medical pre-screening will raise the MEPS medical conversion rate. Though it is not the recruiter's job to determine

[2] Only about 40% of ASVAB testing is conducted at the MEPS (U.S.D., 1994).

[3] DEP enrollment lasts from a few days up to 1 year.

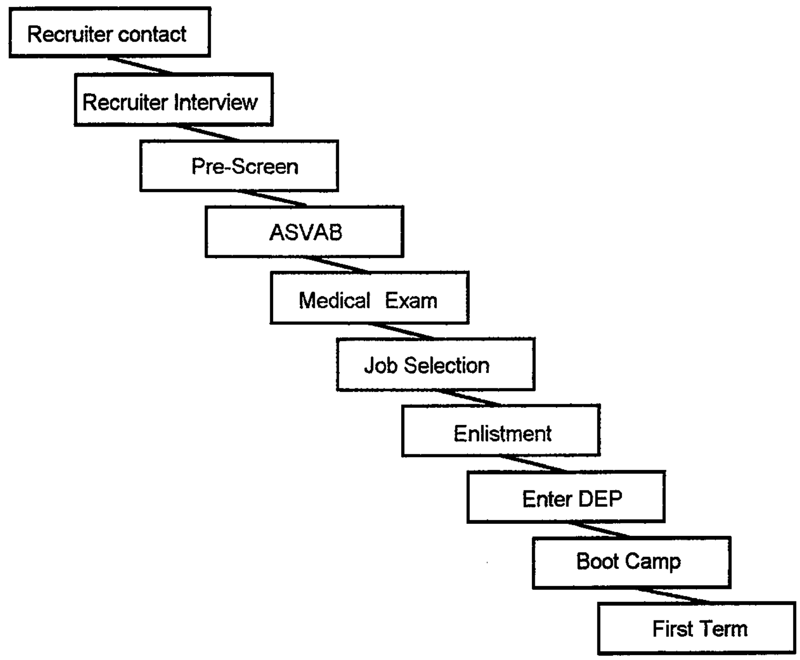

Figure 1.1: Applicant Sequence to First Term of Enlistment.

an applicant's medical qualification, he or she (the recruiter) can ask specific questions to obtain medical history which, when reviewed by a medical officer, could sharpen qualification status.

Initial information concerning medical history is obtained from the applicant and recruiter through the Applicant Medical Pre-screening Form (DD Form 2246).[4] This form is designed to prevent applicants with obvious medical deficiencies from being sent to a MEPS for further processing. Accuracy of medical history is dependent on the applicant's and recruiter's honesty and ability to understand what the questions are asking. Thus the form is reviewed by a medical officer where a recommendation is given on the applicants medical qualification. The medical officer should have the opportunity to recommend, disapprove or require review of additional documents before the applicant is sent to a MEPS for further processing.[5] Unfortunately, this medical assessment is not normally conducted until the applicant is already at a MEPS. When properly used the DD Form

[4] DD Form 2246 consists of five parts: processing requirements, medical history, certification by applicant and recruiter, medical processing instructions to applicant and medical officer's comments.

[5] A medical waiver process may be initiated if the recruiter and medical officer determines the applicant has some medical factor, such as asthma, that would otherwise cause disqualification. DOD's uniform enlistment standards are in Directive 6130.0, "Physical Standards for Appointment, Enlistment, and Induction."

2246 provides a medical blueprint which, when certified by the applicant and recruiter and endorsed by a medical officer, should provide adequate screening prior to the MEPS visit.

2. MEPS Medical Screening

Once a recruiter completes a pre-screen the applicant is sent to one of 65 MEPS [6] located throughout the United States. The MEPS main objective is to process applicants for the Armed Forces of the United States. Within each MEPS are personnel from every branch of the Armed Forces who administer the processing of recruits for their respective service. Medical examinations are completed by a combination of military and civilian personnel. There are a total of 58 possible classifications of medical failures as listed in Table 1.1.

Head	Nose	Ears	Sinuses	Throat
Opthalmoscopic	Drums	Eyes	Lungs & Chest	Pupils
Ocular Motility	Abdomen	Heart	Vascular Sys.	G-U Sys.
Rectum	Endocrine Sys.	Lower Extremities	Upper Extremities	Feet
Skin, Lymphatics	Spine	Body Marks	Pelvic (female)	Neurologic
Psychiatric	Chest X-ray	Dental	Urinalysis	Other Tests (preg.)
Serology	EKG	Temperature	Height	Weight
Distant Vision	Blood Pressure	Pulse	Intraocular Tension	Refraction
Near Vision	Psychomotor	Hearing	Audiometer	Stimulants Use
Cocaine use	Cannabis Sative	Alcohol	Heterophoria	Blood Type
Build	Accommodation	Color Vision	Depth Perception	Field Vision
Night Vision	Red Lens Test	Various Drug Use		

Table 1.1: MEPS Medical Failures.

In FY95 the United States Navy had over 92,000 non-prior service applicants visit a MEPS in the hopes of enlisting. With such a high volume of recruiting activity even small efficiency improvements could raise the MEPS conversion rate.

C. OBJECTIVES

The objectives of this thesis center on analyzing the medical disqualifications that occur at the MEPS. This analysis is broken into two main areas. The first is to differentiate between those Navy applicants who failed and those who did not fail to enter service on medical grounds. The second is to differentiate between those applicant

[6] MEPS are managed by the United States Military Entrance Processing Command (USMEPCOM).

characteristics which have stronger or weaker relationships toward weight failures, which represent the most common medical failure. By meeting these objectives, insight into applicant characteristics and medical failures will be gained to aid Navy recruiting policy makers with decisions concerning applicant medical policies and procedures. To achieve these objectives the analysis focuses on all Department of Defense recruits who screened for service in the United States Navy during Fiscal Year (FY) 95.

D. SUMMARY OF CHAPTERS

This thesis is organized into four chapters. The next chapter describes the data and methodology used to conduct this study. Results are in Chapter III, which is narrowed to applicant sex for the single factor analysis and race for the prominent interaction analysis. These serve as prototype presentations for the other effects whose analysis appears in the appendices. Chapter IV provides conclusions and recommendations based on these analyses.

II. DATA AND METHODOLOGY

A. DATABASE

The analysis of MEPS medical failures required a database which contained information on first-time applicants with no prior service. Applicant records were obtained from the Department of Defense Data Center (DMDC) MEPCOM edit file maintained at the DMDC in Monterey, California. The source of this file is mainly from the individual MEPS to MEPCOM.[1] MEPCOM then sends a monthly service tape to each service and to the DMDC. DMDC processes the database to generate the applicant, DEP enlistment, DEP discharge and active duty enlistment records. Thus it is possible for one individual to have up to four records in this file. The applicant record contains information concerning the recruit's qualifications and status for enlistment. For this analysis the first-time applicant records are used.[2]

The most recent fiscal year available at the start of this study is FY95. The first-time applicant file contained 355,690 Department of Defense records of which 92,279 are Navy. Table 2.1 displays the applicant frequencies for each individual MEPS. Three applicant records are dropped because the MEPS source could not be identified .

Of the Navy records, 7,787 contained one medical failure code, 856 contained two medical failure codes and 133 records had three medical failure codes. This results in a 9.5% medical failure rate of first time Navy applicants. Table 2.2 displays the Navy applicant frequencies for each medical failure code. The most common failure, weight, accounted for 2,719 total failures. The weight failures represent about 31% of all medical failures. The next highest frequency codes appeared about 700 times each and include lower extremities, audiometer, lung & chest, and feet. These four failures combined for a total of 2,769 failures and represent another 32% of the medical failures. The other 53 medical failure types accounted for the remaining 37%. Thus 63% of all medical failures

[1] The MEPS use USMEPCOM Reg. 680-1, Personnel Information Systems, Military Entrance Processing Reporting System (MEPRS) to fill the proper forms and key in the data.

[2] The DEP enlistment, DEP discharge and active duty records are the primary files developed and used for attrition analysis.

East North Central (ENC)		Mountain (MT)		West North Central (WNC)	
Cleveland, OH	1378	Albuquerque, NM	515	Des Moines, IA	749
Columbus, OH	1159	Denver, CO	1792	Kansas City, MO	1474
Chicago, IL	2630	Boise, ID	360	Minneapolis, MN	1112
Detroit, MI	1475	Butte, MN	376	Omaha, NE	505
Indianapolis, IN	2046	Salt Lake City, UT	523	Sioux Falls, SD	351
Milwaukee, WI	943	Phoenix, AZ	1508	St. Louis, MO	1981
Lansing, MI	1133	Spokane, WA	524	Fargo, ND	194
Total	10764	**Total**	5598	**Total**	6366
South Atlantic (SA)		**Pacific (P)**		**Middle Atlantic (MA)**	
Richmond, VA	2179	Fresno, CA	1231	Albany, NY	739
Charlotte, NC	1393	Los Angeles, CA	4390	Baltimore, MD	1888
Miami, FL	1681	Oakland, CA	3323	Buffalo, NY	998
Ft. Jackson, SC	1689	Portland, OR	1381	Harrisburg, PA	1324
Jacksonville, FL	2226	Seattle, WA	1462	Philadelphia, PA	1551
Raleigh, NC	1521	Anchorage, AK	205	Pittsburgh, PA	1238
Tampa, FL	1981	Honolulu, HI	469	Syracuse, NY	821
San Juan, PR	493	San Diego, CA	4852	New York, NY	4182
Total	13163	**Total**	17313	**Total**	12741
East South Central (ESC)		**West South Central (WSC)**		**New England (NE)**	
Beckley, WV	680	Amarillo, TX	462	Boston, MA	1193
Louisville, KY	799	Dallas, TX	2243	Portland, ME	631
Jackson, MS	950	El Paso, TX	924	Springfield, MA	1185
Knoxville, TN	663	Houston, TX	3013		
Memphis, TN	1023	Little Rock, AR	868		
Montgomery, AL	2317	Oklahoma City, OK	1601		
Nashville, TN	964	San Antonio, TX	2194		
Atlanta, GA	2184	Shreveport, LA	900		
New Orleans, LA	1536				
Total	11116	**Total**	12205	**Total**	3009

Table 2.1: FY-95 MEPS Record Distribution.

observed belong in only 5 of the 58 possible medical failure types. Appendix B contains a breakdown of the medical frequencies by their respective MEPS region.

B. COVARIATES

The development of statistical models to help define relationships in MEPS medical failures requires the selection of those effects which best predict or explain the response. In this case the response variable is whether or not an applicant had a medical failure. The data set consists mainly of categorical data, and the non-categorical data are

Failure	Freq.	Failure	Freq.	Failure	Freq.
None	83499	Head	25	Nose	21
Sinuses	6	Throat	24	Ears	71
Drums	78	Eyes	102	Opthalmoscopic	71
Pupils	6	Ocular Motility	59	Lungs & Chest	681
Heart	85	Vascular Sys.	53	Abdomen	258
Rectum	37	Endocrine Sys.	54	G-U Sys.	263
Upper Extremities	329	Feet	672	Lower Extremities	716
Spine	230	Body Marks	19	Skin, Lymphatics	470
Neurologic	177	Psychiatric	507	Pelvic (female)	156
Dental	31	Urinalysis	123	Chest X-ray	1
Serology	45	EKG	2	Other Tests (preg.)	207
Height	41	Weight	2719	Temperature	5
Blood Pressure	276	Pulse	77	Distant Vision	80
Refraction	371	Near Vision	15	Intraocular Tension	2
Hearing	3	Audiometer	700	Psychomotor	2
Cocaine use	4	Cannabis Sative	16	Stimulants	1
Alcohol	6	Heterophoria	1		

Table 2.2: Navy FY95 Medical Failure Frequencies.

grouped into categorical levels. The explanatory factors include Sex, Age, Education, Race, Marital Status for each MEPS region.

The first of the factors is Sex, and the levels "Male" and "Female" are used. The sex distribution of the records is 76% males and 24% females. Age is a variable that is partitioned into ordinal categorical levels. These levels are "≤19," "20–24" and "25+." The fraction of applicants at each age level is about 64%, 28% and 8% respectively.

The educational background of an applicant is broken into three levels. These include those with only a high school background, those having an alternate educational credential (i.e. G.E.D.) and those with college experience. The respective labels are "HS," "GED," and "Coll." The fraction of applicants at each Educational level is 91%, 6% and 3% respectively.

Race has three levels that are labeled "White," "Black" and "Other." The fraction of applicants at each Race level is 60%, 22% and 18% respectively. The marital background of an applicant is factored into single, single with dependents and married. These are labeled as "Single," "Single Dep" and "Married" respectively. The fraction of applicants at each Marital level is 90%, 5% and 5% respectively.

The 65 MEPS are divided into nine regions that closely correlate to the standard census regions of the United States. These regional levels are New England, Middle Atlantic, South Atlantic, East North Central, East South Central, West North Central, West South Central, Mountain, and Pacific, with labels "NE," "MA," "SA," "ENC," "ESC," "WNC," "WSC," "MT" and "P" respectively. Medical failures and Weight failures are each labeled as either "True" or "False." A summary of the covariates and their levels is displayed in Table 2.3 below.

Covariates	Levels
Sex (S)	Male , Female
Age (A)	≤ 19 , 20 - 24, 25+
Education (E)	HS, Coll, GED
Race (R)	White, Black, Other
Marital (D)	Single, SingleDep, Married
Region (G)	NE, MA, SA, ENC, ESC, WNC, WSC, MT, P
Medical Failure (M)	True, False
Weight Failure (W)	True, False

Table 2.3: Model Covariates and Their Levels.

C. METHODOLOGY

The study of medical disqualification starts with exploratory analysis of the relationships between the factors and medical failures. Graphical presentations of the factors are developed. The relative frequency of medical failures are plotted against the factors which are separated into their respective MEPS region. These graphs show visually which factors should have stronger or weaker effects for a particular region.

Chi-squared testing is conducted to test for the independence of each factor with medical failure. This test is performed for each region separately, allowing for comparisons between the regions. From this test insight should be gained concerning whether knowing the level of a factor provides any information about the frequencies of medical failures. The specific hypothesis being tested is

H_0 : medical failure and an individual factor are independent

versus

H_1 : medical failure and an individual factor are dependent.

Testing is performed with a significance level of 0.05. Because nine individual tests are conducted, one for each region, the significance level is reduced to 0.0056 (0.05/9) so the individual regions can be compared, simultaneously.

Multivariate analysis is performed to evaluate the relationships between those Navy applicants with and those without medical failures and then in particular those with and those without weight failures. The multivariate regression is accomplished through the building of generalized linear models. Specifically, log-linear models are developed to describe association patterns among the categorical variables.

Log-linear models obtain their name from expressing the logarithm of expected cell counts as a linear function of parameters; these parameters represent the effects of both the covariates and the interactions between covariates. The data are sorted into multi-dimensional tables of frequencies, i.e. contingency tables. The cell counts are modeled[3] from these tables. The models can have as many parameters as its table has cells. Model development consists of starting with such a saturated model[4] and then conducting the backward elimination stepwise procedure to build an acceptable model with as few parameters as possible.

Four-dimensional contingency tables are built and modeled for each MEPS region. Every table contained the covariate Medical failure (M) or Weight failure (W), Sex (S), Race (R) and Age (A). Appendix B goes through an example of model development to

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[3] Each of the cell counts are assumed to be independent and from the Poisson distribution.

[4] A saturated model contains all possible parameters and provides a "perfect" fit of the cell counts. Backward elimination starts with the saturated model and removes the least significant interaction terms until an acceptable model is found.

show the process used for building each model and the decision criteria used to select an appropriate model.

III. RESULTS

The results of this chapter are presented in two parts. First the analysis of single factors, by MEPS region, for medical and weight failures are discussed. This is followed by a discussion of both the models developed and the prominent interaction's.

A. SINGLE FACTOR ANALYSIS BY MEPS REGION

This analyses is separated into three parts: medical failures, weight failures and an overall summary. The analysis of the Sex factor is presented first. The complete results for the remaining factors (Race, Age, Education and Marital), formatted as presented here for Sex, are in Appendix C.

For each main effect the analysis contains a graphical presentation of the relative frequency of medical failures for each MEPS region, allowing for a comparison between the regions. These frequencies come in sets which identifies the levels of a main effect. Next, the chi-squared test results are presented.

1. Applicant Sex and Medical Failures

Overall the male and female medical failure rates are 9.0% and 11.1% respectively. The relative frequencies of Medical failures and Sex are arranged by the respective regions and displayed in Figure 3.1 below. Figure 3.1 shows that the West South Central, West North Central, East North Central and New England regions appear to have significant

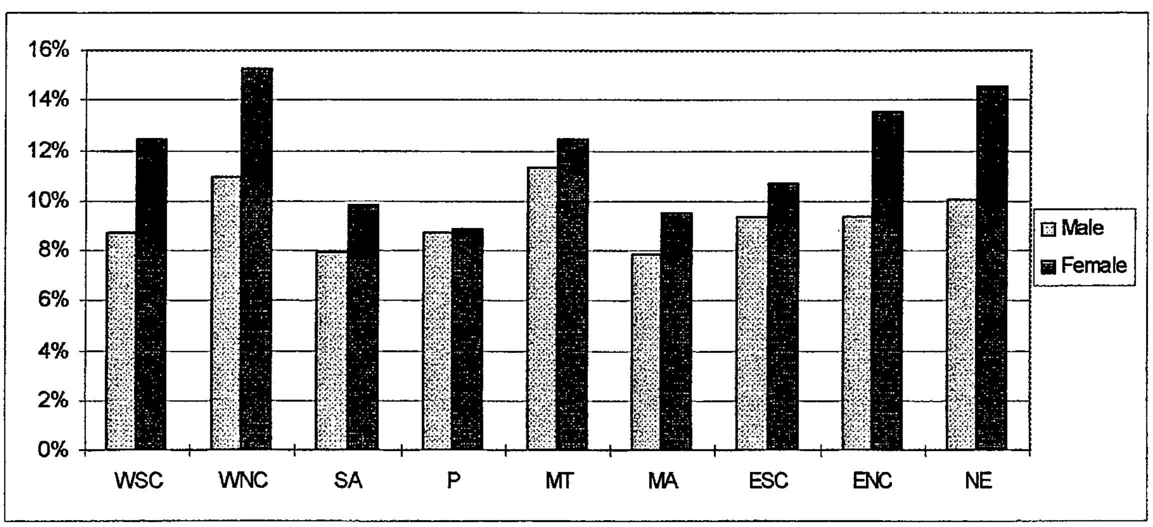

Figure 3.1: Relative Frequencies of Medical Failures and Applicant Sex.

differences between the Male and Female relative frequencies of medical failures. For the Pacific, Mountain and East South Central regions only a slight difference is apparent between Males and Females. Clearly medical failures are not the same for all regions.

The test of independence of Sex and Medical failure factors gave a statistically significant result (χ^2 = 91.84, df = 1 , p-value = 0). Thus the test reveals that the frequency of medical failures is dependent upon the sex of the applicant. Next, at the regional level, a comparison of the independence between Sex and Medical failures are conducted. The results of these evaluations are presented in Table 3.1 below. For six of the MEPS Regions the two factors are statistically significant as was determined for the Navy as a whole. For the Mountain, East South Central and Pacific regions the test would not reject the independence hypothesis.

2. Applicant Sex and Weight Failures

Region	WSC	WNC	SA	P	MT	MA	ESC	ENC	NE
Chi^2	34.65	20.59	11.83	0.094	1.24	8.3	5.15	36.97	9.76
P-value	0	0	0	0.7588	0.2660	0.0040	0.0232	0	0. 0018

Table 3.1: Regional test values of independence for Medical Failures and Sex.

Overall the male and female weight failure rates are 2.2% and 5.3% respectively. The relative frequencies of Weight failures and Sex are arranged by the respective regions and displayed in Figure 3.2 below. Figure 3.2 graphically shows that all MEPS regions appear to have significant differences between the Male and Female relative frequencies of

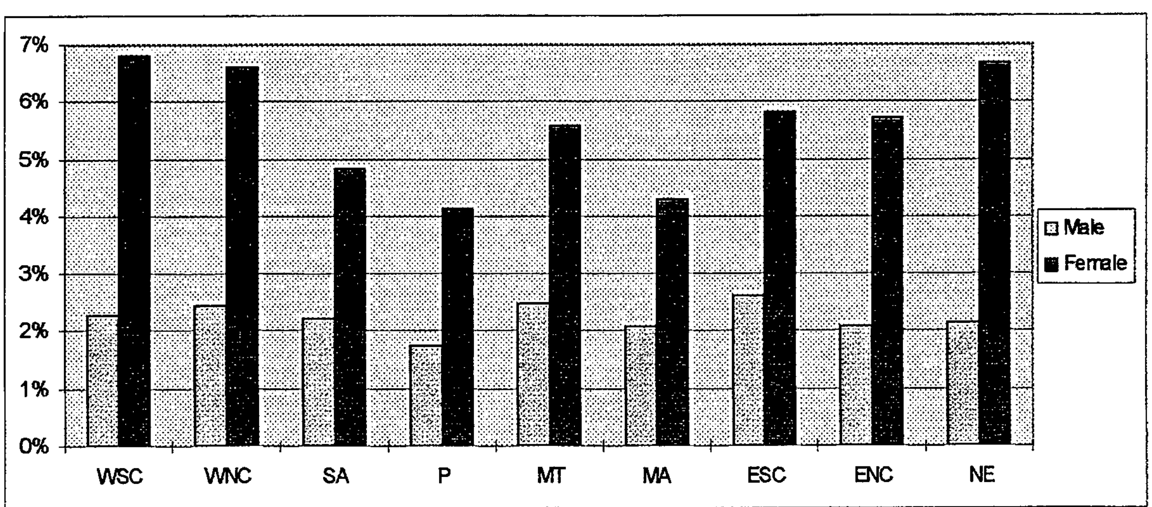

Figure 3.2: Relative Frequencies of Weight Failures and Applicant Sex.

weight failures.

The test of independence of Sex and Weight failure factors gave a statistically significant result (χ^2 = 589.96, df = 1 , p-value = 0). Thus the test reveals that the frequency of weight failures is dependent upon the sex of the applicant. Next, at the regional level, a comparison of the independence between Sex and Weight failures is conducted. The results of these evaluations are presented in Table 3.2 below. For all of the MEPS Regions the dependence between the two factors is statistically significant, as determined for the Navy as a whole. Sex of an applicant appears to be a strong indicator of weight failures for all MEPS Regions and the Navy.

Region	WSC	WNC	SA	P	MT	MA	ESC	ENC	NE
Chi^2	138.03	58.75	63.11	77.24	29.48	42.92	68.61	90.99	32.99
P-value	0	0	0	0	0	0	0	0	0

Table 3.2: Regional test values of independence for Weight Failures and Sex.

3. Summary

The analyses reveal that the sex of an applicant appears to be significantly related to both medical and weight failures. Similar analysis (see Appendix C) shows that an applicant's race is significant for most regions when evaluating medical failures. For medical failures the remaining factors (age, educational background and marital status) are significant for only a few regions. For weight failures all factors, excluding sex, are not significant for any region.

Sex and Race appear to be good predictors of medical failures. Few differences are noticed among the factors Age, Education and Marital. A correlation between the three factors Age, Education and Marital is possible. This can be explained by the fact that the older an applicant is, the more likely he will have a higher educational background and/or dependents. Of these three, Age is included in the model development. The factors Sex, Race and Age are chosen for the building of log-linear models.

B. PROMINENT INTERACTION ANALYSIS

This section is separated into four parts. In Part 1 the medical failure and weight failure models are presented. In Part 2 the regional medical failure model coefficient (RM) is evaluated. Then, in Part 3, the regional weight failure model coefficient (RW) is evaluated. A detailed discussion of the remaining model coefficients, as presented in Parts 1 and 2, can be found in Appendix D. Part 4 is a summary of these multivariate results.

For each coefficient the analysis includes a graphical presentation of the t statistics for the coefficients. The plots arrange the t-values into their respective MEPS region, allowing for a comparison between the regions. The approximate 5% significance level, not adjusted for multiple comparisons, is displayed on the graphs by a dashed red line.

1. Medical and Weight Failure Models

The models presented here show which of the interaction terms are included for each region. The models themselves are not the central focus of this analysis. But, there may be some interest in the identification of the more important interaction terms. The important contribution, of the models, is the significance and non-significance of their coefficients. Each model includes the factors of Sex (S), Race (R), Age (A) and Medical (M) or Weight (W) failures. An example of the technique of model development is presented in Appendix B. The contingency tables used to build the models for medical and weight failures are displayed in Appendix E and Appendix F respectively.

The final models[1] for medical failures are shown below in Table 3.3. Overall most of the models developed contained second-order interaction terms. The East South Central region's model was the only one that does not include any of the second-order interaction terms.

Region	Model	dev	df
ENC	(RMS RMA MAS)	11.37	8
ESC	(RM RS MS RA AS MA)	10.38	16
MA	(RMS RAS MAS)	2.83	8
MT	(RMS MAS RA)	20.01	12
NE	(RAS MAS RM)	4.06	10
P	(RMS RAS MAS)	3.01	8
SA	(RAS RM MS MA)	9.82	12
WNC	(RMA RMS RAS)	6.82	6
WSC	(RAS MA MS RM)	12.67	12

Table 3.3: Medical Failure Log-Linear Models.

[1] The rather extensive list of coefficients have been omitted. Only the identification of the highest order interaction terms is made. All subsequent lower order terms are included in each model.

The final models for weight failures are shown below in Table 3.4. All of the models developed contained second-order interaction terms. The East North Central region's model was the only one that included all of the second-order interaction terms.

Region	Model	dev	df
ENC	(RWS RWA RAS WAS)	3.58	4
ESC	(RWS WAS RA)	10.38	16
MA	(RWS RAS WA)	2.83	8
MT	(RAS WAS RW)	20.01	12
NE	(RWA RS WS AS)	4.06	10
P	(RWA RAS WS)	3.01	8
SA	(RAS RW WS WA)	9.82	12
WNC	(WA RWS RAS)	6.82	6
WSC	(RWS RAS WA)	12.67	12

Table 3.4: Weight Failure Log-Linear Models.

2. Race and Medical Failure Interaction Term (RM)

The first order interaction term evaluated here includes Medical failure and the Race factor. The baseline includes black applicants with medical failures. The coefficient t-values for both the "Other" (ROM) and "White" (RWM) terms are shown below in Figure 3.3. For all regions the RWM term is positive, which indicates that white applicants have higher medical failure rates than black applicants. The graph also shows that whites, except for the West North Central region, also have higher rates than the

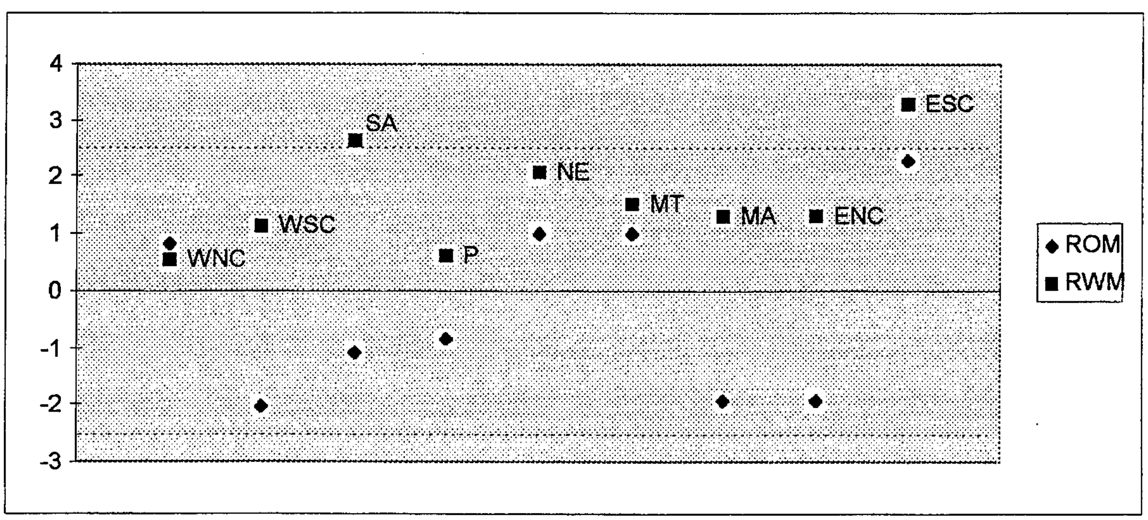

Figure 3.3: Regional Medical Failure and Race Model Coefficient t-values.

"Other" group. For the East South Central and South Atlantic regions white applicants have significantly higher failure rates than blacks. A comparison between the "Other" and "Black" race groups reveals no significant difference.

3. Race and Weight Failure Interaction Term (RW)

The next first order interaction term evaluated includes the Weight failure and Race factors. The baseline for this group includes [those] black applicants with weight failures. Figure 3.4 shows the coefficient t-values for both the "Other" (ROW) and "White" (RWW) terms. For the West North Central region the values overlap. White applicants highest weight failure rates, as compared to blacks, are in the East South Central and South Atlantic regions. For the East North Central, Middle Atlantic and West North Central regions, white failure rates are slightly less. In the Middle Atlantic region, the "Other" group has significantly less medical failures then whites and blacks. For the remaining regions there appears to be no significant difference between the three race groups.

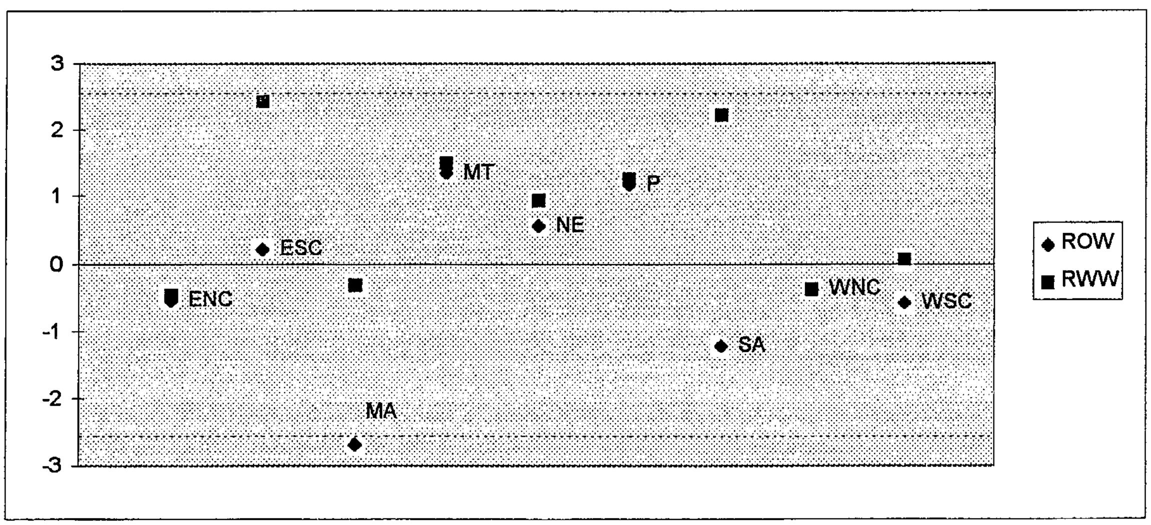

Figure 3.4: Regional Weight failure and Race Model Coefficient t-values

4. Summary

The medical failure multivariate analysis showed that while some significance is found in a region for a particular factor, overall that factor is not significant. This observation was shown earlier with the first order interaction term containing the Medical failure and Race factors. While the same conclusion is also true for weight failures, a significant difference is observed in the interaction of Weight failure and Sex. This interaction term is significant for all regions.

The analysis of medical and weight failures shows that, except for a few regions, the interactions of factors are not significant. Overall such factors are important enough to be included in the models, but when viewed individually they are not significant. For example, there is little difference in failure rates between hispanic female applicants who have a college background and white male applicants who are presently in high school.

IV. CONCLUSION

In conclusion, there are three issues which need to be addressed. First, three possible causes for the non-significance of the higher order medical interaction terms are discussed. Next, the reasons for the most influential main effect (Sex) is evaluated. And finally, a critique of the analysis approach employed is presented.

The analysis of medical and weight failures shows that the individual higher order interaction terms are not significant. One cause is that medical failures represent only about 10% of the applicant population and sub-groups are smaller still. Because of this, large differences are necessary to produce any real significance between the individual medical coefficients. A second cause may be that there really is little interaction between the factors. The final possible cause is that this analysis looked at a specific set of factors which were available in the database. It is probable that failure rates differ on characteristics not measured in the database used in this study.

The most influential of all factors is sex. For all regions, females have significantly higher weight failure rates than males. This is either due to the recruiters inability to properly prescreen female weight problems or a deficiency in the present weight standards used to evaluate a woman's fitness for duty. In recent years the Navy has recognized this problem and evaluated the accuracy of its standards for determining female weight failures. In FY96, the Navy introduced new height and weight standards based on charts adopted by the Department of Defense. The old standards were much more stringent for females. The new maximums allow women to carry an average of 14 pounds more weight than before. In FY97 the Navy raised the body fat standards for women by 3%. This raised the standard for women from a maximum of 30% to 33% of body weight. Both changes came from widely accepted tables charting optimum weight and questions concerning the best way to measure body fat in women. It is expected that both of these changes should lower the overall weight failure rates of females.

A consequence of this type of analysis approach can be seen in the female population. The analysis showed that females had higher medical failure rates but this is mainly due to their high weight failure rate. If weight failures are removed from the group of medical failures, males would actually have a higher overall medical failure rate. Thus it is easy to see the danger of setting up this kind of analysis. How data is grouped or partitioned into various contingency tables can lead to quite different results. If this analysis technique is used as a way to evaluate trends over time, an accurate data base and consistent contingency table development are a necessity.

This thesis provides a snapshot of current applicant medical failure characteristics. It may aid Navy recruiting policy makers in the review of recruiting policy and procedures. Current data collection and reporting is insufficient to provide the more thorough analysis that is needed for this problem. The data issue becomes even more critical as the Navy raises the MEPS conversion rate. With a more accurate database and yearly re-analysis, this approach to looking at medical failures could provide the proper information needed by policy makers.

APPENDIX A. REGIONAL MEDICAL FAILURE TABLES

Failure	Total	Failure	Total	Failure	Total
None	83499	Head	25	Nose	21
Sinuses	6	Throat	24	Ears	71
Drums	78	Eyes	102	Opthalmoscopic	71
Pupils	6	Ocular Motility	59	Lungs & Chest	681
Heart	85	Vascular Sys.	53	Abdomen	258
Rectum	37	Endocrine Sys.	54	G-U Sys.	263
Upper Extremities	329	Feet	672	Lower Extremities	716
Spine	230	Body Marks	19	Skin, Lymphatics	470
Neurologic	177	Psychiatric	507	Pelvic (female)	156
Dental	31	Urinalysis	123	Chest X-ray	1
Serology	45	EKG	2	Other Tests (preg.)	207
Height	41	Weight	2719	Temperature	5
Blood Pressure	276	Pulse	77	Distant Vision	80
Refraction	371	Near Vision	15	Intraocular Tension	2
Hearing	3	Audiometer	700	Psychomotor	2
Cocaine use	4	Cannabis Sative	16	Stimulants	1
Alcohol	6	Heterophoria	1		

Table A.1: Navy FY95 Medical Failures.

Failure	Total	Failure	Total	Failure	Total
None	2680	Head	0	Nose	1
Sinuses	0	Throat	1	Ears	2
Drums	4	Eyes	5	Opthalmoscopic	2
Pupils	1	Ocular Motility	0	Lungs & Chest	18
Heart	1	Vascular Sys.	9	Abdomen	14
Rectum	1	Endocrine Sys.	1	G-U Sys.	8
Upper Extremities	20	Feet	39	Lower Extremities	29
Spine	4	Body Marks	0	Skin, Lymphatics	13
Neurologic	3	Psychiatric	17	Pelvic (female)	4
Dental	3	Urinalysis	7	Chest X-ray	0
Serology	0	EKG	0	Other Tests (preg.)	2
Height	1	Weight	91	Temperature	0
Blood Pressure	23	Pulse	1	Distant Vision	4
Refraction	9	Near Vision	0	Intraocular Tension	0
Hearing	0	Audiometer	35	Psychomotor	1
Cocaine use	0	Cannabis Sative	1	Stimulants	0
Alcohol	0	Heterophoria	0		

Table A.2: New England Region FY95 Medical Failures.

Failure	Total	Failure	Total	Failure	Total
None	11696	Head	4	Nose	4
Sinuses	0	Throat	5	Ears	16
Drums	6	Eyes	14	Opthalmoscopic	5
Pupils	1	Ocular Motility	11	Lungs & Chest	71
Heart	9	Vascular Sys.	9	Abdomen	29
Rectum	6	Endocrine Sys.	5	G-U Sys.	35
Upper Extremities	42	Feet	49	Lower Extremities	72
Spine	30	Body Marks	3	Skin, Lymphatics	63
Neurologic	18	Psychiatric	58	Pelvic (female)	19
Dental	1	Urinalysis	10	Chest X-ray	0
Serology	10	EKG	0	Other Tests (preg.)	19
Height	13	Weight	330	Temperature	0
Blood Pressure	35	Pulse	9	Distant Vision	9
Refraction	59	Near Vision	3	Intraocular Tension	0
Hearing	1	Audiometer	84	Psychomotor	0
Cocaine use	1	Cannabis Sative	2	Stimulants	0
Alcohol	2	Heterophoria	0		

Table A.3: Middle Atlantic Region Medical Failures.

Failure	Total	Failure	Total	Failure	Total
None	12048	Head	3	Nose	4
Sinuses	2	Throat	2	Ears	5
Drums	2	Eyes	13	Opthalmoscopic	16
Pupils	2	Ocular Motility	7	Lungs & Chest	96
Heart	11	Vascular Sys.	4	Abdomen	31
Rectum	0	Endocrine Sys.	7	G-U Sys.	30
Upper Extremities	38	Feet	56	Lower Extremities	74
Spine	27	Body Marks	2	Skin, Lymphatics	56
Neurologic	15	Psychiatric	73	Pelvic (female)	25
Dental	7	Urinalysis	13	Chest X-ray	0
Serology	9	EKG	0	Other Tests (preg.)	44
Height	1	Weight	389	Temperature	1
Blood Pressure	25	Pulse	8	Distant Vision	10
Refraction	44	Near Vision	2	Intraocular Tension	0
Hearing	0	Audiometer	72	Psychomotor	0
Cocaine use	0	Cannabis Sative	2	Stimulants	0
Alcohol	0	Heterophoria	1		

Table A.4: South Atlantic Region Medical Failures.

Failure	Total	Failure	Total	Failure	Total
None	9650	Head	2	Nose	3
Sinuses	1	Throat	3	Ears	12
Drums	12	Eyes	15	Opthalmoscopic	11
Pupils	0	Ocular Motility	7	Lungs & Chest	85
Heart	14	Vascular Sys.	11	Abdomen	27
Rectum	6	Endocrine Sys.	3	G-U Sys.	34
Upper Extremities	36	Feet	102	Lower Extremities	90
Spine	34	Body Marks	4	Skin, Lymphatics	66
Neurologic	28	Psychiatric	56	Pelvic (female)	15
Dental	1	Urinalysis	35	Chest X-ray	0
Serology	6	EKG	1	Other Tests (preg.)	25
Height	4	Weight	315	Temperature	2
Blood Pressure	27	Pulse	9	Distant Vision	14
Refraction	56	Near Vision	3	Intraocular Tension	0
Hearing	0	Audiometer	62	Psychomotor	1
Cocaine use	0	Cannabis Sative	2	Stimulants	0
Alcohol	0	Heterophoria	0		

Table A.5: East North Central Region FY95 Medical Failures.

Failure	Total	Failure	Total	Failure	Total
None	10036	Head	3	Nose	3
Sinuses	1	Throat	2	Ears	2
Drums	8	Eyes	12	Opthalmoscopic	13
Pupils	1	Ocular Motility	5	Lungs & Chest	80
Heart	12	Vascular Sys.	5	Abdomen	43
Rectum	6	Endocrine Sys.	14	G-U Sys.	29
Upper Extremities	40	Feet	98	Lower Extremities	70
Spine	18	Body Marks	2	Skin, Lymphatics	36
Neurologic	23	Psychiatric	43	Pelvic (female)	25
Dental	4	Urinalysis	8	Chest X-ray	0
Serology	5	EKG	0	Other Tests (preg.)	33
Height	3	Weight	393	Temperature	0
Blood Pressure	32	Pulse	6	Distant Vision	19
Refraction	43	Near Vision	4	Intraocular Tension	0
Hearing	0	Audiometer	82	Psychomotor	0
Cocaine use	1	Cannabis Sative	2	Stimulants	0
Alcohol	1	Heterophoria	0		

Table A.6: East South Central Region Medical Failures.

Failure	Total	Failure	Total	Failure	Total
None	5608	Head	3	Nose	0
Sinuses	1	Throat	1	Ears	10
Drums	9	Eyes	6	Opthalmoscopic	1
Pupils	0	Ocular Motility	4	Lungs & Chest	63
Heart	7	Vascular Sys.	9	Abdomen	35
Rectum	3	Endocrine Sys.	2	G-U Sys.	30
Upper Extremities	26	Feet	46	Lower Extremities	88
Spine	41	Body Marks	1	Skin, Lymphatics	33
Neurologic	15	Psychiatric	71	Pelvic (female)	8
Dental	4	Urinalysis	7	Chest X-ray	1
Serology	2	EKG	0	Other Tests (preg.)	22
Height	0	Weight	216	Temperature	2
Blood Pressure	10	Pulse	1	Distant Vision	6
Refraction	32	Near Vision	1	Intraocular Tension	0
Hearing	0	Audiometer	68	Psychomotor	0
Cocaine use	0	Cannabis Sative	1	Stimulants	0
Alcohol	0	Heterophoria	0		

Table A.7: West North Central Region Medical Failures.

Failure	Total	Failure	Total	Failure	Total
None	11036	Head	7	Nose	2
Sinuses	1	Throat	6	Ears	5
Drums	9	Eyes	13	Opthalmoscopic	9
Pupils	0	Ocular Motility	9	Lungs & Chest	75
Heart	11	Vascular Sys.	1	Abdomen	33
Rectum	5	Endocrine Sys.	8	G-U Sys.	32
Upper Extremities	43	Feet	65	Lower Extremities	81
Spine	24	Body Marks	0	Skin, Lymphatics	45
Neurologic	24	Psychiatric	53	Pelvic (female)	37
Dental	4	Urinalysis	15	Chest X-ray	0
Serology	7	EKG	1	Other Tests (preg.)	29
Height	6	Weight	410	Temperature	0
Blood Pressure	50	Pulse	4	Distant Vision	5
Refraction	51	Near Vision	1	Intraocular Tension	1
Hearing	1	Audiometer	126	Psychomotor	0
Cocaine use	1	Cannabis Sative	2	Stimulants	0
Alcohol	3	Heterophoria	0		

Table A.8: West South Central Region Medical Failures.

Failure	Total	Failure	Total	Failure	Total
None	4952	Head	1	Nose	1
Sinuses	0	Throat	2	Ears	7
Drums	6	Eyes	9	Opthalmoscopic	4
Pupils	1	Ocular Motility	8	Lungs & Chest	44
Heart	4	Vascular Sys.	0	Abdomen	12
Rectum	2	Endocrine Sys.	7	G-U Sys.	24
Upper Extremities	39	Feet	80	Lower Extremities	71
Spine	15	Body Marks	3	Skin, Lymphatics	28
Neurologic	14	Psychiatric	49	Pelvic (female)	3
Dental	1	Urinalysis	9	Chest X-ray	0
Serology	2	EKG	0	Other Tests (preg.)	9
Height	1	Weight	177	Temperature	0
Blood Pressure	23	Pulse	2	Distant Vision	2
Refraction	21	Near Vision	1	Intraocular Tension	0
Hearing	1	Audiometer	46	Psychomotor	0
Cocaine use	0	Cannabis Sative	2	Stimulants	1
Alcohol	0	Heterophoria	0		

Table A.9: Mountain Region Medical Failures.

Failure	Total	Failure	Total	Failure	Total
None	15793	Head	2	Nose	3
Sinuses	0	Throat	2	Ears	12
Drums	22	Eyes	15	Opthalmoscopic	10
Pupils	0	Ocular Motility	8	Lungs & Chest	149
Heart	16	Vascular Sys.	5	Abdomen	34
Rectum	8	Endocrine Sys.	7	G-U Sys.	41
Upper Extremities	44	Feet	137	Lower Extremities	141
Spine	37	Body Marks	4	Skin, Lymphatics	130
Neurologic	37	Psychiatric	87	Pelvic (female)	20
Dental	6	Urinalysis	19	Chest X-ray	0
Serology	4	EKG	0	Other Tests (preg.)	24
Height	12	Weight	398	Temperature	0
Blood Pressure	51	Pulse	37	Distant Vision	11
Refraction	56	Near Vision	0	Intraocular Tension	1
Hearing	0	Audiometer	125	Psychomotor	0
Cocaine use	1	Cannabis Sative	2	Stimulants	0
Alcohol	0	Heterophoria	0		

Table A.10: Pacific Region Medical Failures.

APPENDIX B. MODEL DEVELOPMENT EXAMPLE

This Appendix provides an example of the medical failure model development for the Pacific region. This example shows the steps taken and decision criteria used to build all of the models examined in this thesis. Model development consists of starting with the saturated model and performing backward elimination stepwise procedures until a suitable model is found.[1] The contingency table modeled for this particular region is shown below in Table B.1. The factors used to model medical failures are applicant age, sex and race.

		Age					
		≤ 19		20 - 24		25+	
	Medical	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	414	130	179	48	65	13
	False	3914	1121	1583	370	523	165
Black	True	51	35	28	11	12	6
	False	712	367	353	96	151	72
Other	True	218	87	131	27	66	9
	False	2894	960	1346	308	673	185

Table B.1: Pacific Region Medical Failure Contingency Tables.

A starting point for model development consists of the saturated model. This model consists of the only third order interaction term (RMAS). For all models the saturated model had a residual deviance of 0.0 with 0 degrees of freedom and represents a trivial perfect fit. So for the initial stage, the model consisting of all second order interaction terms is examined. Table B.2 below shows that this model has a deviance of 2.42 with 4 degrees of freedom and a p-value of 0.659.[2]

Stage	Model	deviance	df	P-value
1	**(RMA, RMS, RAS, MAS)**	**2.42**	**4**	**0.659**

Table B.2: First Stage Model Results.

[1] Computer software package S-plus, version 3.3, was used to build all models. The S-plus code, for model development, in this example is glm(formula = Fr ~ R*M*A + R*M*S + R*A* S, family = poisson, data = P.md).

[2] P-value is computed from 1-pchisq(dev,df).

The next stage looks at those models containing three of the four second order interaction terms. There are four possible combinations of models as shown in Table B.3. From these four models, the model consisting of RMS, RAS and MAS represents the best model for stage 2. This model, deviance of 3.01 with 8 degrees of freedom, also shows an improvement from the first model. Thus the process is continued and the third stage will consist of building models from (RMS, RAS, MAS).

Stage	Model	deviance	df	P-value
1	**(RMA, RMS, RAS, MAS)**	2.42	4	0.659
2	(RMA, RMS, RAS)	9.56	6	0.144
	(RMA, RMS, MAS)	18.80	8	0.016
	(RMA, RAS, MAS)	4.49	6	0.611
	(RMS, RAS, MAS)	**3.01**	**8**	**0.934**

Table B.3: Second Stage Model Results.

The third stage of model development from the model (RMS, RAS, MAS) looks at those models without one of the second order interaction terms. If the second order interaction term of MAS is removed then the first order interaction term of MA is added to ensure multiple terms are not removed at once. A summary of the results of the three new models is displayed in Table B.4. Of the three models, (RAS, MAS, RM) represents the best model with a deviance of 5.09 and 10 degrees of freedom. But, this model does not represent an improvement from the model chosen in stage 2. At this point the backward elimination process is complete since further model building from the (RAS, MAS, RM) model will not provide a better fit. Therefore, the model chosen for the Pacific region's medical failures is (RMS, RAS, MAS).

Stage	Model	deviance	df	P-value
1	**(RMA, RMS, RAS, MAS)**	**2.42**	**4**	**0.659**
2	(RMA, RMS, RAS)	9.56	6	0.144
	(RMA, RMS, MAS)	18.80	8	0.016
	(RMA, RAS, MAS)	4.49	6	0.611
	(RMS, RAS, MAS)	**3.01**	**8**	**0.934**
3	(RMS,RAS,MA)	10.15	10	0.427
	(RMS,MAS,RA)	19.38	12	0.080
	(RAS,MAS,RM)	**5.09**	**10**	**0.855**

Table B.4: Third Stage Model Results.

Now that a model has been selected, attention turns to the coefficients. The prominent interaction analysis, conducted in this thesis, looks at those coefficients containing the main effect of Medical failure (M) or Weight failure (W). For this example those coefficients are highlighted in Table B.5 below. The coefficient "M" is not highlighted because it is not an interaction term. In the results of this thesis the individual t-values are grouped by region and graphed.

Coefficient	Value	Std. Error	t value
(Intercept)	4.57	0.10	46.45
RO	1.15	0.11	10.28
RW	1.35	0.11	12.33
M	-2.19	0.18	-12.28
S	1.30	0.11	11.67
AH	1.33	0.11	12.18
AL	-0.28	0.15	-1.84
ROM	**-0.15**	**0.17**	**-0.84**
RWM	**0.10**	**0.17**	**0.60**
ROS	0.19	0.13	1.51
RWS	0.14	0.12	1.17
M:S	**-0.33**	**0.21**	**-1.53**
ROAH	-0.19	0.13	-1.48
RWAH	-0.23	0.12	-1.91
ROAL	-0.24	0.17	-1.35
RWAL	-0.53	0.17	-3.07
SAH	-0.63	0.13	-4.99
SAL	-0.58	0.18	-3.26
MAH	**-0.11**	**0.13**	**-0.87**
MAL	**-0.50**	**0.23**	**-2.21**
ROMS	**0.27**	**0.21**	**1.26**
RWMS	**0.29**	**0.20**	**1.44**
ROSAH	0.24	0.14	1.65
RWSAH	0.44	0.14	3.15
ROSAL	0.39	0.20	1.93
RWSAL	0.28	0.20	1.40
M:SAH	**-0.02**	**0.15**	**-0.16**
M:SAL	**0.56**	**0.25**	**2.23**

Table B.5: Pacific Region Medical Failure Model Coefficients.

APPENDIX C. ANALYSIS OF SINGLE FACTORS BY MEPS REGION

This appendix presents the analysis conducted for the factors Race, Age, Education and Marital Status. This appendix is separated into two parts. In Part A, the analysis of the factors and medical failures is presented. Then the analysis of the factors and weight failures is presented in Part B. Both parts include an analysis for each of the factors listed above.

For each main effect the analysis contains a graphical presentation of the relative frequency of medical failures for each MEPS region, allowing for a comparison between the regions. These frequencies come in pairs which identifies the levels of a main effect. Next, the chi-squared test results are presented.

A. MEDICAL FAILURES

1. Applicant Race

Medical failure rates for the White, Black and Other races are 10.2%, 8.6% and 8.1% respectively. The relative frequencies of Medical failures by Race are arranged by the respective regions and displayed in Figure C.1 below. Figure C.1 shows that Whites tend to have higher medical attrition. A lower attrition level is apparent for Blacks in the West North Central, Pacific, East South Central and New England regions. The Other

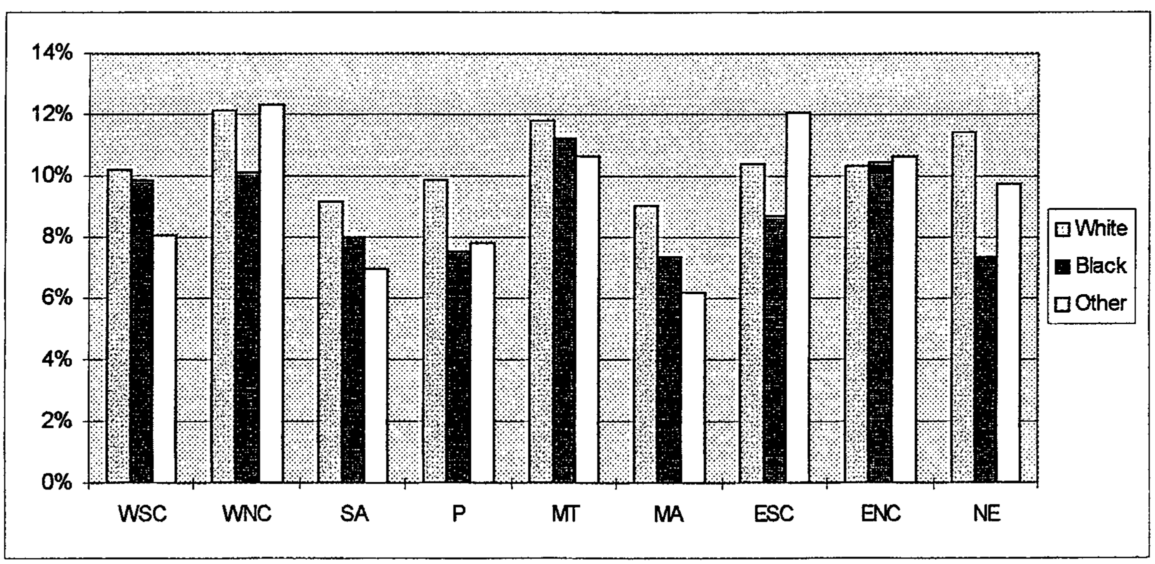

Figure C.1: Relative Frequencies of Medical Failures and Applicant Race.

group has the highest attrition in the East South Central, East North Central and West North Central regions.

The test of independence of Race and Medical failure factors gave a statistically significant result ($\chi^2 = 89.54$, df = 2 , p-value = 0). Therefore the test result reveals that the frequency of medical failures is dependent upon the race of the applicant. Next, at the regional level a comparison of the independence between Race and Medical failures is presented below in Table C.1. For the regions of West North Central, East North Central, East South Central, New England and Mountain the test would not reject that Medical failures were independent of the Race of an applicant.

Region	WSC	WNC	SA	P	MT	MA	ESC	ENC	NE
Chi^2	11.12	2.43	10.53	24.23	1.39	19.82	10.37	0.09	4.46
P-value	0.0039	0.2962	0.0052	0	0.4999	0	0.0056	0.9554	0.1075

Table C.1: Regional Test Values of Independence for Medical Failures and Race.

2. Applicant Age

Age medical failure rates for the "<19", "20-24" and "25+" levels are 9.2%, 10.4% and 8.9% respectively. The relative frequencies of Medical failures and Age are arranged by the respective regions and displayed in Figure C.2 below. Figure C.2 shows that the "20-24" age group tends to have higher medical evaluation attrition. A lower attrition level is apparent for those in the "<19" group.

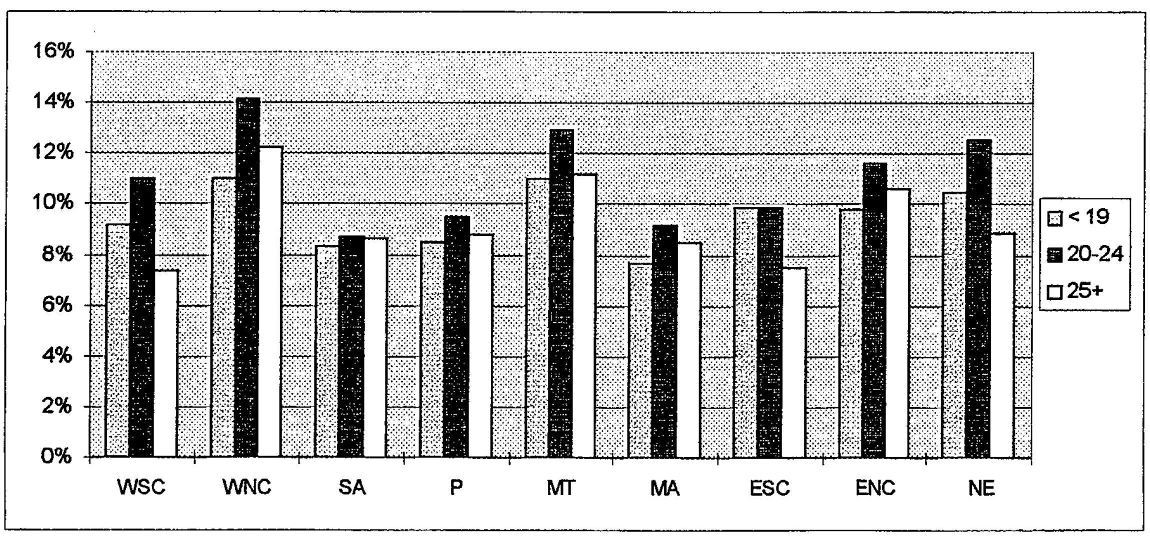

Figure C.2: Relative Frequencies of Medical Failures and Applicant Age.

The test of independence of Age and Medical failure factors gave a statistically significant result ($\chi^2 = 36.17$, df = 2 , p-value = 0). Therefore the test result reveals that the frequency of medical failures is dependent upon the age of the applicant. Next, at the regional level, a comparison of the independence between Age and Medical failures is presented below in Table C.2. Only two of the regions, West South Central and West North Central, show significance. For the remaining regions the test would not reject that medical failures are independent of the Age of an applicant.

Region	WSC	WNC	SA	P	MT	MA	ESC	ENC	NE
Chi^2	15.02	11.02	0.60	3.75	3.83	8.75	4.20	7.71	3.99
P-value	0	0.0040	0.7393	0.1531	0.1474	0.0126	0.1222	0.0211	0.1353

Table C.2: Regional Test Values of Independence for Medical Failures and Age.

3. Applicant Education

Education medical failure rates for the HS, GED and Coll levels are 9.6%, 7.0% and 11.7% respectively. The relative frequencies of Medical failures and Education are shown in Figure C.3 below. Figure C.3 shows that those with College experience tend to have higher medical evaluation attrition. Except for the West North Central region, a lower attrition level is consistently seen for those applicants with an alternate education.

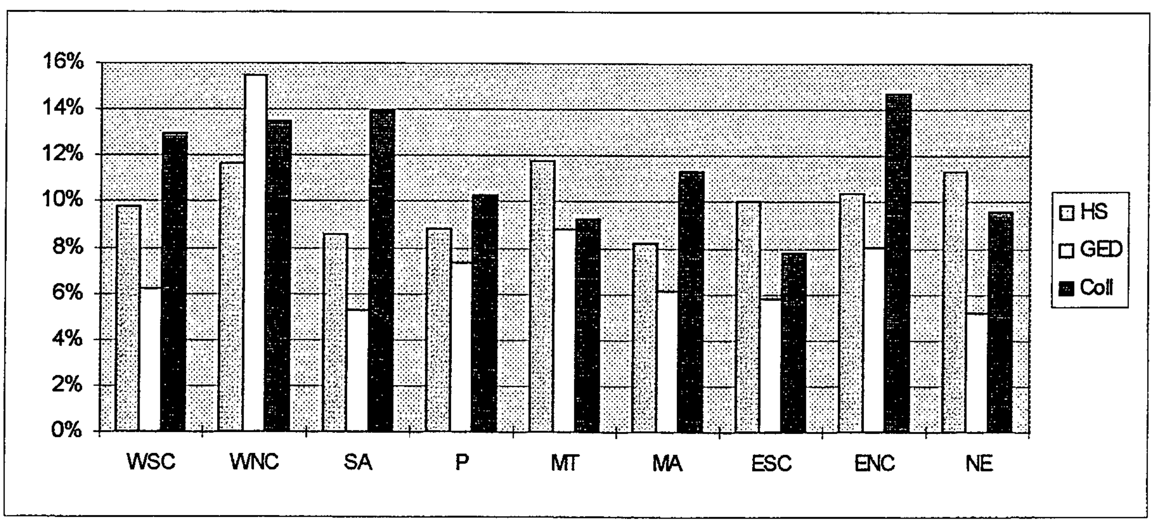

Figure C.3: Relative Frequencies of Medical Failures and Applicant Educational Background.

The test of independence of Education and Medical failure factors gave a statistically significant result ($\chi^2 = 54.52$, df = 2 , p-value = 0). Therefore the test result reveals that the frequency of medical failures are dependent upon the education of the applicant. Next, at the regional level a comparison of the independence between Education and Medical failures is presented below in Table C.3. Three of the regions, West South Central, South Atlantic and East South Central, show significance. The remaining regions revealed that the independence of the educational background of an applicant and medical failures could not be rejected.

Region	WSC	WNC	SA	P	MT	MA	ESC	ENC	NE
Chi^2	13.76	3.92	29.15	4.14	3.60	10.27	13.99	7.66	5.22
P-value	0.0010	0.1406	0	0.1259	0.1650	0.0059	0.0009	0.0217	0.0734

Table C.3: Regional Test Values of Independence for Medical Failures and Education.

4. Applicant Marital Status

Medical failure rates for the Single, Single Dep and Married levels are 9.7%, 7.6% and 8.2% respectively. The relative frequencies of Medical failures and Marital Status are displayed in Figure C.4 below. Figure C.4 shows that single applicants tend to have higher medical evaluation attrition. Except for the West North Central region, a lower attrition level is consistently seen for those single applicants with dependents.

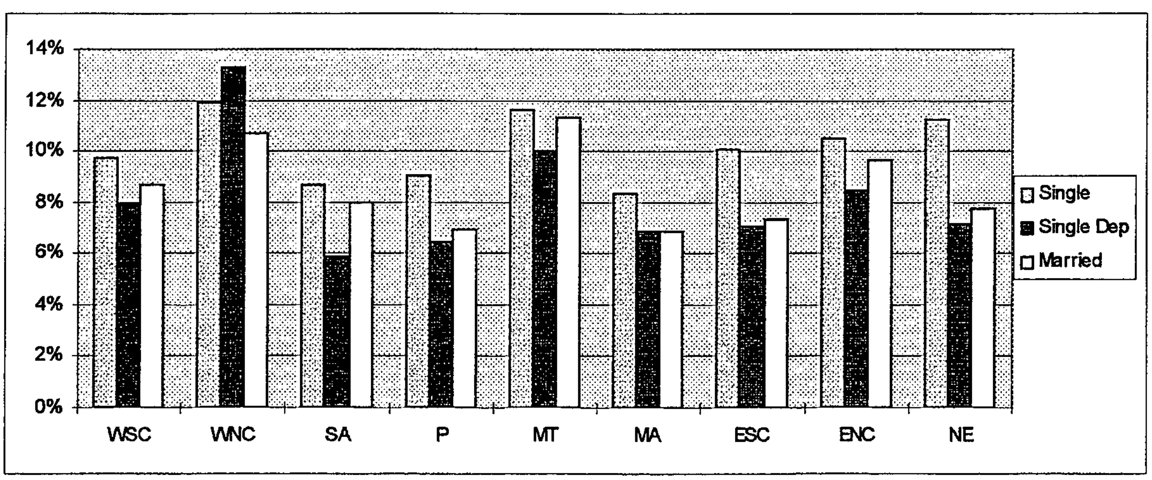

Figure C.4: Relative Frequencies of Medical Failures and Applicant Marital Status.

The test of independence of Marital Status and Medical failure factors gave a statistically significant result ($\chi^2 = 34.36$, df = 2 , p-value = 0). Therefore the test result reveals that the frequency of medical failures is dependent upon the marital status of the applicant. Next, at the regional level a comparison of the independence between Marital Status and Medical failures is presented below in Table C.4. When broken down by region only the East South Central region shows significance. The remaining regions revealed that for medical failures there is not enough evidence to reject the independence of the marital status of an applicant and medical failures.

Region	WSC	WNC	SA	P	MT	MA	ESC	ENC	NE
Chi^2	3.19	0.93	7.76	10.04	0.56	2.99	1149	2.65	3.25
P-value	0.2019	0.6281	0.0206	0.0066	0.7568	0.2236	0.0032	0.2652	0.1966

Table C.4: Regional Test Values of Independence for Medical Failures and Marital Status.

B. WEIGHT FAILURES

1. Applicant Race

Weight failure rates for the White, Black and Other races are 3.1%, 2.8% and 2.6% respectively. The relative frequencies of Medical failures by Race are arranged by regions and displayed in Figure C.5 below. Figure C.5 shows that in the eastern regions white applicants tend to have higher weight failure rates as compared to the other races. A

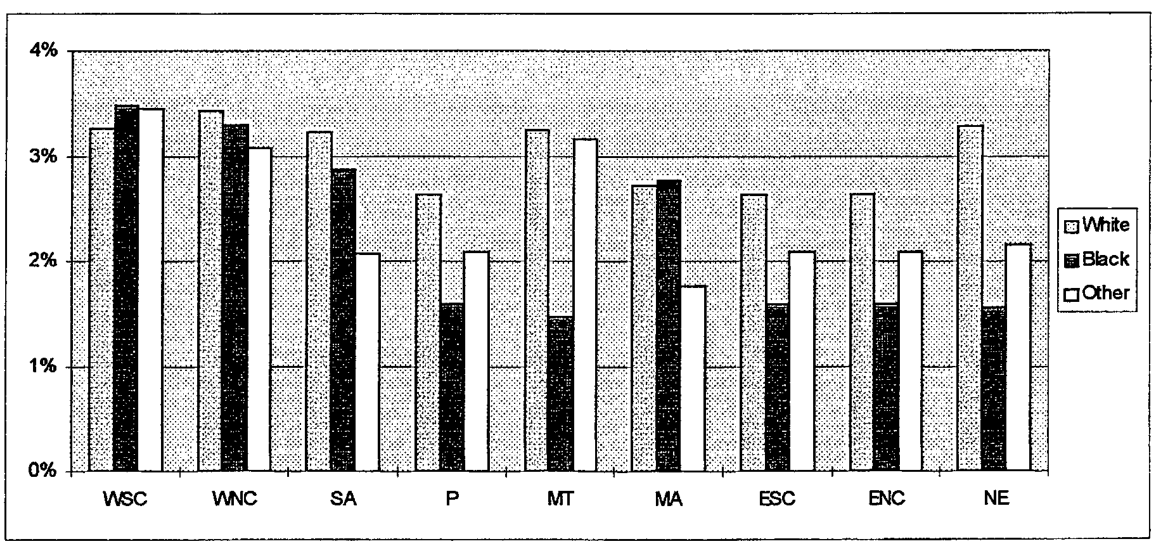

Figure C.5: Relative Frequencies of Weight Failures and Applicant Race.

higher attrition level is seen for Blacks in the Middle Atlantic and West South Central region. The Other group has their highest attrition values in the Mountain, West North Central and West South Central regions.

The test of independence of Race and Weight failure factors gave statistically a significant result ($\chi^2 = 16.396$, df = 2 , p-value = 0.0003). Therefore the test result reveals that the frequency of weight failures is dependent upon the race of the applicant. At the regional level a comparison of the independence between Race and Weight failures is presented below in Table C.5. For all of the MEPS regions the two factors are not statistically significant which is opposite for the Navy as a whole. Race of an applicant does not appear to be a strong indicator of weight failures when looking at the individual MEPS regions.

Region	WSC	WNC	SA	P	MT	MA	ESC	ENC	NE
Chi^2	0.39	0.15	6.62	9.88	2.03	5.73	9.03	3.35	3.15
P-value	0.8218	0.9286	0.0365	0.0072	0.3630	0.0570	0.0109	0.1869	0.2066

Table C.5: Regional test values of independence for Weight Failures and Race.

2. Applicant Age

Age weight failure rates for the "<19", "20-24" and "25+" levels are 2.9%, 3.3% and 2.3% respectively. The relative frequencies of Weight failures and Age are arranged by regions and displayed in Figure C.6 below. Figure C.6 shows that the "20-24" age

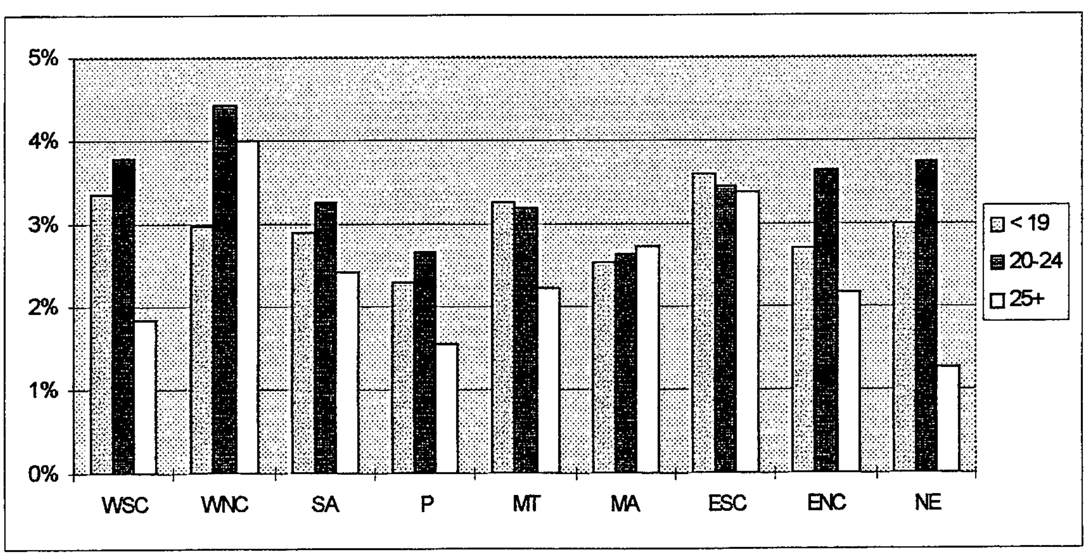

Figure C.6: Relative Frequencies of Weight Failures and Applicant Age.

group tends to have slightly higher weight failures. A lower attrition level is consistently seen for those in the "<19" and "25+" age group.

The test of independence of Age and Weight failure factors gave a statistically significant result (χ^2 = 23.07, df = 2 , p-value = 0). Therefore the test result reveals that the frequency of weight failures is dependent upon the age of the applicant. Next, at the regional level a comparison of the independence between Age and Weight failures is presented below in Table C.6. As is the case for applicant race, all of the MEPS regions are not statistically significant which is opposite for the Navy as a whole. Therefore, age of an applicant also does not appear to be a strong indicator of weight failures when looking at the individual MEPS regions.

Region	WSC	WNC	SA	P	MT	MA	ESC	ENC	NE
Chi^2	9.03	7.85	2.46	7.45	1.11	0.18	0.22	7.49	4.73
P-value	0.0110	0.0197	0.2921	0.0242	0.575	0.9161	0.8973	0.0236	0.0938

Table C.6: Regional Test Values of Independence for Medical Failures and Age.

3. Applicant Education

Education weight failure rates for the HS, GED and Coll levels are 3.0%, 2.2% and 2.4% respectively. The relative frequencies of Weight failures and Education are displayed in Figure C.7 below. Figure C.7 shows that the educational background of an

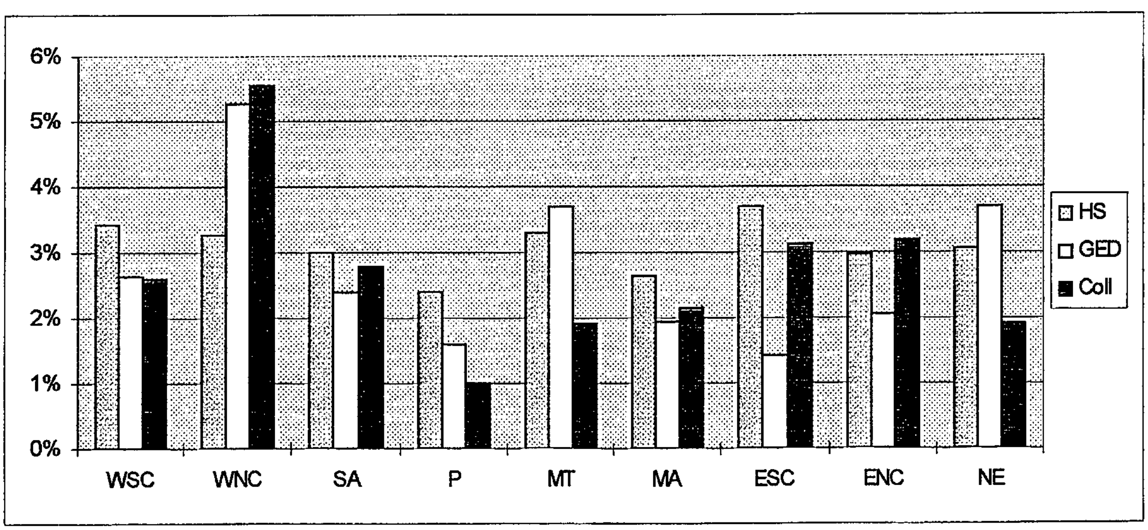

Figure C.7: Relative Frequencies of Medical Failures and Applicant Educational Background.

applicant appears provide no information concerning weight failures.

The test of independence of Education and Weight failure factors gave a statistically significant result ($\chi^2 = 14.13$, df = 2 , p-value = 0). Therefore the test result reveals that the frequency of weight failures is dependent upon the education of the applicant. Next, at the regional level a comparison of the independence between Education and Weight failures is presented below in Table C.7. As in the previous cases, all of the MEPS regions are not statistically significant. Therefore, education of an applicant also does not appear to be a strong indicator of weight failures when looking at the individual MEPS regions.

Region	WSC	WNC	SA	P	MT	MA	ESC	ENC	NE
Chi²	1.92	5.17	1.25	6.12	4.11	1.61	10.01	1.20	0.87
P-value	0.3834	0.0754	0.5357	0.0468	0.1279	0.4469	0.0067	0.5479	0.6487

Table C.7: Regional Test Values of Independence for Medical Failures and Education.

4. Applicant Marital Status

Weight failure rates for the Single, Single Dep and Married levels are 3.0%, 2.5% and 3.0% respectively. The relative frequencies of Weight failures and Marital Status are displayed in Figure C.8 below. Figure C.8 shows that single and married applicants tend to have higher medical evaluation attrition. Except for the West North Central region, a lower attrition level is consistently seen for those single applicants with dependents.

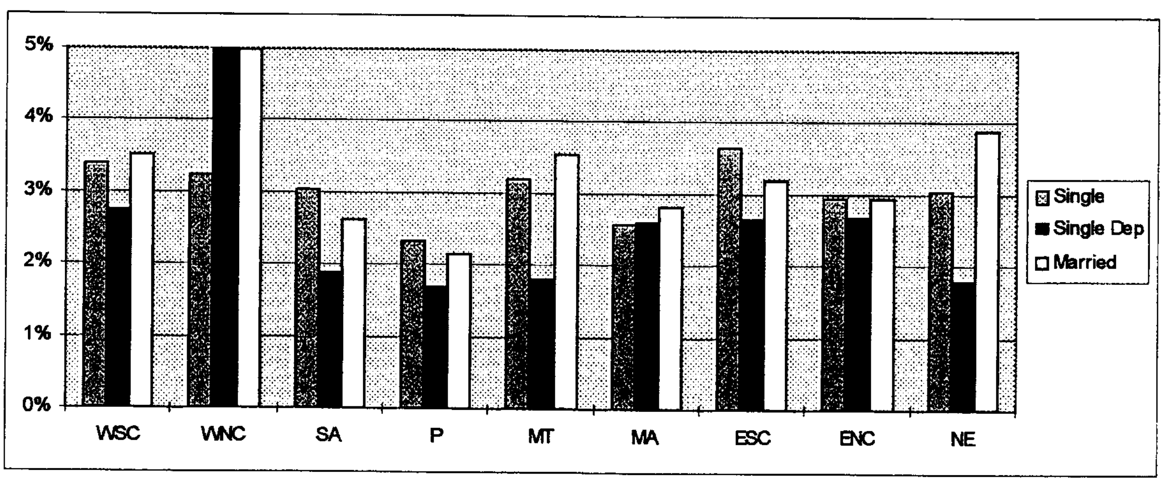

Figure C.8: Relative Frequencies of Weight Failures and Applicant Marital Status.

The test of independence of Marital Status and Weight failure factors gave a not statistically significant result ($\chi^2 = 3.99$, df = 2 , p-value = 0.14). Therefore the test result reveals that the independence of weight failures and the marital status of an applicant can not be rejected. Next, at the regional level a comparison of the independence between Marital Status and Weight failures is presented below in Table C.8. For applicant marital status all of the MEPS regions are not statistically significant as is for the Navy as a whole. Marital status of an applicant does not appear to be a strong indicator of weight failures.

Region	WSC	WNC	SA	P	MT	MA	ESC	ENC	NE
Chi^2	0.85	4.79	3.91	1.37	1.45	0.10	2.40	0.16	0.91
P-value	0.6551	0.0910	0.1419	0.5032	0.4848	0.9500	0.3011	0.9248	0.6357

Table C.8: Regional test values of independence for Weight Failures and Marital Status.

APPENDIX D. PROMINENT INTERACTION ANALYSIS

This appendix presents the prominent interaction analysis results. It is separated into two parts. The medical failure results are presented in Part A. Then, in Part B, the weight failure results are presented. Both parts include analysis of model coefficients. The coefficients included are the first and second-order interaction terms which contain either Medical failure (M) or Weight failure (W). For each coefficient the analysis includes a graphical presentation of the coefficient's t-values. The plots arrange the t-values into their respective MEPS region, allowing for a comparison between the regions. The approximate 5% significance level, not adjusted for multiple comparisions, is displayed on the graphs by a dashed red line.

A. MEDICAL FAILURES

1. First-order Interaction Terms

Females with medical failures form the baseline for the Medical and Sex (MS) interaction term. Figure D.1 below displays the coefficient t-values for each region; the M:S term represents male applicants with medical failures. The values in each region are negative which suggests that the male population tends to have lower then expected medical failures as compared to the females. For the West South Central region, medical failures are significantly associated with the applicant sex. For this region the females tend

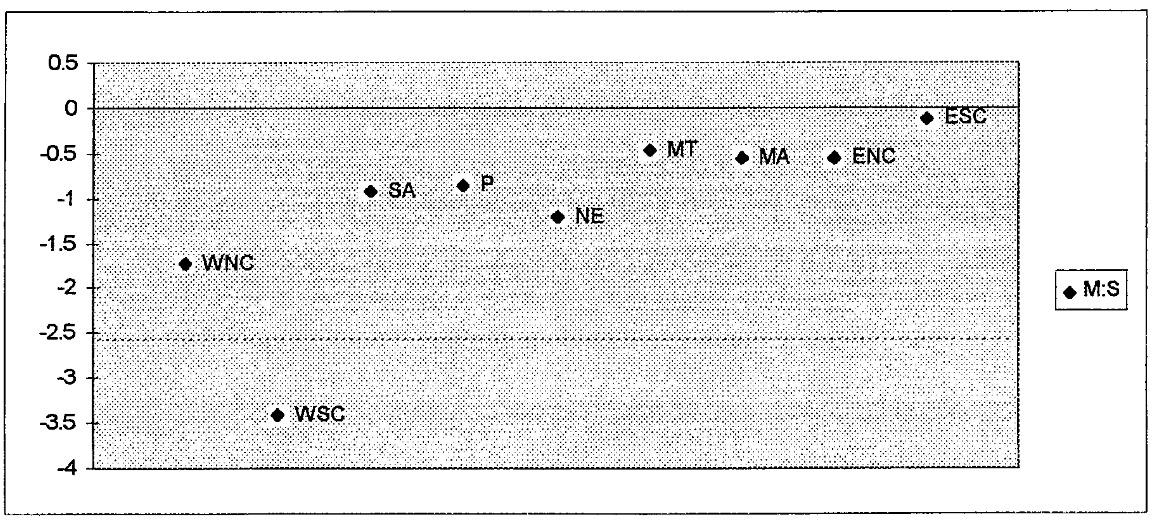

Figure D.1: Regional Medical Failure and Sex Coefficient t-values.

to have a much higher rate of medical failures then the males. In the East South Central region there is the smallest difference between the sexes and medical failure rates.

Next, the interaction between medical failures and age is evaluated. The baseline includes those 20-24 year old applicants with medical failures. Figure D.2 displays the coefficient t-values for both the "25+" age group (MAL) and "<20" age group (MAH) terms. In general the coefficients' t-values are negative. This indicates that the "20-24" year old age group tends to have higher medical failure rates then the other two groups. In the West South Central, both MAL and MAH coefficients have significantly lower failure rates then the baseline. For the remaining regions no significance between the age groups is seen.

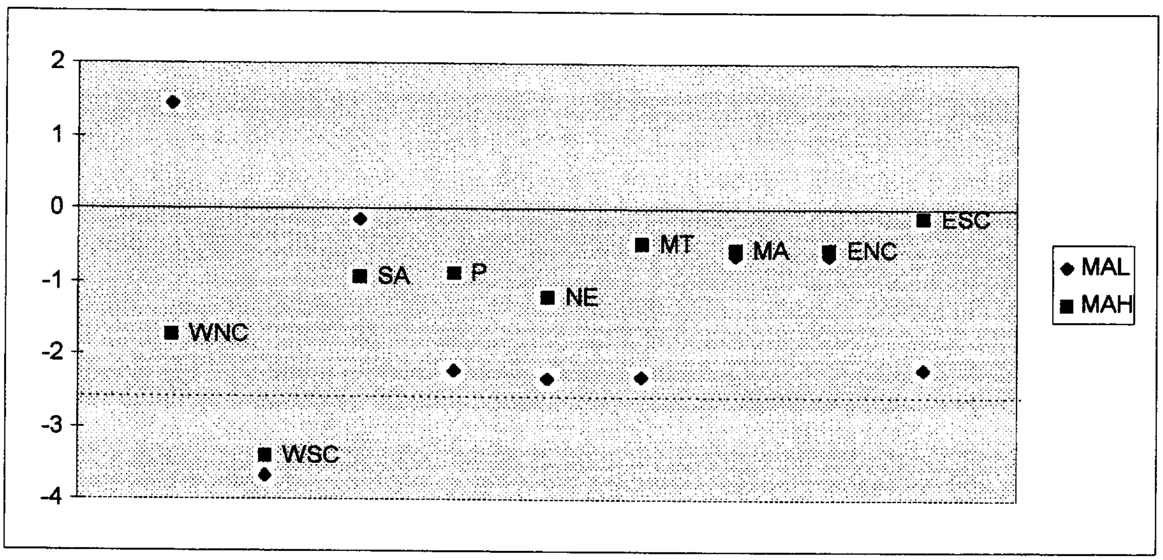

Figure D.2: Regional Medical Failure and Age Coefficient t-values.

2. Second-order Interaction Terms

Second-order interaction terms are evaluated next to show the relationship between medical failures with regard to "Sex and Age" and to "Race and Sex". Those interaction terms which are not significant enough to be included in the model are represented with a coefficient t-value of zero.

The first second-order interaction term examined contains Medical Failures, Race and Sex. The baseline for this group is medical failures for male applicants whose race is black. Figure D.3 below, shows the coefficient t-values for both the "Other and Sex"

(ROMS) and "White and Sex" (RWMS) terms. Except for the Mountain region, white males tend to have higher medical failures than the baseline group. "Other" have lower relative failures then black males in the West North Central and Mountain regions. Overall, none of the respective coefficients are individually significant.

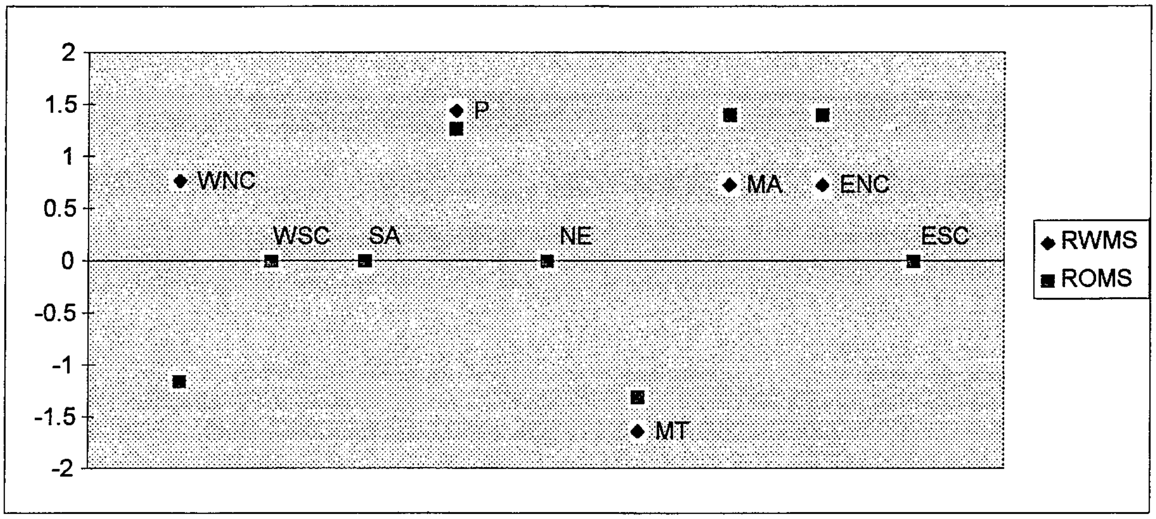

Figure D.3: Regional Medical Failure, Race and Sex Coefficient t-values.

The next second-order interaction term considered includes Medical Failures, Age and Sex. The baseline for this group is medical failures for male applicants whose age is between 20-24 years. Figure D.4 below shows the coefficient t-values for both the "25+ and Sex" (MSAL) and "<20 and Sex" (MSAH) terms. Overall the males in the "25+" age group tend to have higher attrition as compared to the baseline. The opposite is true for

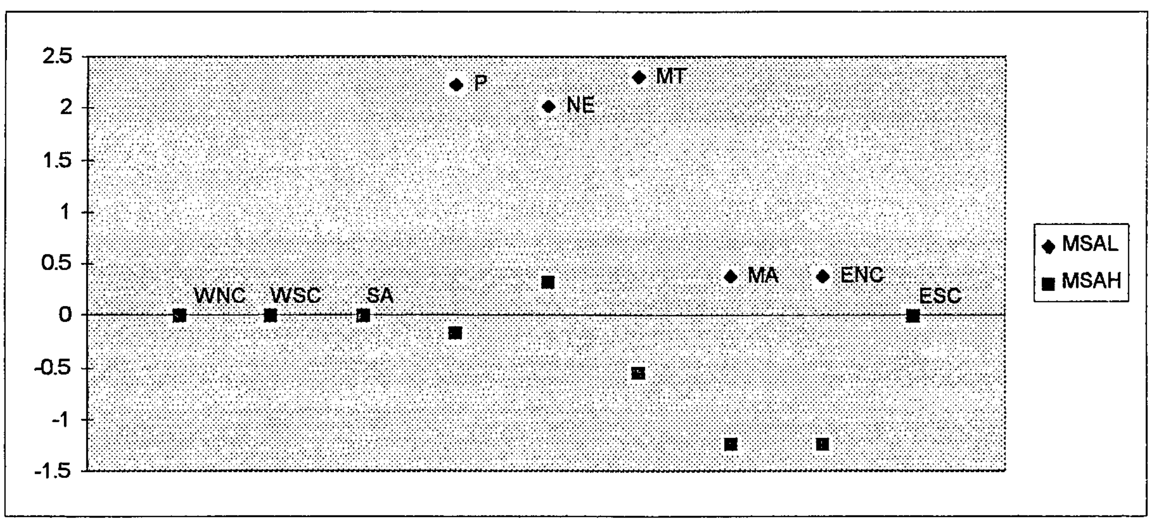

Figure D.4: Regional Medical Failure, Age and Sex Coefficient t-values.

males in the "<20" age group where most regions show a lower overall medical failure rate. In general, there in no significant difference between the coefficients.

B. WEIGHT FAILURES

1. First-order Interaction Terms

Females with medical failures form the baseline for the Weight and Sex (WS) interaction term. Figure D.5 below displays the coefficient t-values for each region; the M:S term represents males with medical failures. The values in each region are significantly negative which suggests that the male population tends to have lower then expected weight failures as compared to the females. The Pacific and South Atlantic regions applicants' weight failures are the most prominent of the regions. For these two regions the females tend to have a much higher rate of medical failures than the males. The Mountain region is the only region whose level of significance is borderline.

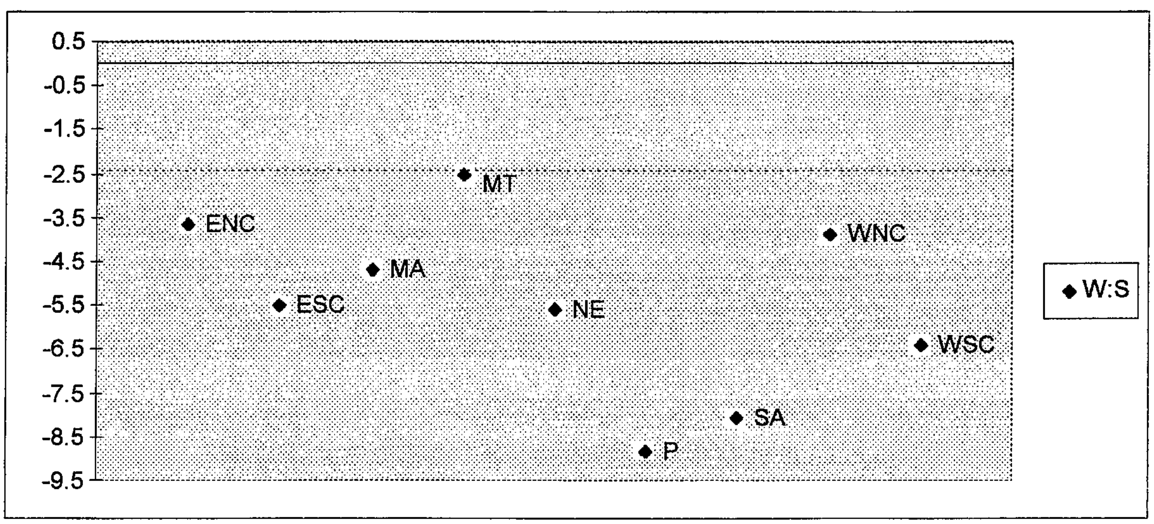

Figure D.5: Regional Weight Failure and Sex Coefficient t-values.

Next Weight failure and Age levels are compared. The baseline for these coefficients includes those 20-24 year old applicants with weight failures. Figure D.6 displays the coefficient t-values for both the "25+" (WAL) and "<20" (WAH) terms. In general the two terms are negative which indicates that the "20-24" year old age group tends to have higher weight failure rates then the other two groups. For most of the regions the differences between the age groups is insignificant. This is true for all regions except the West North Central and West South Central. In the West North Central region applicants in the "<19" group have significantly fewer weight failures. For the West South Central region the "25+" age group has significantly fewer weight failures.

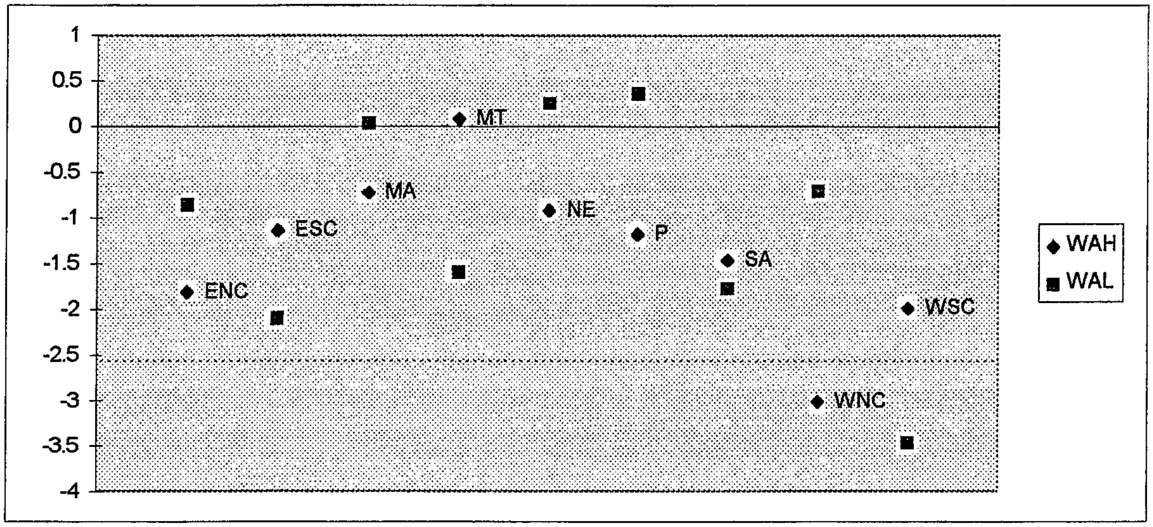

Figure D.6: Regional Weight Failure and Age Coefficient t-values.

2. Second-order Interaction Terms

Second-order interaction terms are evaluated next to show the relationship between weight failures and "Sex and Age," "Race and Age" and "Race and Sex". Those interaction terms which are not significant enough to be included in the model are represented with a coefficient t-values of zero.

The first second-order interaction term examined contains weight failures and "Race and Sex." The baseline for this group is weight failures for male applicants whose race is Black. Figure D.7 below shows the coefficient t-values for both the "Other and Sex" (ROMS) and "White and Sex" (RWMS) terms. Overall the values are positive which indicates male black applicants tend to have lower weight failure rates. The difference, between male black applicants and the other two race groups, is not significant for any region.

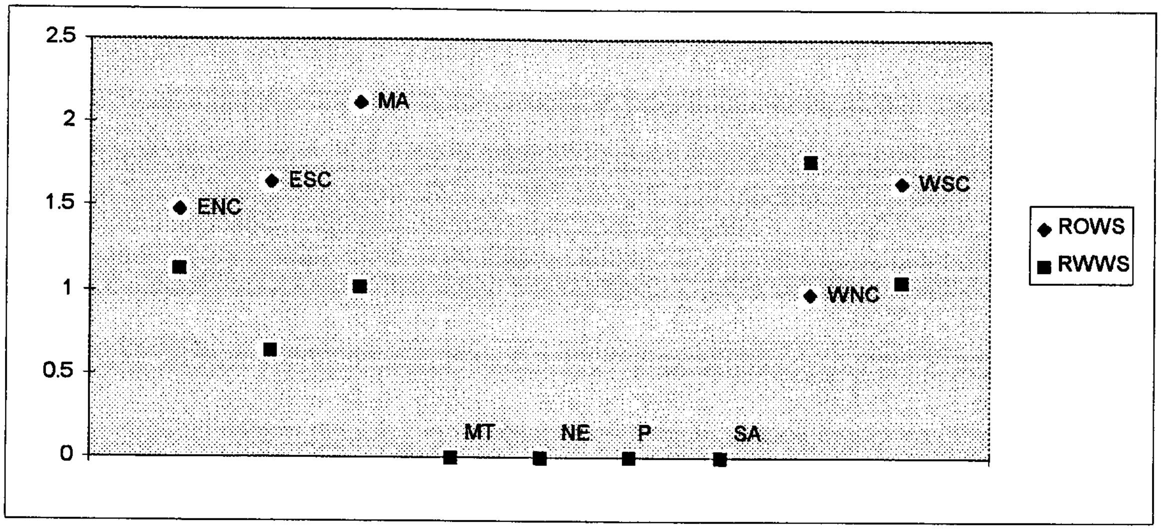

Figure D.7: Regional Weight Failure, Race and Sex Coefficient t-values.

The next second-order interaction term considered contains Weight failures, Age and Sex. The baseline for this group is weight failures for male applicants whose age is between 20-24 years. Figure D.8 below shows the coefficient t-values for both the "25+ and Sex" (MSAL) and "<20 and Sex" (MSAH) terms. Overall the weight failure difference, between male applicants age "20-24", is not considerably significant. The only exception to this is in the East South Central region where males over 25 years of age have a significantly higher rate of weight failures.

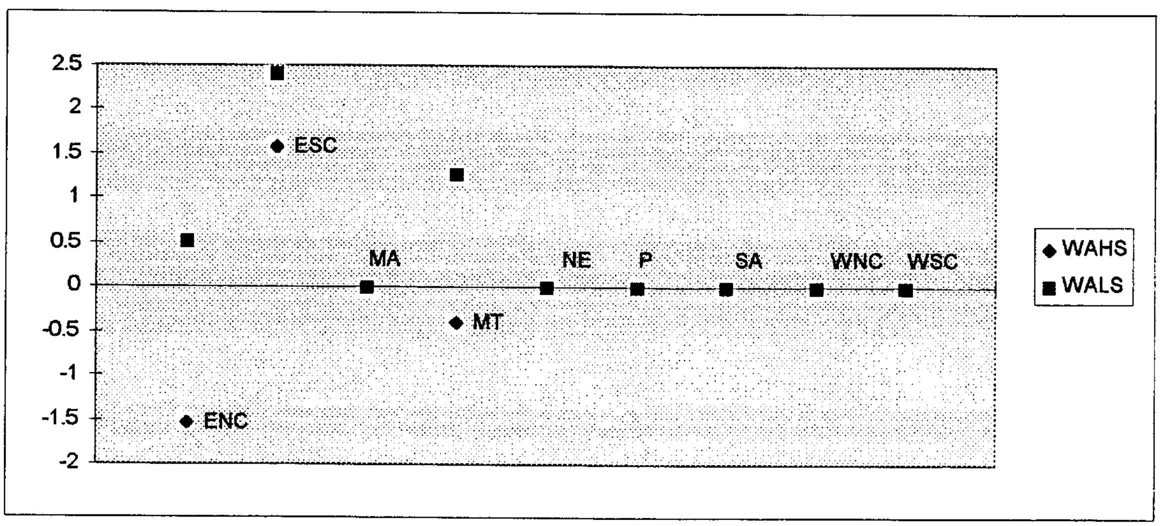

Figure D.8: Regional Weight Failure, Age and Sex Coefficient t-values.

The last second-order interaction term considered includes Weight failures, Age and Race. The baseline for this group is weight failures for black applicants whose age is between 20-24 years. Figure D.9 below shows the coefficient t-values for the "25+ and Other" (ROWAL), "25+ and White" (RWWAL), "<19 and Other" (ROWAH) and "<19+ and White" (RWWAH) terms. Overall the weight failure difference, between black applicants age 20-24, is not considerably significant. The only exception to this is in the Pacific region where the race of "Other" who are over 25 years of age tend to have a significantly lower rate of weight failures.

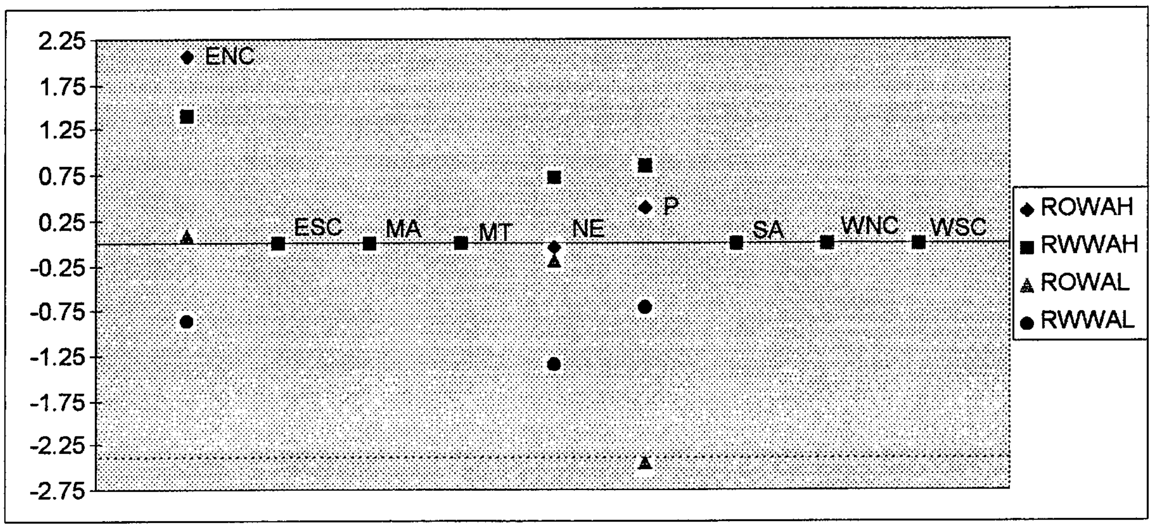

Figure D.9: Regional Weight Failure, Age and Race Coefficient t-values.

APPENDIX E. MEDICAL FAILURE DATA

		Age					
		≤ 19		20 - 24		25+	
	Medical	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	380	156	178	63	38	8
	False	3943	1054	1470	338	242	116
Black	True	72	58	50	29	8	5
	False	819	352	408	164	115	50
Other	True	24	19	15	2	5	4
	False	277	79	147	27	37	12

Table E.1: East North Central Region.

		Age					
		≤ 19		20 - 24		25+	
	Medical	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	296	102	132	44	23	6
	False	2694	• 804	1188	279	272	112
Black	True	161	124	92	38	9	9
	False	1880	1114	792	360	114	107
Other	True	19	7	11	3	2	2
	False	123	61	78	31	20	7

Table E.2: East South Central Region.

		Age					
		≤ 19		20 - 24		25+	
	Medical	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	226	85	124	23	22	5
	False	1938	532	793	124	158	67
Black	True	9	0	6	4	4	0
	False	72	35	42	14	9	10
Other	True	64	27	31	7	8	1
	False	557	184	269	73	44	31

Table E.3: Mountain Region.

		Age					
		≤ 19		20 - 24		25+	
	Medical	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	294	114	193	40	49	9
	False	3528	942	1727	308	436	107
Black	True	73	49	57	26	17	12
	False	1127	503	687	256	265	109
Other	True	40	15	32	9	13	3
	False	711	263	418	117	154	38

Table E.4: Middle Atlantic Region.

		Age					
		≤ 19		20 - 24		25+	
	Medical	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	125	45	66	22	23	2
	False	1106	258	504	94	192	36
Black	True	5	4	5	3	2	0
	False	97	26	65	19	23	9
Other	True	8	6	9	3	1	0
	False	114	40	59	11	21	6

Table E.5: New England Region.

		Age					
		≤ 19		20 - 24		25+	
	Medical	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	412	128	177	46	63	13
	False	3914	1121	1583	370	523	165
Black	True	51	35	28	11	12	6
	False	712	367	353	96	151	72
Other	True	218	87	131	27	66	9
	False	2894	960	1346	308	673	185

Table E.6: Pacific Region.

		Age					
		≤ 19		20 - 24		25+	
	Medical	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	265	102	139	51	40	18
	False	2923	913	1387	348	374	140
Black	True	140	118	65	34	12	13
	False	1802	1086	826	380	171	125
Other	True	43	22	30	6	15	2
	False	659	212	341	110	195	56

Table E.7: South Atlantic Region.

		Age					
		≤ 19		20 - 24		25+	
	Medical	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	278	110	181	56	30	12
	False	3004	702	1418	276	369	119
Black	True	84	81	49	23	14	4
	False	997	541	451	145	122	74
Other	True	109	46	61	19	6	6
	False	1271	460	715	146	167	59

Table E.8: West South Central Region.

		Age					
		≤ 19		20 - 24		25+	
	Medical	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	309	112	142	45	21	11
	False	2625	675	892	187	184	77
Black	True	20	17	12	14	9	2
	False	282	140	130	57	32	14
Other	True	14	15	10	2	1	2
	False	149	48	79	15	19	3

Table E.9: West North Central Region.

APPENDIX F. WEIGHT FAILURE DATA

		Age					
		≤ 19		20 - 24		25+	
	Weight	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	78	73	51	24	5	2
	False	4245	1137	1597	377	275	122
Black	True	11	15	9	16	2	3
	False	880	395	449	177	121	52
Other	True	9	10	4	1	1	1
	False	292	88	158	28	41	15

Table F.1: East North Central Region.

		Age					
		≤ 19		20 - 24		25+	
	Weight	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	97	62	32	28	10	4
	False	2898	849	1293	295	285	114
Black	True	37	61	14	22	4	4
	False	2009	1182	845	376	119	112
Other	True	5	4	6	2	1	0
	False	137	64	83	32	21	9

Table F.2: East South Central Region.

		Age					
		≤ 19		20 - 24		25+	
	Weight	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	48	40	30	8	5	2
	False	2116	577	887	139	175	70
Black	True	2	0	0	1	0	0
	False	79	35	48	17	13	10
Other	True	19	12	4	5	1	0
	False	602	199	296	75	51	32

Table F.3: Mountain Region.

		Age					
		≤ 19		20 - 24		25+	
	Weight	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	80	52	43	15	17	3
	False	3742	1004	1877	333	468	113
Black	True	22	27	17	14	2	6
	False	1178	525	727	268	280	115
Other	True	10	4	10	3	4	1
	False	741	274	440	123	163	40

Table F.4: Middle Atlantic Region.

		Age					
		≤ 19		20 - 24		25+	
	Weight	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	31	21	15	12	1	1
	False	1200	282	555	104	214	37
Black	True	0	1	0	2	1	0
	False	102	29	70	20	24	9
Other	True	0	2	3	0	1	0
	False	122	44	65	14	21	6

Table F.5: New England Region.

		Age					
		≤ 19		20 - 24		25+	
	Weight	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	89	56	37	24	13	5
	False	4239	1185	1725	394	575	173
Black	True	4	11	6	3	2	4
	False	759	391	375	104	161	74
Other	True	42	47	37	12	3	3
	False	3070	1000	1440	323	736	191

Table F.6: Pacific Region.

		Age					
		≤ 19		20 - 24		25+	
	Weight	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	72	58	43	28	9	7
	False	3116	957	1483	371	405	151
Black	True	41	52	21	17	1	5
	False	1901	1152	870	397	182	133
Other	True	9	8	8	4	5	1
	False	693	226	363	112	205	57

Table F.7: South Atlantic Region.

		Age					
		≤ 19		20 - 24		25+	
	Weight	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	76	56	43	31	5	3
	False	3206	756	1556	301	394	128
Black	True	14	46	14	13	2	1
	False	1067	576	486	155	134	77
Other	True	36	30	21	12	3	4
	False	1344	476	755	153	170	61

Table F.8: West South Central Region.

		Age					
		≤ 19		20 - 24		25+	
	Weight	Sex		Sex		Sex	
Race	Failure	Male	Female	Male	Female	Male	Female
White	True	67	49	34	19	8	4
	False	2867	738	1000	213	197	84
Black	True	1	8	5	8	0	2
	False	301	149	137	63	41	14
Other	True	2	4	4	0	0	1
	False	161	59	85	17	20	4

Table F.9: West North Central Region.

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