



# Injury Epidemiological Investigations in Army Special Populations

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January 21, 2025

# Disclaimer

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# The Public Health Process



From Jones et al. 2010:

- Surveillance: identify the problem
- Investigations & Evaluations: determine causes and risk factors
- Intervention: identify what works to prevent the problem
- Policy: authorities implement prevention strategies
- Evaluation: assess effectiveness of prevention strategies



# Injury Prevention Epidemiologic Investigations & Special Studies

- *Assessments of injuries and injury risk for:*
  - Infantry units
  - Military police
  - Army Wheeled Vehicle Mechanics
  - Medical (Leonard Wood Army Community Hospital staff)
  - Armor Brigade
  - Chemical Brigade
  - Paratroopers
  - Quartermaster Brigade
  - U.S. Army Band
  - Special Operations Forces
  - Army War College
  - Command and General Staff College
  - Sergeants Major Course
  - Ordnance School
  - Combat Medic Advanced Individual Training
  - Military Working Dogs
  - Federal Bureau of Investigation
  - Running Shoe Study: Marine Corps Officer Basic Training, Air Force Basic Military Training



# Survey Background

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- For investigations in special populations, surveys are often helpful to supplement other data
  - Detailed information about circumstances associated with injuries (activity, mechanism, location)
  - Other related factors associated with injury risk not usually captured in medical records or elsewhere (health behaviors like sleep and tobacco use, unique occupational exposures and injury risk factors, etc.)
- Usually electronic in recent years
- Responses only reported in aggregate
- Must be approved by the Defense Centers for Public Health-Aberdeen (DCPH-A) Public Health Review Board



# Special Population #1: U.S. Army Reserves

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# Background

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- Fulfilled a 2020 request from the U.S. Army Reserve Command (USARC) to investigate impacts of a new fitness program Pilot among 21 selected Reserve units in the southeast U.S.
  - Included all Holistic Health and Fitness domains: Physical, Mental, Nutritional, Sleep, Spiritual
  - Baseline phase 2021 – summarized pre-implementation injuries, risk factors, health behaviors
  - Follow-up phase 2023 – compared injuries, risk factors, and health behaviors before and after new fitness program
- Reservists are not typically included in Army surveillance or investigations; sparse literature about injuries and fitness among Reservists



# Background

- A novel Pilot program was necessary for the geographically-diverse and part-time Reserve population
- USARC Pilot design includes two groups with differing degrees of support, plus a comparison group

Year 1: 1 AUG 2021 Year 2: 1 AUG 2022	<u>Pilot A</u>	<u>Pilot B</u>	<u>Comparison Group</u>
	<b><u>Pilot A and B common elements in red</u></b>		
<u>Participating Units</u>	7 units, southeast U.S.	7 units, southeast U.S.	7 units, southeast U.S.
<u>Pilot Resources</u>	<ul style="list-style-type: none"> <li>• Virtual Holistic Health and Fitness (H2F) education 2x/year, 8 hours via Contracted H2F team (Year 1)</li> <li>• Access to CoachMe Plus- mobile app to deliver customized physical training programs (Year 1)</li> <li>• <b>Access to H2F Education via All Partners Access Network (APAN) website</b></li> <li>• <b>Link to Troop Program Unit (TPU) Physical Therapist, Occupational Therapist, and Dietitian</b></li> <li>• <b>1:100 Instructor-to-Soldier ratio for Master Fitness Trainers (MFTs)/Master Resilience Trainers (MRTs)</b></li> <li>• <b>Human Performance Advisor</b></li> <li>• Eight 90-minute education sessions by O2X<sup>®</sup> (Year 2)</li> <li>• <b>O2X<sup>®</sup> mobile application (Year 2)</b></li> <li>• <b>3-day H2F Summit events, education, resources, and Individual assessments provided on H2F domains (Year 2)</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Access to H2F Education via APAN website</b></li> <li>• <b>Link to TPU Physical Therapist, Occupational Therapist, and Dietitian</b></li> <li>• <b>1:100 Instructor-to-Soldier ratio for MFT/MRT</b></li> <li>• <b>Human Performance Advisor</b></li> <li>• <b>O2X<sup>®</sup> mobile application (Year 2)</b></li> <li>• <b>3-day H2F Summit events, education, resources, and Individual assessments provided on H2F domains (Year 2)</b></li> </ul>	No access to H2F Pilot Resources





## Results: U.S. Army Reserves Demographics and Characteristics (n=3,588 Follow-up participants)

- 71% male, 29% female
- Average age 30 ± 9 years
- 57% E1-E4
- 28% men and 17% women were obese (Body Mass Index > 30 kg/m<sup>2</sup>)

Demographic differences from the Active Duty population suggested potential differences in injuries, fitness, and other holistic health metrics



# Unique Population Characteristics

	Impacts on fitness, injuries, obesity, other H2F metrics?
Older average age (30 ± 9)	<b>Guesses?</b>
Higher proportion of women (29%)	
Higher average BMI	
Little or no unit training	

Discussion: How might these unique population characteristics impact H2F outcomes?



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# Results: U.S. Army Reserves Fitness Test Performance

- The groups with H2F-related resources showed improvements in ACFT performance between Baseline and Follow-up

Men	Pilot A		Pilot B		Comparison	
	Baseline (n=496)	Follow-up (n=496)	Baseline (n=329)	Follow-up (n=329)	Baseline (n=436)	Follow-up (n=436)
Deadlift (pounds, mean ± SD)	192 ± 57	203 ± 63*	185 ± 61	206 ± 66*	176 ± 52	198 ± 59
Standing Power Throw (meters, mean ± SD)	8.5 ± 1.8	9.1 ± 1.7*	8.9 ± 1.8	9.3 ± 1.8*	8.5 ± 1.9	8.9 ± 1.7
Hand-release Push-ups (repetitions, mean ± SD)	26 ± 13	28 ± 14*	25 ± 13	26 ± 12*	22 ± 13	26 ± 12
Sprint Drag Carry (minutes, mean ± SD)	2.1 ± 0.4	2.0 ± 0.3*	2.1 ± 0.4	2.1 ± 0.3	2.2 ± 0.4	2.1 ± 0.3
2-mile Run (minutes, mean ± SD)	18.1 ± 2.9	18.5 ± 2.4*	18.8 ± 2.8	18.6 ± 2.4	18.5 ± 2.8	18.2 ± 2.5
Total Score (ACFT 3.0 Baseline, ACFT 4.0 Follow-up)	418 ± 73	441 ± 59*	402 ± 83	431 ± 70*	390 ± 100	426 ± 74
<b>Women</b>	(n=147)	(n=147)	(n=93)	(n=93)	(n=133)	(n=133)
Deadlift (pounds, mean ± SD)	155 ± 26	155 ± 34	153 ± 23	149 ± 33	148 ± 20	144 ± 30
Standing Power Throw (meters, mean ± SD)	5.6 ± 1.3	5.6 ± 1.1	5.4 ± 1.3	5.6 ± 1.2*	5.3 ± 1.3	5.5 ± 1.2
Hand-release Push-ups (repetitions, mean ± SD)	18 ± 9	21 ± 11*	17 ± 10	18 ± 9	16 ± 9	19 ± 10
Sprint Drag Carry (minutes, mean ± SD)	2.7 ± 0.5	2.6 ± 0.4	2.8 ± 0.5	2.9 ± 0.6	2.8 ± 0.5	2.8 ± 0.5
2-mile Run (minutes, mean ± SD)	20.3 ± 3.2	19.7 ± 2.7	20.5 ± 2.9	20.3 ± 2.4	20.4 ± 2.9	20.2 ± 2.1
Total Score (ACFT 3.0 Baseline, ACFT 4.0 Follow-up)	313 ± 101	437 ± 74*	309 ± 92	407 ± 89*	314 ± 79	419 ± 65

Note: \*p<0.05, paired samples t-test (improved performance in green, decline in performance in red)



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# Results: U.S. Army Reserves Fitness Test Performance

- The group with the most H2F-related resources had better ACFT performance, especially for women, compared to the other groups.

Follow-up Data	MEN			WOMEN		
	Pilot A	Pilot B	Comparison	Pilot A	Pilot B	Comparison
	(n=541)	(n=386)	(n=486)	(n=187)	(n=157)	(n=184)
Deadlift (pounds, mean ± SD)	211 ± 64	206 ± 63	204 ± 64	150 ± 31*†	141 ± 25†	141 ± 26
Standing Power Throw (meters ± SD)	9.0 ± 1.8†	9.3 ± 1.9*†	9.0 ± 1.7	5.4 ± 1.1	5.4 ± 1.1	5.4 ± 1.1
Hand-release Push-ups (repetitions, mean ± SD)	29 ± 14*	28 ± 13	27 ± 14	22 ± 10*†	18 ± 8*†	20 ± 10
Sprint Drag Carry (minutes, mean ± SD)	2.0 ± 0.3*	2.1 ± 0.3	2.1 ± 0.3	2.7 ± 0.4†	2.9 ± 0.6*†	2.8 ± 0.4
Plank (minutes, mean ± SD)	2.1 ± 0.8*†	1.9 ± 0.7	1.9 ± 0.7	2.0 ± 0.7†	1.8 ± 0.7†	1.9 ± 0.7
2-mile Run (minutes, mean ± SD)	18.4 ± 2.5*	18.4 ± 2.5*	18.1 ± 2.4	19.9 ± 2.6	20.2 ± 3.1	19.9 ± 2.4
Total Score (ACFT 4.0)	443 ± 64*	435 ± 63	431 ± 74	430 ± 69*†	396 ± 86*†	420 ± 72

#### Notes:

\*Statistically significant difference from the Comparison group ( $p < 0.05$ ), ANCOVA adjusting for age and BMI (better performance in green, worse in red)

†Statistically significant difference between Pilot groups ( $p < 0.05$ ), ANCOVA adjusting for age and BMI (better performance in green, worse in red)

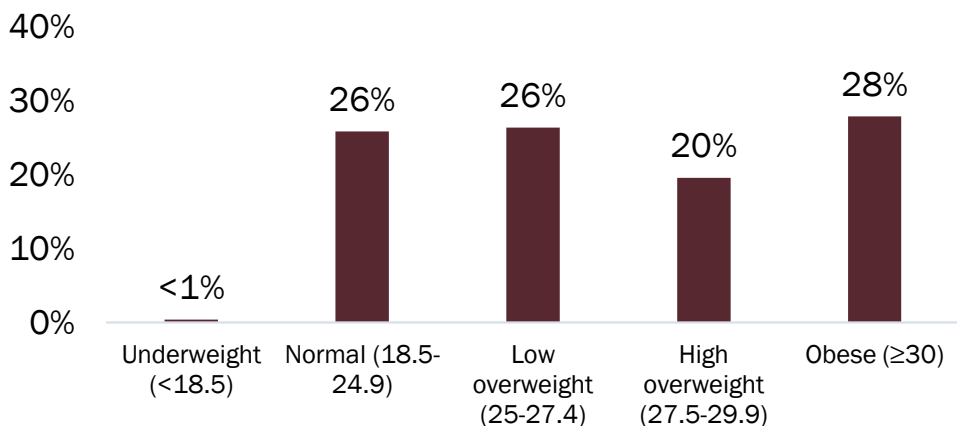
- Based on multivariable logistic regression, non-obese BMI ( $< 30 \text{ kg/m}^2$ ) was the factor with the strongest association with passing the ACFT for both sexes



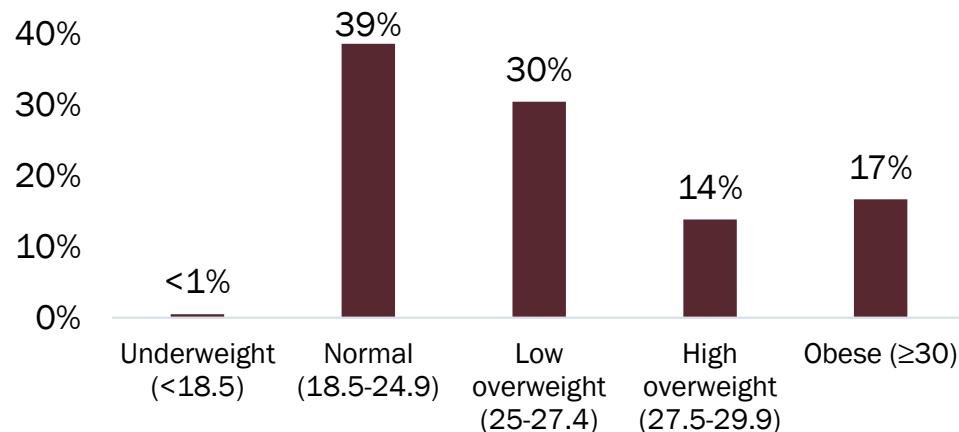
# Results: U.S. Army Reserves Body Composition

- Average BMI during the Follow-up timeframe was 28 kg/m<sup>2</sup> among men and 26 kg/m<sup>2</sup> among women. There were negligible differences between Baseline and Follow-up or across groups.
- Based on multivariable logistic regression, age was the factor with the strongest association with obesity for both sexes ( $\geq 25$  years men,  $\geq 35$  years women)

## Men (n=2,210)



## Women (n=809)



## Other Interesting Findings - U.S. Army Reserves

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- This Reserves population had lower proportions of Soldiers reporting tobacco use, compared to the overall Army
- No significant differences were observed in health behaviors (sleep, tobacco use, nutritional intake, etc.) or health knowledge between Baseline and Follow-up



# Discussion

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- Thoughts, insights, questions about injuries, fitness, and obesity among Army Reservists?



# Special Population #2: U.S. Army Band

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# Background

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- Fulfilled a 2018 request from unit Commanders to investigate musculoskeletal injuries among members in the 42S MOS in the Military District of Washington/National Capital Region (MDW/NCR):
  - The U.S. Army Band (TUSAB), The U.S. Army Field Band (TUSAFB), The U.S. Army Old Guard Fife & Drum Corps (OGFDC)
- Unique population - injuries and risk factors may differ from other Army populations
- Extends previous work by DCPH-A Injury Prevention, 2004-2005



## Demographics (n=465 Army Band Members, rosters)

Variable	Characteristic	All Band Members n=465 n (%)
Sex	Female	113 (24.3)
	Male	352 (75.7)
Age (years)	18–24	12 (2.6)
	25–34	144 (31.0)
	35–44	192 (41.2)
	≥ 45	117 (25.2)
	Mean ± SD	38.9 ± 8.0
Rank	E1–E4	4 (0.9)
	E5–E9	449 (96.6)
	O1–O6	9 (1.9)
	W1–W5	3 (0.6)

Instruments were predominantly brass and woodwinds in all groups; more percussion in Old Guard Fife & Drum



# Unique Population Characteristics

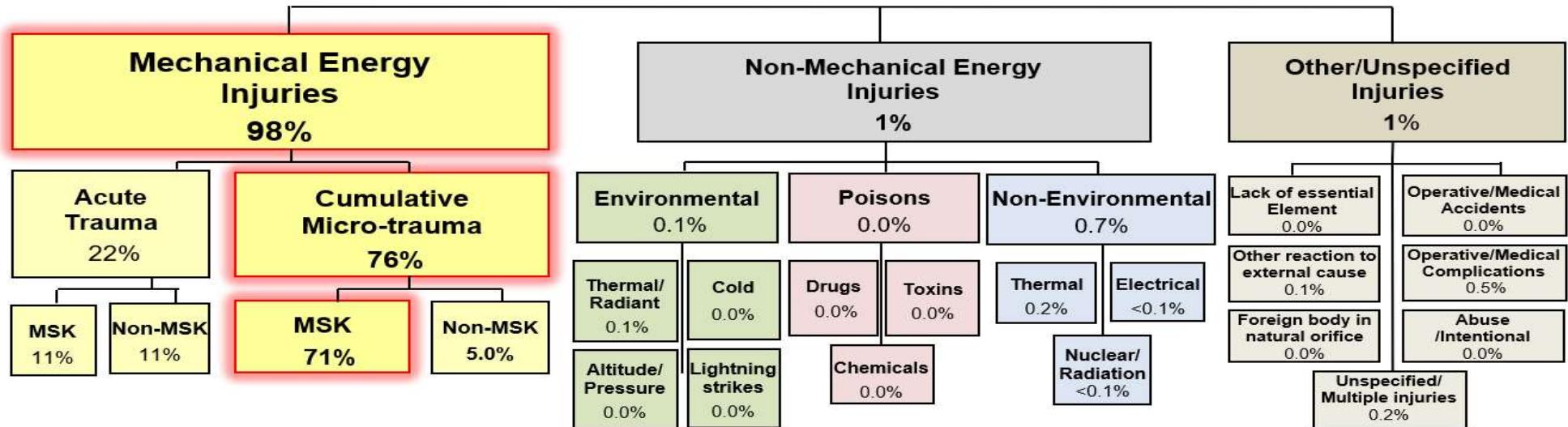
	Impacts on injuries and injury risk factors
Older average age (39 ± 8)	<b>Guesses?</b>
Higher proportion of women (24%)	
Extended standing, sitting, marching	
Non-neutral playing postures	
Loading/unloading instruments and equipment for performances (*some)	

Discussion: How might these unique population characteristics impact injuries and injury risks?



# Results: U.S. Army Band Injuries

- Medical record
  - n=766 medical record injuries, October 2017-December 2018
  - 71% of injuries were MSK overuse



# Injury Rates and Prevalence, October 2017–2018

	All Band Members n=465	All Army n=465k
Crude injury rate per 1,000 person-years	1,328	1,821
Age- and gender-adjusted injury rate per 1,000 person-years	1,040	1,821
Percent with at least one medical encounter for injury	60	56
Total medical encounters for injuries (including follow-up visits and long-term effects of MSK injuries)	1,919	2.2M



# Results: U.S. Army Band Injuries

- Self-reported via electronic survey
  - 48% response rate (n=221, total n=465)
  - 80% of respondents reported at least one injury in the previous 12 months (n=176)
  - Most frequently injured body regions were the lower back (26%), foot/toe (13%) and knee (9%)

## Top activities associated with injury

(self-report, n=174 injuries)

21% running for physical training

11% repetitive movements associated with playing

11% standing while practicing, rehearsing, or performing

## Top mechanisms of injury

(self-report, n=174 injuries)

30% band-related overuse/repetitive motions

25% other overuse/repetitive motions

15% overexertion/over-extension/twisting effort



## Results: Risk Factors for Injury among U.S. Army Band Musicians (Multivariable, Men Only)

		Total n	% with any injury	Odds Ratio (95% CI)	Category p-values
Fitness test 2-mile run time	<15.4 minutes	100	63%	Ref	
	15.4–16.9 minutes	101	70%	1.33 (0.73–2.42)	0.36
	>16.9 minutes	102	84%	2.23 (1.07–4.67)	0.04
	No data	49	90%	N/A	N/A
Estimated body fat percentage	<20.5	113	69%	Ref	
	20.5–23.5	120	68%	0.87 (0.48–1.63)	0.66
	>23.5	117	89%	2.30 (1.02–5.18)	0.04
	No data	2	0%	N/A	N/A
Age (years)	18–34	106	79%	Ref	
	35–44	147	86%	0.88 (0.48–1.63)	0.69
	≥45	99	92%	1.04 (0.47–2.31)	0.93



# Recommended Injury Prevention Strategies U.S. Army Band Musicians

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- Increase physical training, with a variety of activities
  - Leadership support needed, scheduled around occupational expectations (rehearsals, performances, practicing, etc.)
  - Armed Forces Wellness Center services can be utilized for training support and education
  - Support from athletic trainers, physical therapists, occupational therapists have been shown to improve injury risk among musicians
- Request ergonomic assessments to address non-neutral and maladaptive postures
- Use relaxation techniques, take breaks while rehearsing

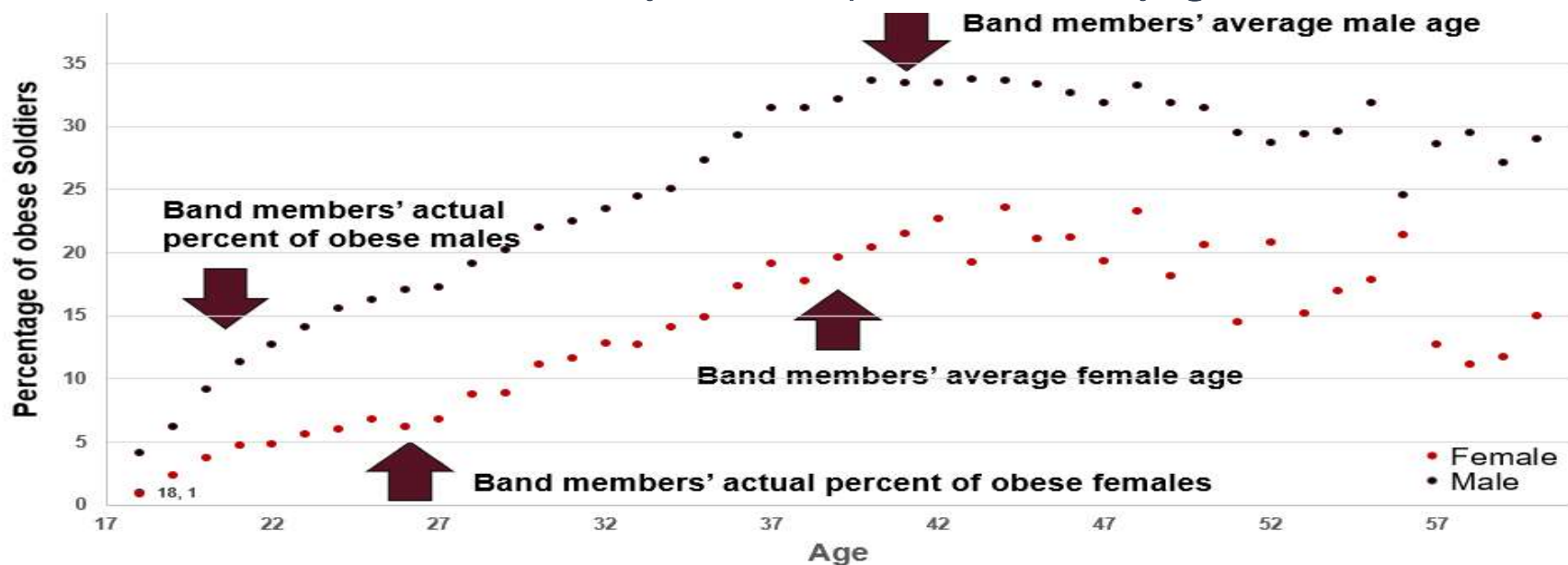




## Other Interesting Findings - U.S. Army Band Musicians

Army Band Soldiers had comparable average BMI (26kg/m<sup>2</sup> men, 24kg/m<sup>2</sup> women) and lower proportion of obese (12% men; 7% women), compared to the overall Army

2017 U.S. Army Active Component, % obese by age



# Discussion

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- Thoughts, insights, questions about injuries among Army Band members?



# Special Population #3: Employees at the General Leonard Wood Army Community Hospital (GLWACH)



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# Background

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- Fulfilled a 2014 request from GLWACH leadership to investigate injuries and health behaviors among hospital staff
- Unique population – employees include both civilians and Active-Duty



## Demographics Summary (n=380 survey respondents)

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- 44% male, 56% female
- 47% were 26-39 years
- 53% military, 45% DA Civilians, 2% other
- 49% Bachelor's degree or higher
- A variety of occupations were represented, including nurses (16%), hospital administration staff (14%), medics (13%), technicians (10%), physicians (6%), and pharmacists (2%)



# Unique Population Characteristics

	Impacts on injuries and injury risk factors
Older average age (47% were 26-39)	<b>Guesses?</b>
Higher proportion of women (56%)	
Variety of occupations represented	

Discussion: How might these unique population characteristics impact injuries and injury risks?



# Results: Military Hospital Employee Injuries

- Did not focus on medical records, civilian medical records not captured in the Military Health System
- Self-reported via electronic survey
  - 33% response rate (n=380, total n=1,147)
  - 47% of respondents reported at least one injury in the previous 12 months (n=178)

Leading injury types	Leading injured body areas	Leading injury activities
Sprain/strain (30%)	Knee (22%)	Running (34%)
Tear (14%)	Lower back (17%)	Other physical training (11%)
Dislocation (8%)	Shoulder (9%)	Lifting heavy objects (9%)



## Results: Risk Factors for Injury among Military Hospital Employees

Variable	Variable category	Total n	% injured	Injury OR (95% CI)	Category p-value
Employee status	Enlisted	117	60%	2.75 (1.32–5.71)	<0.01
	Officer	88	47%	2.98 (1.44–6.17)	<0.01
	DA civilian	169	38%	1.00	
	Other	6	50%	1.11 (0.18–6.72)	0.91
Occupational group	Nurse	61	39%	1.00	
	Physician	23	13%	0.11 (0.03–0.46)	<0.01
	Technician	38	58%	2.08 (0.79–5.50)	0.14
	Pharmacy	8	50%	1.00 (0.18–5.57)	>0.99
	Medic	50	58%	1.43 (0.51–4.00)	0.50
	Other Medical Providers	77	53%	1.35 (0.59–3.10)	0.48
	Admin	53	47%	1.79 (0.77–4.18)	0.18
	Other non-medical/Unspecified	70	43%	1.57 (0.69–3.54)	0.28





## Results: Risk Factors for Injury among Military Hospital Employees (continued)

Variable	Variable category	Total n	% injured	Injury OR (95% CI)	Category p-value
Stress	Yes	119	58%	2.10 (1.30-3.40)	<0.01
	No	261	42%	1.00	
Education level	GED or High School	86	48%	1.32 (0.65-2.64)	0.44
	Associate's	80	58%	2.32 (1.16-4.65)	0.02
	Bachelor's	83	38%	1.00	
	Master's or Doctorate	102	43%	1.87 (0.93-3.76)	0.08
	Other Professional Degree	29	52%	2.27 (0.87-5.90)	0.09



# Recommended Injury Prevention Strategies Military Hospital Employees

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- Leadership should focus on initiatives to address sprains and strains, from activities like heavy lifting and physical training
- Health education should focus on health behaviors contributing to injury risk, like stress management
- Targeted prevention strategies could be used for subpopulations at greater risk (e.g., Active Duty)



## Other Interesting Findings - Military Hospital Employees

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- Also looked at barriers to physical activity
- $\geq 4$  reported barriers to physical activity were associated with lower perceived health
- Leading reported barriers to physical activity:
  - Lack of time (65% of respondents)
  - Lack of motivation (45%)
  - Pain or previous medical condition (27%)



# Discussion

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- Thoughts, insights, questions about injuries among military hospital employees?



# Special Population #4: U.S. Army Road Marching Participants



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# Background

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- Sub-analysis of an investigation of injuries among Soldiers in an infantry brigade, exploring road marching injuries; 2017 analysis of 2014 data
- Unique population – road marching participants only



## Demographics Summary (n=831 survey respondents)

Variable	Category	n (% of total)
Gender	Female	6 (1)
	Male	825 (99)
Age (years) Mean age: 25±5	18-24	474 (57)
	25-34	297 (36)
	35-54	60 (7)
Rank	E1-E4	553 (67)
	E5-E9	200 (24)
	O1-O5	78 (9)
Occupation	Combat Arms	681 (82)
	Combat Services	41 (5)
	Combat Services Support	108 (13)



# Unique Population Characteristics

	Impacts on injuries and injury risk factors
Mostly young, enlisted, combat-arms Soldiers	<b>Guesses?</b>
99% men	
Frequent road marching participation	

Discussion: How might these unique population characteristics impact injuries and injury risks?





## Results: Leading Injury Activities in an Infantry Brigade (n=831 survey respondents)

Road marching was the second highest reported cause of injury in the previous 6 months

Activity associated with injury	Total injuries n (%)	# injuries resulting in limited duty n (%)	Total limited duty days	Average # limited duty days per injury
Physical training (running)	113 (27)	74 (32)	2,514 (28)	31
Road marching	96 (23)	49 (21)	1,840 (20)	33
Physical training (weightlifting)	43 (10)	19 (8)	678 (8)	36
Lifting or moving heavy objects	35 (8)	18 (8)	957 (11)	49
Other physical training	31 (8)	17 (7)	482 (5)	28



## Results: Injury Rates per Mile of Exposure

- Commanders may be tempted to replace running with road marching to address high injury rates during running
- In this population, the relative risk of injury during road marching was higher

Activity associated with injury	Total injuries in prior 6 months	Total injuries resulting in limited duty in prior 6 months	Total miles exposed in prior 6 months	Rate of injury per 10,000 miles	Rate of injury per 10,000 miles resulting in limited duty per mile	Relative risk of injury (95% CI)	Relative risk of injury resulting in limited duty (95% CI)
Running	113	74	347,537	3.3	2.1	-	-
Road marching	96	49	163,392	5.9	3.0	1.81 (1.38–2.37)	1.41 (0.98–2.02)



# Results: Risk Factors for Injuries during Road Marching

## ALL ROAD MARCHING PARTICIPANTS

- Age  $\geq$  35
- Regular occupational lifting 50–100+ pounds
- $\leq$ 4 miles of running per week during personal PT
- Road marching  $\geq$ 5 times per month
- Wearing  $>$ 25% of body weight during road marching

## LOW MILEAGE

(1–19 miles per month)

- Rank E5–E9
- Current smokeless tobacco user

## MODERATE MILEAGE

(20–32 miles per month)

- Rank O1–O5
- No personal PT running participation

*As road marching mileage increased, concurrent participation in other physical activities became a risk factor for injury during road marching*

## HIGH MILEAGE

( $\geq$ 33 miles per month)

- Regular occupational lifting 50–100+ pounds
- $<$ 1–4 miles of running per week during personal PT
- $\geq$ 31 minutes of resistance training per session during personal PT
- Wearing  $>$ 25% of body weight during marching



# Recommended Injury Prevention Strategies

## Road Marching

- Establish a balanced, scheduled training program
  - Include a variety of exercises: aerobic, anaerobic (strength, endurance, power), agility, balance
- Use gradual progression for road march training
  - Follow recommendations in Army Field Manual 7-22 and Army Field Manual 21-18

**Table 7-3. 20-week ruck marching progression**

<b>Week</b>	<b>Recommended Load</b>	<b>Distance (miles)</b>	<b>Time Standard</b>	<b>Pace</b>	
1-2	15–20 lb	2	35 min +/- 5 min	3 mph	
4	25–30 lb	4	65 min +/- 5 min	3 mph	
6	30–35 lb	4	90 min +/- 5 min	3 mph	
8	50–60 lb	6	None	3 mph	
12	60–70 lb	6	None	3 mph	
16	60–80 lb	6	None	3.5 mph	
20	60–80 lb	8	None	3.5 mph	
lb	pounds	mins	minutes	mph	miles per hour



## Other Interesting Findings - Road Marching

- In another recent exploration, road marching injuries among men and women were compared
- Women reported significantly more hip injuries during road marching, compared to men

	Male			Female			Relative risk of road marching injury Female : Male (95% CI)
	# Injuries	# Road marching participants	Rate of Injuries per 1,000 soldiers	# Injuries	# Road marching participants	Rate of Injuries per 1,000 soldiers	
Hip injuries during road marching	5	2,677	2	5	441	11	6.07 (1.76-20.97)



# Discussion

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- Thoughts, insights, questions about road marching injuries?



# Conclusions

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- It's important to explore injuries and injury risks in unique military populations to characterize population-specific injury problems
- Surveys enhance existing data and provide necessary details to inform injury investigations in special populations
- Many common Active Duty Army injury risk factors have also applied in special Army populations (e.g., older age, low fitness, obesity, tobacco use), even when population demographics and exposures differ greatly from the overall Army



# References for Highlighted Injury Investigations

## Army Reserves

- Baseline Technical Information Paper (2023): <https://apps.dtic.mil/sti/trecms/pdf/AD1196570.pdf>
- Baseline manuscript submitted to *BMJ Military Health*, final Technical Report in draft

## Army Band

- Technical Report (2021): <https://apps.dtic.mil/sti/pdfs/AD1134062.pdf>
- Manuscript (2023): <https://www.ingentaconnect.com/contentone/scimed/mppa/2023/00000038/00000004/art00005>
- Previous investigation:
  - Technical Report: <https://apps.dtic.mil/sti/citations/ADA462210>
  - Manuscript: <https://www.sciencedirect.com/science/article/abs/pii/S0958259210000908>
  - Manuscript: <https://onlinelibrary.wiley.com/doi/pdf/10.1002/ajim.20532>





# References for Highlighted Injury Investigations

## Fort Leonard Wood Hospital Employees

- Technical Report (2016): <https://apps.dtic.mil/sti/pdfs/ADA633025.pdf>
- Manuscript (*Workplace Health & Safety*, 2018):  
<https://journals.sagepub.com/doi/full/10.1177/2165079917736069>
- Manuscript (*AMEDD Journal*, 2018)  
<https://medcoeckapwstorprd01.blob.core.usgovcloudapi.net/pfw-images/dbimages/Jan-Jun2018.pdf>

## Road Marching

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