Gender Differences in Occupational & Non-Occupational Injuries in the U.S. Army
&
The Effects of Re-injury on Military Discharge from the US Army

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The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination of policy

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Overview

- Military Injury Research
- Total Army Injury & Health Outcomes Database (TAIHOD)
- Gender Differences in Occupational & Non-Occupational Injuries in the US Army
- The Effects of Re-injury on Military Discharge from the US Army

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In war, there are no unwounded soldiers

Jose Norasky

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Military Injuries

- 'Biggest health threat confronting the US Armed Forces' – General Peake (2000)
- Leading cause of morbidity, mortality, disability, & manpower loss
- Leading causes of injury: MVC, falls, & sports/athletics
- 39% of hospitalizations in 1st GW were non-battle injuries; only 5% were battle-related

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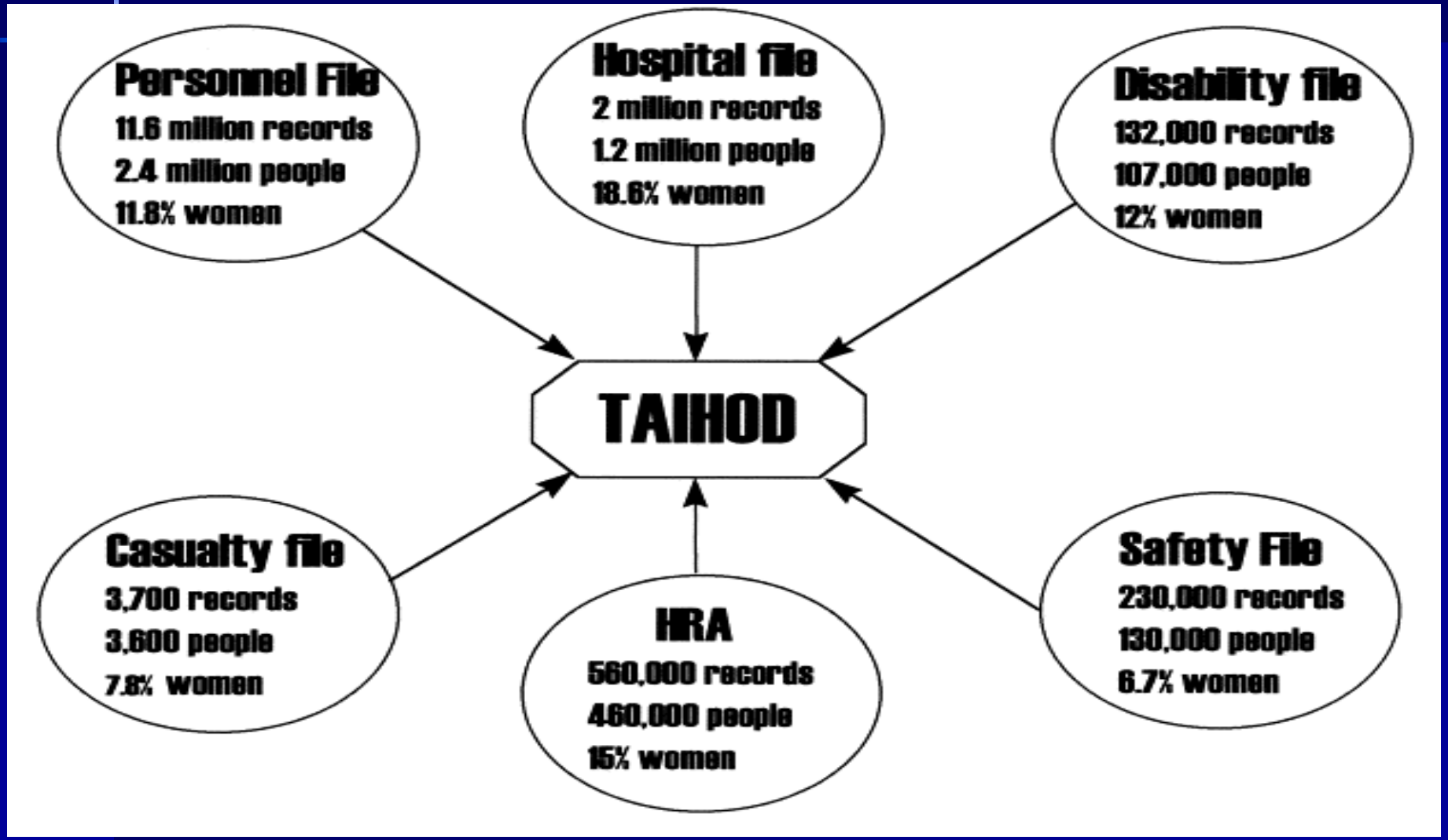
Total Army Injury & Health Outcomes Database (TAIHOD)



Advantages of TAHIOD

- ICD-9 Code – (800-999)

- STANAG injury coding system
  - Trauma code (intent & duty-status)
    - battle related, intentional inflicted non-battle, off-duty, schemes & exercises, scheduled training, on-duty, unknown
  - Injury Code (activity or cause)

Duty - Status

- **Battle Wound / Injury**
  - Direct result of action
  - Other battle casualties
- **Intentionally Inflicted Non-battle Injuries**
  - Assault
  - Intentionally self-inflicted
- **Accidental Injury**
  - Off-duty
  - Schemes & exercises
  - Other scheduled training
  - On-duty
  - Unknown

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Example

- ICD-9CM code
  - 800-804 (Fracture of Skull)
    - 800.1 Closed with cerebral laceration and contusion
- Trauma Code
  - 5 = 'off-duty'
- Injury Code
  - 100 = Non-mil:Injury is to driver of motor vehicle
  - 101 = Non-mil:Injury is to passenger of motor vehicle
  - 102 = Non-mil:Injury is to unspecified occupant of mv
  - 103 = Non-mil:Boarding/alighting from vehicle
  - 104 = Non-mil:Injury is to pedestrian
  - 105 = Non-mil:Injury is to pedal cyclist
  - 106 = Non-mil:Injury is to motorcyclist
  - 107 = Non-mil:Driver/rider on tracked/semi tracked veh
  - 109 = Non-mil:Injury is to other or unspecified person

Gender Differences in Occupational & Non-Occupational Injuries*

- Significant correlations between recreational injuries & having a work-place injury
- Trends not well described with respect to gender or occupation
- Majority of military injury research focuses on initial entry training

** Tiesman HM, Peek-Asa C, Zwerling C, Sprince NL, Amoroso PJ. Occupational & Non-Occupational Injuries in the US Army: Focus on Gender. AJPM 2007; 33(6).*

Retrospective Cohort

Inclusion Criteria:

- **AD between 1/1992 – 12/2002**
- **hospitalized injury via primary diagnosis (ICD-9CM 800-959.8)**
- **injury occurred in first 11 months of service**
- **Off-duty, schemes & exercises, scheduled training, on-duty, & unknown**

Followed till 12/31/2002

Outcomes:

1. **Injuries**
2. **Re-injuries**
3. **Disability discharges**

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Retrospective Cohort

5,678 soldiers

4,879 men (86%)
792 women (14%)

4,051 Caucasian (71%)
1,627 Non-Caucasian (29%)

5,441 Enlisted (96%)
237 Officers (4%)

Average age 21.4 (sd=3.2)

Average follow-up 2.7 yrs (sd=2.5 yrs)

5,661 followed:

337 soldiers injured

329 soldiers re-injured

977 with disability-related discharges

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Methods

- Injury Variables
  - External cause of injury
  - ISS (calculated with ICD-MAP)
  - # days in hospital
- Demographics
  - Gender, age, education
  - Pay grade (Enlisted & Officers/Warrant Officers)
- Occupation (12 DoD Career Management Fields)
  - infantry, electrical equipment repair, communications & intelligence, health care, technical & allied specialties, support & administration, electronic & mechanical equipment repair, craft workers, service & supply, non-occupational enlisted, unknown, officer

Analysis

- Cross-sectional analysis
- Injury Rates
  - Denominator data via DMDC (mid-yr estimates)
  - Compared with Rate Ratios (RR's) & 95% CI's
- Injuries compared via Pearson chi-square's, Fisher's exact, & t-tests
  - Stratified by gender
  - P-values adjusted using the Bonferroni correction

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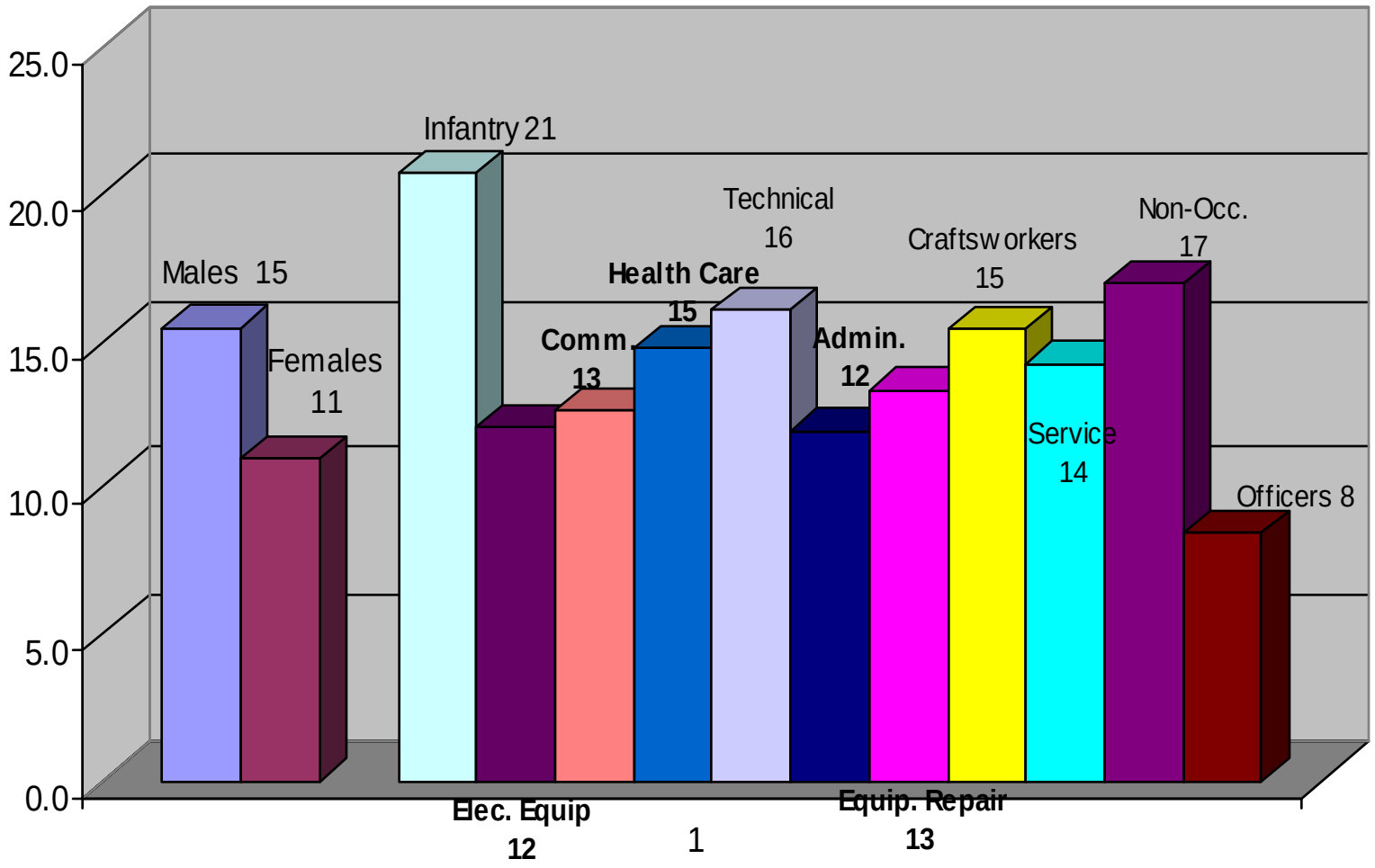
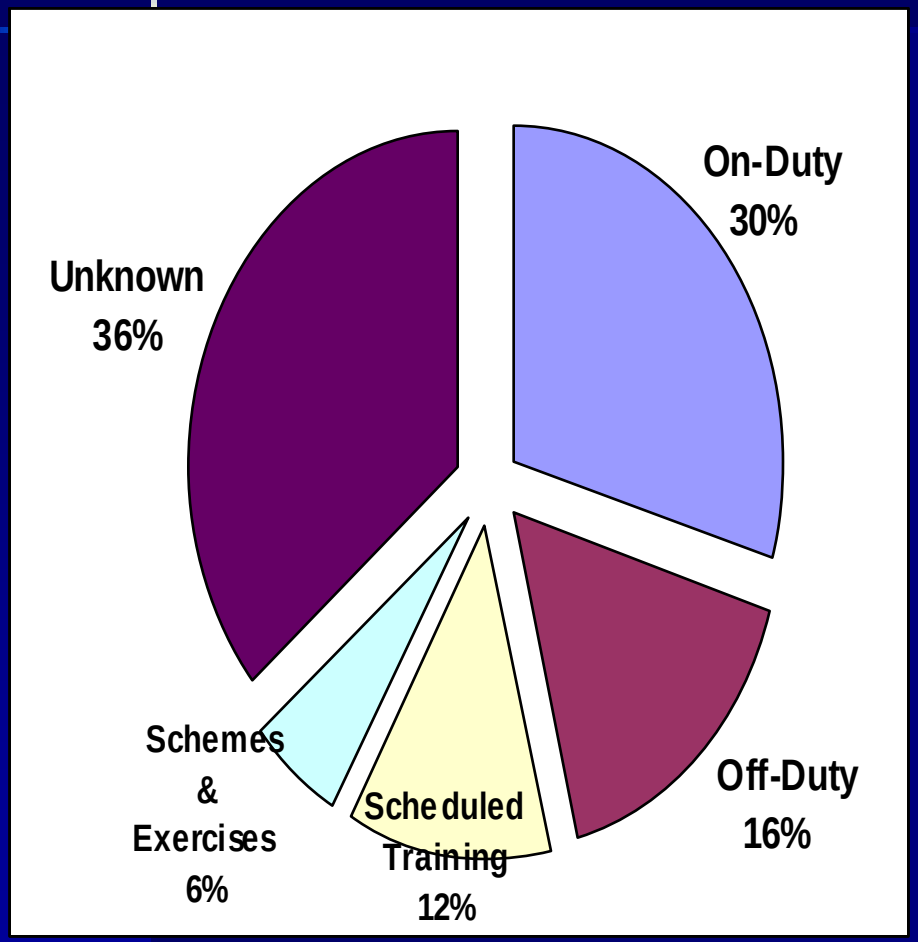
Results – Crude Injury Rates



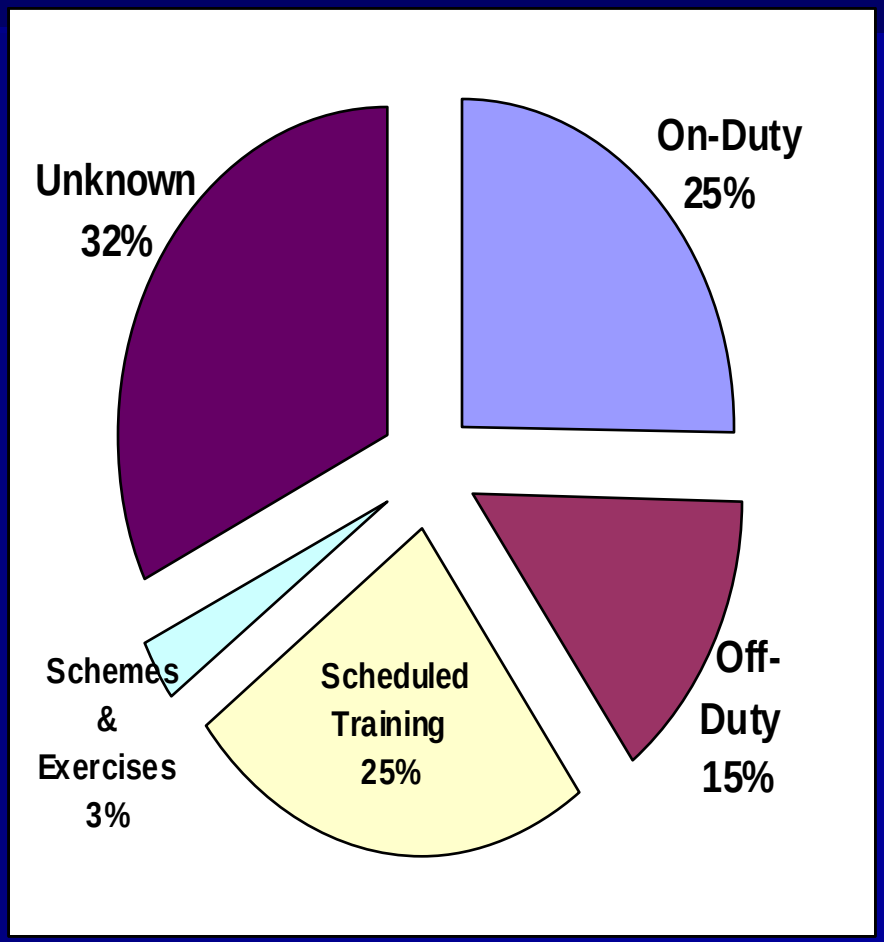
Hospitalized Injury Rate per 1,000 Soldiers

Duty-Status by Gender

Male

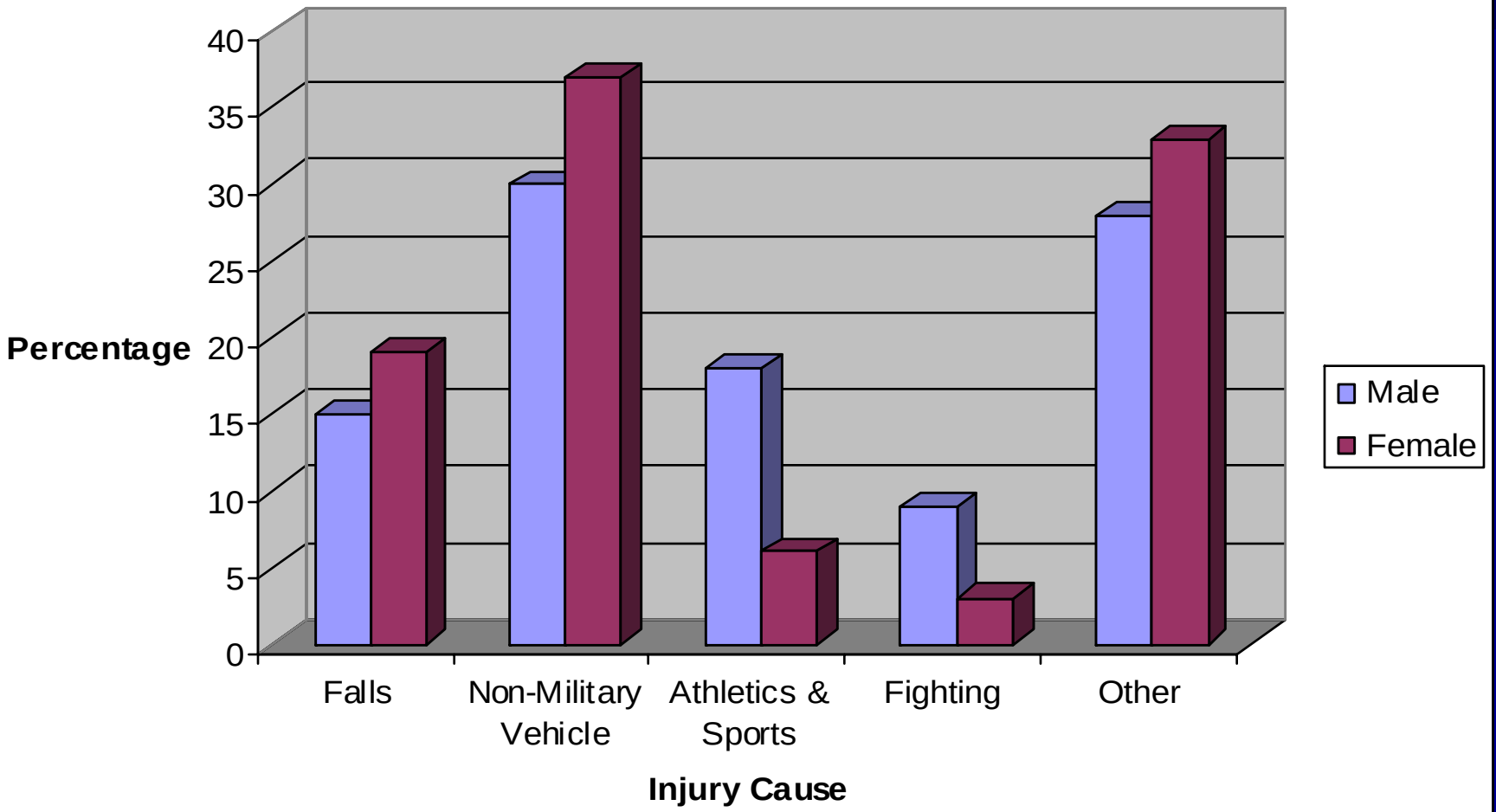


Female



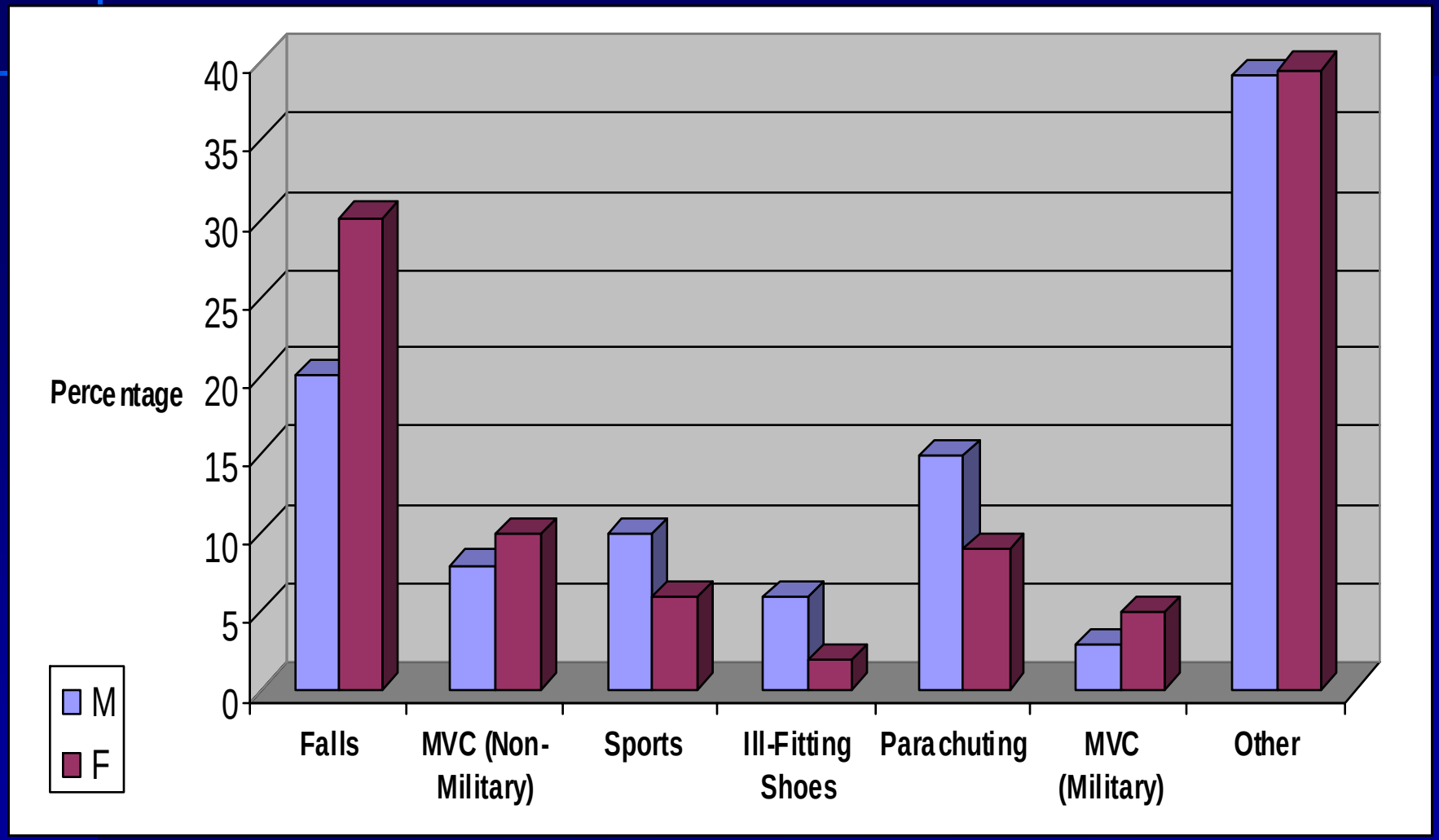
** Training p<0.0001, On-duty p=0.01, Schemes p=0.006, Off-duty p=0.23*

Selected Causes of Off-Duty Injuries by Gender



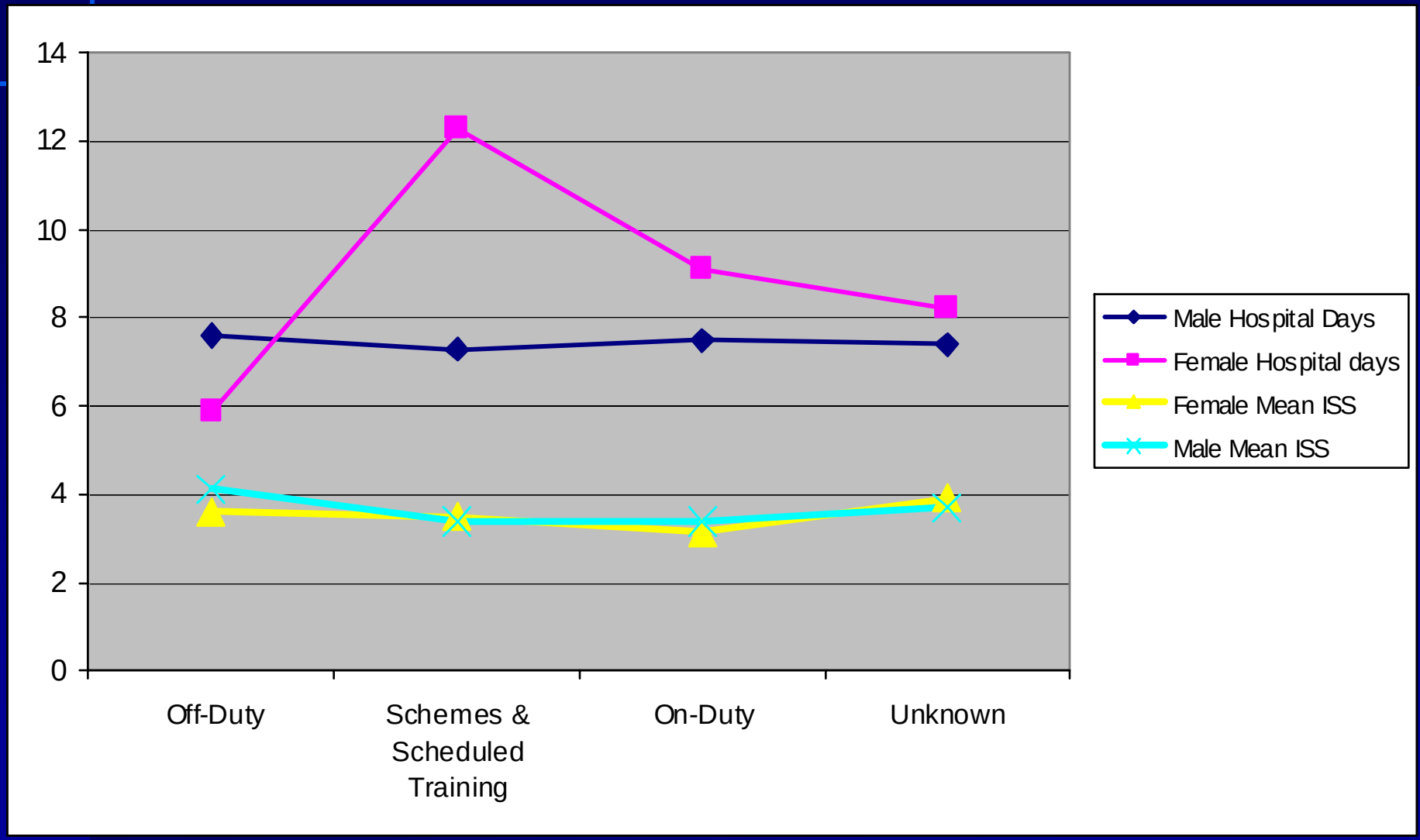
p=0.001 – athletics and sports, p=0.017 - fighting

Selected Causes of On-Duty Injuries by Gender



p=0.0016 – Falls

ISS & Hospital Days by Gender



Strengths & Limitations

- **Strengths**
  - **TAIHOD database**
  - **Large cohort of mixed occupations**

- **Limitations**
  - **Confounding**
  - **Out-patient injuries**
  - **'Unknown' trauma code**

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Conclusions

- Findings consistent with current research
  - Scheduled training most dangerous injury risk period for women
- Off-duty: No differences in frequency, sig. differences in injury causes
- On-duty: job tasks within job categories appear to be gender specific
- Women longer hospital stays, though injuries not more severe
- Special attention paid to men's off-duty injuries

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Questions?

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The Effects of Re-injury on Military Discharge from the US Army

- Military disability rates rising:
  - 1/5 partly disabled due to service in Iraq/Afghanistan
- Approximately 50% of permanent disability cases caused by traumatic injury
- Role of re-injury unknown
- Investigate role of re-injury on physical disability discharge
  - nature of re-injury

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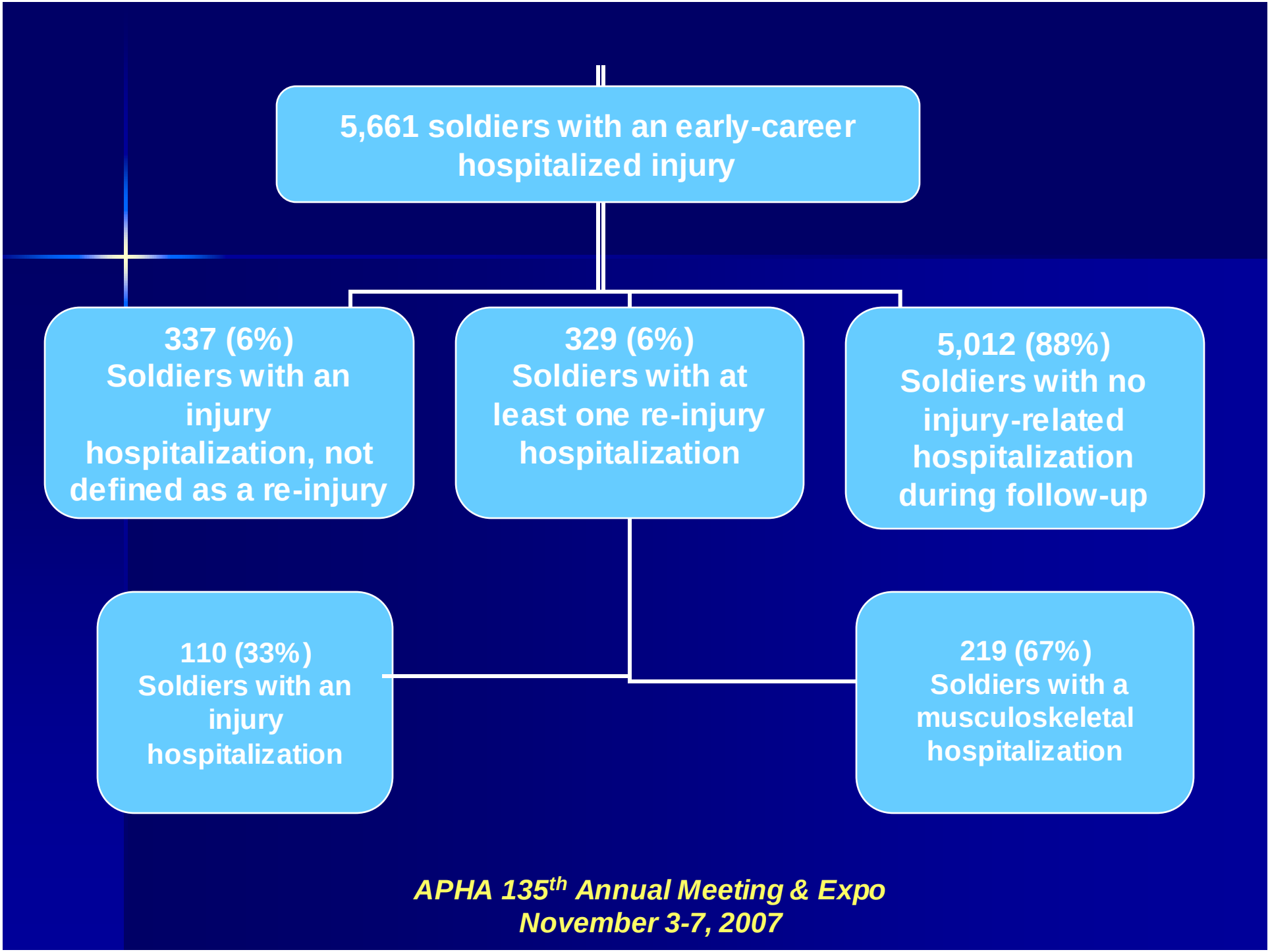

Methods

- Retrospective cohort design – described previously
- Primary Risk Factor
  - Re-injury hospitalization after discharge for 1st event (n=329)
- Definition of Re-injury
  - 1 day between discharge for 1st injury & admission for re-injury
  - Visits for aftercare management (V-codes) removed

Methods – Re-injury

- ICD-9 code for re-injury same as code for 1st event (n=74)
- ICD-9 code for re-injury associated with 1st event (n=36)
  - (844):Sprains & Strains of Knee and Leg & (836):Dislocation of Knee
- Musculoskeletal conditions associated with 1st event (n=219)
  - (717):Internal Derangement of Knee

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Methods - Outcome

- Discharge from the Army, due to physical disabilities
  - Physical disability, entitled to severance pay, no retirement
  - Mandatory retirement required by law due to temporary disability
  - Mandatory retirement, permanent physical disability
  - Involuntary discharge, physical disability not otherwise covered
  - Involuntary discharge, physical disability, resulted from intentional misconduct, no severance pay
  - Previously retired, entitled to recomputation of retirement pay, aggravate physical disability

Methods

- Possible Confounders
  - demographics
  - DoD occupation code
  - body region
  - type of initial injury
  - work-relatedness
  - nature of re-injury
- Survival Analysis
  - Cox Proportional Hazards Regression
  - Kaplan-Meier estimates of survival
  - Log-rank tests for equality

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Results

- 977 (17%) physical disability discharge
- 3,336 (59%) discharged for other reason
- Females, those not married, & enlisted soldiers significantly more likely to be discharged ($p<0.0001$)
- Soldiers in health care occupations had highest proportion receiving a disability discharge (49%) ($p<0.0001$)

Results

- Those with sprains and strains most likely to be discharged ($p<0.001$)
- Those with knee injuries most likely to be discharged ($p<0.001$)
- On-duty injuries slightly more likely to result in discharge ($p=0.07$)
- Nature of re-injury not associated with discharge ($p=0.33$)

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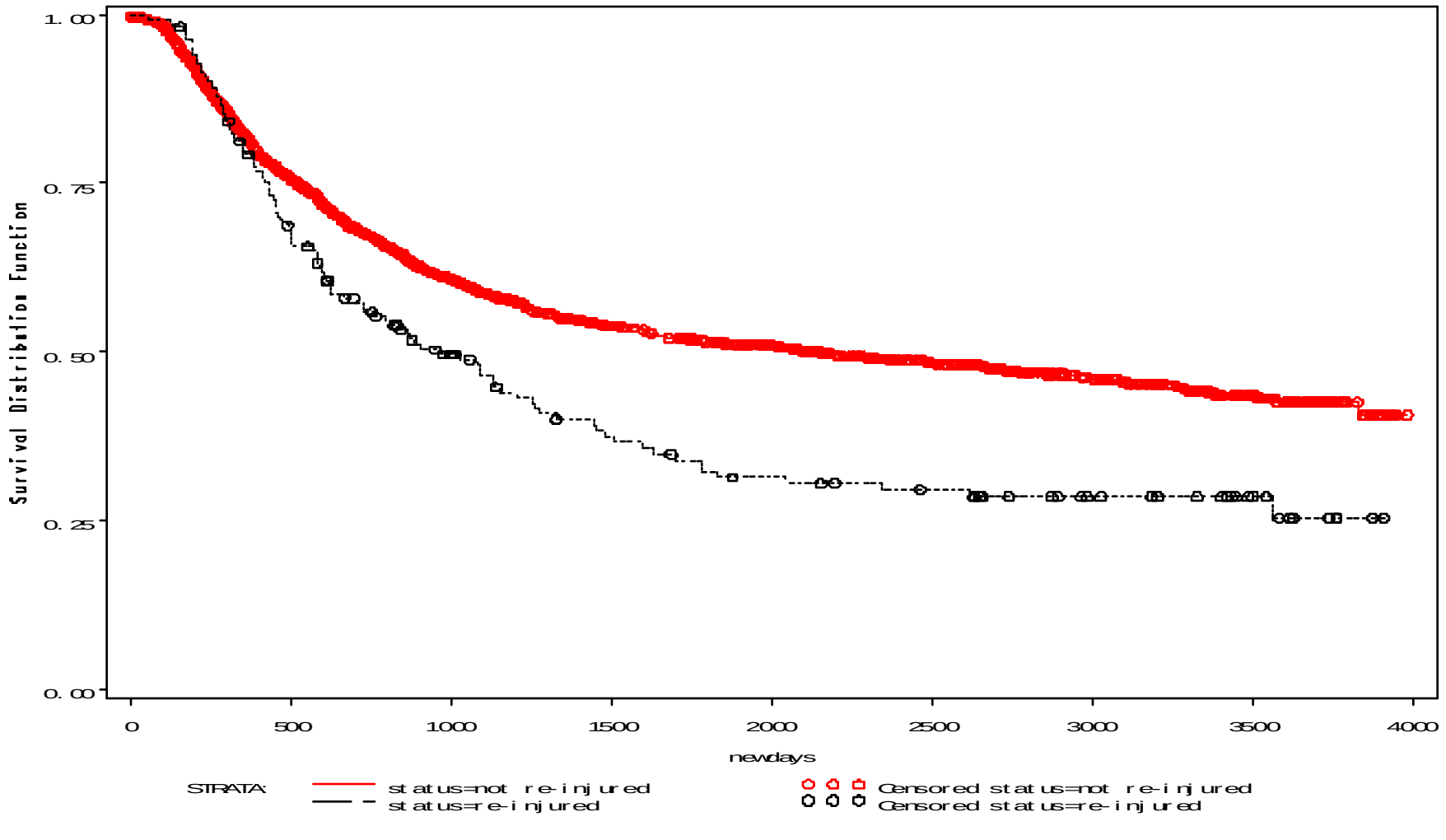
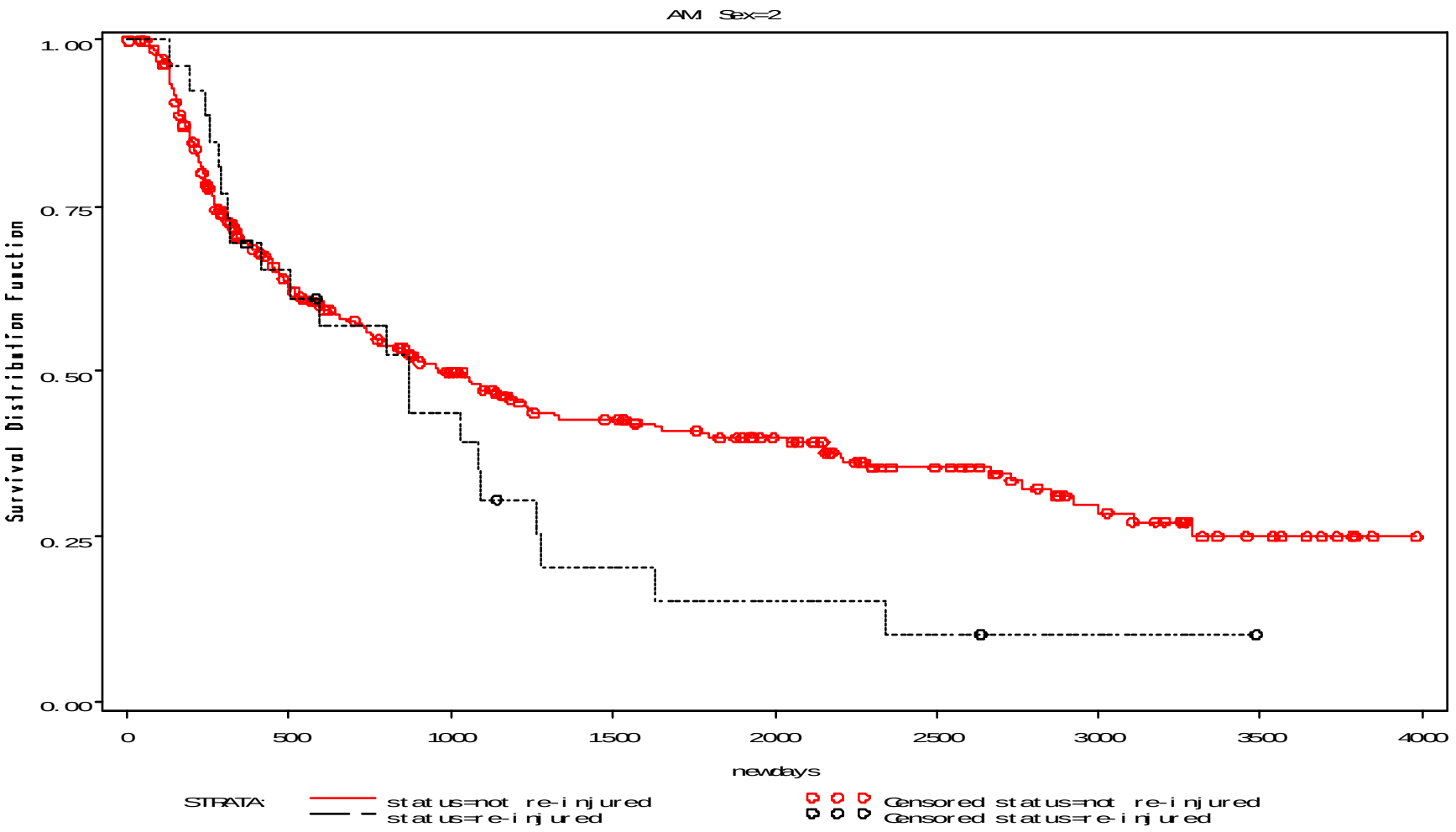
Survival curves for disability discharge, by re-injury status



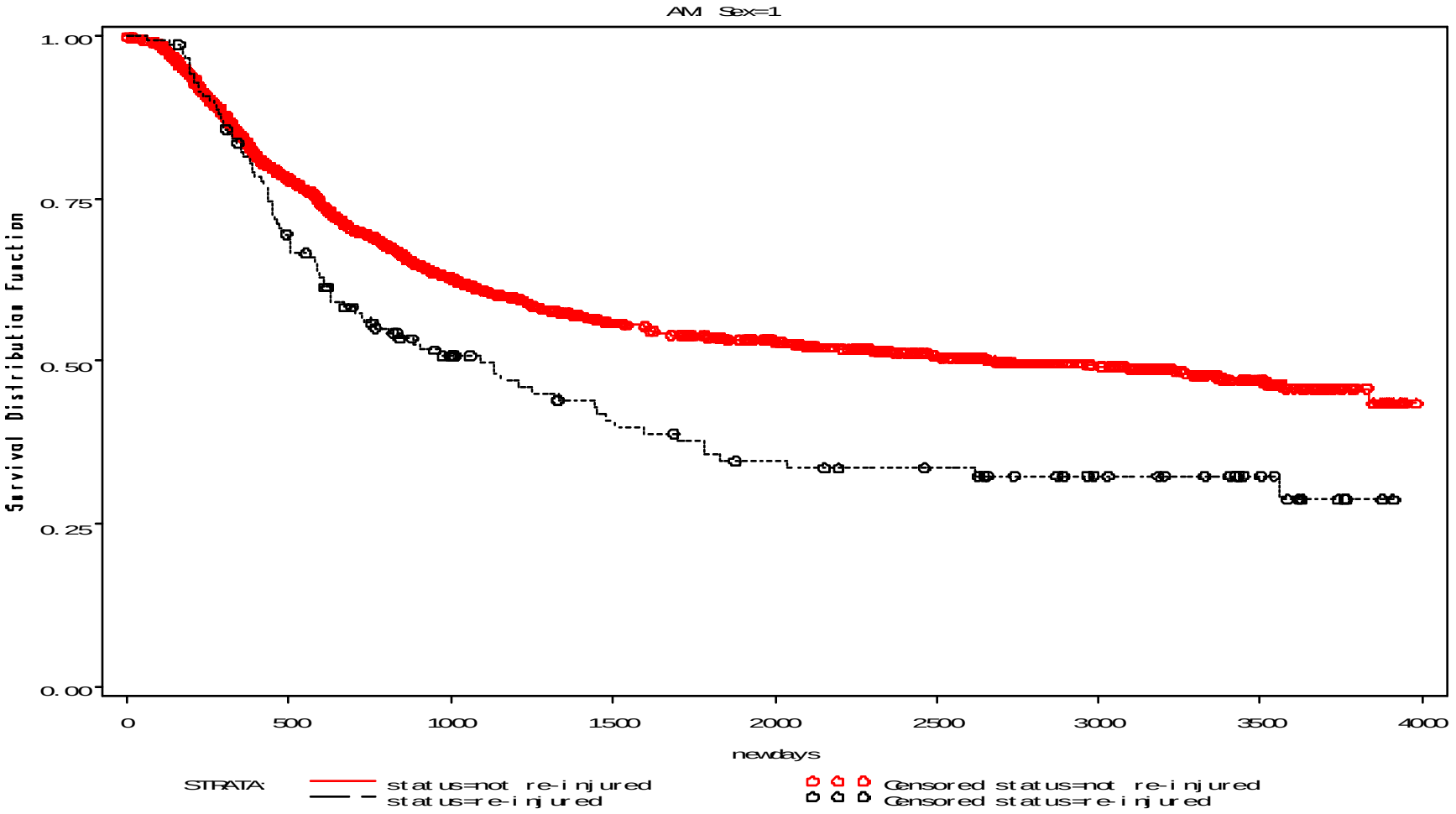
**log-rank test, p<0.0001*

Survival curves for disability discharge, by re-injury status - Females



** Log rank test p=0.14*

Survival curves for disability discharge, by re-injury status - Males



** Log rank test, p=0.0003*

Multivariate analysis for disability discharge, stratified by gender

	Both Genders	Males	Females
Risk Factor	RR (95% CI)	RR (95% CI)	RR (95% CI)
Re-injury	1.34 (1.04, 1.72)	1.36 (1.03, 1.79)	1.20 (0.67, 2.16)
HS education or more vs. less than HS	1.12 (0.74, 1.69)	1.19 (0.71, 2.00)	1.19 (0.60, 2.35)
Not Married	2.66 (2.22, 3.19)	2.85 (2.32, 3.51)	2.07 (1.40, 3.05)
On-duty Injury	1.28 (1.05, 1.56)	1.15 (0.93, 1.42)	2.21 (1.26, 3.89)
Enlisted Status	3.02 (1.63, 5.59)	2.88 (1.38, 6.00)	2.25 (0.68, 7.41)

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Strengths & Limitations

- **Limitations**
  - **Temporality**
  - **relationship between disability discharge & injury**
  - **inclusion of musculoskeletal events**
  - **analysis of re-injury not feasible**
- **Strengths**
  - **large & diverse cohort over long period**
  - **control for known confounders**

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Conclusions

- Re-injury, regardless of nature, sig. risk factor for pre-mature military discharge
- Soldiers with a re-injury 34% more likely to be discharged from the Army, after controlling for confounders (Men - 36%, Women – 20%)
- On-duty injuries associated with military discharge (HR=1.28, 1.05-1.56)
- Nature of re-injury not associated with discharge
- Prospective cohort could fully examine relationships between injury, re-injury and disability

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Questions?

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