

Risk factors associated with reinjury in the 12 months post-neuromusculoskeletal injury among active duty service women, 2017-2023

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Disclosure Information

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Study Team

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Learning Objectives



1

Identify risk factors for reinjury following neuromusculoskeletal injury (NMSKI) among active duty service women (ADSW).



2

Understand which NMSKIs are at highest risk of reinjury in the 12 months post-injury.



3

Examine differences in time to recovery and rehabilitation for ADSW with and without reinjury in the 12 months post-NMSKI.

Neuromusculoskeletal injuries (NMSKIs)

- Degrade medical and operational readiness as the leading cause for ambulatory encounters; 25 million limited duty days (LDDs)
- Musculoskeletal injuries (MSKIs) impact **roughly 55%** of ADSW annually; ASDW had a **25%–29% higher risk** of any MSKI
- Elucidating the highest risk factors for reinjury can optimize recovery and return to duty (RTD)
- **Lack of female-specific NMSKI research surrounding reinjury**

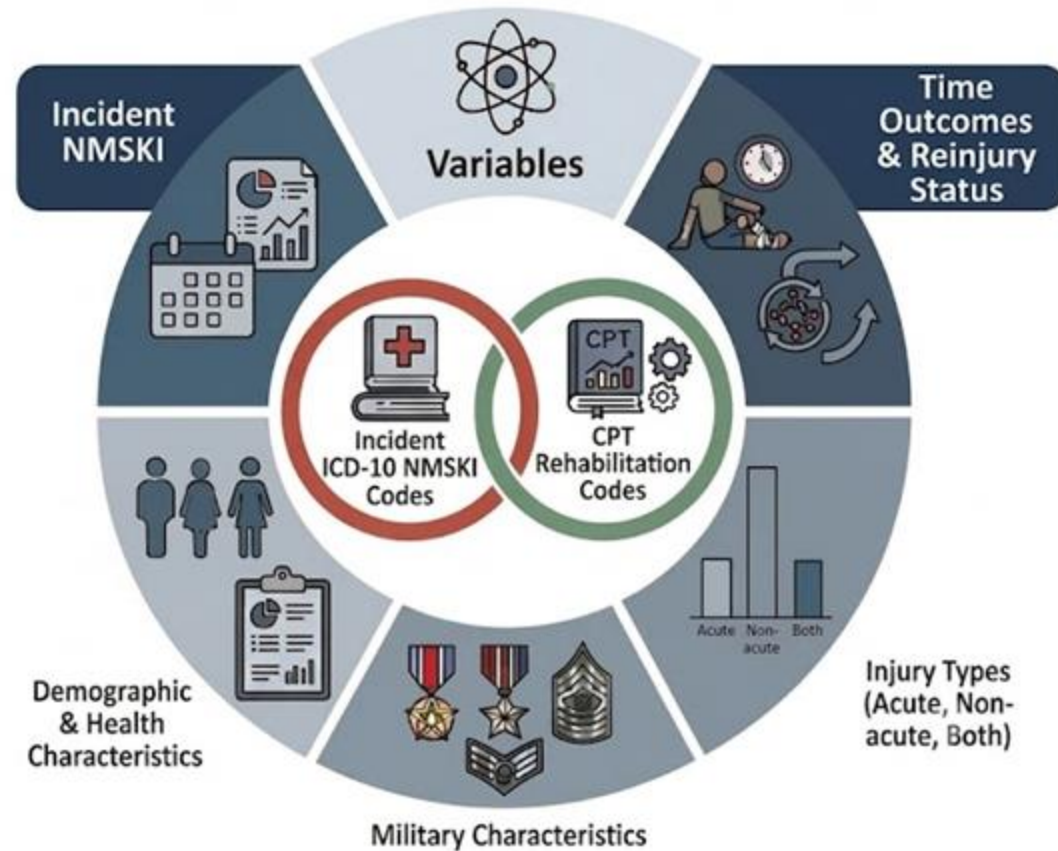


Methods

- **Study design:** Retrospective cohort
- **Data Source:** Military Health System Data Repository (MDR)
- **Population of interest:** Active duty service women (ADSW) aged 18 - 64 diagnosed with incident NMSKIs, March 1, 2017 - February 28, 2022
- **Analysis:** Logistic regression and Kaplan Meier survival curves

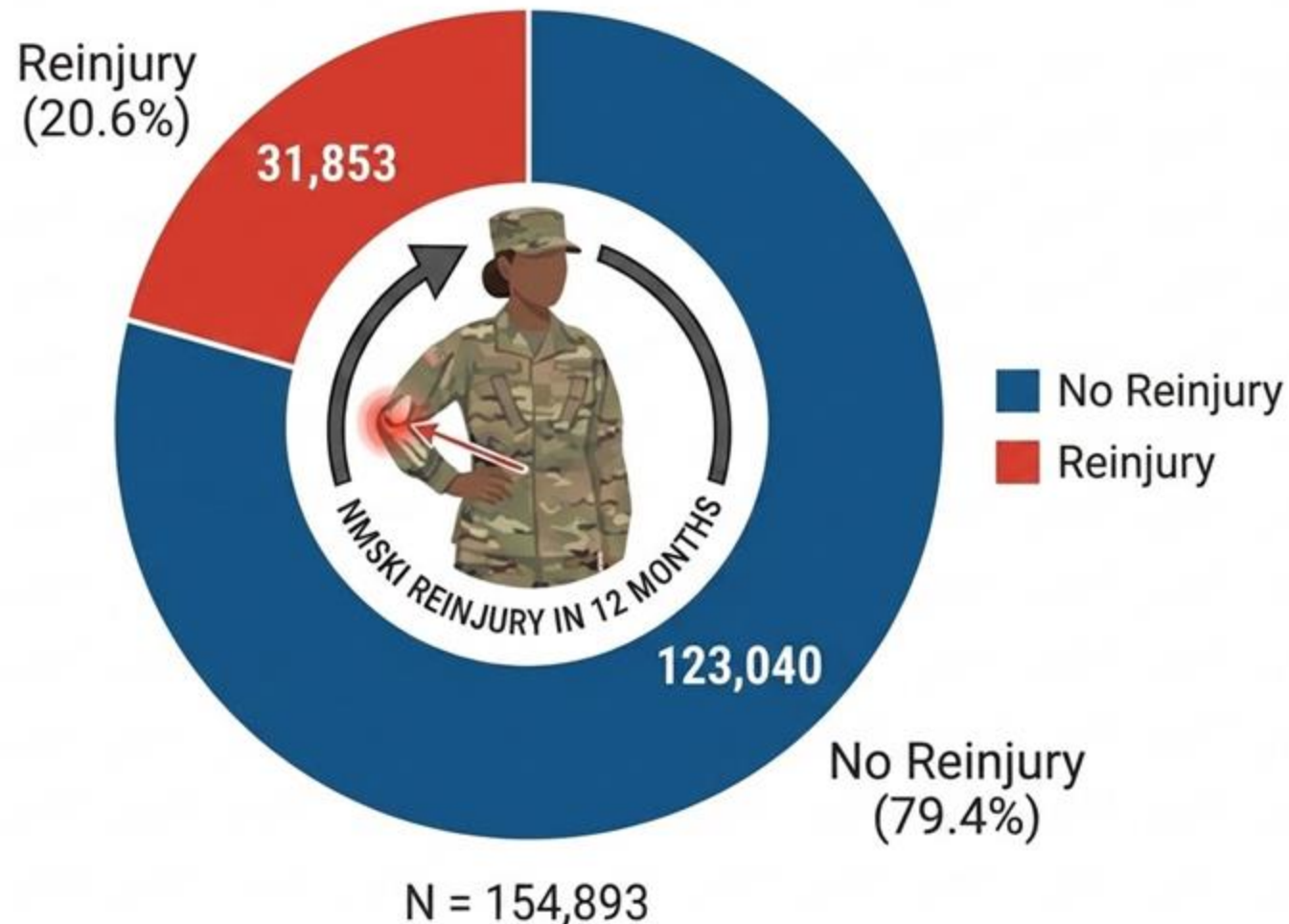
Variable Definitions

- Dependent variables:
 - Reinjury status
 - Time to recovery
 - Time to outpatient rehabilitation
- Independent variables:
 - Health/Injury Characteristics
 - Demographic Characteristics
 - Military Characteristics



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ADSW Reinjury

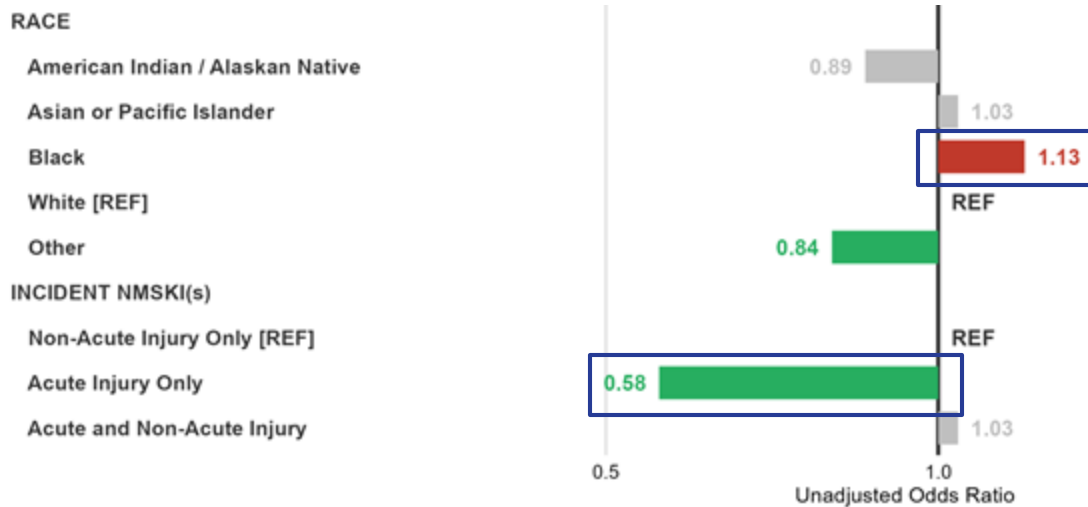


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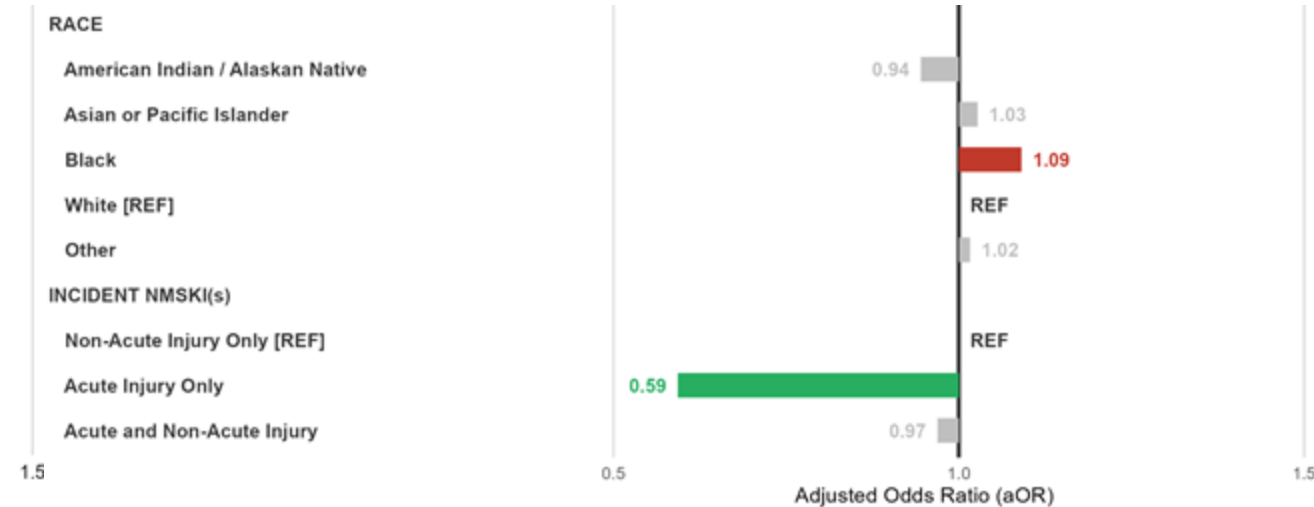
Health, Demographic, and Injury Characteristics of ADSW with NMSKIs, by reinjury of NMSKI	Overall (N = 154,893)	No Reinjury (n = 123,040)	Reinjury (n = 31,853)	Odds Ratio (95% CI)
Age, M (SD)	23.5 (6.0)	23.4 (5.8)	24.0 (6.4)	1.02 (1.02-1.02)
BMI Category, n (%)				
Underweight (< 18.5 kg/m ²)	2,034 (1.3)	1,694 (1.4)	340 (1.1)	0.76 (0.68-0.86)
Optimum range (18.5-24.9 kg/m ²)	84,750 (54.7)	67,554 (54.9)	17,196 (54.0)	0.94 (0.91-0.96)
Overweight (>24.9-29.9 kg/m ²)	54,605 (35.3)	42,897 (34.9)	11,708 (36.8)	1.07 (1.04-1.09)
Obese (> 29.9 kg/m ²)	10,893 (7.0)	8,526 (6.9)	2,367 (7.4)	1.06 (1.02-1.12)
Race, n (%)				
American Indian / Alaskan Native	1,865 (1.2)	1,512 (1.2)	353 (1.1)	0.89 (0.79-1.00)
Asian or Pacific Islander	10,243 (6.6)	8,081 (6.6)	2,162 (6.8)	1.03 (0.98-1.08)
Black	39,881 (25.7)	31,027 (25.2)	8,854 (27.8)	1.13 (1.10-1.16)
White	92,588 (59.8)	73,853 (60.0)	18,735 (58.8)	0.93 (0.91-0.95)
Other	6,849 (4.4)	5,609 (4.6)	1,240 (3.9)	0.84 (0.79-0.90)
Incident NMSKI(s), n (%)				
Non-Acute Injury Only	124,146 (80.1)	96,994 (78.8)	27,152 (85.2)	1.55 (1.50-1.60)
Acute Injury Only	24,696 (15.9)	21,267 (17.3)	3,429 (10.8)	0.58 (0.56-0.60)
Acute and Non-Acute Injury	6,051 (3.9)	4,779 (3.9)	1,272 (4.0)	1.03 (0.97-1.10)

Odds of ADSW Reinjury

Crude*



Adjusted*

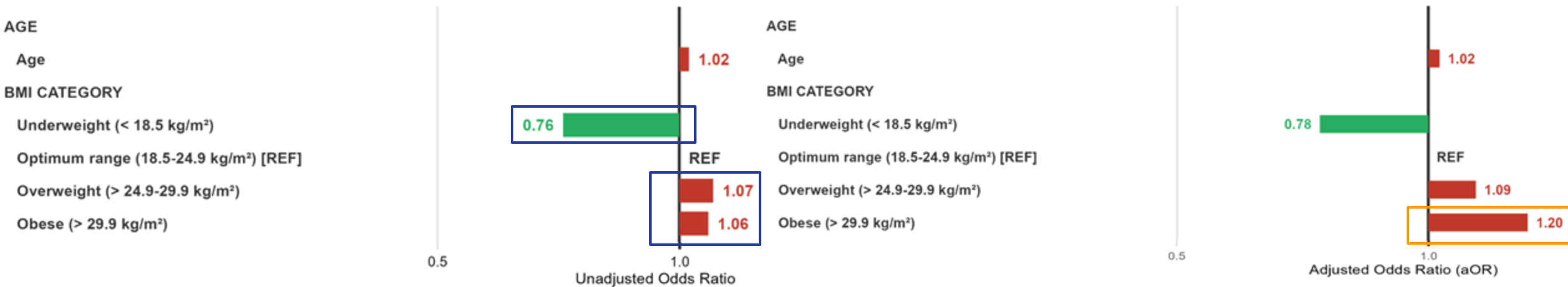


* Grey bars denote insignificant results; blue boxes represent notable crude risk findings; orange boxes highlight notable post-adjustment risk findings

Odds of ADSW Reinjury

Crude*

Adjusted*

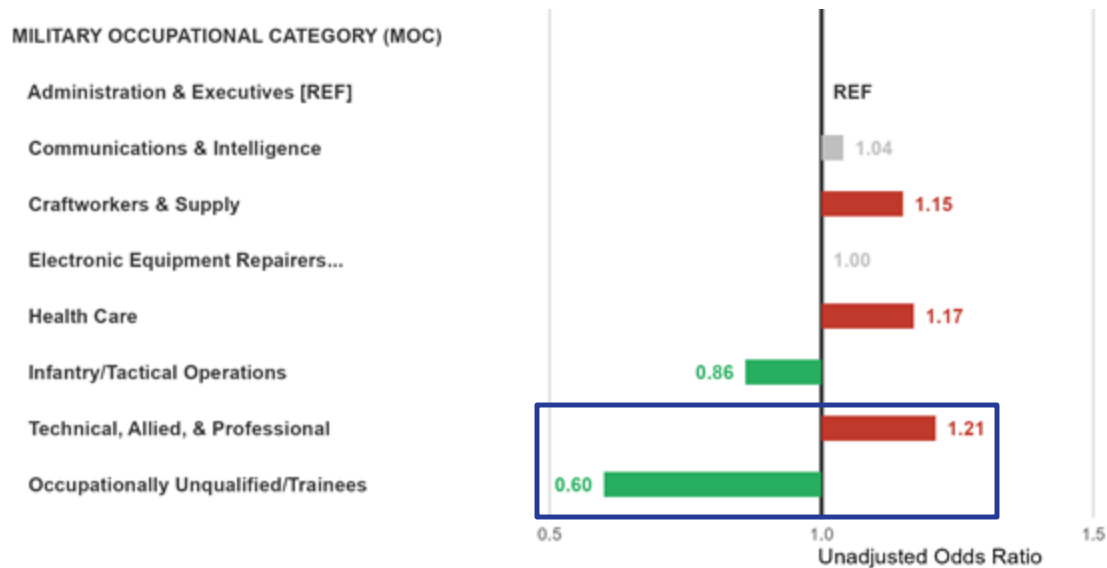


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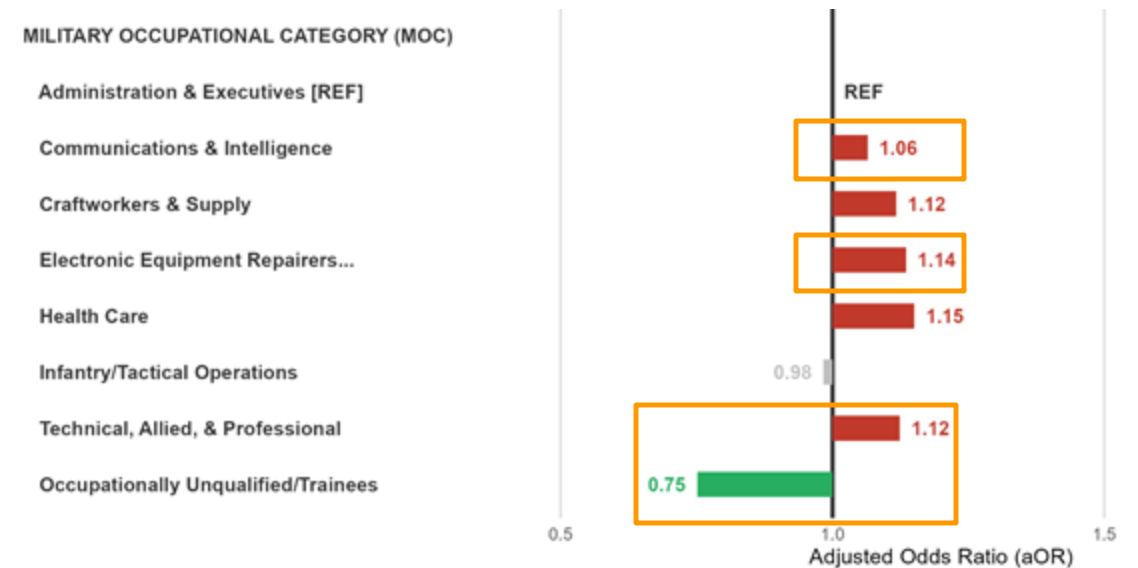
Military Characteristics of ADSW with NMSKIs, by reinjury of NMSKI	Overall (N = 154,893)	No Reinjury (n = 123,040)	Reinjury (n = 31,853)	Odds Ratio (95% CI)
Branch of Service, n (%)				
Air Force	39,129 (25.3)	31,116 (25.3)	8,013 (25.2)	0.99 (0.97-1.02)
Army	57,676 (37.2)	43,912 (35.7)	13,764 (43.2)	1.37 (1.34-1.41)
Marine Corps	14,943 (9.6)	11,555 (9.4)	3,388 (10.6)	1.15 (1.10-1.20)
Navy	43,145 (27.9)	36,457 (29.6)	6,688 (21.0)	0.63 (0.61-0.65)
Military Rank, n (%)				
Junior Enlisted	115,288 (74.4)	91,959 (74.7)	23,329 (73.2)	0.92 (0.90-0.95)
Junior Officer	21,840 (14.1)	17,146 (13.9)	4,694 (14.7)	1.07 (1.03-1.11)
Senior Enlisted	13,975 (9.0)	11,108 (9.0)	2,867 (9.0)	1.00 (0.95-1.04)
Senior Officer	3,788 (2.4)	2,825 (2.3)	963 (3.0)	1.33 (1.23-1.43)
Military Occupational Category (MOC), n (%)				
Administration & Executives	24,961 (16.1)	19,174 (15.6)	5,787 (18.2)	1.20 (1.16-1.24)
Communications & Intelligence	11,580 (7.5)	9,136 (7.4)	2,444 (7.7)	1.04 (0.99-1.09)
Craftworkers & Supply	20,824 (13.4)	16,130 (13.1)	4,694 (14.7)	1.15 (1.11-1.19)
Electronic Equipment Repairers, Engineering Maintenance	22,640 (14.6)	17,974 (14.6)	4,666 (14.6)	1.00 (0.97-1.04)
Health Care	20,799 (13.4)	16,056 (13.0)	4,743 (14.9)	1.17 (1.13-1.21)
Infantry/Tactical Operations	12,351 (8.0)	10,082 (8.2)	2,269 (7.1)	0.86 (0.82-0.90)
Technical, Allied, & Professional	3,693 (2.4)	2,814 (2.3)	879 (2.8)	1.21 (1.12-1.31)
Occupationally Unqualified/Trainees	4,577 (3.0)	3,957 (3.2)	620 (1.9)	0.60 (0.55-0.65)

Odds of ADSW Reinjury

Crude*



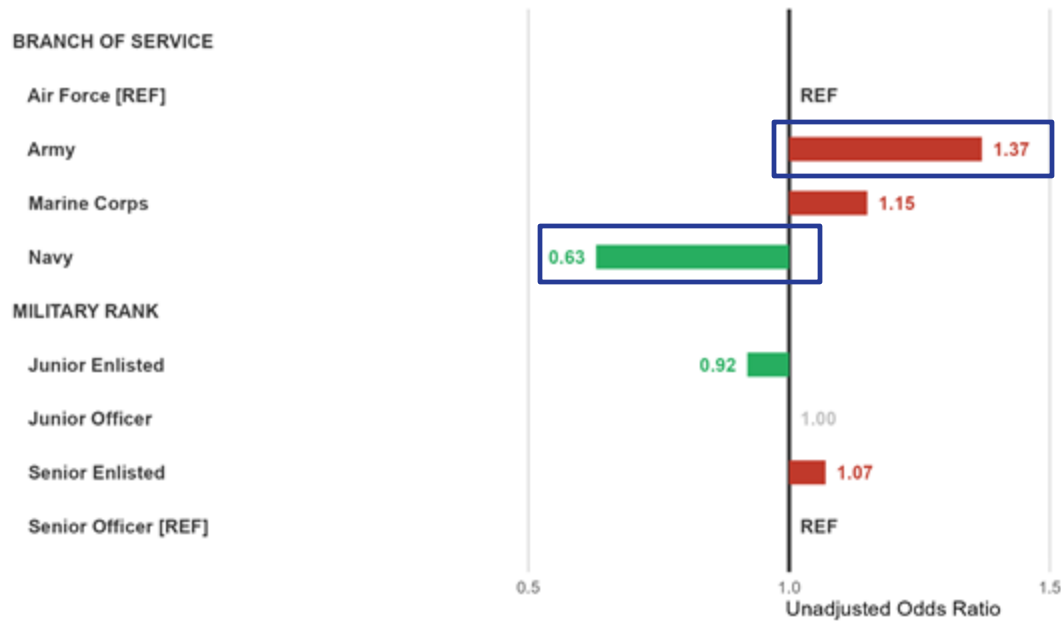
Adjusted*



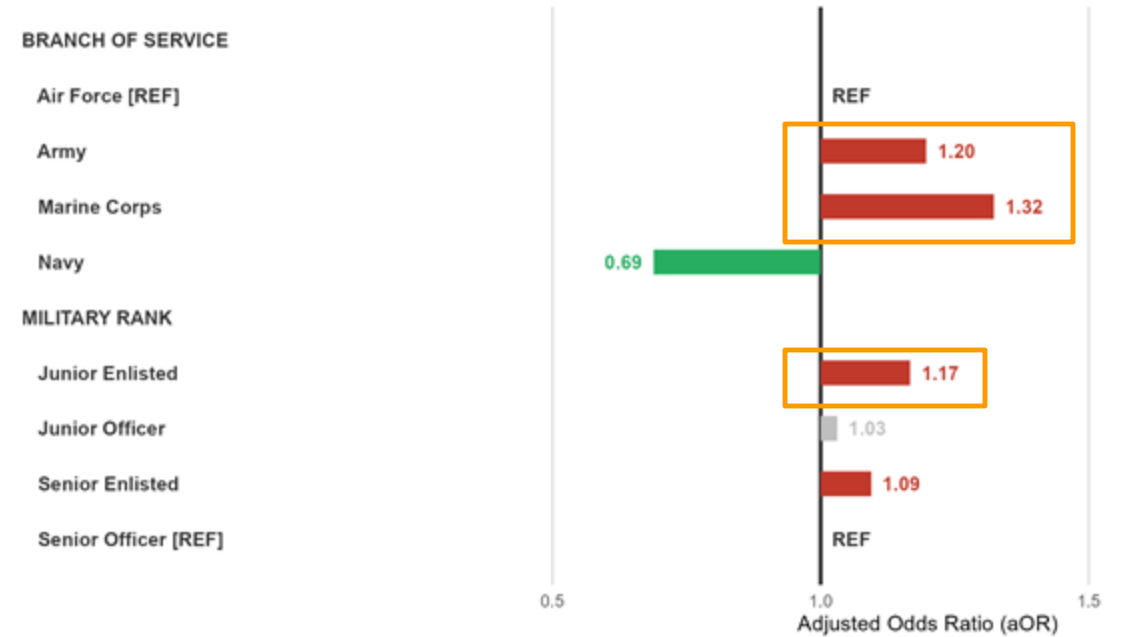
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Odds of ADSW Reinjury

Crude*

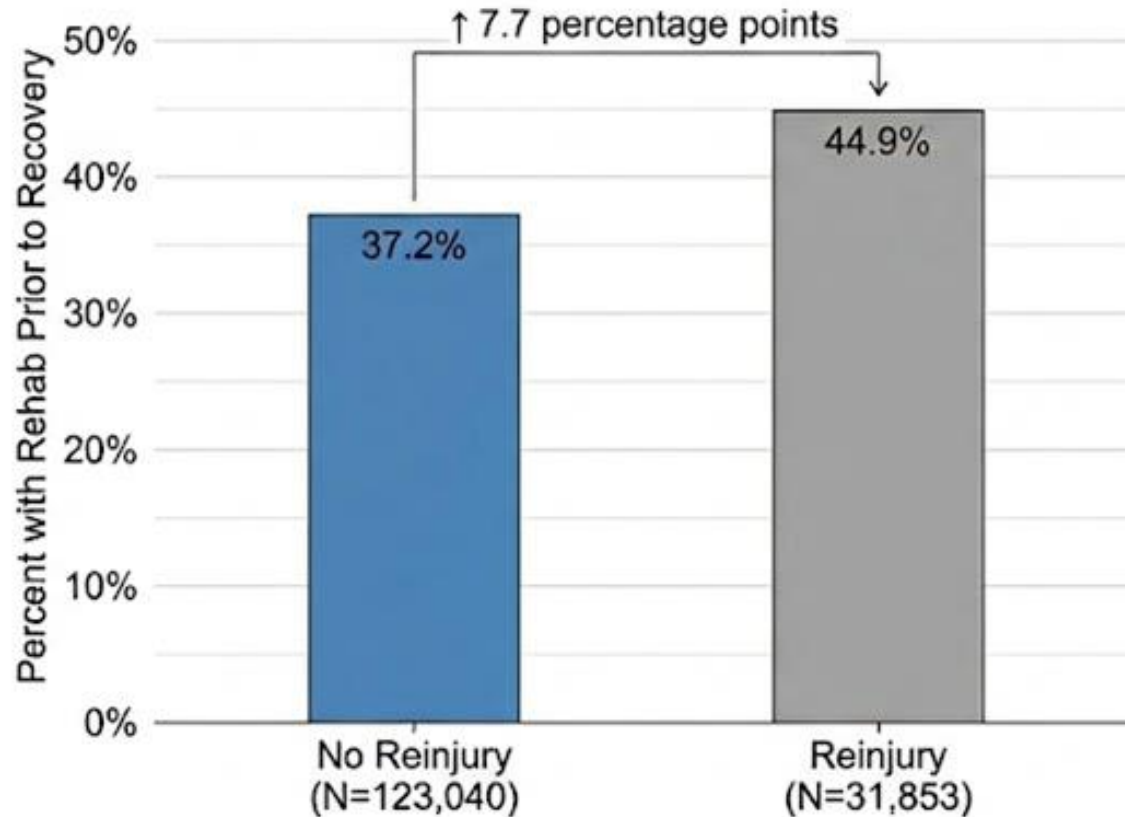


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ADSW Rehabilitation Before Reinjury



KEY CLINICAL FINDING

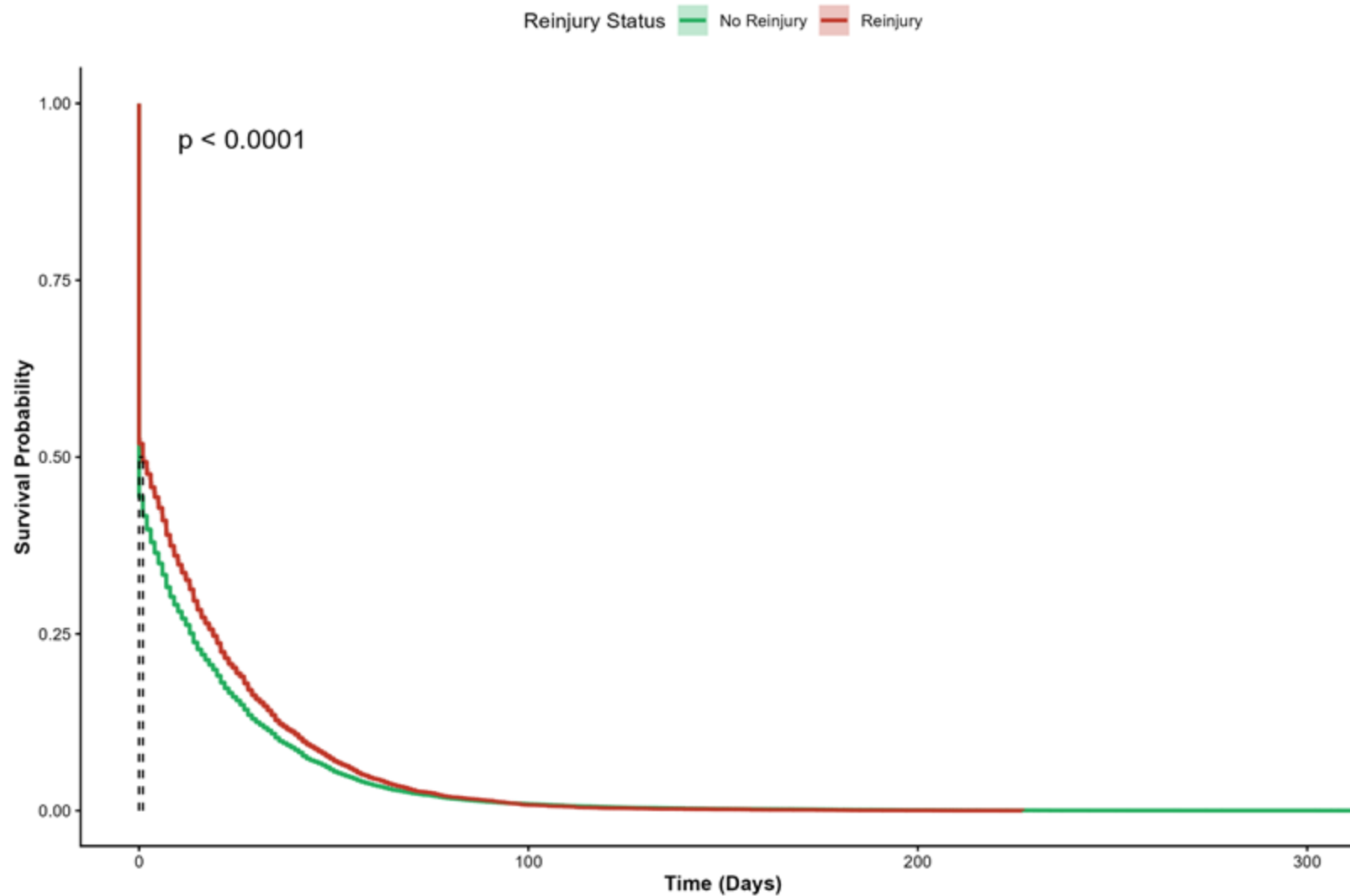
- Higher rate of outpatient rehab for women who reinjured.
- Reflects more severe initial injuries and increased future risk.



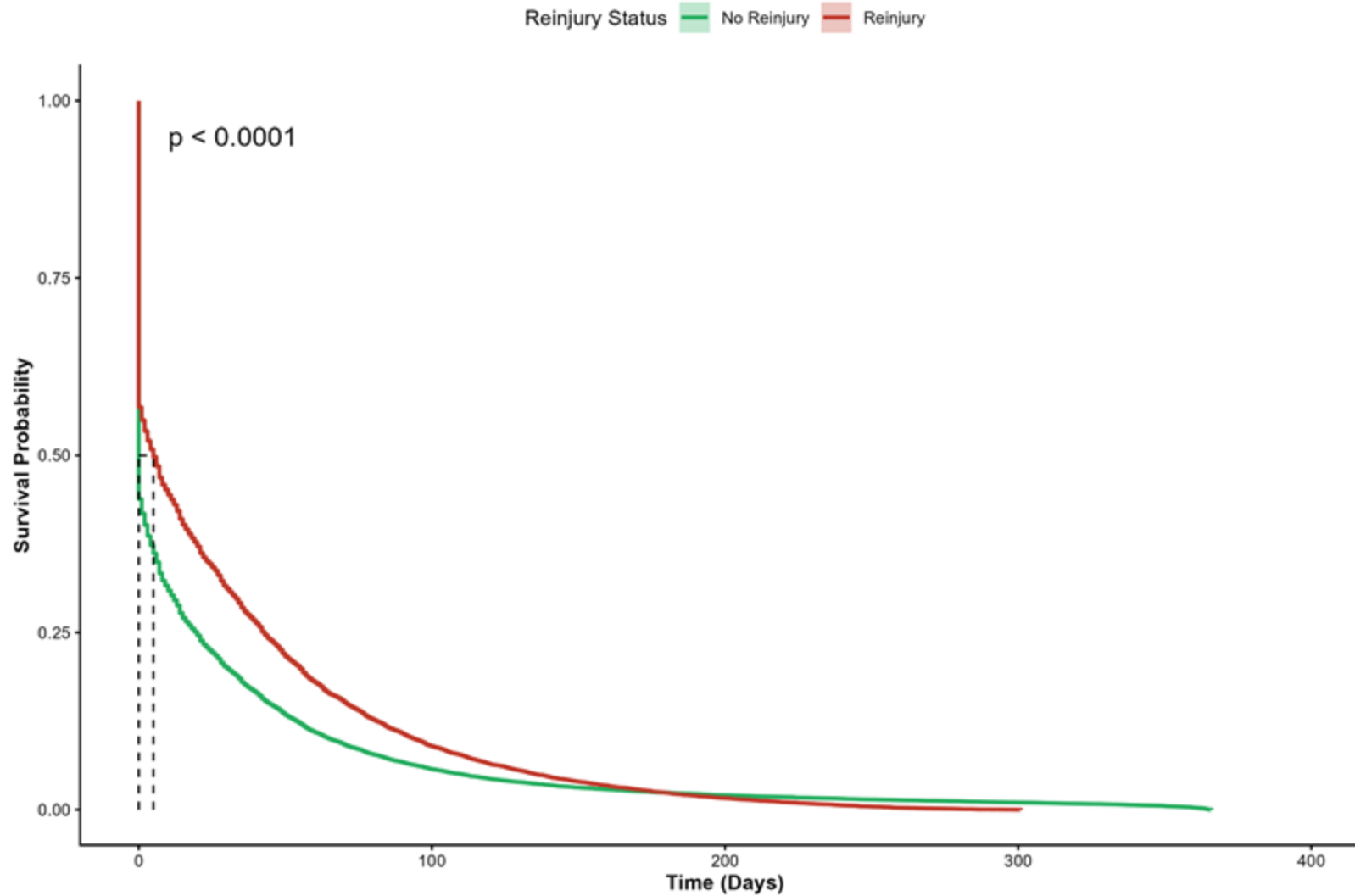
STATISTICAL SIGNIFICANCE

Chi-squared Test of Independence
 $p < 0.001$

Time to Rehabilitation Before Recovery



Time to Recovery



Discussion: Intersectional Risk Profiles

- **Confounding Masks True Readiness Risks**
 - Raw data obscures the compounding effect of overlapping military and physical traits
- **High-Risk Subpopulations Unmasked:**
 - Obese BMI & Marines: Risk (ORs: 1.06, 1.15) spikes significantly once adjusted (aORs: 1.20, 1.32)
 - Junior Enlisted: Emerges as a highly vulnerable group (aOR: 1.17)
 - MOCs: Hidden risks revealed in Communications & Intelligence and Electronic Equipment Repairers
- **Operational Shift Required:** Reinjury prevention must recognize these differences to target these specific intersections

Discussion: The Care Timeline & Severity

- **The Rehab Paradox:** Higher utilization (45% vs. 37%) acts as a proxy for initial injury severity
- **Delayed Care Windows:** Reinjury cohort experienced significantly delayed initiation of rehabilitation
- **Drawn-Out Recovery:** Longer initial time to clinical recovery (5 vs. 0 median days) leaves joints/tissue systematically vulnerable
- **Readiness Takeaway:** Early, acute intervention and aggressive post-recovery tracking are vital for sustainable Return to Duty (RTD)

Strengths and Limitations

Sample size



Granularity



Nature of the data



MHS Genesis
Rollout



What's Next?

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