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Morbidity among female Air Force recruits during basic military training is the subject of this study, which was managed and funded by the Office for Prevention and Health Services Assessment (OPHSA). The study paired male and female flight cohorts ("brother/sister" flights) for an eight-month period in 1994/1995 in order to examine any gender differences in injury/illness rates. Among the key results of the study: 1) female recruits are approximately 1.5 to 2.5 times more likely than male recruits to experience an injury or illness during basic training; 2) for both men and women, many of the absolute injury and non-injury rates decreased markedly during the six weeks of basic training; 3) even though the absolute rates for many injuries and non-injuries decreased substantially over time, the relative risks comparing women to men were fairly constant during the six-week training period; 4) the risk of being discharged was significantly less for men than for women; 5) the risk of being recycled did not differ significantly for men compared to women; 6) although the absolute rates were higher for the female recruits, the relative occurrence of specific injuries and non-injuries did not appear to be gender-specific.

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INTRODUCTION

Air Force policymakers, planners, and medical managers need valid, specific information with which to effectively design policies, provide health resources, and make decisions to meet the health and training needs of female military personnel. The data needed to develop such information do not currently exist for female Air Force members, or their male counterparts. By assessing injuries and illnesses among female Air Force trainees, risk factors and health outcomes can be identified and appropriate remedies can be implemented that will reduce the rates of morbidity, attrition, and training recycling. Identifying conditions that are gender specific can allow an evaluation of whether current health resources meet those needs. Identifying and implementing such changes can reduce training costs and produce a healthier and more productive US Air Force (USAF) member.

The Female Recruit Morbidity Study was conducted by the US Air Force Office for Prevention and Health Services Assessment (OPHSA) with the assistance of Battelle Memorial Institute (BMI) and the Centers for Disease Control and Prevention (CDC) between October 1994 and June 1995.

Each year, over 35,000 young men and women undergo six weeks of basic military training (BMT) at Lackland Air Force Base, Texas, soon after enlisting in the USAF. Anecdotal evidence from BMT training staff and medical personnel, along with published reports from other branches of the military, indicate that female recruits experience higher rates of injury, illness, and attrition than male recruits. However, formal data collection on disease and injury rates in Air Force military recruits, either male or female, has never been collected or reported.

The primary purpose of this task was to assess injuries and illnesses among female USAF recruits and a matched cohort of male recruits. Study objectives included:

1. Assessing the types, rates, and risks of injury and illness in USAF female basic military recruits
2. Identifying the week of training and the source of injuries
3. Comparing rates of injury and illness of female and male recruits
4. Identifying gender-specific injuries and illnesses to aid in reducing training risk and allocating health resources

During the study period, female recruits and a matched cohort of male recruits were followed through BMT to obtain data on injuries and illnesses for which medical care was sought. Data on attrition and recycling (a return of the trainee to BMT following a healing hiatus) were also collected to provide a more complete evaluation of gender differences that might exist in BMT. Specific null hypotheses to be tested include:

1. Female recruits suffer the same rates of injury and illness as male recruits.
2. Specific injuries will not be significantly associated with week of training.
3. Female recruits will not have gender-specific injuries and illnesses.
4. Female recruits will have the same rates of referral, recycling, and attrition as male recruits.

The results of this study can be used by military commanders and medical managers to make recommendations for meeting the health needs of female military personnel. Assessing the injury rate, the week of training, and potential cause associated with different types of injuries may suggest modifications to the training protocol that will reduce injuries and decrease attrition and recycle rates. Determining the frequency and type of female-specific injury and illness may identify modifiable risk factors and reveal unmet medical needs. Reducing risk factors may decrease the morbidity rate, and the attrition and recycle rates of female recruits, thereby reducing training costs while producing a healthier airman for the USAF.

STUDY POPULATION

Every week, between 500 and 800 recruits arrive at Lackland AFB, San Antonio, TX, for six weeks (30 training days) of basic military training. The recruits are assigned to one of five squadrons, based on their arrival date and time at Lackland AFB. Squadron members are housed in the same barracks and are divided into smaller groups, called "flights," for training activities. Flights usually consist of between 40 and 50 recruits and are segregated by gender. Most female flights have paired "brother" flights that complete training together, and are assumed to have been exposed to the same training risks.

Most recruits (in this study, 82 percent of males and 77 percent of females) stay with the initially assigned flight for the duration of training. However, a small number either do not graduate with their originally enrolled flight, or do not graduate at all (i.e., they are discharged). Some recruits may change flights and/or squadrons, a process called "recycling." Recycling may occur for several reasons, including behavior, performance, and/or medical condition, usually injury. Sometimes a recycled recruit is forced to repeat certain sections of training because of poor performance, lengthening his/her time in BMT. In other instances, recruits are recycled into a new flight at approximately the same point in training at which they left the previous flight, so their actual time in training is the same as that of non-recycled recruits. In addition, every two weeks approximately 50 recruits are selected from flights in all five squadrons to form a band squadron. Recruits can also be recycled into new flights from medical hold, where they are placed when injured or awaiting discharge. These recruits are housed in the same building, away from the other training squadrons, until recycled or discharged.

The study population consisted of Air Force basic military recruits who began basic military training in eligible flights at Lackland AFB after 1 October 1994, and who should have completed training (graduated, unless discharged) by 30 June 1995. The majority of recruits (73 percent of females and 74 percent of males) were between 18 and 21 years of age.

Recruits eligible for analyses were restricted to those who were members of "brother-sister" flight pair groups (i.e., male and female flights that started training at the same time and within the same squadron). It was assumed that, regardless of gender, all recruits who began training on the same date in the same squadron shared the same training environment with respect to facilities and training instructors (TI). Each brother-sister flight group was defined by squadron and training start date and contained one to two flights of female recruits and one to three flights of male recruits. For the three instances where there were female flights with no corresponding male flights, male flights were selected from the prior week, from the same squadron. All analyses retained the matching on squadron and training start date. In all, there were 102 brother-sister pair groups, consisting of 161 male flights and 103 female flights.

STUDY DESIGN

The pairing scheme of brother-sister flights allowed valid comparison of gender differences, while minimizing the influence of other potential confounding factors, namely time of year and training environment, or TI influence. Because of this pairing, male recruits who attended basic training at Lackland AFB during the study period, but who were not members of flights with associated female flights, were not included in the analysis. Of the 21,491 total recruits enrolled in BMT during the study period, all females (n=5,250) and 8,656 males (13,910 total) were included in the study. The remaining 7,581 males were not used for this study, but their data will be maintained in a separate database for possible future use. For certain analyses, the study cohort was further reduced to eliminate recruits who recycled into other flights, because recycling breaks the matching by squadron and training start date.

Training start dates for all recruits were entered, based on the enrolled flight. Graduation dates for each recruit who successfully completed training (i.e., who was not discharged) were entered, based on the flight each recruit was in at graduation. Data collection ended on 30 June 1995, so some recruits were otherwise lost to follow-up (OLTF) due to recycling out of the study, or being in medical hold status. These recruits are so identified in the database.

Illness and injury rates were calculated during the six-week training cycle for males and females, based on the amount of time each recruit spent in the originally enrolled flight. These rates are derived by using the number of illness and injury events, divided by the number of person-weeks at risk. Recruits who graduate contribute six person-weeks, while recruits who recycle (or who are discharged) contribute the number of weeks (from one to six) until they leave their enrolled flight. The date of the first status change (which also includes medical hold and emergency leave, in addition to recycle and discharge) was used to determine when a recruit left the flight in which he/she was originally enrolled. This allows the inclusion of recyclers in the analysis, which is important because recycling may be directly related to injury or other training difficulties, and because recruits who are recycled may account for a disproportionate number of injuries and illnesses. Events occurring after recycling cannot confidently be attributed to the original training environment or to the brother-sister matched groups, and so are excluded in most analyses. The time period (up to five days) preceding the official training start date was also included in considering status changes and clinic visits, in that all recruits share the same risk between arrival at Lackland AFB and the start of training.

For some analyses, percentages were calculated, instead of rates. Percentages of recruits who recycle or are discharged before graduation were calculated using the full cohort, since all members of the selected flights face this risk when training begins. Recruits who exited the flight before the training start date were included in these calculations as well. Thus, all 13,910 recruits contributed to tables presenting rate of injury based upon person-weeks of training, although only non-recycling graduates contributed the maximum of six person-weeks. Periods spent on medical hold or emergency leave prior to recycling were not included in person-week calculations.

The study duration was broken into two-month time periods to stratify for environmental exposures. This stratification was performed using the start date for each flight and resulted in four time periods: October-November 94, December 94-January 95, February-March 95, and April-May 95.

Table 12 presents details on the number of recruits and the number of person-weeks by gender, the five squadrons, and the four time periods, for a total of 20 strata for each gender. On the squadron level, the 320th had the greatest number of female recruits (n=1,094), while the 321st had the fewest females (n=1,022). The 320th squadron had the fewest male recruits (n=1,344), while the 323rd had the most males (n=2,123). Training start dates in December and January had the most recruits of both genders (1,522 females and 2,858 males). The October and November time period had the lowest number of enrolled female recruits (n=1,975), while the April and May time period contained the fewest male recruits (n=1,574).

LITERATURE REVIEW

A review of the literature revealed that there are very few studies on the illness and injury rate of female military trainees, and none on Air Force recruits undergoing BMT. While some researchers have investigated the incidence of and risk factors for injury and illness among male and female recruits in the Army and Navy, none have focused specifically on Air Force female recruits.

Further, even those who have performed research in these areas recognize the need to include additional factors in future studies: "Risk factors cited in literature which need further study include: gender, age, body composition, anatomic factors, level of physical fitness, prior health, equipment and training program parameters such as intensity, duration, and frequency." (Jones 1988)

Observations from studies indicate that the cumulative risk of injury over the eight-week Army basic training cycle is about 25% males and 50% females. "The risks of making one or more sick call visits for illness were greater for women than men; however, if gynecological complaints were excluded from the comparison the risks of illness for women versus men were the same." (Jones 1988)

Women are also more likely to request or seek attention for illness than men: "In Health United States 1984 the Department of Health and Human Service reported that on average there were 2.95 physician visits per woman nation wide compared to 2.19 visits per man in 1981." However, when the incidences of illness for women and men are compared for conditions to which both genders are susceptible, the risks are the same (Jones 1988).

The conclusions from the Army study by Jones (1988) were that:

1. training-related injuries are one of the most important causes of morbidity in Army basic training populations, and are the leading cause of limited duty due to medical restriction;
2. female trainees suffer nearly twice as many training related injuries as males;
3. low levels of physical fitness, especially endurance performance, predispose individuals to increased risk of training-related injury (in fact, the large difference in injury risk between male and female trainees can be attributed to differences in their levels of fitness);
4. further epidemiological and carefully controlled intervention studies are required to evaluate the impact of the training program itself on the risks of injury;
5. risks for illnesses, like upper respiratory infections, for which women have no special predisposition, are the same for male and female trainees;
6. very low levels of physical fitness and activity predispose individuals to greater likelihood of upper respiratory tract infections; and

7. modulation of physical training to accommodate individuals or groups of individuals of different fitness levels may help to prevent injuries and, to a lesser extent, illnesses like upper respiratory tract infections.

Ross reports that there has been a very large increase in the risk of injury and, in particular, the risk of overuse injury in women in the later years of this study, when compared with 1985 data. "Given that neither the course itself nor the types of recruits have altered significantly over this time, there must be other factors operating, independent of the factors included in the logistic regression analysis, that account for this increase." (1994) Ross goes on to state: "Selection criteria have not changed in any substantive way and it appears unlikely that recent recruits are constitutionally more vulnerable to injury than those entering the program in 1985. One would expect environmental changes to cause a similar rise in a 'threshold' for injury (lower in women than in men). The presence of a threshold, however, is biologically implausible. In most biological systems there is a range of individual variability that would be reflected in a population by a gradual rise in the proportion of those injured in response to the increasing intensity of training. There are other parameters that have not been studied that could contribute to the injury rate: drill surface, type of boots and running shoes, drill methods, protection on lower limb from load bearing during the bone remodeling phase in response to stress, and the gradual wearing-in of boots." (1994)

Relationships shown in data between some physical fitness measures and injury are not strong and, in some cases, are hard to interpret, as in the Army's "Run, Dodge, and Jump" test. However, data do show, on some measures such as in sit-ups and heart rate, that there is a greater likelihood that the less-fit individual will sustain some sort of injury or experience serious illness during training than will a more fit colleague (Burke 1994).

Four hundred Army women recruits, ages 18 to 29, participated in a prospective study to 1) determine the incidence and nature of injuries they would sustain as the result of a vigorous, supervised training program, and 2) identify the predisposing factors that may be related to their occurrence (Kowal 1979). The data from the Kowal study demonstrated that 54% (215) women sustained reportable injuries, resulting in an average training time loss of 13 days. 41% of these injuries resulted in major profiles and limited all participation in physical training. Significant injuries were: tibial stress fractures in 45, chrondomalacia of the patella (CMP) in 21, hip or neck of the femur stress fractures in 20, sprains in 12, Achilles tendonitis in 10, calcaneous metatarsal stress fractures in 8, and fascial or anterior compartment strains in 6. The injury data were correlated with prior fitness measures which showed that the major causes of injury in women are a lack of conditioning, greater body weight and body fat, and limited leg strength. The authors concluded that susceptibility to these potential orthopedic and medical conditions could be identified prior to beginning training, and minimized through proper screening and remedial action before starting a vigorous physical training program. The Kowal study states: "Based on the results presented above, there can be little doubt that disorders of the lower extremities for female military recruits are costly in terms of medical care and utilization, recruit training time lost, hospitalization, and other duty restrictions." Kowal further states: "The solution to the problem, however, is not clear, due to the problem's multidimensional nature. Preventive programs that include assessing the factors discussed in this paper (i.e., prior physical activity, leg strength, body composition, and weight), such as a thorough pre-enlistment screening, would identify individuals at risk of injury and allow for appropriate actions. These actions could be to provide remedial physical training and toughening programs, orthotics, and properly broken in footwear. Likewise, identifying and treating overuse symptoms early could reduce the incidence of lower-extremity injuries in all recruits entering training, but especially in women, because of their increased susceptibility. Sedentary individuals who start a physical training program, particularly new military recruits, have a substantial risk of developing an overuse injury of the lower limb." (1979)

In a prospective study of common overuse injuries (Schwellnus et. al. 1990), researchers investigated the effect of using neoprene insoles on the incidence of overuse injuries during nine weeks of basic military training. The experimental group consisted of 237 randomly selected new recruits. The control group consisted of 1151 recruits. Insoles were given to the experimental group and compliance was monitored. A panel of doctors documented and classified all injuries occurring during the nine-week period. A total of 54 (22.8%) injuries were reported in the experimental group, and 237 (31.9%) injuries were reported in the control group. In both groups, the majority of injuries were overuse (experimental group, 90.7%; control group, 86.4%). The mean weekly incidence of total overuse injuries and tibial stress syndrome was significantly lower ($P<0.05$) in the experimental group. The mean incidence of stress fractures was lower in the experimental group, but not significantly so ($0.05<P<0.10$). This results of the Schwellnus study show that the incidence of total overuse injuries and tibial stress syndrome during nine weeks of basic military training can be reduced by wearing insoles.

A prospective study of 390 male Israeli Defense Force infantry recruits revealed that the medial tibial intercondylar distance and that the isometric strength of the quadriceps, tested at 85 degrees of flexion of the knee, had a statistically significant correlation with the incidence of patellofemoral pain caused by overactivity. Some 15 percent of the recruits studied developed pain from overuse during the 14-week training course. Researchers concluded that such pain is caused by an overload of patellofemoral contact forces. Increased medial tibial intercondylar distance and increased strength of the quadriceps were deemed to be risk factors for this syndrome (Milgrom 1991).

Because little is known about the cause of physical training-related injuries, 391 Army trainees were prospectively measured to identify intrinsic risk factors (Jones et. al. 1993). For 8 weeks of basic training, 124 men and 186 women (79.3%) were studied. They answered questionnaires on past activities and sports participation, and were measured for height, weight, and body fat percentage; 71% of the subjects took an initial army physical training test. Women had a significantly higher incidence of time-loss injuries than men, 44.6% compared with 29.%. During training, more time-loss injuries occurred among the 50% of the men who were slower on the mile run, 29.0% versus 0.0%. Slower women were likewise at greater risk than faster ones, 38.2% versus 18.5%. Men with histories of inactivity and with higher body mass index were at greater injury risk than other men, as were the shortest women. This study by Jones (1993) concluded that female gender and low aerobic fitness measured by run times are risk factors for training injuries in army trainees, and that other factors such as prior activity levels and stature may affect men and women differently.

In conclusion, it appears female recruits are at higher risk for injury during basic military training for various reasons that may not be physiologically gender-specific, but have more to do with pre-enlistment physical conditioning. However, when gender-specific illnesses are excluded, female recruits have the same risk for illnesses at male recruits.

BODY

DATA COLLECTION INSTRUMENTS AND PROCEDURES

Field Personnel

This study was conducted at Lackland AFB in San Antonio, TX. To perform data collection, OPHSA contracted with the Centers for Disease Control and Prevention (CDC) and Battelle/SRA (BMI), which hired the following field personnel to work on-site at Lackland AFB: a study manager, an assistant study manager, and two medical records abstractors/data entry staff.

Personnel Services Management (PSM) Files

The USAF Personnel Systems Management (PSM) office at Lackland AFB generated computerized rosters of all the recruits, by flight. BMI received a disk each week that contained records of all recruits, by flight, who arrived that week. The electronic file contained 15 variables: name, Social Security Administration Number (SSAN), flight, squadron, education level, ethnic group, place of birth, race, gender, marital status, date of birth, state of residence, height, weight, and GTEP AFSC (an Air Force ability test score). These data were used to create a recruit receipt control system for monitoring study participants and tracking study data. The hardcopy rosters were used by training instructors (TI) to record any change of status (recycles, discharges, and medical holds). BMI also received paper copies of the rosters.

The recruit receipt control file was established and managed in BMI's Rockville office. Electronic ASCII files of flight rosters were uploaded from disks and formatted for file layout standardization using SAS. An in-house program using PAL, a programming language supporting the PARADOX relational database software, was developed to import individual and multiple ASCII files. The program formatted incoming data for compatibility with pre-existing roster records. After standardization, all roster files were merged into our receipt control system, which was developed and maintained in PARADOX.

Reports

- Daily Status Reports
  Each squadron prepared daily lists of recruits who were being removed from their current flight/squadron. Data included SSAN, name, flight/squadron number, duty status condition (recycle with new and old flight/squadron numbers, medical hold, emergency leave, hospitalized, or discharge), and effective date. Daily status reports were obtained from the 737th Training Support Squadron office and sent to Rockville by the field manager. Weekly, information from the daily status reports (including discharges) was used to update the status of recruits in the receipt control system. Event status changes (e.g., medical hold, recycle) and associated dates were manually entered by the study manager. This information was used to monitor the status of all recruits enrolled in the study.

- Shipping Reports
  Shipping reports were the final updated hardcopy flight rosters that provided information on the technical school to which each recruit who successfully completed training was shipped. The shipping rosters also recorded the date recruits left the flight (through recycling, medical hold, or discharge), or were added to the flight (recycled). These rosters were used to confirm graduation status and to verify

recycle and discharge information and dates. They were obtained from the 737th Training Support Squadron office and sent to Rockville by the field manager.

- Separation Reports
  The 319th Transition Flight prepared hardcopy reports that provided daily discharge statistics. Data included name, SSAN, discharge reason (code), and flight/squadron number of those discharged on a particular date. Discharge data were compiled in the field and combined into a summary report that provided reasons for each discharge. A certified nosologist assigned an ICD-9 code for each medical discharge.

Health Care Utilization Data

Each flight was assigned to one of three satellite dispensaries, where recruits receive routine medical care provided by physician assistants (PA). Each time a recruit visited one of the dispensaries, or the Reid Health Services Center (or Reid Clinic, the main health care facility at Lackland AFB), for a medical reason, a care provider completed a "Chronological Record of Medical Care," or Standard Form (SF) 600, describing the nature of the visit and the outcome. The pre-printed form had spaces for patient name, sex, status, rank/grade, organization, department/service, SSAN/identification number, and date of birth. A stamp imprint requested the following data: date of visit, facility, arrival time, temperature, blood pressure, day of training (BMTS DOT), age, sex, drug allergies, present medications, smoking status, first day of last menstrual period (females), chief complaint, and disposition. In the remaining space available, the care provider(s) wrote out additional information, including a history, physical exam, the care provider's diagnosis, and the treatment.

Blisters are a common problem in basic military training. To ease the burden on care providers, a standardized stamp was used on the SF 600 to record blister diagnosis and treatment information. Other standardized stamps included confidence course overprints and physical examination/optometry evaluations.

Records for each recruit were maintained at the dispensary to which the recruit was assigned. Study staff obtained copies of SF 600s daily from each of the four participating facilities at Lackland AFB (including the Reid Clinic). In addition, Emergency Department reports from nearby Wilford Hall Medical Center, Lackland AFB, involving recruits were abstracted, but copies were not retained. OPHSA provided copiers at each of the four sites for use by USAF dispensary personnel. Dispensary personnel copied the SF 600 representing each patient visit.

The medical records of study recruits were then abstracted using a computerized data-entry program developed by the US Navy. The Sports Medicine and Research Team (SMART) program was developed to collect medical information for research and to help medical personnel provide better patient care. SMART is a personal computer (PC)-based, outpatient-encounter tracking and reporting system. It is structured to be interactive with similar databases that already exist in other military branches. SMART thus allows comparison of similar data across services, as well as pooling of data for statistical analysis purposes.

The medical abstractors (MA) entered all requested data from the SF 600 copies using the SMART program. However, not all the variables appearing on the SF 600 were abstracted for this study. The SMART program allowed for only a select number of variables to be entered. These SMART variables are described in another section of this report.

SMART data were stored in two separate data files that were combined on the screen: a patient database and an encounter (clinic visit) database.

Patient data were entered once by the MAs for each unique patient. Data consisted of nine demographic variables: SSAN, last name, first name, middle initial, date of birth, sex, race, branch of service, and pay grade. Patient records could be accessed repeatedly, using either the last name or SSAN, so the MAs would not have to re-enter the same patient information each time they received a new SF 600 for a person already in the system.

After patient data were entered or retrieved, a blank screen appeared for entering information on the specific clinic visit or encounter. Encounter data consisted of 14 variables: encounter date, position at facility, new/follow-up (visit), flight number, squadron number, week (of training), chief complaint, description of activity when injured, care provider, diagnosis, comments, final diagnosis (yes/no), disposition, and duty status. Based on the care provider's diagnosis, the medical abstractor assigned an ICD-9 code to each reason for a clinic visit. The code was selected either from a pop-up menu provided by SMART, or through consultation with USAF medical personnel. Space was provided to allow for entry of multiple diagnoses occurring on the same visit. The SMART program considered each diagnosis as a unique encounter, which resulted in multiple records or encounters for a single clinic visit.

All data were maintained on individual PCs in the field office. Files were sent to the Battelle's Rockville office periodically, where data were uploaded from disks to create a SMART database for cleaning and analysis purposes. The MAs entered data from approximately 1,000 copies of SF 600s each week, representing approximately 400 patients. However, not all patients for whom data were entered were study participants. Eligible study recruits were identified in the SMART database by performing cross-checks of names and SSANs with the data in the recruit receipt control system, creating a separate SMART database of study recruits for analysis.

METHODS, PROCEDURES, AND SYSTEMS

Field Operations

The Reid Health Services Center commander and the officer in charge of public health provided space in the Reid HSC at Lackland AFB for the study field staff. Besides providing a work area for the medical abstractor, the office also served as a repository for SMART-related data, including copies of SF 600s, shipping rosters, and discharge reports. Periodically, electronic and hardcopy data were shipped to the Rockville office for processing and permanent storage.

SMART data were entered and stored on PCs located in the Reid office. These PCs were provided by OPHSA. Paper copies of SF 600s were stored in locked file cabinets before being shipped to Rockville. Every Friday, the field staff would batch the week's SMART data (paper copy and disk) to send to Rockville.

There were no electronic tracking systems in the field office. The Rockville office maintained an electronic receipt control system for tracking receipt and data entry. This PARADOX database was maintained in a password-protected network file. Hard copies of shipping rosters, daily status reports, and SF 600s were all stored in locked file cabinets, to which only study personnel had access.

Receipt Control

In addition to the demographic variables provided for each recruit by the Air Force Personnel System Management (PSM) already described, BMI tracked training status changes: medical hold, recycle, or discharge. The recruit receipt control database was crucial for monitoring training status, specifically dates of recycle, medical hold, discharge, or graduation. These dates were used to determine the eligible observation period for each recruit. In addition, discharge reason data, including ICD-9 codes for discharges due to medical reasons, were stored in this file. A six-digit number was assigned to each recruit, which identifies individual recruits after personal identifiers (name and SSAN) are stripped from delivery files. This number is also found in the SMART data, and allows linkage between individual recruit data and medical record data.

SMART Data

Weekly, incremental files of all new and updated records for that week were downloaded onto diskettes and sent to the Rockville office, along with copies of all associated SF 600s. SMART data were then translated and stored in PARADOX databases. At Rockville, the data were cleaned and validated. Cleaning involved correcting data-entry errors in names, SSANs, DOB, dates of encounters, and other variables as needed.

Validation was accomplished by a certified nosologist through a review of ICD-9 codes assigned to a selected five-percent sample of encounter records each week. However, based on the nosologist's review, no changes were made to ICD-9 codes assigned by field personnel. This decision was made after consultation with OPHSA staff, based on the finding that discrepancies in ICD-9 codes were usually minor. Major ICD-9 coding errors were identified through review of SMART ICD-9 code definitions for the entire SMART database, and corrected as needed. It was agreed that the best way to ensure the integrity of the data was to maintain consistency in field ICD-9 code assignments. Copies of notes describing the nosologist's review comments have been provided to OPHSA staff.

SMART data were linked to the recruit receipt control database by SSAN and recruit name. Cross checks on names and SSANs were conducted within and between both databases to ensure that all study recruits were properly identified. Once the linkage was established, SSANs were replaced in the SMART file with the unique six-digit identification number from the recruit receipt control database.

Eligible study subjects who had ever had a SMART encounter (an entry in the SMART database as a result of a clinic visit) were identified through a direct SSAN match. To catch entry errors in the SMART database, these subjects were then checked against those with the same name but a different SSAN. A separate dataset containing SMART variables for study subjects only was then created.

Discharge Data

Discharge data were obtained from three different sources: 1) separation reports, 2) shipping rosters, and 3) discharge summary reports. The separation report identified, with some limitations, recruits discharged for new (as a result of training) and pre-existing medical conditions, and a discharge reason code. The discharge summary reports contained the diagnosis for each medical discharge. Separation reports were not always available, so there were no codes distinguishing new and pre-existing medical conditions for all recruits discharged for medical reasons. Data from the discharge summary report were used to fill in any gaps in discharge reasons, assigning all medical discharges to the "pre-existing" category that were not known to be new. Where more than one discharge date was provided, the earlier date was used to identify when the recruit exited the flight, instead of the date the recruit was officially separated from the Air Force. All medical discharges were assigned ICD-9 codes and diagnosis category codes by the nosologist. These data provided the USAF with frequencies on the reasons for medical and other discharges.

Outcome Measures

Outcome measures consisted of injury and illness diagnoses from the SMART database, each of which represented an encounter. After removing clinic visits by base personnel and visits by recruits occurring outside their eligible time frame, a total of 17,202 encounters remained. Each recruit's eligible time frame began with their arrival at Lackland AFB (up to five days before training started), and ended with their departure from the enrolled flight for any reason, including medical hold, hospitalization, emergency leave, discharge and recycling, or graduation.

Since the ICD-9 system provides thousands of detailed codes, meaningful analysis required substantial aggregation of these diagnostic data. First, in consultation with the nosologist and OPHSA staff, ICD-9 codes were classified as either injuries or non-injuries. The label "Non-Injury" replaces "illness," as used previously in this report, because it more accurately reflects the range of ICD-9 codes used in the analysis. The label "Non-Injury" includes illnesses, such as respiratory infections and gastroenteritis, as well as medical conditions, such as scoliosis and dermatitis (skin rash).

Seventy-five exclusive categories representing injuries and non-injury conditions were developed from the ICD-9 codes occurring among the 17,202 encounters. Ambiguous ICD-9 codes were reviewed and assigned to one of these 75 categories, based on comments and other text information included in the SMART record. These ambiguous ICD-9 codes included 418 encounters coded "7999" for unknown diagnosis, and 1,233 encounters coded "V," indicating visits not directly attributable to an injury or non-injury. All of the encounters with "7999" ICD-9 codes were reassigned to other injuries or conditions. Some 48 of the diagnoses with "V" codes were reassigned to categories for injuries or non-injuries, leaving 1,185 encounters to be placed in additional categories that included reasons such as examinations and medication refills.

The SMART system treats each diagnosis as a single encounter. While the encounter data included a variable to identify follow-up visits, it was found to be unreliable. Distinctions between new complaints and follow-ups, or between multiple diagnoses for a single complaint, could only be inferred from the date of the encounter and the ICD-9 code. But given the complexity of the ICD-9 coding system, an ongoing condition could be reported in varying detail using different diagnostic codes, leaving no reliable way to separate unique events from follow-up visits. Therefore, only the first occurrence of an event in each specific category for each recruit was counted. Any subsequent encounter falling within the bounds of a previously used category was assumed to be a follow-up visit for the original complaint, and was excluded from rate calculations. This resulted in the exclusion of 4,877 encounters, or 28 percent of the total.

Preliminary analysis showed that the data included too few outcomes among the 75 injury and non-injury categories to support the adjustment of rates by squadron and training start week. Because sufficient data was needed in each of the cells defined by squadron and training start date, injuries and non-injuries drawn from the 75 diagnostic categories described above were selected into ten aggregated categories to use for analysis. To facilitate interpretation, the injury groups were defined by body area, rather than by type of injury (e.g., all knee injuries were grouped together, rather than grouping all sprains together). Non-injury aggregated categories were created based on their relevance to the study hypotheses, and because they provided adequate cell size to allow meaningful analysis.

The ten aggregated categories were:

1. Injuries (excluding lacerations and contusions) to the trunk, back, neck, chest, shoulders and arms
2. All knee injuries, excluding lacerations and contusions
3. Ankle and foot injuries, excluding blisters, lacerations, and contusions
4. Injuries to the hips and legs, excluding the knees, ankles and feet
5. Lacerations and contusions, all sites
6. Blisters
7. Respiratory infections; all ear, nose and throat (ENT) infections; allergies and asthma
8. Psychological conditions
9. Dermatological conditions
10. Gastro-intestinal conditions

These ten aggregated categories are mutually exclusive, but do not exhaust the original 75 categories. So, not all of the 75 categories were used to develop the ten aggregated categories. Totals for these aggregated categories, and for each of the original categories they were defined to include, are shown in Table 1. As with calculations involving the original 75 categories, only the first occurrence of a complaint within any aggregated category was included as an outcome. Subsequent visits that fell into the same aggregated category were treated as follow-ups. This resulted in fewer total outcomes, because they were limited to the first occurrence of events from larger groups. A recruit suffering both a shoulder dislocation and a back sprain, for example, would contribute only once to the category of "Injuries to the trunk, back, neck, chest, shoulders and arms."

Three additional aggregated categories were defined to describe overall rates of injury and non-injury:

1. All encounters
2. All injuries
3. All non-injuries

"All encounters" included "V" code conditions, such as examinations and medication refills, that were not used to create the ten aggregated categories. "All injuries" and "All non-injuries" included injuries and non-injuries that were omitted from the ten aggregated categories, but which were from the original 75 categories. These three overall categories were also limited to the first occurrence of any diagnosis falling within their definitions, resulting in more encounters being treated as follow-ups and further reduction in total counts. For "All encounters," the number became the number of recruits who had ever had any encounter with the SMART system.

Analytic Approach

A stratified analysis method was used to estimate adjusted gender-specific injury and non-injury rates occurring during basic training. Rates were first estimated for every stratum defined by squadron and training start date. Adjusted rates were weighted sums of the stratum-specific estimates, where the weights were inversely proportional to the stratum-specific variances.

Injury and non-injury rates were adjusted by squadron and training start date, primarily to control for the potential confounding effects of training environment. Recruits are assigned to training flights based on squadron and training start date. It is understood that those recruits who train together in the same flight share the same environment. The environment (i.e., the training instructor and the season of the year) is likely to be a strong predictor of the risk of injury and non-injury.

This approach, as in any approach based on stratified data analysis, requires sufficient data in every cell. Therefore, it was not possible to estimate adjusted rates for certain rare injury and non-injury categories. The disease outcome groupings were designed to ensure sufficient numbers of injuries and non-injuries in each cell. Similarly, training start date was expanded from weeks into broader categories, to ensure sufficient numbers in each cell. The original study plan called for maintaining the matches based on training start week, for a total of 34 start weeks. For the analysis, these 34 start weeks were combined into four groups, based on the start month, to minimize the number of strata with no outcomes. Because eligible recruits were selected based on enrollment in brother-sister flights, the matching is still retained, but is less precise than if the data allowed the use of training start week.

The resulting analysis is based on 20 strata, defined by five squadrons and four time periods: October-November, December-January, February-March, and April-May. These periods represented the month in which the first week of training occurred for all of the eligible flights. Even though data were collected through June, the time periods only go through May, because recruits had to complete the six-week training cycle by June 30 to remain eligible for the study. Adjusted rates are presented only in cases where there is at least one occurrence of the injury or non-injury in 15 or more of the 20 cells.

STUDY RESULTS

Adjusted Rates and Relative Risks

Rates of injuries and non-injuries, adjusted for squadron and training start date, are based on person-week calculations drawn from all 13,910 recruits (Table 2).

- The adjusted rate for all encounters combined was 109.5 per 1,000 person-weeks for females, and 65.0 per 1,000 person-weeks for males.

- The adjusted rate for all injuries combined was 63.0 per 1,000 person-weeks for females, and 27.8 per 1,000 person-weeks for males.

- The adjusted rate for all non-injuries combined was 77.9 per 1,000 person-weeks for females, and 48.8 per 1,000 person-weeks for males.

Respiratory infections were the most common problem for both men (30 per 1,000 person-weeks) and women (41.9 per 1,000 person-weeks). Both men and women suffered from blisters, knee, and ankle/foot injuries more often than from lacerations/contusions or hip/leg injuries. The category with the lowest rate for both males and females was psychological.

Women were at significantly increased risk compared to men for all categories of injuries and non-injuries examined in this report (Table 2). The adjusted relative risks for females versus males for all encounters, all injuries, and all non-injuries, respectively, were 1.68, 2.22, and 1.59.

The relative risks for injuries ranged from 1.67 for upper body injuries (trunk, back, neck, chest, shoulder, arm), to 3.27 for ankle and foot injuries. The relative risks for non-injuries ranged from 1.39 for respiratory infections, to 2.33 for gastro-intestinal disorders.

The analysis shown in Table 3 is limited to recruits who graduated, and investigated whether the results shown in Table 2 could be explained by a substantially increased risk among the subset of recruits who were recycled, discharged, or put on medical hold. Table 3 shows that, in general, the absolute rates of injuries and non-injuries decreased when the analysis was limited to graduating recruits. Two categories for which the absolute rates did not change were blisters and dermatological conditions. The relative risks remained essentially the same, however, as those shown in Table 2.

Adjusted rates and relative risks for being placed on medical hold as a result of the first occurrence of injuries and non-injuries are given in Table 4. For this analysis, medical hold was used as a surrogate for a serious medical condition. The table shows that the increased risk for women for serious injuries and non-injuries was approximately the same magnitude as the increased risk for all injuries and non-injuries.

Week of Training Analysis

Table 5 presents injury and non-injury rates adjusted by squadron and training start date, stratified by week of training. The goal of this analysis was to determine whether the rates of injuries and non-injuries varied during the course of the six-week basic training period. Adjusted rates are only presented in cases where there was at least one occurrence of the injury or non-injury in 15 or more of the 20 cells defined by squadron and training start date.

For both men and women, many of the absolute injury and non-injury rates decreased markedly during the course of the six weeks of basic training. For example, the adjusted rate for women for all injuries combined went from 106.1 per 1,000 person-weeks in week one of basic training, to 13.4 per 1,000 person-weeks in week six. Similarly, the adjusted rate for all non-injuries combined for men went from 95.0 per 1,000 person-weeks in week one, to 4.1 per 1,000 person-weeks in week six. Two notable exceptions where the absolute rates were constant over time are the rates for hip/leg injuries in women, and for ankle/foot injuries for men. It is striking that none of the adjusted rates increased consistently over time.

Even though the absolute rates for many injuries and non-injuries decreased substantially over time, the relative risks comparing women to men were fairly constant during the six-week training period. For example, the relative risks for respiratory infections only varied between 1.16 and 1.59. Although the relative risks sometimes appeared to increase slightly in week six (e.g., blisters), these later estimates were much less precise than those from the early weeks of training, due to decreased sample sizes.

Activity Analysis
An investigation was attempted to determine whether particularly high injury rates were associated with specific activities (e.g., running, marching, and the confidence course). However, there was not sufficient data to address this question. For example, among all eligible SMART encounters, only 5 percent identified running as the activity preceding the encounter. Less than 2 percent of all encounters were attributable to marching. Less than 2 percent were attributable to the confidence course. The vast majority of eligible encounters either did not provide an injury activity (24 percent), or listed the injury activity as "other" (65 percent), with no further detail.

Attrition
The percent of recruits who were discharged and the percent who were recycled was estimated, adjusting for squadron and training start date (Table 6). The risk of being discharged was significantly less for men than for women: 8.2 percent for males, versus 11.5 percent for females. The risk of being recycled did not differ significantly for men compared to women: 9.8 percent for males, versus 10.3 percent for women.

Table 7 shows the final disposition of the men and women in each squadron. A total of 1,375 recruits were discharged from eligible flights during the study period. Of these, 731 were discharged for new or pre-existing medical reasons (Table 8). Table 9 shows that, of men discharged for medical reasons, 55.6 percent were discharged for an injury, and 44.4 percent were discharged for a non-injury. Conversely, of women discharged for medical reasons, 53.2 percent were discharged for a non-injury, and 46.8 were discharged for an injury.

Gynecological conditions
A total of 264 visits by female recruits involved gynecological diagnoses, not including visits to obtain birth control. The adjusted (by squadron and training start date) rate of visits for gynecological reasons was 8.9 per 1,000 person-weeks. This rate was fairly low compared to rates of other reasons for clinic visits. Of the ten aggregated categories examined in this study, the rates among women were lower only for hip/leg injuries, lacerations/contusions, and psychological conditions.

CONCLUSIONS

SUMMARY OF STUDY RESULTS

This study examined four main hypotheses:

1. Female recruits suffer the same rates of injury and illness as male recruits.
2. Specific injuries will not be significantly associated with week of training.
3. Female recruits will not have gender-specific injuries and illnesses.
4. Female recruits will have the same rates of referral, recycling, and attrition as male recruits.

In this section, each of these hypotheses is addressed, possible explanations and sources of bias are discussed, and an interpretation of the findings is provided.

1. *Female recruits suffer the same rates of injury and illness as male recruits.*
   Women appear to be at significantly increased risk compared to men for all categories of injuries and non-injuries examined in this report. The relative risks for females versus males for all encounters, all injuries, and all non-injuries were 1.68, 2.22, and 1.59, respectively. In general, the relative risks were slightly higher for injuries (1.67-3.27) than for non-injuries (1.39-2.33).

   This pattern remained after excluding recruits who did not complete training (i.e., those who were recycled, discharged, or put on medical hold). The results were also the same when the analysis was restricted to injuries and non-injuries that were serious enough to place a recruit on medical hold.

2. *Specific injuries will not be significantly associated with week of training.*
   For both men and women, most of the absolute injury and non-injury rates decreased markedly during the course of training. Two exceptions where the rates were constant over time were for hip/leg injuries in women, and for ankle/foot injuries in men. None of the adjusted rates increased consistently over time, and the rates did not appear to spike during any one particular training week.

   Even though the absolute rates for many injuries and non-injuries decreased substantially over time, the relative risks comparing women to men were fairly constant during the six-week course of training.

3. *Female recruits will not have gender-specific injuries and illnesses.*
   Female recruits do not appear to have gender-specific injuries and non-injuries.

   Although the absolute rates were higher for the female recruits, the relative occurrence of specific injuries and non-injuries did not appear to be gender-specific. For example, respiratory infections were the most common problem for both men and women. Both men and women suffered from blisters, knee, and ankle/foot injuries more often than they suffered from lacerations/contusions or hip/leg injuries. Psychological reasons accounted for the lowest rate of the ten aggregated categories examined for both men and women.

4. *Female recruits will have the same rates of referral, recycling, and attrition as male recruits.*
   The risk of being discharged was significantly less for men than for women: 8.2 percent for men versus 11.5 percent for women. The risk of being recycled did not differ significantly for men compared to women: 10.3 percent for women, versus 9.8 percent for males. Data were not available for assessing the risk of being referred.

Discussion of Study Results

Based on these data, female recruits are approximately 1.5 to 2.5 times more likely than male recruits to experience an injury or a non-injury during basic training. This increased risk holds for all types of injuries and non-injuries examined in this study. These results may reflect real differences, they may reflect random occurrences, or there may be bias present. Because there was considerable consistency across outcome categories, random variation does not seem to be a likely explanation.

It is not unreasonable, however, to hypothesize that these results are confounded, in that the observed gender-differences may be due to differences in physical fitness level between the men and the women when they enter training. There is anecdotal evidence that females do not arrive as well prepared as males for the physical demands of training. The data were not immediately available to examine the possibility that once controlled for level of fitness, fit female recruits and fit male recruits have similar injury and non-injury rates. This is supported by Jones, et. al., 1988, but in 1993, Jones, et. al. states that female gender, in and of itself, is a risk factor for training injuries.

It is also possible that the results are due to reporting differences between female and male recruits. Female recruits may be more likely to report injuries and non-injuries than are male recruits. It is doubtful that this explanation would account for all the observed differences, however, because the same results are obtained when the analysis is restricted to injuries and non-injuries that are serious enough to result in the recruit being placed on medical hold.

There is probably some misclassification bias present in the diagnosis coding, because of limitations of the SMART system. Data-entry staff had to choose ICD-9 codes from a pop-up menu that was not complete, and, in fact, contained some coding errors. Misclassification would dilute the numbers of encounters in some specific categories, so broad aggregated categories were used to reduce misclassification bias. For example, a knee sprain could be miscoded as a knee dislocation, but it is unlikely that a knee strain would be miscoded as an ankle sprain. Thus injury diagnoses were grouped by body location, instead of type of injury, to minimize the effects of miscoding. In any case, this random noise would result in underestimates of the true relative risks, because there is no reason to suspect that the misclassification occurred differently for men and women.

The absolute rates decreased for both men and women for most injuries and non-injuries during the six weeks of basic training. The absolute decrease may reflect the process of weeding out those who are not able to complete training. It may also reflect the fact that the more weeks a recruit survives, the more motivated he/she is to graduate, making it less likely for recruits to go to the clinic during the later weeks of training.

Rates for most injuries and non-injuries dropped after the first week of training and continued to decline as training progressed. However, the occurrence of hip/leg injuries for females and ankle/foot injuries for males appear to have been relatively consistent throughout the training cycle. No other patterns were observed in rates for either females or males.

The relative risks remained fairly constant during the six weeks of basic training. In addition, the two-fold increase in risk for women remained when the analysis was restricted to those who graduated from basic training (i.e., when those who are discharged, recycled, or put on medical hold are excluded). Therefore, the increased risk for women may continue throughout the women's careers and does not appear to be restricted to those who do not graduate from BMT.

The rate for gynecological encounters was higher than only the three lowest diagnostic categories evaluated among females. However, this category was associated with the highest number of referrals. There were 139 referrals linked to gynecological encounters. The next two categories most frequently associated with referrals among women were psychological conditions (n=93) and respiratory infections (n=75). For men, referrals were most frequently associated with psychological conditions (n=85), dermatological conditions (n=81), and respiratory infections (n=62).

It should be noted that referrals could have been from a physician's assistant in one of the squadron dispensaries to a medical doctor at the Reid Clinic, or could have represented the need for further care by a specialist. While no precise definition of a referral exists, it could imply that this is an area where female health needs are not being adequately met. SMART did not provide the information necessary to address this issue, such as the number of specialty care providers (e.g., gynecologists), or the specialty of any of the care providers listed in the SMART database.

These data were analyzed by "matching" brother/sister flights (i.e., by stratifying on squadron and training start date) to control for the potential confounding effects of environment. Therefore, it was not possible to assess the independent effects of training instructor or calendar time.

Only the first occurrence of a particular problem was counted. For example, if someone had multiple encounters for one knee injury, the injury was counted only once. Therefore, the observed rate for all encounters underestimated the overall utilization rate. Because SMART considers each diagnosis to be a separate encounter, one also cannot simply use the number of encounters to estimate the utilization rate.

After examining the data in depth, the conclusion is that information is not currently available to analyze patterns in referrals, or to investigate injury rates by particular activity (running, marching, confidence course).

STUDY LIMITATIONS

The SMART System

In this section, limitations of the SMART system that affected analyses and suggestions for improving the system are discussed.

- Make detailed documentation available to users.
  The SMART program was not designed specifically for this research study. Documentation on how the system was created was not available, so modifying the program to meet study goals were not possible. Also, many of the variables and features built into SMART, especially the report capabilities, were not usable. Upon request, the program was modified to allow for incremental backup of data each week, or since the previous backup. Thus, only new and updated records were sent weekly to the Rockville office for cleaning, instead the full database. This modification also allowed field data entry staff to add new ICD 9 codes and associated definitions to the SMART pop-up menu.

  Detailed documentation should be made available to all users so that SMART can be adapted to meet specific study needs. Independent researchers would then be able to take full advantage of SMART's capabilities, while still providing data in a standard format to suit the overall objective of the SMART program.

- Modify SMART to function in a multi-user environment.
  SMART is designed for a single user who performs all data entry, and the data are maintained on a single PC. For this study, multiple users on different computers were employed. Due to the way SMART is structured, none of the machines could be linked together, so a large number of duplications (patients and encounters) occurred that had to be individually resolved in the Rockville office. Most

duplicates were resolved by cleaning four variables: name, SSAN, DOB, and encounter date. However, even after cleaning the data in the Rockville office, there was no way to transmit a clean data file back to the field without disrupting the flow of work.

To be useful in large-scale research efforts, SMART should be modified to permit multiple users and to provide linkage between different work stations that would allow integration of data from many sites.

- Develop a standard form for care providers to record diagnosis information and assign diagnostic categories.

The data entry staff relied on the SMART pop-up menu and USAF clinic staff to assign ICD-9 codes to the diagnoses written on the forms. The menu had many errors, most notably the incorrect code for blisters—7172 instead of 9172. As a result, many inconsistencies arose in the coding of certain diagnoses. Differences in denoting the specific diagnosis by different care providers were thus further compounded through inconsistency by the data entry staff in assigning codes to each. This was also a problem because SMART considers each diagnosis a separate encounter, so a single visit for one medical problem with multiple diagnoses results in multiple encounters for the same visit. Thus, some care providers might collapse multiple symptoms into a single diagnosis of an upper respiratory infection (one diagnosis, one encounter), while others would diagnose each symptom (e.g., sore throat, runny nose, headache—three diagnoses, three encounters).

A more accurate method for obtaining reliable diagnostic data would be to develop a standard form on which care providers could record diagnosis information, including whether the encounter is a new or follow-up visit, and assign diagnostic categories. The form could be designed with check-off boxes and pre-printed responses for diagnosis categories. It would provide more precise data, while minimizing the burden on care providers. This approach and several like it were proposed to the clinic staff who were opposed to changing any aspect of their current system of medical record documentation.

- Develop a better means for recording injury activity and referral data.

Differences in referral rates between males and females, or the identification of injury-causing activities could not be investigated due to the scarcity of data for these variables. Table 10 presents a summary of the values for these variables. For injury activity, the value is either "none" (missing) or "other" for over 88 percent of the encounters. Based on the limited available data, there are no means to determine if these are accurate estimations of activities associated with particular encounters, or the low numbers are a result of data abstraction practices. This may reflect the type of injury, as overuse injuries usually cannot be attributed to a specific activity or occurrence and thus would have no associated activity, as would acute injuries.

Only 17 percent of eligible encounters were associated with referrals, and, here again, the most frequent response is "other," for which there are no definitions. Also, SMART considers each diagnosis a separate encounter. When there are multiple diagnoses on a single visit, all variables other than secondary diagnoses and comment fields are based on the primary diagnosis, but copied over to the record for each multiple diagnosis. Thus, variables such as referral or injury activity that are appropriate for a primary diagnosis may be linked incorrectly to a secondary diagnosis.

This limitation could be overcome in two ways: 1) Expand the provider diagnosis form described above to include space to record injury activities when a recruit suffers an injury, reasons for referral, and the specialty of the care provider to whom the patient is referred. By providing choices of pre-printed responses for these variables, the quality of the data collected could be improved without increasing the reporting burden. However, this would require the clinic staff be persuaded to adopt this. 2) Modify SMART so that these variables and others can be properly entered for each multiple diagnosis.

Problems with PSM Roster Files

Shipping rosters obtained from the individual squadrons were used to update recycle, discharge, and other status changes experienced by study subjects. Discharge dates and reasons were verified by a summary separation report prepared by field personnel. Upon entering this information, it was discovered that a large number of recruits were missing (i.e., they were on the hardcopy shipping rosters, but not in the database). After consultation with PSM, it was learned that these "missing" recruits were late arrivals (those arriving after the disks had been prepared on Friday). Unfortunately, since PSM only maintains records for about six months, all the missing recruits were not retrievable. Approximately half of those missing had to be manually entered in Battelle's Rockville office. The total number of "missing" recruits added was 460, of which 359 were manually entered. For all missing recruits, as well as guards and reserves, the only data available were name, SSAN, DOB, and gender. Where necessary, gender was provided based on name and flight number (since flights are segregated by sex).

FURTHER ANALYSIS

The analytic results presented in this report indicate that female recruits are at greater risk of injury and non-injury than male recruits, and so imply that females have greater health needs than their male counterparts. There are several suggestions for further analysis to address female recruit health issues using the data collected for this study.

A related research effort was conducted earlier on USAF recruits. The Air Force Recruit Fitness Study (AFRFS) evaluated the effect of changing the physical conditioning component of basic training, for which detailed fitness evaluation and health care utilization data were collected. The AFRFS results demonstrated that fitness level at entry into basic training was an important predictor of completing training as well as for being injured during training. These fitness data could be used to stratify recruits as being fit or unfit in calculations of rates and risks of injuries and non-injuries in the manner done for this study. While the AFRFS population is substantially smaller than that of the current study, it is sufficiently large to demonstrate trends and indicate whether this is an area that needs further investigation. The same matching scheme used in the current analysis could be used, as flight, squadron, and training start date data are available for all recruits. In addition, the AFRFS overlapped somewhat with this study, so since the two studies share subsets of their respective populations, the results from a fitness analysis are applicable to both studies.

The FRMS analysis plan was not designed to assess utilization rates but could be modified to address this issue. To minimize overcounting of repeat visits as new events, only the first occurrence of each type of medical event for each recruit was included in the analyses. A new analysis could lift this restriction to examine all medical encounters for each recruit to obtain estimates of prevalence and incidence rates and health care utilization rates. However, such an analysis would require careful review of the SMART data to accurately identify follow-up visits, eliminate redundant encounters resulting from the use of multiple diagnosis codes to describe a single medical event, and clarification of ICD-9 codes, including developing more refined diagnostic categories.

Another possible analysis involves further investigation of referrals. Hard copies of all the SF 600s are available, so they can be used to verify and obtain reasons for referrals, the identity of the provider making the referral, and the specialty of the provider to whom the patient was referred. To conduct this analysis, a list of all providers who supply medical care at Lackland AFB health facilities would be required.

The current analysis, while important, is preliminary and could be expanded by adding any of the new elements described above.

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APPENDIXES

APPENDIX A

TABLES

TABLE 1
INJURIES AND NON-INJURIES BY GENDER

INJURY/NON-INJURY	Total	Females	Males
ALL ENCOUNTERS	6014	2979	3035
ALL INJURY ENCOUNTERS	3072	1743	1329
Specific Injury Encounters			
Trunk/back/neck/chest/shoulder/arm	540	269	271
Dislocations/Derangements - Shoulder	17	9	8
Joint/Muscle/Other Pain - Back	205	84	121
Joint/Muscle/Other Pain - Arm, Shoulder	46	22	24
Joint/Muscle/Other Pain - Chest	96	59	37
Inflammation of Joint, Tendon-Arm/Shoulder	24	14	10
Disorder of Muscle, Ligament, - Back, Neck	1	0	1
Disorder of Muscle, Ligament - Arm, Shoulder	0	0	0
Bone Disorder, Other Diseases/Injuries - Arm	2	1	1
Sprains/Strains - Arm, Shoulder	61	23	38
Sprains/Strains - Trunk, Back, Neck	171	105	66
Knee Injuries	652	374	278
Dislocations/Derangements - Knee	29	15	14
Joint/Muscle/Other Pain - Knee	464	263	201
Inflammation - Knee	97	60	37
Sprains/Strains - Knee	184	107	77
Ankle and Foot, excluding blisters	747	497	250
Dislocations/derangements - Ankle	3	1	2
Joint/Muscle/Other Pain - Ankle/Foot	285	190	95
Inflammation - Ankle/Foot	213	151	62
Stress Fractures - Ankle/Foot	24	18	6
Bone Disorder, Other Diseases/Injuries - Foot	62	44	18
Sprains/Strains - Ankle	308	197	111
Hip and Other Leg Injuries	394	250	144
Joint/Muscle/Other Pain - Other Leg	71	45	26
Inflammation of Joint, Tendon - Other Leg	12	9	3
Disorders of Muscle, Ligament, Fascia - Leg	4	3	1
Stress Fractures - Shin/Lower Leg	12	10	2
Stress Fractures - Leg	3	3	0
Bone Disorder, Other Diseases/Injuries - Leg	13	8	5
Sprains/Strains - Shin Splints/Lower Leg	213	138	75
Sprains/Strains - Other Leg, Hip	109	63	46

TABLE 1
INJURIES AND NON-INJURIES BY GENDER (CONT.)

INJURY/NON-INJURY	Total	Females	Males
Lacerations and Contusions	321	179	142
Lacerations/Contusions - Lower Limbs	134	76	58
Lacerations/Contusions - Trunk	22	17	5
Lacerations/Contusions - Arm, Hand	83	52	31
Lacerations/Contusions - Other	104	51	53
Blisters	812	483	329
Blisters - Foot	806	481	325
Blisters - Other	15	8	7
ALL NON-INJURY ENCOUNTERS	4414	2131	2283
Specific Non-Injury Encounters			
Respiratory Conditions	2605	1162	1443
Respiratory Infections/Diseases/Symptoms	2254	975	1279
Allergies/Allergic Reactions/Asthma	510	284	226
Ear/Nose/Throat Conditions	125	51	74
Psychological	297	162	135
Psychological Conditions	251	130	121
Sleep Disorders	32	19	13
Eating Disorders	12	11	1
Drug Abuse	3	2	1
Dermatological	917	441	476
Dermatological Conditions	917	441	476
Gastro-intestinal	586	341	245
Infectious Diseases (Gastric)	172	100	72
Digestive System Conditions	450	268	182

TABLE 2
RATES AND RELATIVE RISKS OF INJURY AND NON-INJURY BY GENDER, ADJUSTED BY SQUADRON AND TRAINING START DATE FOR ALL ELIGIBLE RECRUITS

INJURY/NON-INJURY	Females			Males			Adjusted Relative Risk		
	Rate*	(95%c.i.**)		Rate*	(95% c.i.**)		RR(f/m)	(95%c.i.**)	
ALL ENCOUNTERS	109.5	106.9	112.1	65.0	63.2	66.9	1.68	1.62	1.74
ALL INJURIES	63.0	60.6	65.5	27.8	26.4	29.2	2.22	2.09	2.37
Specific Injuries:									
Trunk/back/neck/chest/shoulder/arms	9.2	8.1	10.3	5.0	4.4	5.7	1.67	1.41	1.98
Knee injuries	12.2	11.0	13.5	4.9	4.3	5.6	2.24	1.91	2.61
Ankle and foot, excluding blisters	16.7	15.2	18.1	4.8	4.2	5.4	3.27	2.81	3.80
Hip and other leg injuries	7.6	6.6	8.6	2.6	2.1	3.0	2.80	2.27	3.47
Lacerations and contusions	5.8	4.9	6.7	2.5	2.1	3.0	2.11	1.68	2.65
Blisters	15.9	14.5	17.3	5.8	5.1	6.5	2.47	2.15	2.84
ALL NON-INJURIES	77.9	75.4	80.5	48.8	47.1	50.5	1.59	1.52	1.67
Specific Non-Injuries:									
Respiratory conditions	41.9	39.8	44.1	30.0	28.6	31.5	1.39	1.29	1.49
Psychological	4.8	4.0	5.7	2.4	2.0	2.8	2.03	1.60	2.57
Dermatological	14.9	13.5	16.2	9.5	8.6	10.3	1.56	1.37	1.77
Gastro-intestinal	12.0	10.8	13.3	4.6	4.0	5.2	2.33	1.98	2.74

*rate per 1,000 person-weeks
**c.i. = confidence interval

TABLE 3
RATES OF INJURY AND NON-INJURY BY GENDER,
ADJUSTED BY SQUADRON AND TRAINING START DATE FOR NON-RECYCLING GRADUATES

INJURY/NON-INJURY	Females			Males			Adjusted Relative Risk		
	Rate*	(95% c.i.**)		Rate*	(95% c.i.**)		RR(f/m)	(95% c.i.**)	
ALL ENCOUNTERS	93.6	91.1	96.1	55.2	53.4	57.0	1.69	1.62	1.76
ALL INJURIES	52.7	50.4	55.0	21.2	19.9	22.5	2.36	2.20	2.54
Trunk/back/neck/chest/shoulder/arms	5.6	4.7	6.5	2.4	2.0	2.9	1.83	1.45	2.31
Knee injuries	8.6	7.5	9.7	3.3	2.8	3.9	2.56	2.11	3.10
Ankle and foot, excluding blisters	14.2	12.8	15.6	4.0	3.4	4.6	3.40	2.86	4.02
Hip and other leg injuries	5.6	4.7	6.5	1.8	1.4	2.3	2.67	2.09	3.41
Lacerations and contusions	5.2	4.4	6.1	1.9	1.5	2.3	2.25	1.75	2.90
Blisters	15.0	13.6	16.4	5.3	4.6	5.9	2.50	2.16	2.90
ALL NON-INJURIES	66.9	64.5	69.3	42.5	40.8	44.2	1.57	1.49	1.66
Respiratory conditions	37.0	35.0	39.1	27.7	26.3	29.1	1.35	1.25	1.45
Psychological	2.3	1.7	2.9	0.9	0.6	1.2	2.33	1.61	3.36
Dermatological	14.0	12.6	15.4	8.9	8.0	9.7	1.57	1.37	1.79
Gastro-intestinal	9.9	8.7	11.1	3.9	3.3	4.5	2.23	1.86	2.67

*rate per 1,000 person-weeks
**c.i. = confidence interval

TABLE 4

RATES AND RELATIVE RISKS OF INJURY AND NON-INJURY BY GENDER, ADJUSTED BY SQUADRON AND TRAINING START DATE FOR ENCOUNTERS RESULTING IN MEDICAL HOLD

INJURY/NON-INJURY	Females			Males			Adjusted Relative Risk		
	Rate*	(95% c.i.**)		Rate*	(95% c.i.**)		RR(f/m)	(95% c.i.**)	
ALL ENCOUNTERS	4.7	3.9	5.5	2.2	1.7	2.6	1.80	1.43	2.26
ALL INJURIES	2.9	2.3	3.5	1.6	1.2	1.9	1.69	1.27	2.25
ALL NON-INJURIES	1.6	1.1	2.1	0.8	0.5	1.0	1.73	1.17	2.57

*rate per 1,000 person-weeks
**c.i. = confidence interval

TABLE 5
RATES AND RELATIVE RISKS OF INJURY AND NON-INJURY BY WEEK OF TRAINING AND GENDER, ADJUSTED BY SQUADRON AND TRAINING START DATE

INJURY/NON-INJURY		Females			Males			Adjusted Relative Risk		
		Rate*	(95% c.i.**)		Rate*	(95% c.i.**)		RR(f/m)	(95% c.i.**)	
ALL ENCOUNTERS	Week 1	263.6	251.5	275.6	138.4	131.0	145.7	1.88	1.75	2.02
	Week 2	127.6	118.0	137.2	85.1	79.0	91.2	1.48	1.33	1.64
	Week 3	99.3	90.6	107.9	61.2	55.9	66.5	1.61	1.42	1.82
	Week 4	56.3	49.5	63.0	36.0	31.9	40.2	1.56	1.33	1.83
	Week 5	29.1	24.2	34.1	24.6	21.1	28.1	1.31	1.06	1.61
	Week 6	12.6	9.2	15.9	6.9	5.0	8.9	1.99	1.38	2.86
ALL INJURIES	Week 1	106.1	97.6	114.5	53.7	48.9	58.6	2.03	1.80	2.28
	Week 2	63.3	56.4	70.3	33.5	29.5	37.4	1.88	1.61	2.20
	Week 3	70.2	62.8	77.6	25.7	22.2	29.2	2.53	2.14	2.98
	Week 4	52.3	45.7	58.9	20.3	17.2	23.5	2.50	2.06	3.03
	Week 5	20.5	16.3	24.6	13.2	10.6	15.8	2.15	1.67	2.76
	Week 6	13.4	9.9	16.9	-	-	-	-	-	-
Specific Injuries:										
Trunk/back/neck/chest/ shoulder/arms	Week 1	22.0	17.9	26.1	12.1	9.8	14.4	1.56	1.20	2.03
	Week 2	8.3	5.6	11.0	6.6	4.6	8.5	1.21	0.77	1.89
	Week 3	8.3	5.4	11.1	-		-	-	-	-
	Week 4	8.2	5.2	11.3	-		-	-	-	-
	Week 5	-	-	-	-		-	-	-	-
	Week 6	-	-	-	-		-	-	-	-

*rate per 1,000 person-weeks
**c.i. = confidence interval

TABLE 5 (CONT.)
RATES AND RELATIVE RISKS OF INJURY AND NON-INJURY BY GENDER, ADJUSTED BY SQUADRON AND TRAINING START DATE

INJURY/NON-INJURY		Females			Males			Adjusted Relative Risk		
Specific Injuries		**Rate***	**(95% c.i.**)**		**Rate***	**(95% c.i.**)**		**RR(f/m)**	**(95% c.i.**)**	
Knee injuries	Week 1	14.5	11.1	17.8	9.3	7.2	11.4	1.69	1.24	2.31
	Week 2	13.6	10.2	17.0	5.6	3.9	7.2	2.08	1.46	2.98
	Week 3	16.6	12.8	20.3	7.6	5.5	9.7	2.45	1.74	3.43
	Week 4	9.0	6.2	11.8	-	-	-	-	-	-
	Week 5	8.3	5.3	11.3	3.9	2.4	5.5	1.86	1.06	3.28
	Week 6	-	-	-	-	-	-	-	-	-
Ankle and foot, excluding blisters	Week 1	19.0	15.2	22.7	4.3	2.9	5.7	2.81	2.03	3.89
	Week 2	9.3	6.6	12.1	4.0	2.6	5.5	2.20	1.47	3.29
	Week 3	18.9	14.9	22.9	4.7	3.1	6.3	2.64	1.88	3.72
	Week 4	15.3	11.7	18.9	4.9	3.3	6.5	3.22	2.19	4.75
	Week 5	10.1	7.0	13.1	3.5	2.0	4.9	3.14	1.93	5.10
	Week 6	-	-	-	-	-	-	-	-	-
Hip and Other Leg Injuries	Week 1	9.3	6.5	12.1	2.8	1.5	4.0	3.44	1.93	6.13
	Week 2	8.2	5.4	11.1	-	-	-	-	-	-
	Week 3	9.3	6.3	12.2	4.8	3.1	6.5	2.39	1.54	3.70
	Week 4	6.5	3.8	9.2	3.8	2.2	5.3	1.89	1.07	3.34
	Week 5	8.6	5.5	11.8	-	-	-	-	-	-
	Week 6	-	-	-	-	-	-	-	-	-

*rate per 1,000 person-weeks
**c.i. = confidence interval

TABLE 5 (CONT.)
RATES AND RELATIVE RISKS OF INJURY AND NON-INJURY BY GENDER, ADJUSTED BY SQUADRON AND TRAINING START DATE

INJURY/NON-INJURY		Females			Males			Adjusted Relative Risk		
Specific Injuries		**Rate***	**(95% c.i.**)**		**Rate***	**(95% c.i.**)**		**RR(f/m)**	**(95% c.i.**)**	
Lacerations and Contusions	Week 1	8.0	5.5	10.6	4.3	2.8	5.9	1.46	0.92	2.32
	Week 2	-	-	-	3.7	2.1	5.2	-	-	-
	Week 3	-	-	-	-	-	-	-	-	-
	Week 4	10.0	6.9	13.0	4.0	2.4	5.6	2.42	1.46	4.01
	Week 5	-	-	-	-	-	-	-	-	-
	Week 6	-	-	-	-	-	-	-	-	-
Blisters	Week 1	22.5	18.4	26.6	10.9	8.6	13.1	2.19	1.69	2.85
	Week 2	10.5	7.4	13.6	6.6	4.7	8.4	2.05	1.44	2.90
	Week 3	13.4	10.0	16.9	5.8	4.1	7.5	2.23	1.54	3.21
	Week 4	12.9	9.6	16.2	3.9	2.3	5.5	2.85	1.84	4.42
	Week 5	6.8	4.1	9.5	-	-	-	-	-	-
	Week 6	9.6	6.5	12.7	-	-	-	-	-	-
ALL NON-INJURIES	Week 1	179.0	168.5	189.6	95.0	88.7	101.2	1.84	1.69	2.01
	Week 2	91.3	83.0	99.6	66.9	61.4	72.3	1.30	1.15	1.46
	Week 3	72.3	64.8	79.8	45.3	40.7	49.9	1.58	1.37	1.82
	Week 4	43.9	37.9	49.9	27.6	23.9	31.3	1.62	1.35	1.94
	Week 5	21.9	17.6	26.2	23.7	20.2	27.2	1.17	0.93	1.47
	Week 6	10.3	7.1	13.5	4.1	2.6	5.7	1.92	1.21	3.05

*rate per 1,000 person-weeks
**c.i. = confidence interval

TABLE 5 (CONT.)
RATES AND RELATIVE RISKS OF INJURY AND NON-INJURY BY GENDER, ADJUSTED BY SQUADRON AND TRAINING START DATE

INJURY/NON-INJURY		Females			Males			Adjusted Relative Risk		
		Rate*	(95% c.i.**)		Rate*	(95% c.i.**)		RR(f/m)	(95% c.i.**)	
Specific Non-injuries:										
Respiratory infection/ENT/Allergies	Week 1	70.2	63.1	77.2	44.2	39.8	48.6	1.59	1.38	1.83
	Week 2	54.0	47.6	60.5	43.5	39.0	47.9	1.16	1.00	1.35
	Week 3	34.9	29.6	40.2	29.0	25.3	32.7	1.38	1.16	1.64
	Week 4	20.7	16.5	24.9	15.5	12.8	18.3	1.50	1.20	1.87
	Week 5	15.6	11.9	19.3	13.4	10.8	16.0	1.25	0.94	1.65
	Week 6	7.5	4.6	10.4	-	-	-	-	-	-
Psychological	Week 1	13.5	10.2	16.7	7.6	5.7	9.4	1.64	1.20	2.23
	Week 2	5.1	2.8	7.4	-	-	-	-	-	-
	Week 3	-	-	-	-	-	-	-	-	-
	Week 4	-	-	-	-	-	-	-	-	-
	Week 5	-	-	-	-	-	-	-	-	-
	Week 6	-	-	-	-	-	-	-	-	-
Dermatological	Week 1	18.0	14.3	21.8	13.4	11.0	15.9	1.35	1.05	1.72
	Week 2	12.4	9.2	15.6	10.0	7.8	12.2	1.24	0.91	1.69
	Week 3	15.5	11.8	19.2	7.0	5.1	8.9	1.97	1.40	2.77
	Week 4	14.8	11.2	18.3	7.4	5.4	9.3	2.28	1.62	3.19
	Week 5	8.5	5.7	11.3	7.8	5.8	9.9	1.42	0.96	2.10
	Week 6	-	-	-	-	-	-	-	-	-

*rate per 1,000 person-weeks
**c.i. = confidence interval

TABLE 5 (CONT.)
RATES AND RELATIVE RISKS OF INJURY AND NON-INJURY BY GENDER,
ADJUSTED BY SQUADRON AND TRAINING START DATE

INJURY/NON-INJURY		Females			Males			Adjusted Relative Risk		
		Rate*	(95% c.i.**)		Rate*	(95% c.i.**)		RR(f/m)	(95% c.i.**)	
Gastro-intestinal	Week 1	19.9	16.0	23.7	6.0	4.3	7.6	2.33	1.73	3.15
	Week 2	13.9	10.6	17.3	6.1	4.3	7.9	1.85	1.29	2.67
	Week 3	10.3	7.3	13.3	4.4	2.9	6.0	2.41	1.55	3.73
	Week 4	7.0	4.3	9.6	3.2	1.8	4.7	2.28	1.25	4.16
	Week 5	7.0	4.1	9.8	-	-	-	-	-	-
	Week 6	-	-	-	-	-	-	-	-	-

*rate per 1,000 person-weeks
**c.i. = confidence interval

TABLE 6
PERCENT OF RECRUITS DISCHARGED, INJURED AND RECYCLED BY GENDER, ADJUSTED BY SQUADRON AND TRAINING START DATE

INJURY/NON-INJURY	Females			Males			Adjusted Difference		
	Percent	(95% c.i.)		Percent	(95% c.i.)		% Females - % Males	(95% c.i.)	
Discharged Anytime	11.5	10.7	12.4	8.2	7.6	8.8	3.4	2.4	4.5
Injured At Least Once	32.8	31.5	34.0	15.0	14.2	15.7	17.6	16.1	19.1
Recycled At Least Once	10.3	9.5	11.1	9.8	9.1	10.4	0.7	-0.4	1.7

*Row percents are not additive due to adjustments
**c.i. = confidence interval

TABLE 7
RECRUIT FINAL STATUS REPORT BY SQUADRON AND GENDER

	Squadron											
	320		321		322		323		331		Total	
STATUS/GENDER	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Enrolled	1344	1094	1413	1022	1915	1040	2123	1063	1865	1031	8660	5250
Discharged	99	160	132	101	166	120	176	135	164	122	737	638
Recycled	120	112	125	107	159	90	232	119	157	83	793	511
Medical Hold	12	6	6	8	14	12	8	12	11	5	51	43
OLTF	1	1	1	0	2	0	2	1	2	0	8	2
Graduated	1112	815	1149	806	1574	818	1705	796	1531	821	7071	4056

Final Status: based on last status change regardless of preceding events. Discharges prevail over other previous changes. Each recruit can contribute only one final status.

OLTF (otherwise lost to follow-up): Recruits with unknown final status as of 30 June, 1995

Graduated: with enrolled flight

TABLE 8
DISCHARGE REASON SUMMARY BY GENDER

REASON/GENDER	Males	Females	Total
1: Medical - Did not exist prior to service*	24	23	47
2: Medical - Did exist prior to service	351	333	684
3: Psychological	116	139	255
4: Fraudulent Enlistment	136	80	216
5: Admitted Homosexual	26	15	41
6: Performance	59	26	85
7: Not qualified for job which was reason for enlistment	5	1	6
8: Unit request/recalled by guard unit	3	1	4
9: Pregnant	0	9	9
10: Misconduct	4	4	8
11: Other	13	7	20
Total	**737**	**638**	**1375**

*Limited data available. See text for details.

TABLE 9
MOST FREQUENT REASONS FOR MEDICAL DISCHARGE BY GENDER

	Males		Females	
REASON	**Number**	**Percent***	**Number**	**Percent***
All injuries	208	55.6	166	46.8
Knee pain	61	16.3	51	14.4
Back pain	40	10.7	24	6.8
All non-injuries	166	44.4	189	53.2
Genetic conditions[1]	48	12.8	42	11.8
Allergies/Asthma	34	9.1	49	13.8
Nervous systems[2]	33	8.8	37	10.4

*Percents are based on the total number of discharges for medical reasons, by gender (M=341, F=325). Totals exclude two discharges (1 male, 1 female) for unknown medical reasons.

[1] Includes sickle cell trait/disease, pes planus, and scoliosis
[2] Includes headache

TABLE 10
SELECTED SMART VARIABLE FREQUENCIES

VARIABLE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disposition				
(Missing)	1	0.0	1	0.0
Referral	2923	17.0	2924	17.0
Admission	5	0.0	2929	17.0
Return to Clinic	3718	21.6	6647	38.6
Other	10555	61.4	17202	100.0
Injury Activity				
(Missing)	4070	23.7	4070	23.7
Running	988	5.7	5058	29.4
Circuit Training	292	1.7	5350	31.1
Confidence Course	263	1.5	5613	32.6
Marching	259	1.5	5872	34.1
Mess Hall/Detail	76	0.4	5948	34.6
Stairs	85	0.5	6033	35.1
Other	11096	64.5	17129	99.6
Dorm	73	0.4	17202	100.0
Duty Status				
(Missing)	11	0.1	11	0.1
Return to Training	12932	75.2	12943	75.2
Duty Restrictions	3355	19.5	16298	94.7
Medical Hold	438	2.5	16736	97.3
Other	466	2.7	17202	100.0

TABLE 11
ICD CODE GROUPS NOT USED IN SPECIFIC INJURY AND SPECIFIC NON-INJURY CALCULATIONS

	Total	Females	Males
INJURIES			
Dislocations/Derangements -Other/Unspecified	3	2	1
Joint/Muscle/Other Pain - Unspecified Site	415	295	120
Inflammation - Plantar Fascitis	67	46	21
Inflammation - Unspecified Site	1	1	0
Disorder of Muscle, Ligament, Fascia - Unspecified Site	16	6	10
Fractures - All sites	22	12	10
Bone Disorders and Other Diseases/Injuries - Unspecified	1	1	0
Nerve Disorders	44	24	20
Injuries/Trauma Complications	49	18	31
Environmental Injuries/Poisonings	120	70	50
NON-INJURIES			
Other Infectious Diseases/Parasites/Fever, AIDS	437	193	244
Endocrine Systems	154	90	64
Blood Conditions	85	76	9
Genetic/Hereditary Conditions	375	204	171
Neoplasms	8	4	4
Nervous System and Eyes	176	103	73
Cardiac Conditions	42	24	18
Circulatory Conditions	55	23	32
Effects of External causes	9	8	1
Sexually Transmitted Diseases (STD)	143	72	71
Gynecological Diseases/Conditions	264	264	0
Dental Diseases/Conditions	36	21	15
Genitourinary Conditions	94	73	21
Musculoskeletal Conditions	30	9	21
Symptoms/Other Reasons for Encounters	227	127	100
Miscellaneous Exam (Includes Weight Evaluation)	102	50	52
Other Prophylaxis/Screening	80	37	43
Administrative (CC Waivers, Evaluations, Reviews)	356	167	189
Medication (other than BCP)	195	184	11
Test Results	17	6	11
Birth Control Prescription	72	72	0

TABLE 12
TOTAL RECRUITS AND PERSON-WEEKS, BY START OF TRAINING, GENDER, AND SQUADRON

Females

Start of Training	Total	Squadron 320	321	322	323	331
Oct/Nov						
r	1075	219	196	211	261	188
p-w	5633.50	1170.25	1057.75	1081.75	1307.50	1016.25
Dec/Jan						
r	1522	299	312	316	241	354
p-w	7900.50	1482.25	1591.75	1675.00	1249.00	1902.50
Feb/Mar						
r	1440	303	299	251	302	285
p-w	7513.50	1537.75	1608.75	1325.25	1552.00	1489.75
Apr/May						
r	1213	273	215	262	259	204
p-w	6204.75	1441.00	1072.75	1403.00	1282.00	1006.00
Total						
r	5250	1094	1022	1040	1063	1031
p-w	27252.25	5631.25	5331.00	5485.00	5390.50	5414.50

Males

Start of Training	Total	Squadron 320	321	322	323	331
Oct/Nov						
r	1657	259	202	412	469	315
p-w	8946.00	1415.25	111.50	2267.50	2444.50	1707.25
Dec/Jan						
r	2858	341	501	650	627	739
p-w	15291.50	1850.00	2644.00	3384.00	3318.00	4095.50
Feb/Mar						
r	2571	417	520	462	641	531
p-w	13928.50	2312.50	2830.50	2541.00	3504.00	2740.50
Apr/May						
r	1574	327	190	391	386	280
p-w	8366.25	1798.50	970.50	2091.50	2064.00	1441.75
Total						
r	8660	1344	1413	1915	2123	1865
p-w	46532.25	7376.25	7556.50	10284.00	11330.50	9985.00

r = number of recruits
p-w = number of person-weeks of training

APPENDIX B: BIBLIOGRAPHY

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APPENDIX C

LIST OF PROJECT PERSONNEL

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