OPTIMISING PHYSICAL PERFORMANCE: TRAINING FEMALE SOLDIERS FOR ARDUOUS ROLES

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ARMY HEALTH AND PHYSICAL PERFORMANCE RESEARCH

DEMANDS OF COMBAT

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SEX DIFFERENCES IN PHYSICAL PERFORMANCE

Women vs Men

Body composition

- 25 - 30% more fat
- 40 - 45% less muscle
- Smaller skeleton

20 - 30% lower aerobic fitness

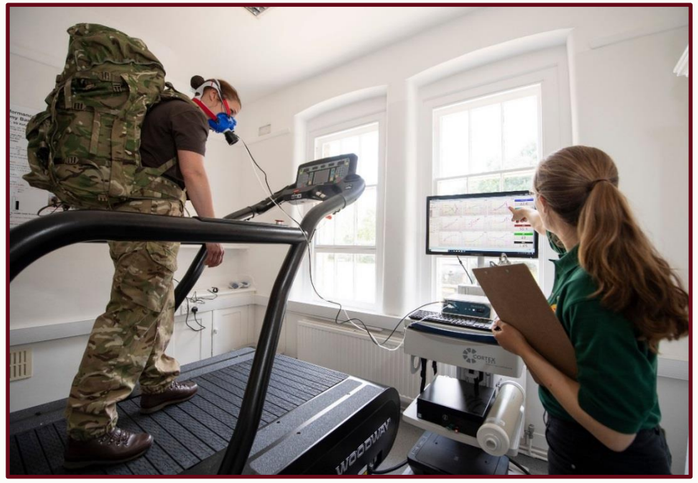
- 25 - 30% smaller hearts and lungs
- 40 - 45% lower muscle mass
- Lower blood volume
- Lower Hb concentrations

20 - 50% lower anaerobic power and capacity

- 40 - 45% less muscle
- Lower percentage of FT fibres

20 - 50% less muscle strength and endurance

- 40 - 45% less muscle
- Higher percentage of ST fibres



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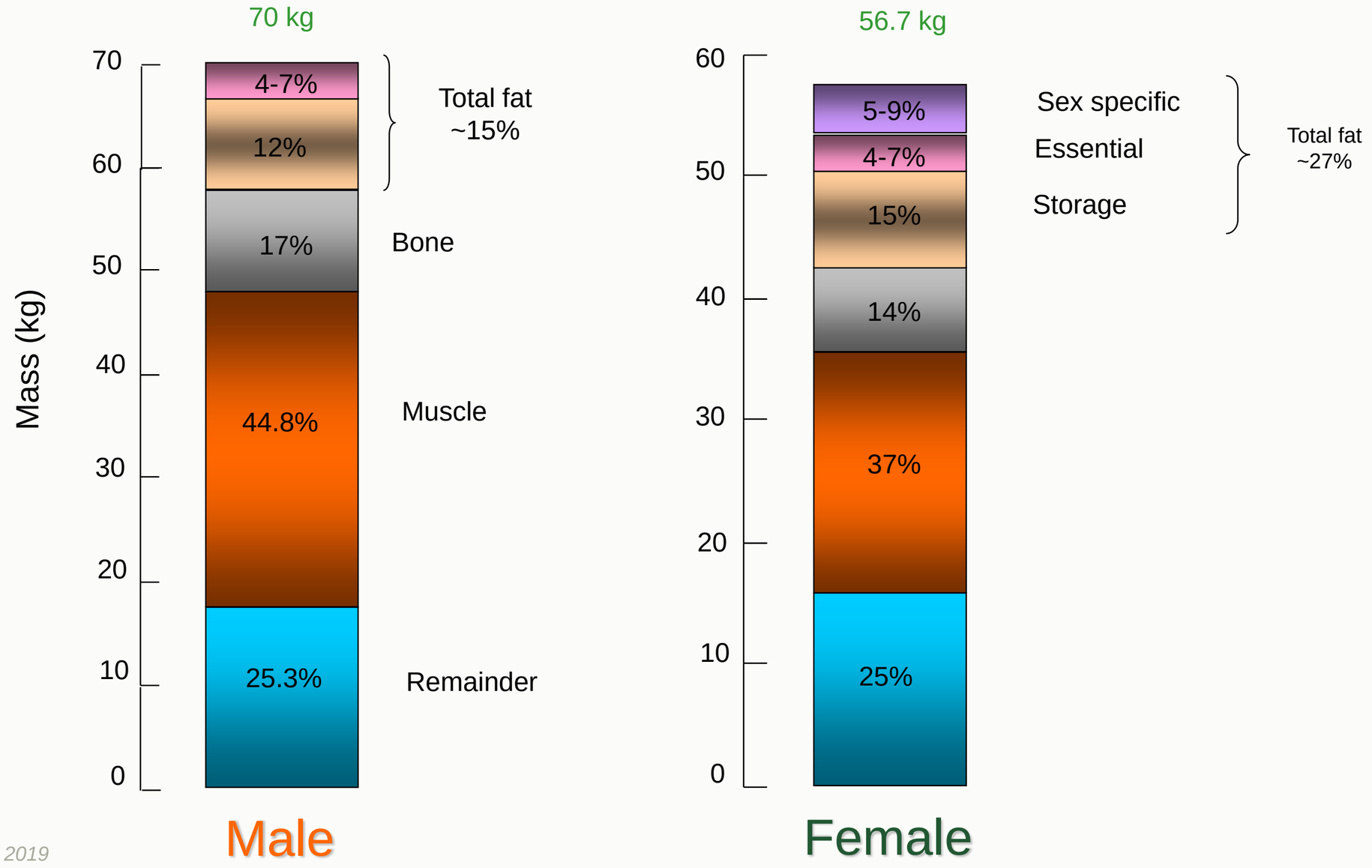
SEX DIFFERENCES IN PHYSICAL PERFORMANCE



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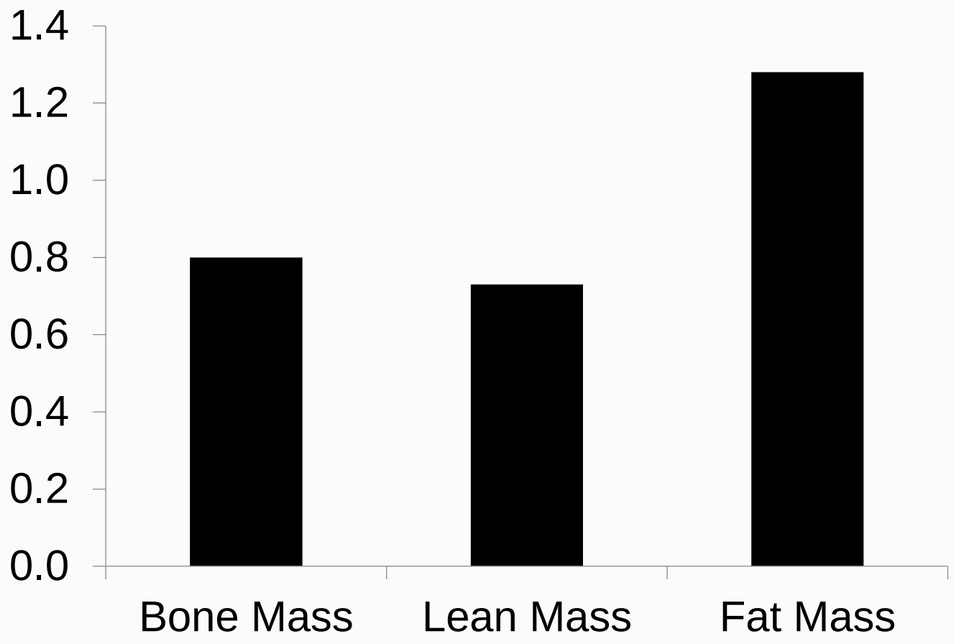
SEX DIFFERENCES IN PHYSICAL PERFORMANCE

F:M Ratio



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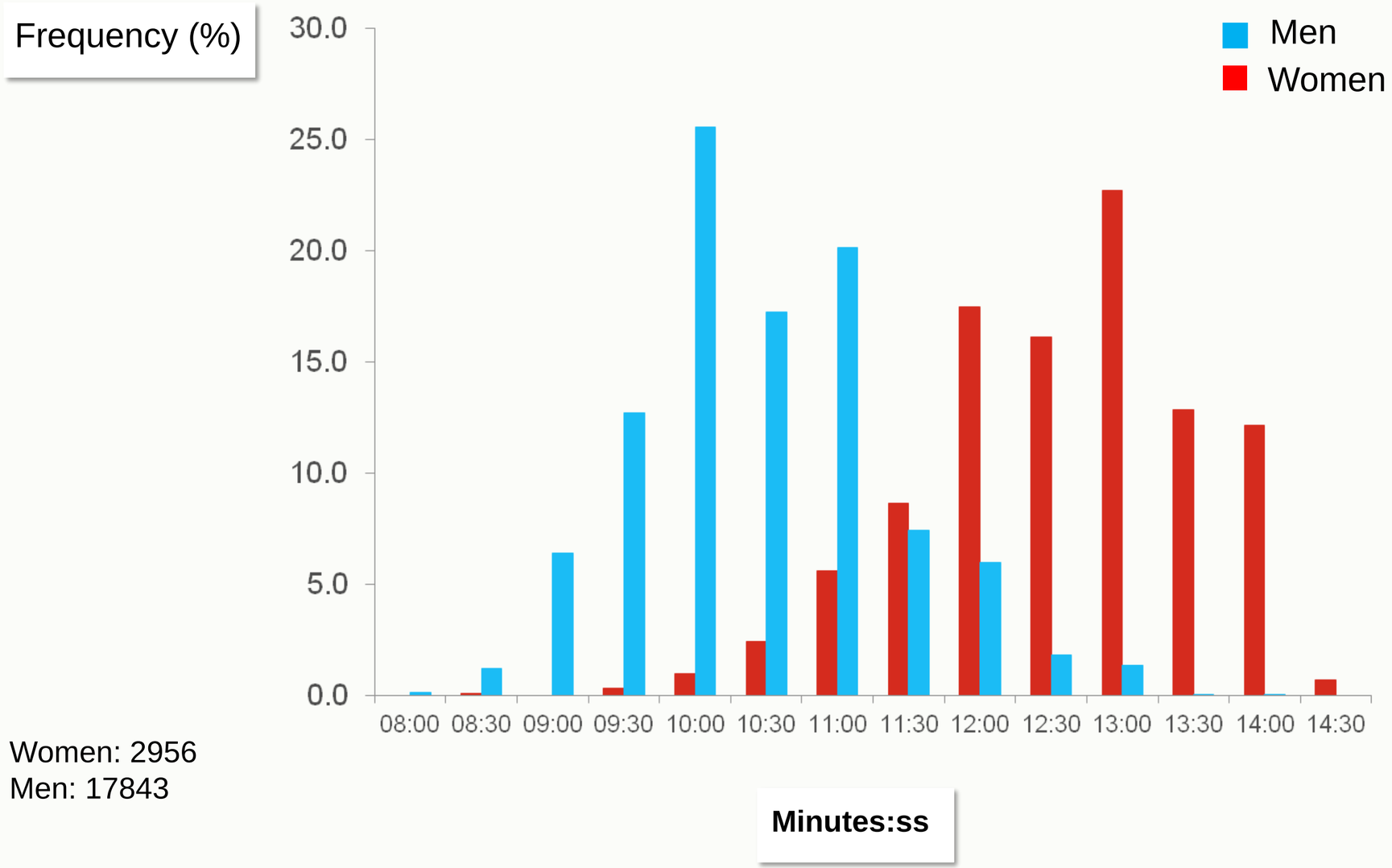
SEX DIFFERENCES IN AEROBIC CAPACITY (1.5 MILE RUN TIME)



Women: 2956
Men: 17843

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SEX DIFFERENCES IN MAXIMAL LIFT STRENGTH

On average, **women work harder than men** during military tasks, which increases their musculoskeletal injury risk by **2 to 3-fold**

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TRAINING FOR THE DEMANDS OF MILITARY ROLES

Training Mode	Effect Size
Upper & lower body resistance training with aerobic training and load carriage exercise	1.69
Upper and lower Body resistance training with aerobic training	1.18
Field based training with load carriage exercise	1.11
Linear upper and lower body resistance training with aerobic training	1.03
Upper and lower body resistance training with aerobic training	0.81
Upper body resistance training with aerobic training	0.79
Upper and lower body resistance training only	0.75
Aerobic training only	0.29

Knapik et al 2012

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TRAINING FOR THE DEMANDS OF MILITARY ROLES

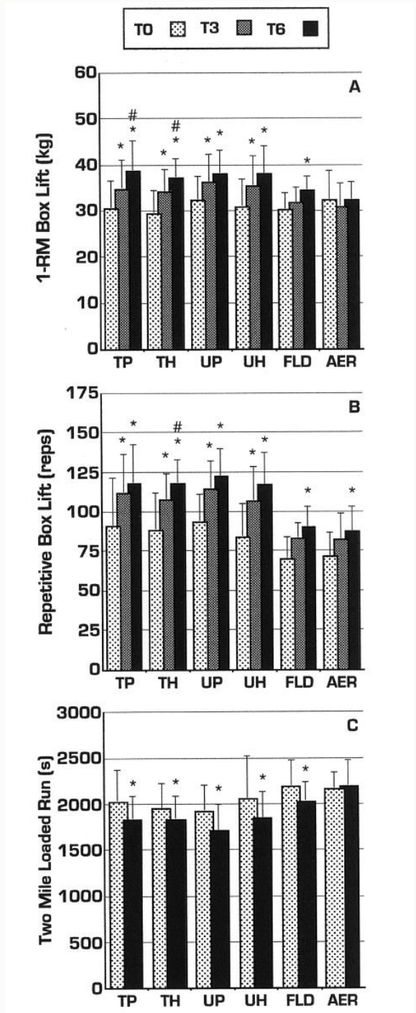
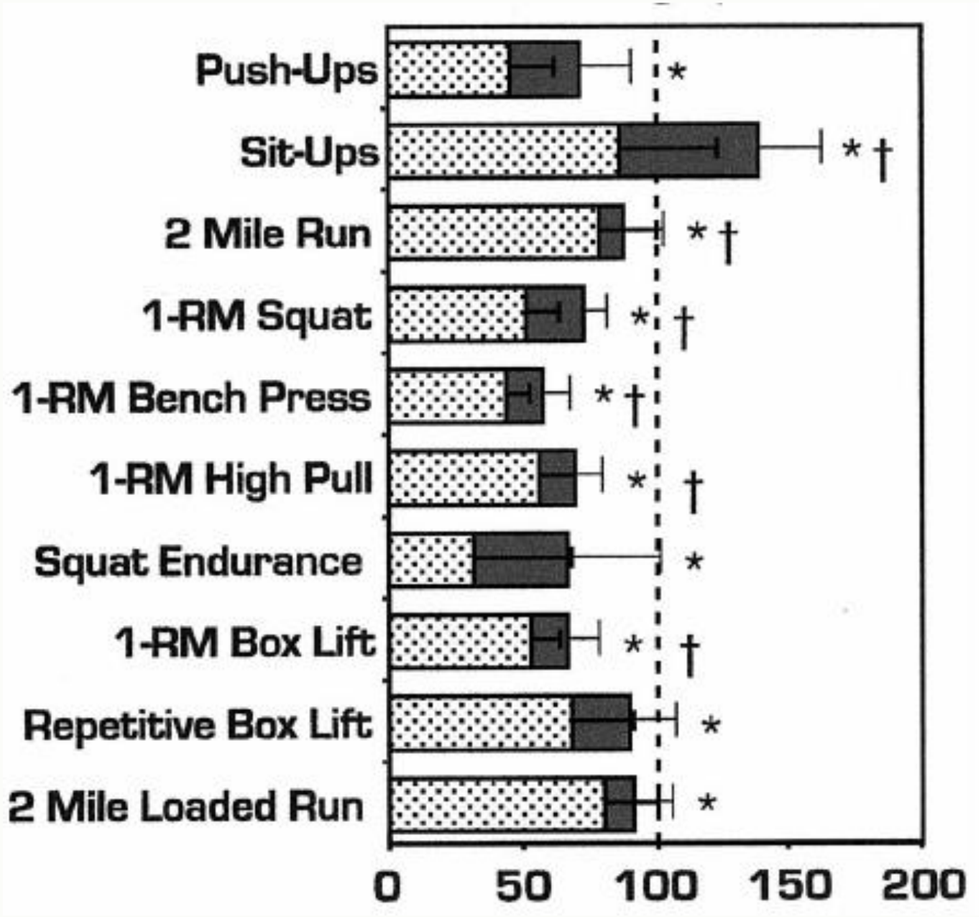


FIGURE 3—Comparison of women's 1-RM box lift (A), repetitive box lift (B), and 2-mile loaded run performances (C) before (T0) and after 3 (T3) and 6 months of training (T6) among total strength/power (TP), total strength/hypertrophy (TH), upper strength/power (UP), upper strength/hypertrophy (UH), field (FLD), and aerobic training groups (AER). Values are means ± SD; * $P \leq 0.05$ vs corresponding T0 value, # $P \leq 0.05$ vs corresponding T3 value.



6 months progressive resistance training in women (Kraemer et al. 2001)

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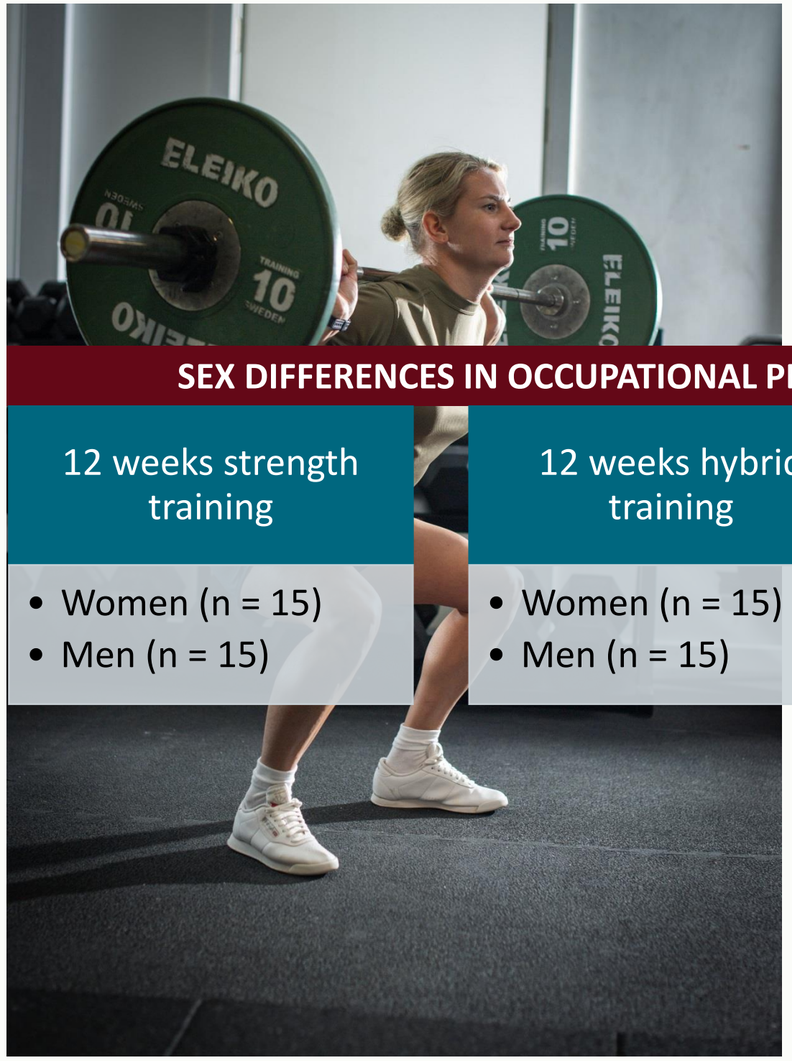
SEX DIFFERENCES IN ADAPTATIONS TO PHYSICAL TRAINING



SEX DIFFERENCES IN OCCUPATIONAL PERFORMANCE ADAPTATIONS TO PHYSICAL TRAINING

12 weeks strength training	12 weeks hybrid training	24 weeks strength + endurance and load carriage training	24 weeks hybrid + endurance and load carriage training
• Women (n = 15) • Men (n = 15)	• Women (n = 15) • Men (n = 15)	• Women (n = 15) • Men (n = 15)	• Women (n = 15) • Men (n = 15)

Medical Innovation 2019

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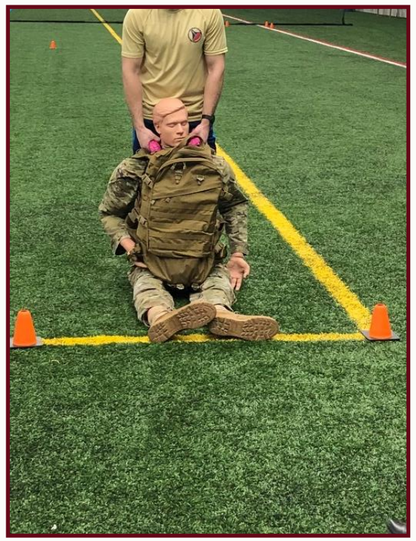
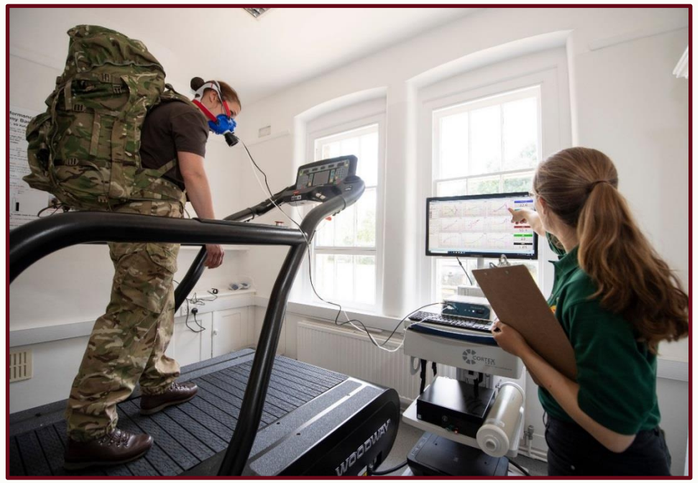
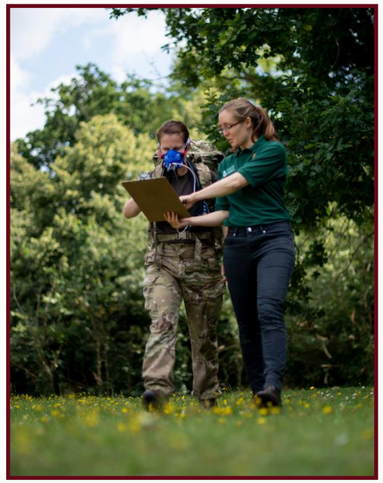
SEX DIFFERENCES IN ADAPTATIONS TO PHYSICAL TRAINING







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THE EFFECT OF PREGNANCY ON PHYSICAL PERFORMANCE

- Weakened pelvic floor;
- Reduced aerobic fitness;
- Reduced in muscle strength;
- Increased ligament laxity;
- Reduction in bone mass;
- Increased risk of musculoskeletal injury.

(Bo et al. 2017)

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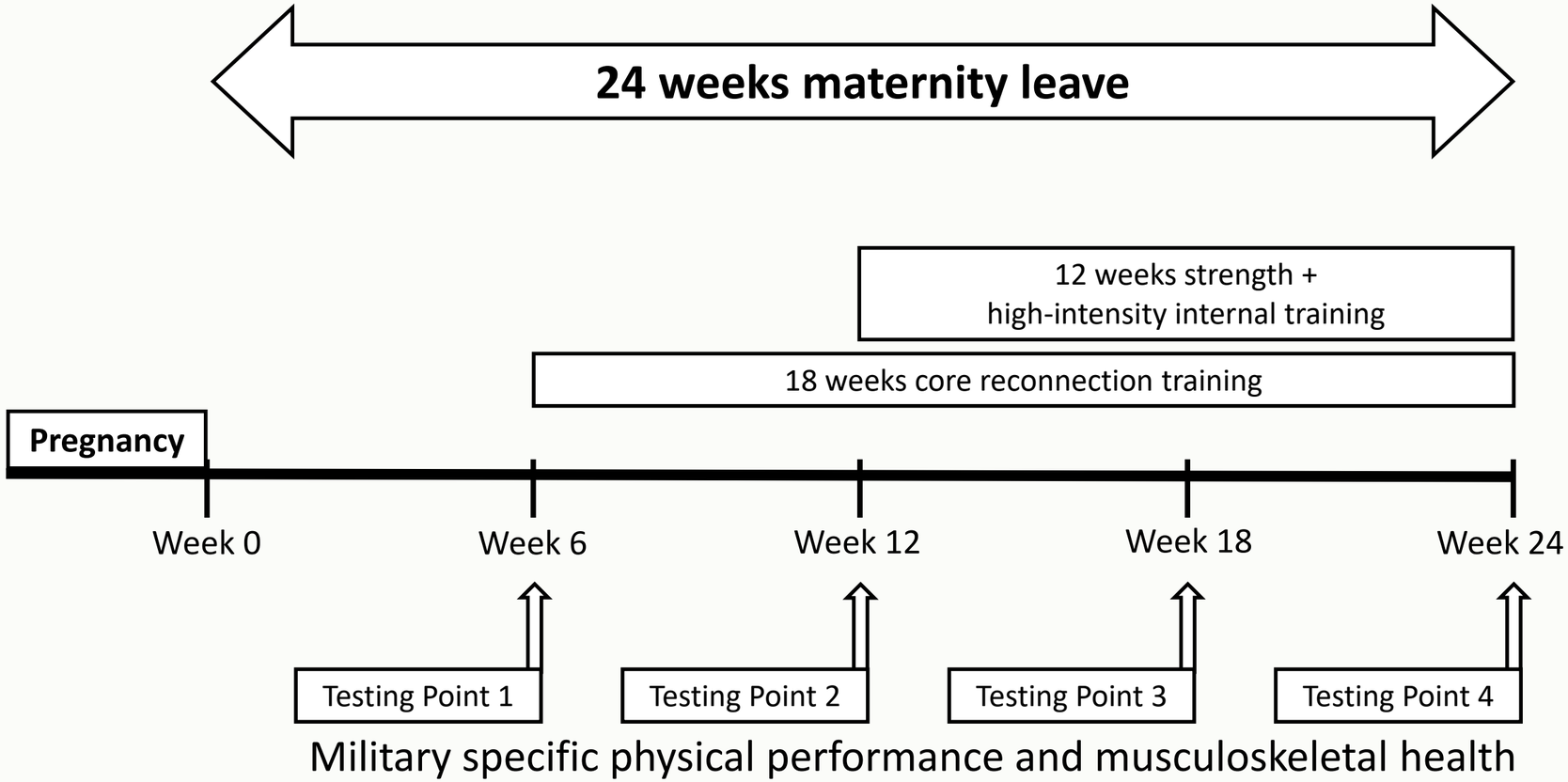
PROJECT PERFORM: PHYSICAL TRAINING POST-PARTUM



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SUMMARY

- Military tasks require muscle strength and aerobic capacity.
- On average, women have lower muscle strength and lower aerobic capacity than men.
- Targeted progressive resistance and endurance training improves performance in occupational roles.
- Requirement for sex-specific training for performance and resilience in military roles is under investigation.
- Physical performance is reduced, and injury risk is increased in the postpartum period.
- Our research aims to optimise training for women in arduous military roles, and on return to work from pregnancy.

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QUESTIONS