Injuries among Women following U.S. Army Gender Integration

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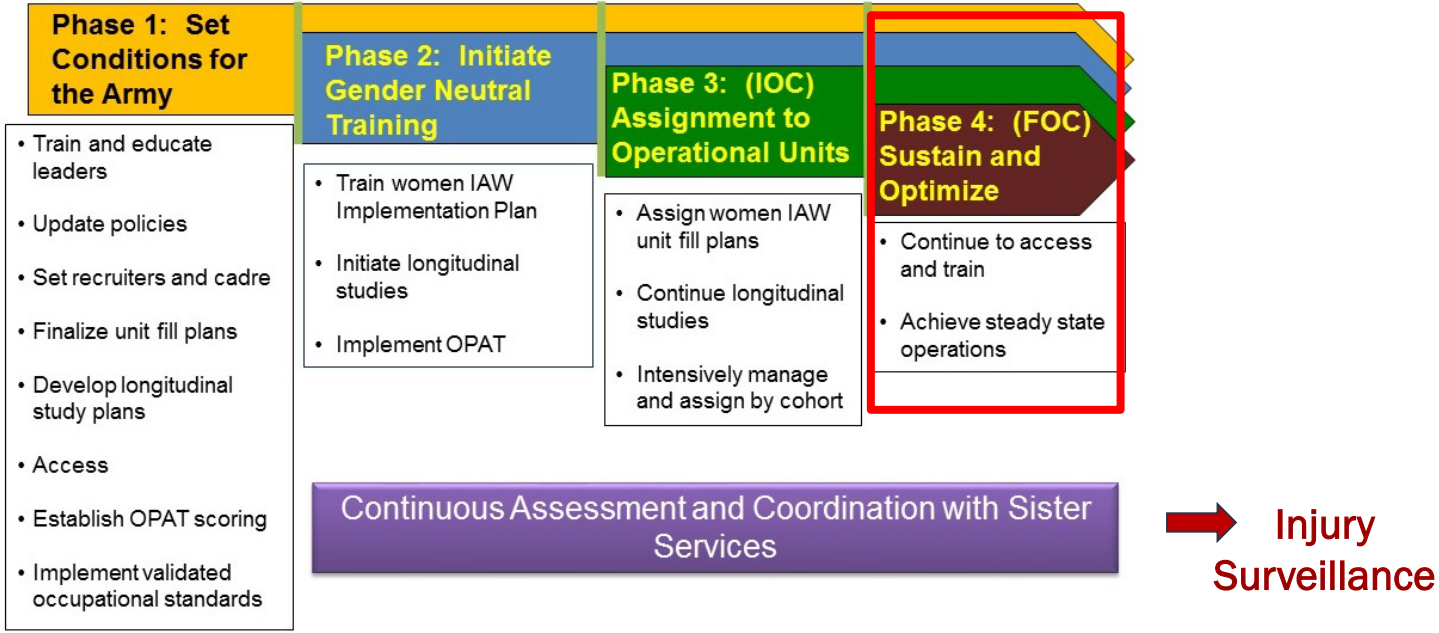
Background: Gender Integration in the U.S. Army

- January 2013: U.S. Secretary of Defense (SECDEF) rescinded 1994 Direct Ground Combat Definition and Assignment Rule
  - Directed integration of women into previously closed combat occupations and units.
  - **Directed services to develop and implement gender-neutral performance standards**
- April 2013: U.S. Army directed actions to **integrate women into all occupations while maintaining combat effectiveness**.
  - Physical Demands Study
  - Occupational Physical Assessment Test (OPAT) Study
  - Soldier 2020 Injury/Attrition Rates Working Group (Lead: U.S. Army Surgeon General's Office)
    - ✓ **Appropriate use of physical standards should reduce injuries and medical attrition**
    - ✓ **No medical basis to prohibit opening any occupational field to women**

Background: Gender Integration in the U.S. Army (cont.)

- December 2015: SECDEF directed full integration of women in combat occupations and units
  - Seven areas of concern:
    - Transparent standards
    - Population size
    - **Physical demands and physiologic differences**
    - Conduct and culture
    - Talent management
    - Operating abroad
    - **Assessment and adjustment:** Critical that the Services "embark on integration with a commitment to monitoring, assessment, and in-stride adjustment that enables sustainable success."
- March 2016: U.S. Department of the Army Headquarters Publication of *Execution Order (EXORD) 097-16 to the U.S. Army Implementation Plan 2016-01 (Army Gender Integration)*

Background: Gender Integration in the U.S. Army (cont.)



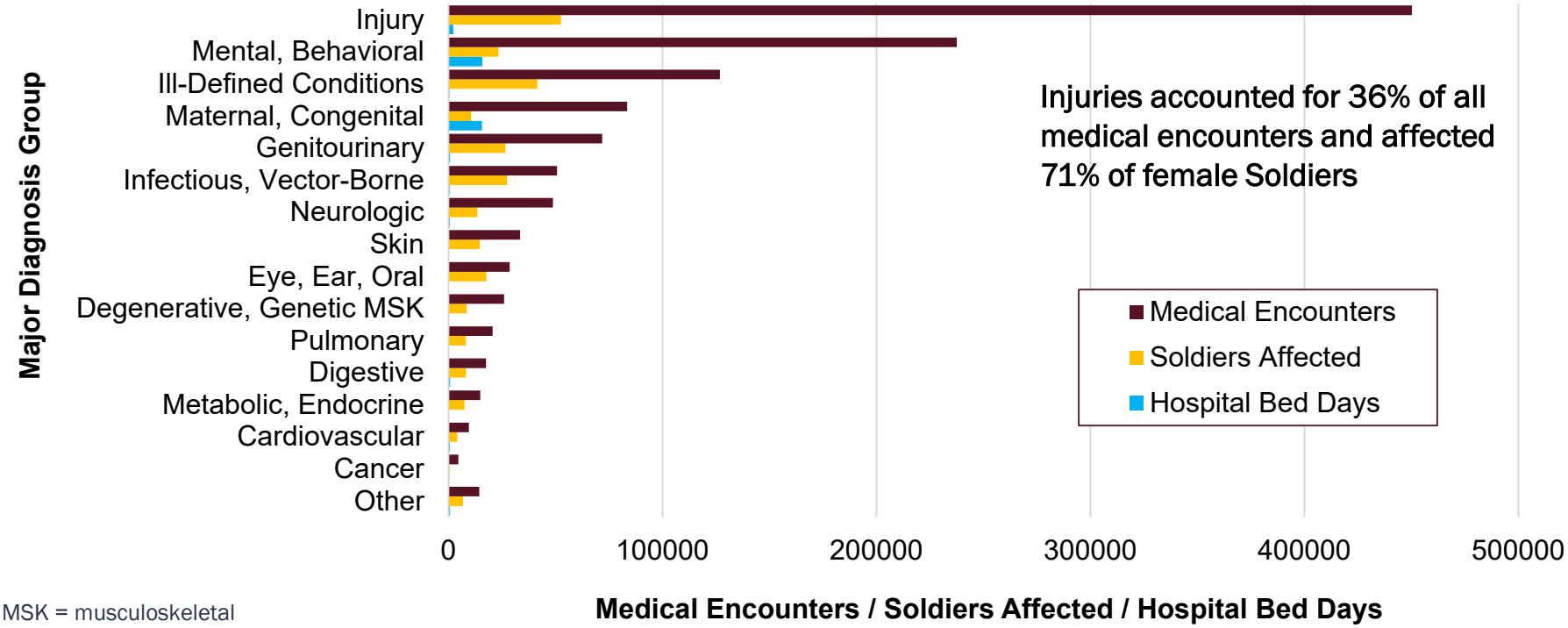
Source: Headquarters Department of Army EXORD 097-16 to the Army Implementation Plan 2016-01 (Army Gender Integration)
Abbreviations: **OPAT** = Occupational Physical Assessment Test; **IOC** = Initial Operating Capability; **FOC** = Full Operating Capability; **IAW** = In Accordance With

U.S. Army Occupational Specialties Opened to Women

	Military Occupational Specialty Code (MOS)	Title	FY Began Training Women	Physical Demand Category
	11B	Infantry	FY 2017	Heavy
	12B	Combat Engineer	FY 2015	Heavy
Armor	19D	Calvary Scout	FY 2017	Heavy
Armor	19K	Armor Crewmember	FY 2017	Heavy
Field Artillery	13B	Cannon Crewmember	FY 2016	Heavy
Field Artillery	13F	Joint Fire Control Specialist	FY 2017	Heavy
Field Artillery	13J	Fire Control Specialist	FY 2017	Heavy
Field Artillery	13M	Multiple Launch Rocket System Crew	FY 2013	Heavy
Field Artillery	13R	Field Artillery Firefinder Radar Operator	FY 2013	Heavy
Ordnance	91A	M1 Abrams Tank System Maintainer	FY 2013	Moderate
Ordnance	91M	Bradley Fighting Vehicle System Maintainer	FY 2013	Moderate
Ordnance	91P	Artillery Mechanic	FY 2013	Moderate

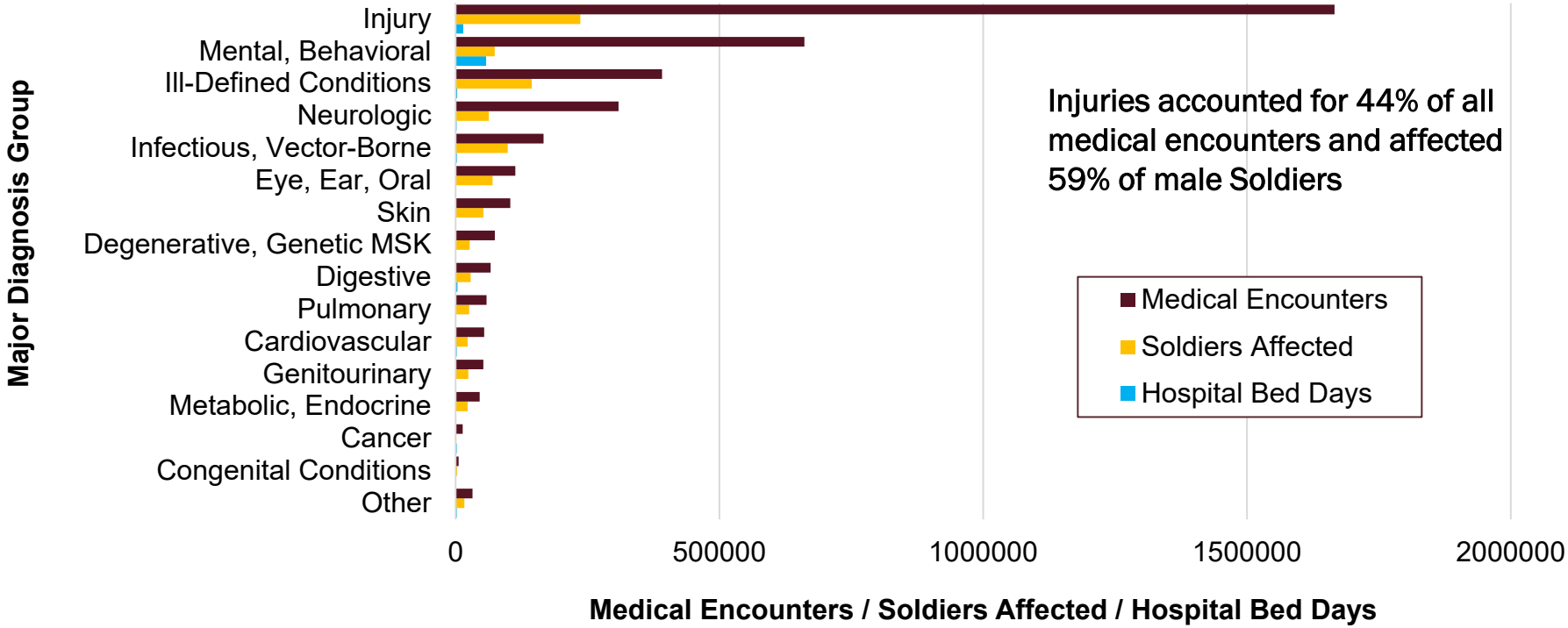
*Blue = One Station Unit Training (OSUT) courses that began training women in 2017. Injury metrics for these OSUTs presented later in this presentation.

Relative Burden of Illnesses and Injuries
Army Active Component, Women, 2021



MSK = musculoskeletal

Relative Burden of Illnesses and Injuries
Army Active Component, Men, 2021



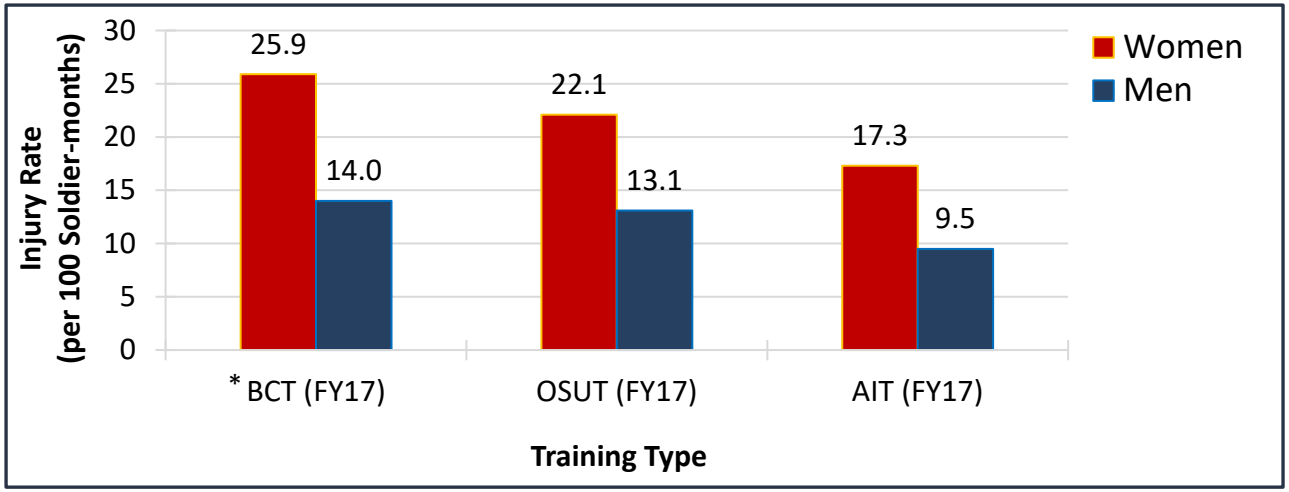
Prior Studies: Sex and Injury Risk during U.S. Army Basic Training

Study	Year	Women (%)	Men (%)	RR*
Kowal[1]	1980	54	26	2.1
Bensel[2]	1982	41	21	2.0
Jones[3]	1984	50	28	1.8
Bell[4]	1988	62	29	2.1
Canham[5]	1995	64	42	1.6
Knapik[6]	2000	47	17	2.8
Knapik[7]	2003	48	28	1.7

1. Kowal D. 1980. *Am J Sports Med*; 8(4):265-9.
2. Bensel C. Army Tech Report, Natick
3. Jones BH, et al. 1992. National Academy Press.
4. Bell N, et al. 2000. *Am J Prev Med* 18(Suppl 3):141-6
5. Canham ML, et al. 1998. *Advances in Occ Erg & Safety*.
6. Knapik JJ, et al. 2003. *Int J Sports Med* 24(5):372-81.
7. Knapik, USACHPPM Tech Report 12-HF-5772B-04.

*RR = rate ratio

Injury Rates During Enlisted Initial Entry Training (IET) Men vs. Women, FY 2017

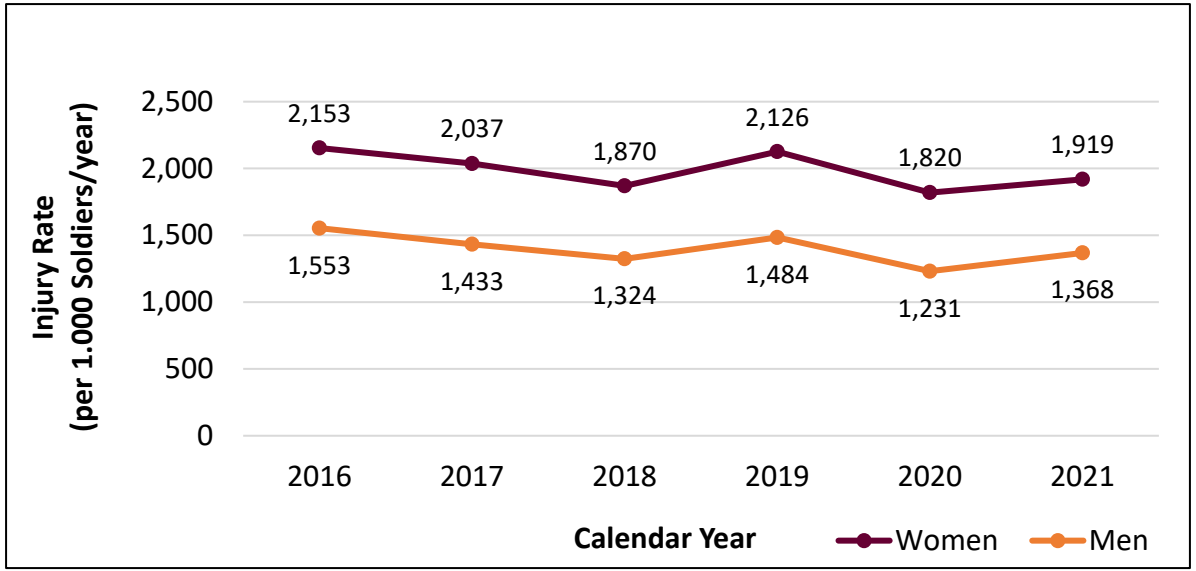


Rate Ratio (Women:Men)	
BCT*:	1.86 (1.81-1.90)
OSUT:	1.69 (1.61-1.78)
AIT:	1.82 (1.52-2.18)

- During IET, women and men train together and are exposed to similar injury risks and exposures.
- Historically (>30 years), women in BCT have had 2 times higher injury rates than men.
- In FY 2017, injury rates for women were 1.7 to 1.9 times higher than rates for men.

*Initial entry training types: BCT = basic combat training; OSUT = one station unit training; AIT = advanced individual training

Annual Musculoskeletal Injury Rates[a] Army Active Component, CYs 2016 to 2021

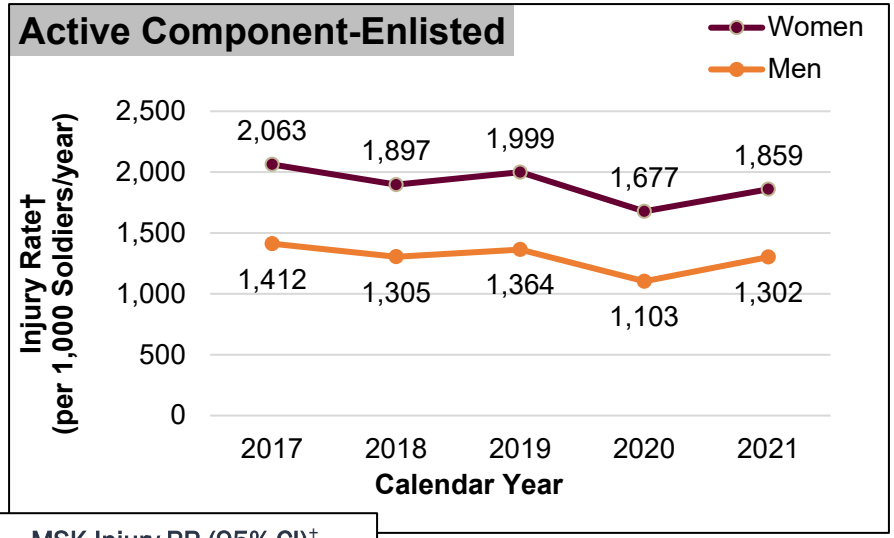


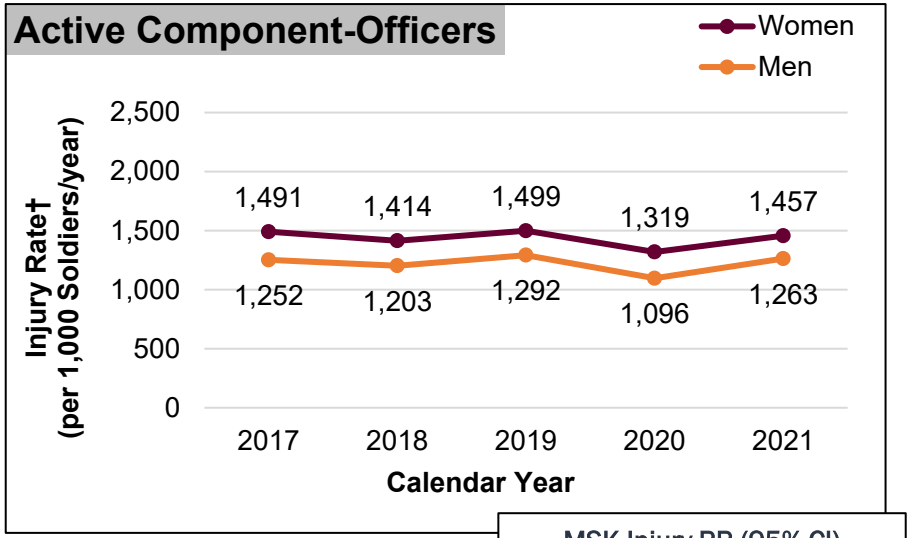
MSK Injury Rate Ratio (W/M)[b]

2016: 1.36 (1.35–1.37)*
2017: 1.39 (1.38–1.40)*
2018: 1.38 (1.37–1.39)*
2019: 1.43 (1.43–1.44)*
2020: 1.42 (1.30–1.54)*
2021: 1.40 (1.40–1.41)*

Data Source: Defense Medical Surveillance System, 2022; prepared by DCPH-A Injury Prevention Branch
Notes: Soldiers in the Army active component in CY 2021: M=399,218; W=73,560
[a]Injury Rate: Number of injuries per 1,000 Soldiers per year
[b]Injury rate ratio (RR) (W/M): injury rate among women / injury rate among men
* Indicates statistically significant injury RR (W/M)

Annual Musculoskeletal Injury Rates[a]
Army Active Component Enlisted and Officers, CYs 2017 to 2021





MSK Injury RR (95% CI)‡
2017: 1.46 (1.45–1.47)*
2018: 1.45 (1.44–1.46)*
2019: 1.47 (1.46–1.48)*
2020: 1.52 (1.51–1.53)*
2021: 1.43 (1.42–1.46)*

Data Source: Defense Medical Surveillance System, August 2022; prepared by DCPH-A Injury Prevention Branch
Notes:
†Injury Rate: injuries per 1,000 Soldiers per year
‡Confidence Interval
*Indicates statistically significant injury rate ratio (RR) (W/M)

MSK Injury RR (95% CI)
2017: 1.19 (1.17–1.21)*
2018: 1.18 (1.16–1.19)*
2019: 1.16 (1.14–1.18)*
2020: 1.20 (1.19–1.22)*
2021: 1.15 (1.14–1.17)*

MSK Injury Rates by MOS or AOC Functional Category
Enlisted & Officers, Army Active Component, CY 2021

Enlisted MOS Functional Category[a]	Women		Men		Injury Rate Ratio (W/M)[c]
	Person-yrs.	Injury Rate[b]	Person-yrs.	Injury Rate[b]	
Operations	5,011	2,071	134,657	1,272	**1.63 (1.60–1.66)***
Operations Support	14,389	1,951	75,868	1,352	1.44 (1.42–1.46)*
Force Sustainment	37,106	2,062	112,788	1,539	1.34 (1.33–1.35)*
Overall	**56,506**	**2,034**	**323,313**	**1,384**	**1.47 (1.46–1.48)***
Officer AOC Functional Category[a]	**Women**		**Men**		**Injury Rate Ratio (W/M)[c]**
	Person-yrs.	**Injury Rate[b]**	**Person-yrs.**	**Injury Rate[b]**	
Army Special Operations	128	2,382	2,446	1,970	**1.21 (1.08–1.36)***
Operations	3,220	1,306	26,090	1,094	1.19 (1.16–1.23)*
Operations Support	1,949	1,699	9,857	1,497	1.13 (1.09–1.18)*
Force Sustainment	4,162	1,630	12,980	1,432	1.14 (1.11–1.17)*
Health Services	5,702	1,403	9,084	1,141	1.23 (1.19–1.27)*
Overall	**15,162**	**1,424**	**60,457**	**1,275**	**1.17 (1.15–1.19)***

Source: Defense Medical Surveillance System: 2022; prepared by DCPH-A Injury Prevention Branch

Abbreviations: MOS = military occupational specialty; AOC = area of concentration; yrs = years

[a] Functional Categories (as defined by Human Resource Command)

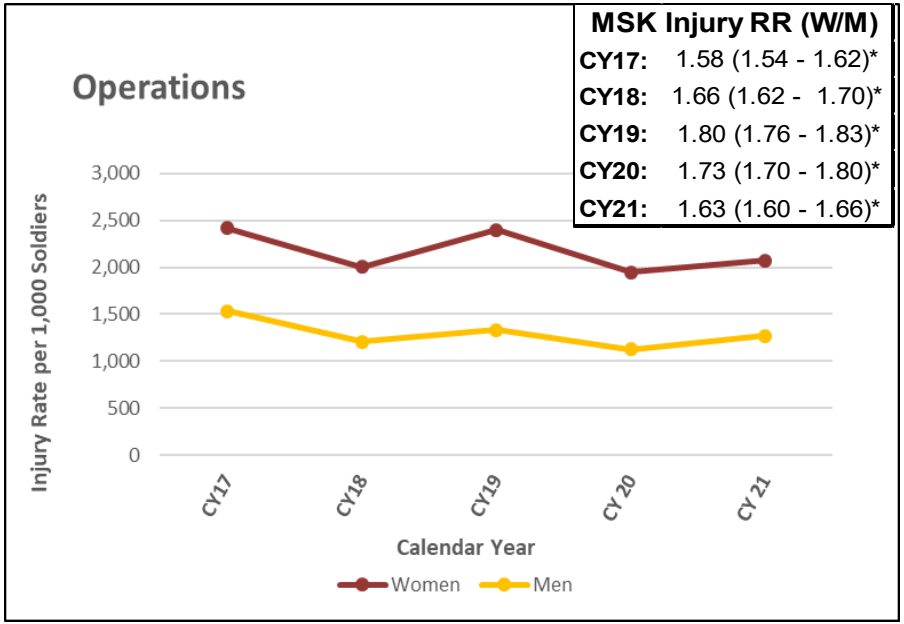
[b] Injury Rate: Number of MSK injuries per 1,000 Soldiers per year

[c] Injury rate ratio (W/M): injury rate among women / injury rate among men

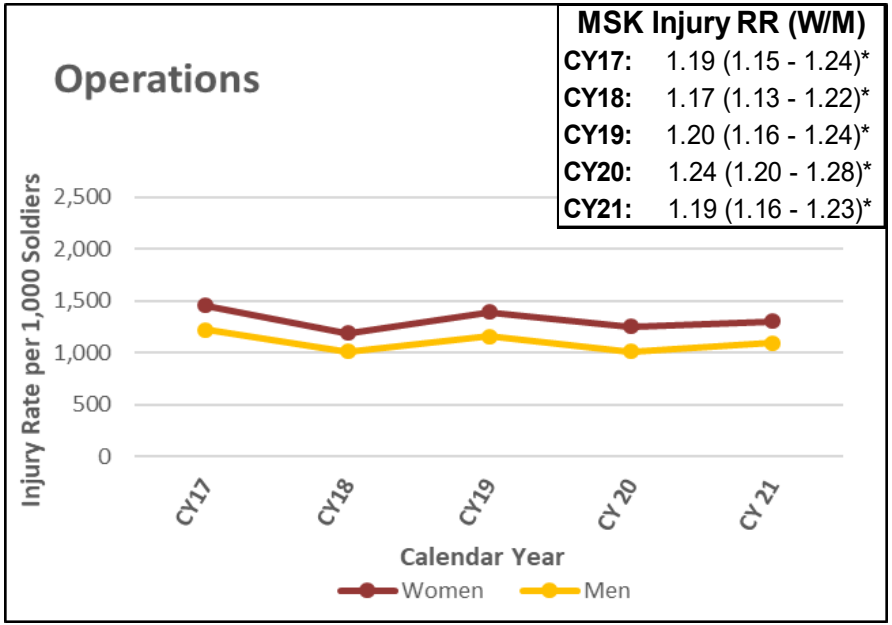
* Rate Ratio (W:M) is statistically significant ($p<0.05$) for the functional category

Injury Rate Trends for Operations Functional Category

Annual MSK Injury Rates
Operations Enlisted Soldiers by Sex, 2017-2021



Annual MSK Injury Rates
Operations Officers by Sex, 2017-2021



MSK Injury Rates in Combat Arms MOS/AOC
Enlisted & Officers, Army Active Component, CY 2021

Enlisted MOS	Women		Men		Injury Rate Ratio (W:M)[c]
	Person-yrs.	Injury Rate[a]	Person-yrs.	Injury Rate[a]	
Infantry (11)	421	2,020	58,439	1,175	1.72 (1.61, 1.84)
Engineer (12)	1721	2,245	14,728	1,447	1.55 (1.50, 1.61)
Field Artillery (13)	1261	2,116	18,965	1,298	1.63 (1.57, 1.70)
Special Forces (18)[b]	4		7,729	1,687	
Armor (19)	412	2,324	17,382	1,266	1.84 (1.72, 1.96)

Officer AOC	Women		Men		Injury Rate Ratio (W:M)[c]
	Person-yrs.	Injury Rate[a]	Person-yrs.	Injury Rate[a]	
Infantry (11)	109	1,760	7,955	1,140	1.54 (1.34, 1.78)
Engineer (12)	586	1,293	3,317	1,132	1.14 (1.06, 1.24)
Field Artillery (13)	696	1,283	4,406	1,017	1.26 (1.11, 1.29)
Special Forces (18)[b]	2		1,527	1,843	
Armor (19)	222	1,232	3,434	953	1.29 (1.15, 1.47)

Source: Defense Medical Surveillance System: 2022 prepared by DCPH-A Injury Prevention Branch

[a]Injury Rate: Number of MSK injuries per 1,000 Soldiers per year

[b]Injury rates for women in SF and RR (W/M) are not shown since there were fewer than 10 women in SF

[c]Injury rate ratio (W/M): injury rate among women / injury rate among men

Injury Surveillance Quarterly Reporting
16 Integrated Brigades

July – September 2021		Combined Total 16 Brigades			Infantry & Armor Occupational Specialties			All Other Occupational Specialties		
		Total	M	W	Total	M	W	Total	M	W
	Assigned Strength (n)	73,235	65,617	7,618	28,638	28,192	446	44,597	37,425	7,172
Musculoskeletal (MSK) Injuries	Soldiers Injured (%)	17%	17%	22%	16%	16%	16%	18%	17%	22%
	Number of Injuries (n)	18,062	15,560	2,502	6,529	6,410	119	11,533	9,150	2,383
	Injury Rate (injuries per 100/mo)	8.2	7.9	10.9	7.0	7.0	9.0	9.0	8.6	11.0
Injury Type	Traumatic Injuries (%)	15%	15%	10%	16%	16%	9%	14%	15%	10%
	Overuse Injuries (%)	85%	85%	90%	84%	84%	91%	86%	85%	90%
Anatomic Location	Upper Extremity (%)	20%	21%	15%	20%	20%	21%	20%	21%	15%
	Lower Extremity (%)	53%	52%	57%	53%	52%	57%	53%	52%	57%
	All Other (%)	27%	27%	28%	27%	28%	22%	27%	27%	28%

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Leading Causes of MSK Injury with Limited Duty Profile, 2021

Causes of MSK Injury Profiles[b] (CY 2021)	Army AC			Infantry (11-series)	Armor (19-series)
	Total (% profiles)	Women (% profiles)	Men (% profiles)	Total (% profiles)	Total (% profiles)
Running	**29.7**	**32.1**	**28.8**	**24.1**	**24.1**
MOS work tasks (lifting, mechanical repair, push/pull objects, other work task):	13.9	12.1	14.5	10.8	15.9
Gradual/Insidious Onset	12.6	**15.1**	**11.6**	9.8	11.8
Fall/Slip/Trip	8.9	8.4	.1	12.8	12.1
Strength Training	8.6	7.8	8.9	9.2	7.7
Road Marching/Load Carriage	7.8	**9.3**	**7.3**	13.2	9.5
Sports	5.4	2.7	6.4	4.5	5.4
Physical Training, Other[c]	4.0	4.3	3.9	3.7	3.2
Other, Specified[d]	9.1	8.0	9.5	11.8	10.2

Data Source: eProfile (Medical Operational Data System), 2022; prepared by DCPH-A Injury Prevention Branch

Notes: "n" in the column headers represents the number of injury-related temporary profiles in eProfile in CY 2021. Green shaded cells: proportion of Infantry or Armor is significantly smaller compared to proportion for the Army Active Component; Pink shaded cells: proportion of Infantry or Armor is significantly larger compared to the proportion for the Army Active Component.

[a]Army Active Component (total and by gender) does not include Infantry (11-series) or Armor (19-series).

[b]Causes of MSK injury profile are ordered by frequency (high to low) of causes for the total Army Active Component [c]"Physical Training, Other" does not include running or strength training.

[d]"Other, Specified" includes all other specified causes of injury; each individual cause accounted for <5% of column totals.

Summary

- Historically:
  - In initial entry training, women have 2x higher injury rates compared to men.
  - In operational units, women have 1.4x higher injury rates compared to men.
- Among Functional Categories, highest rate ratios among Operations (enlisted) and Special Operations (officer).
- In Operations, among officers and enlisted, women have 1.2 to 1.6x higher injury rates compared to men.
- In integrated brigades, women and men in integrated occupations (infantry and armor) had lower injury rates compared to all other occupations combined. Women's rates remained 1.1 to 1.8 times higher than men.
- Running was the leading cause of injury across occupational specialties and sex; other causes varied by occupation and sex.