



Ministry of Defence

To pee or not to pee? Why is this still a question in UK military aviation?

SAFE Europe Mar 23

KING'S
College
LONDON

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Background

Scope of Presentation

- Exploration of what the gender data gap is and how it may be relevant in aerospace medicine.
- Discussion of a research project into hydration and urination habits in military aviation as a model to discuss the gender data gap.
- Discussion of how we can close the gender data gap in aerospace medicine and optimise the health, wellbeing and performance of female aircrew.



Wg Cdr Jemma Austin

General Practitioner with station, operational, command and staff and research experience.

- Diploma in Aerospace Medicine 2019
- MSc in Aerospace Medicine 2021

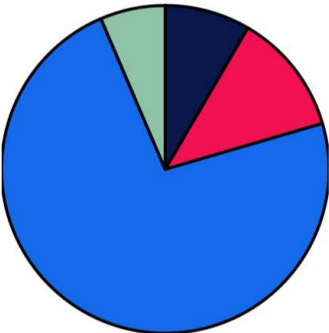
- Undertook the research as part of the Chief of Air Staff fellowship scheme
- SO1 Force Health
- RAF Lead on Servicewomen's Health Improvement Focus Team.



Urination in Aviation Research Summary

- Do UK military aircrew adjust their hydration and urination behaviours to avoid in-flight urination?

Participant Demographics

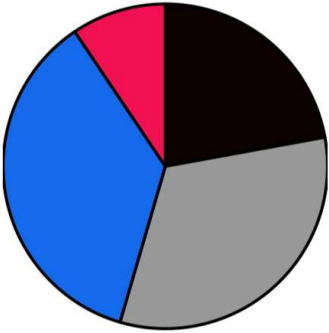


- Royal Navy (21)
- Army (30)
- Royal Air Force (182)
- Reservists (16)

208 Male
Aircrew
Participated



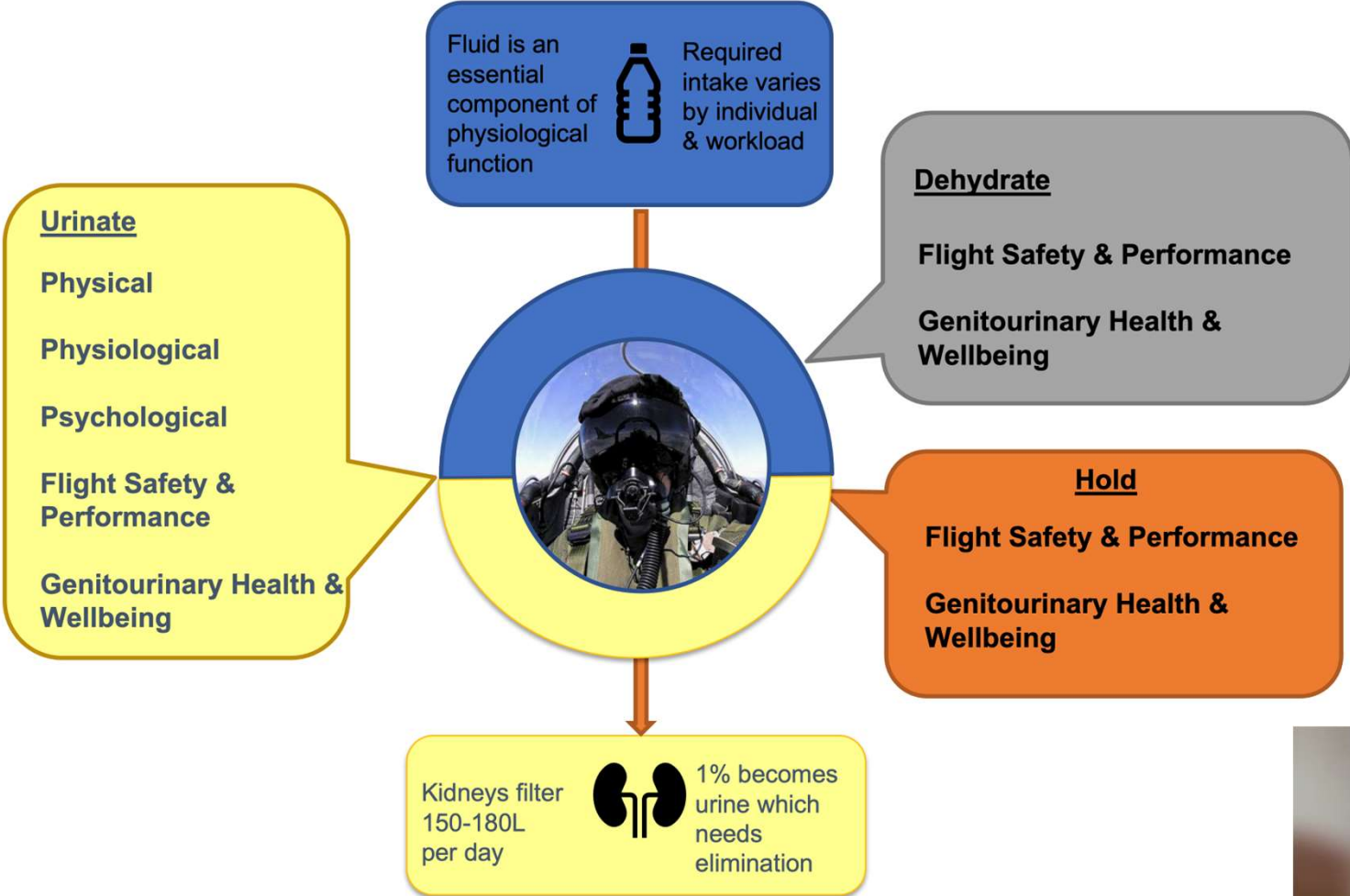
41 Female
Aircrew
Participated (16%)



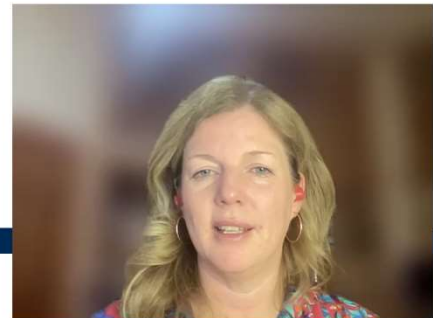
- Fast Jet (FJ) (54)
- Rotary (Rot) (79)
- Multi-engine (MEJ) (88)
- Fixed wing (FWT) (23)



Homeostasis in a nutshell:

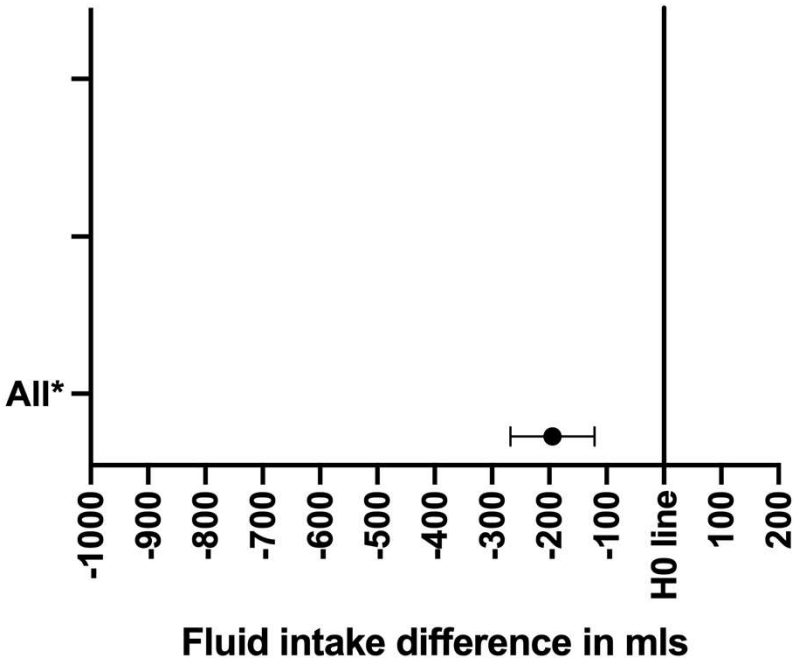


Urination in Aviation – the UK military range.



UK military aircrew self-report a reduction in fluid intake on flying days:

Difference in self-reported fluid intake (in mls) on flying days versus non-flying days in UK military aircrew.



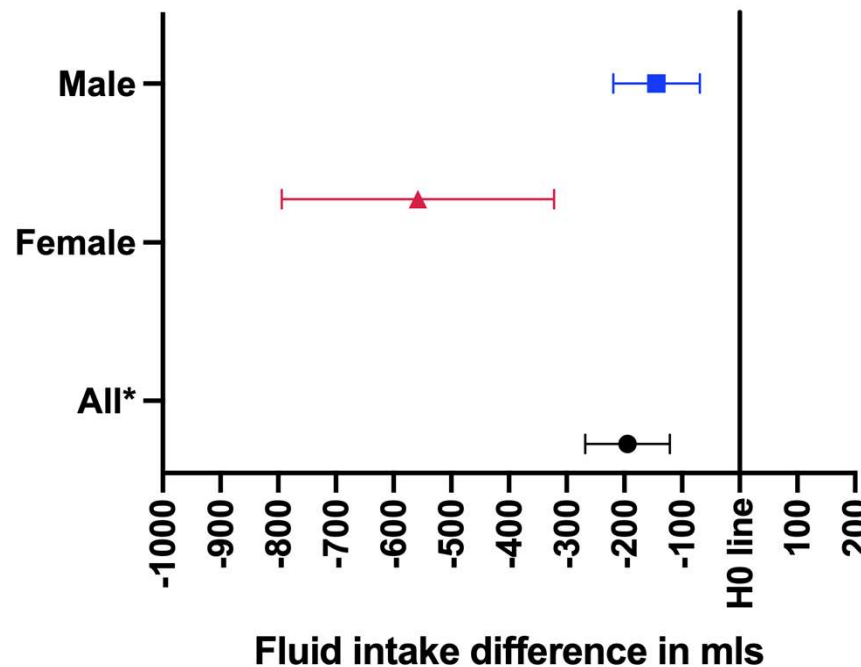
- Mean difference (mls) with 95% confidence intervals represented by bars

Mean difference = -218 mls
t= - 5.21, p=<.001



Sex-disaggregation of data shows a 4-fold greater reduction in fluid intake in females:

Difference in self-reported fluid intake (in mls) on flying days versus non-flying days in UK military aircrew with sex disaggregation.

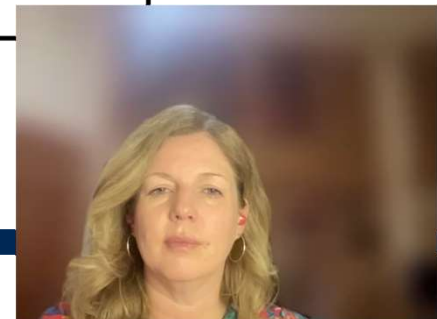


● Mean difference (mls) with 95% confidence intervals represented by bars

■ Male (-150ml)

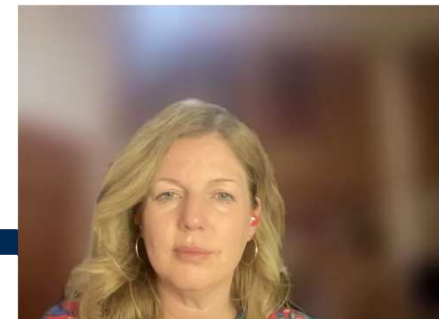
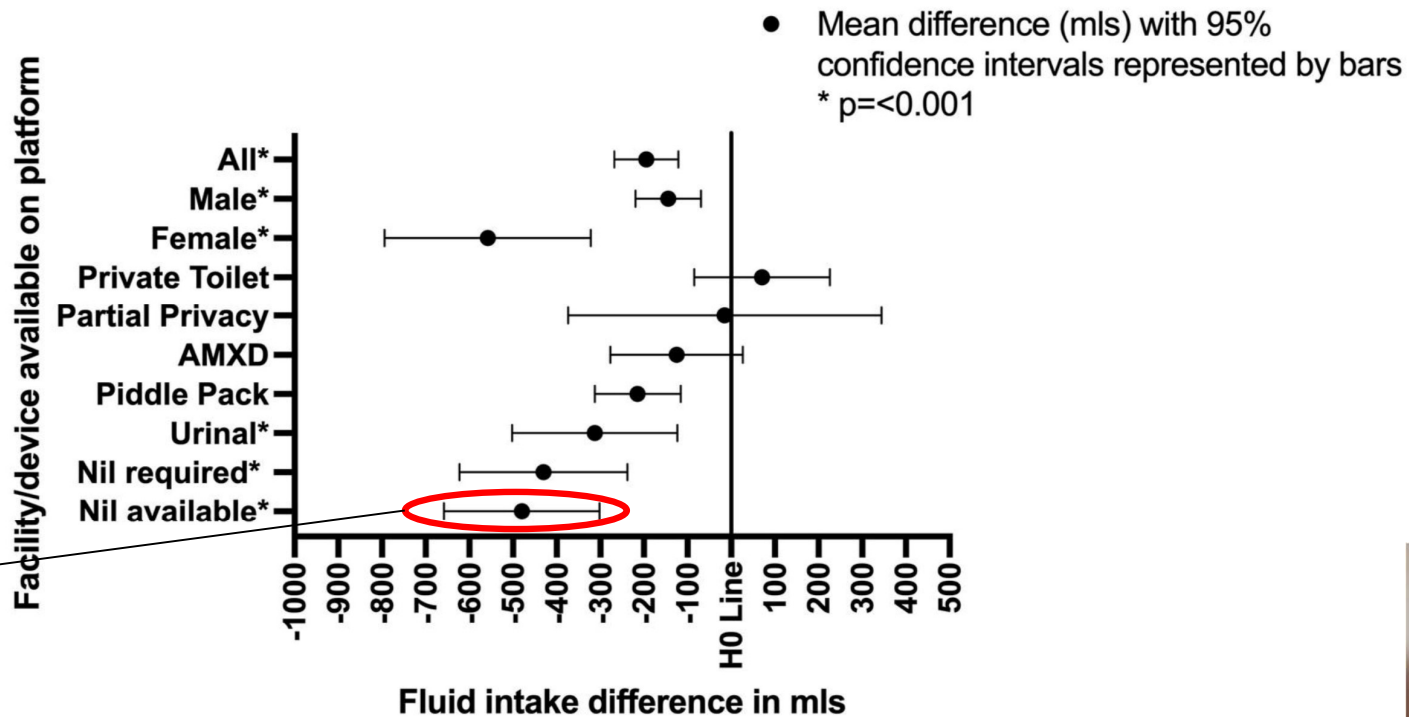
▲ Female (-594ml)

Comparison of medians
 $t=3.72, p<.001$

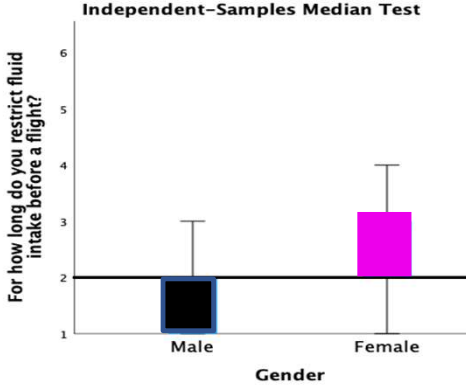
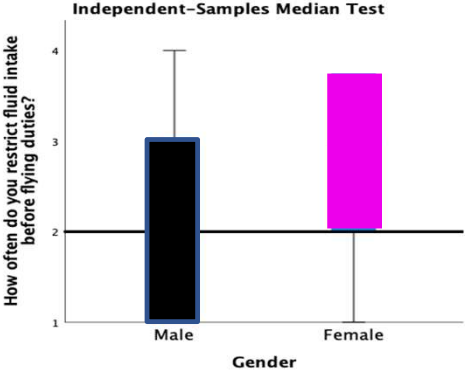
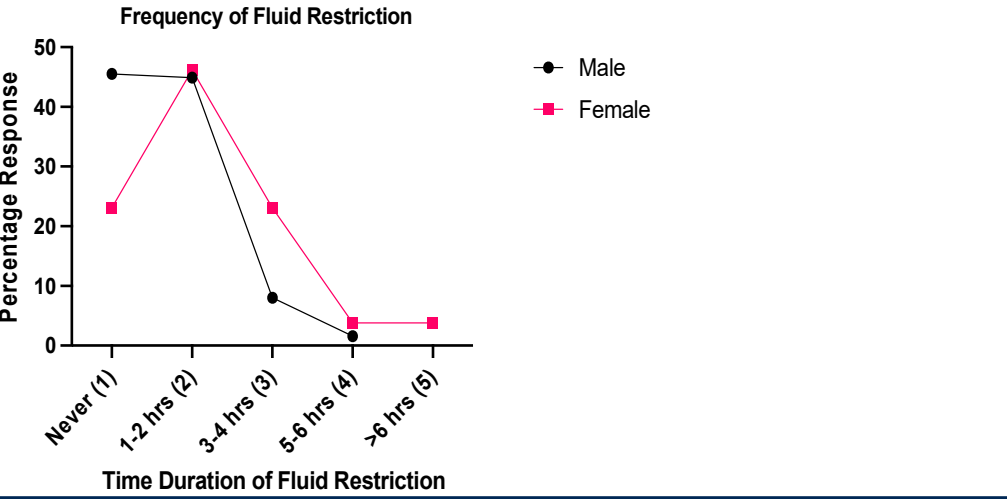
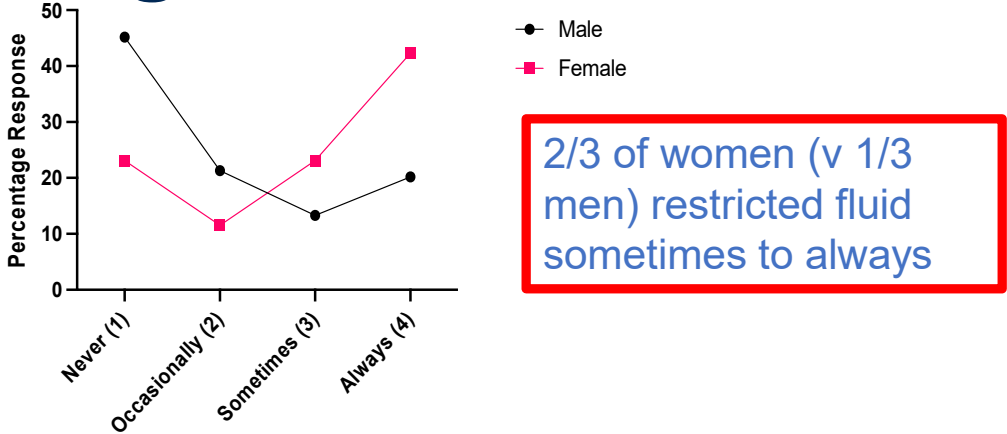


Type of toilet/facility accessible influenced hydration behaviour:

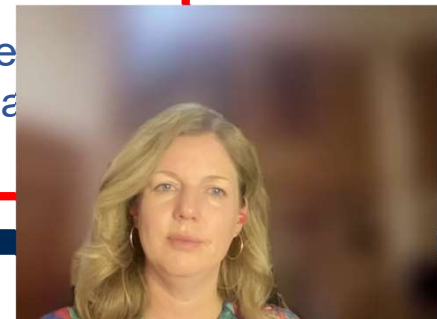
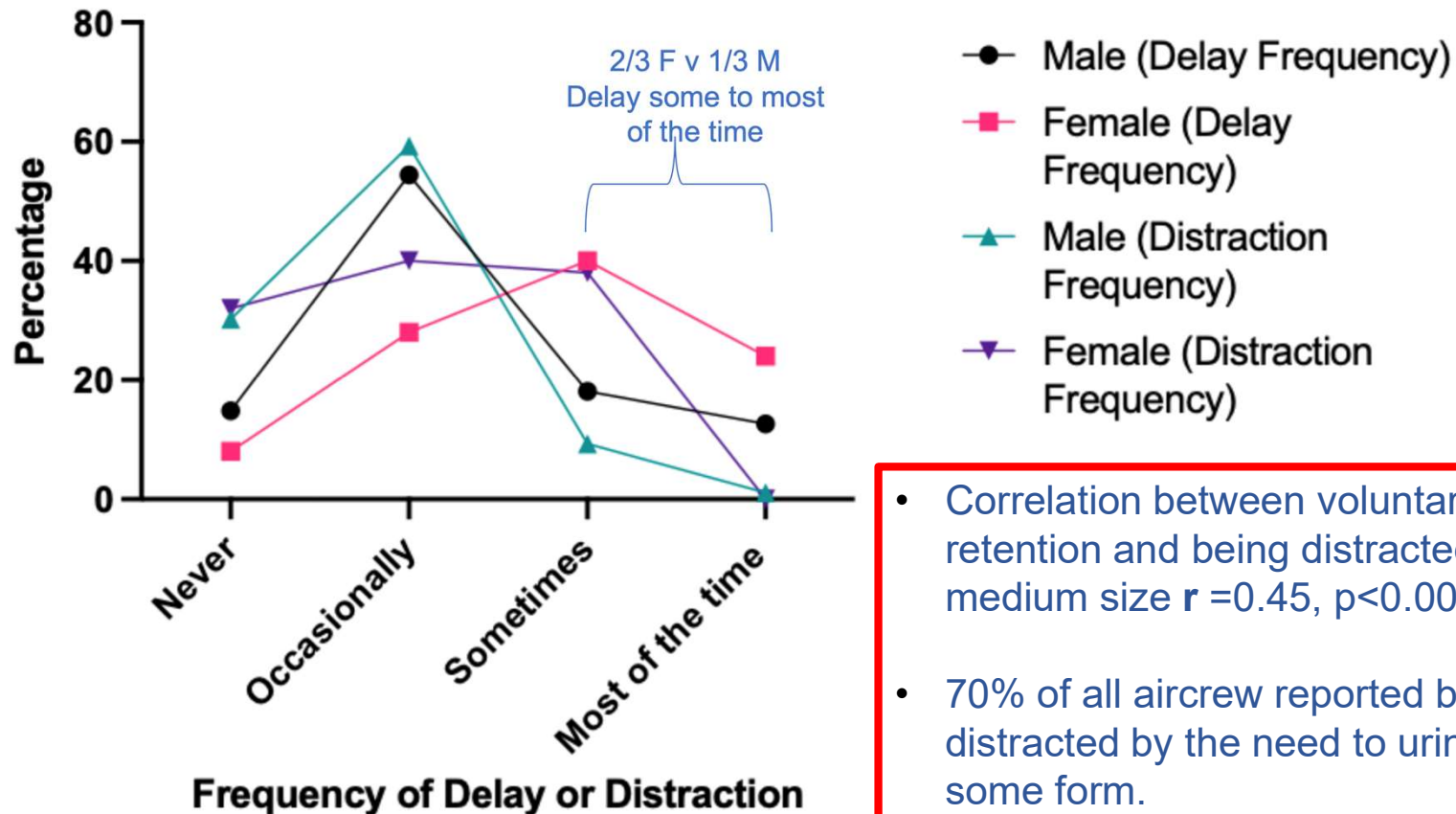
Difference in self-reported fluid intake (in mls) on flying days versus non-flying days in UK military aircrew.



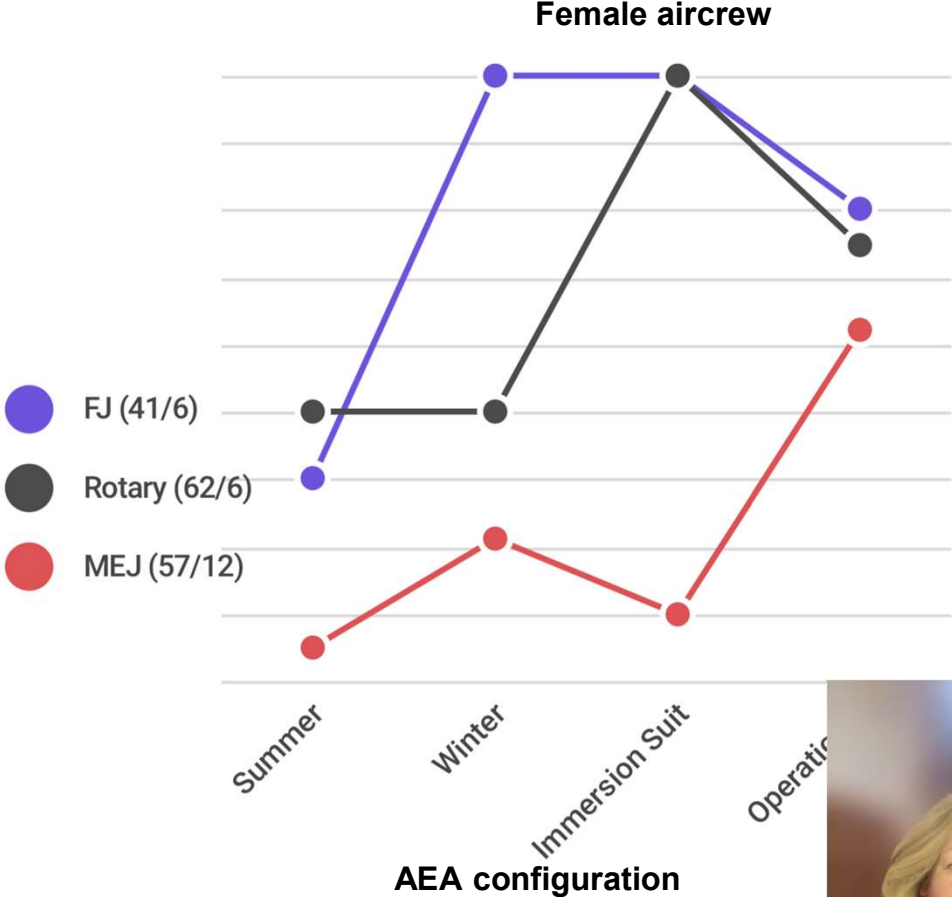
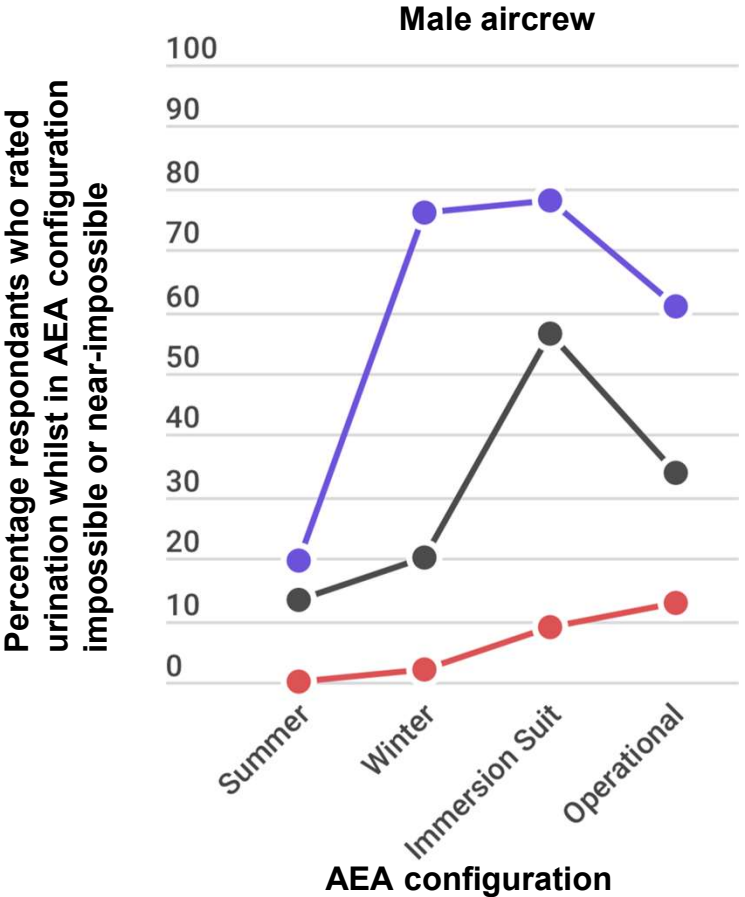
Female aircrew reported more frequent and prolonged fluid restriction:



Female aircrew reported prolonged holding and experiencing distraction:



Design and configuration of AEA impacts ability to urinate:



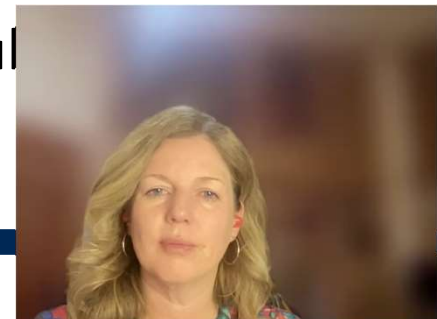
Rotary:

Male considerations

- Mission role/flight profile mean can't limit position
- Remain strapped in
- Unscheduled landings
- BALCS makes egress dangerous
- Provided facilities 'last resort'
- DIY sick bags and water bottles
- Freight and pax (professionalism)
- Occupational hazard
 - Spray, air flow, blockage

Female Observations

- Don't feel able to urinate whilst flying
 - Movement makes she-wee impossible
- 1-piece flying suits a hinderance
- Plan landings
- Don't want to 'be that guy'
- 'Would do it if they could'



Fixed-wing:

Male observations

- Sitting side by side
- Getting cover for front seat – ‘asking permission’

Female observations

- Freight blocking only toilet option
- Vulnerable behind shower curtain
- She-wee useless (not enough hands)
- Flying suit a hinderance +++++
 - Cubicle size
 - Bodily exposure
 - 2-piece, 2-piece, 2-piece



Fast jet:

Male observations

- Always handling pilot
 - Single-seat operations
- Ejector seat safety
 - Pin-in, unstrapped
- Lack of serviceable parts to AMXD
- Embarrassment
 - Deliberate wetting
 - Kit/equipment soiling

Female observations

- Feel nothing available
- AEA – layers and zips
 - Modification of AEA
- Peeing uphill
- Up to 10 minutes loss of SA to use piddle pack



Menstruation: Suppression desire ≠ achievement

- 16/28 women had a contraceptive requirement.
- 13/16 used hormonal contraception
- 5 used LARC

- 3/16 women achieved complete menstrual suppression.

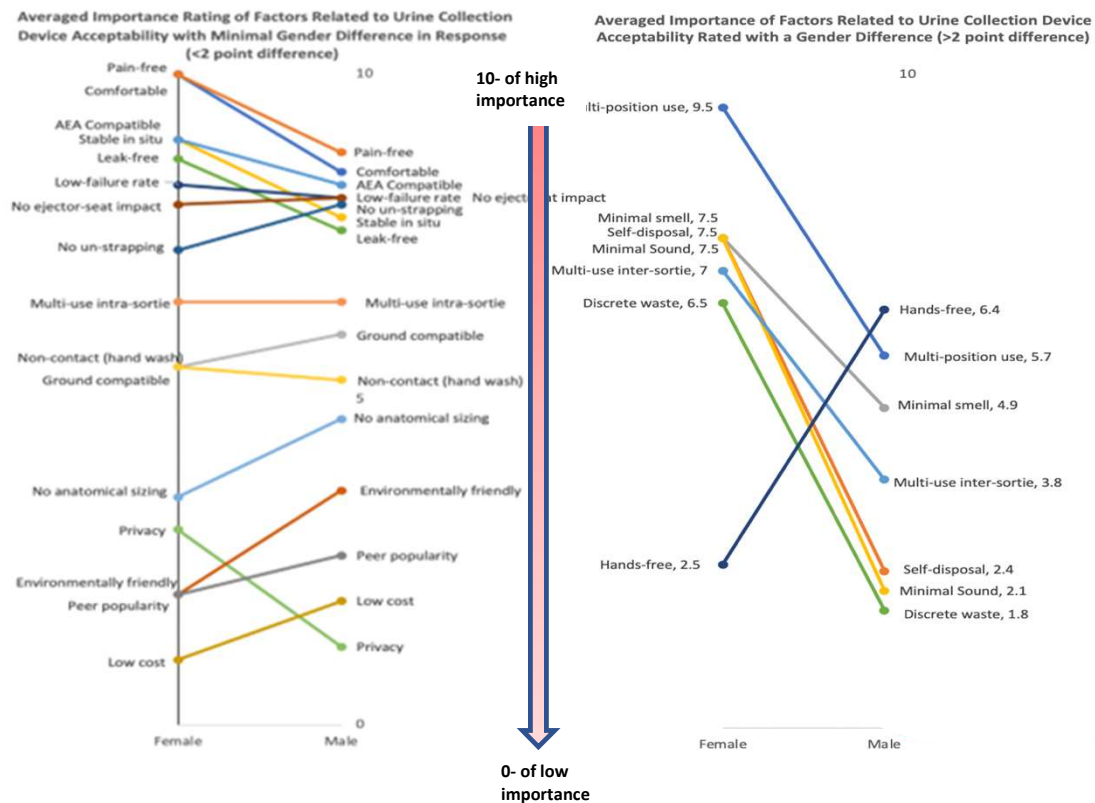
- But, 18/25 had a desire to suppress menstruation if they could whilst flying.

The majority of female aircrew had some form of a vaginal bleed to manage at certain points whilst flying



Gender differences in 'urination collection device' acceptability:

Aircrew were asked to rate (out of 10) the importance of factors related to using a UCD (10 of highest importance, 0 of least importance)



Female aircrew rated factors related to discretion and ability to use in multiple positions, multiple times as more important.



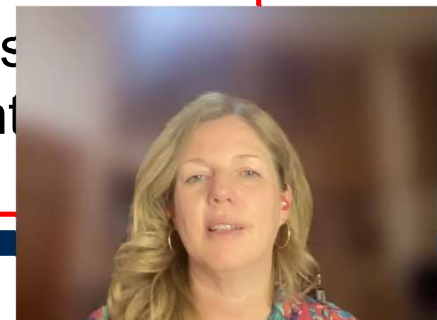


Discussion

- **Study limitations:** Why is this important
- self-reported behaviours.
- no quantification of adverse events like dehydration or degree of distraction
- behaviour adaptation potentially detrimental to performance and safety reported but not observed.

Cohort of aircrew that are not having the same experience or potential performance level.

Female specific considerations especially within AEA design and equipment integration.



What is it?

Gender data gap

- Not including females in general research.
- Not undertaking research on female-specific issues.
- Not sex-disaggregating data collected to analyses gender/sex differences.
- Using data collected on predominantly male populations and assuming the results can be applied equally to all humans.



Recent examples

Gender data gap

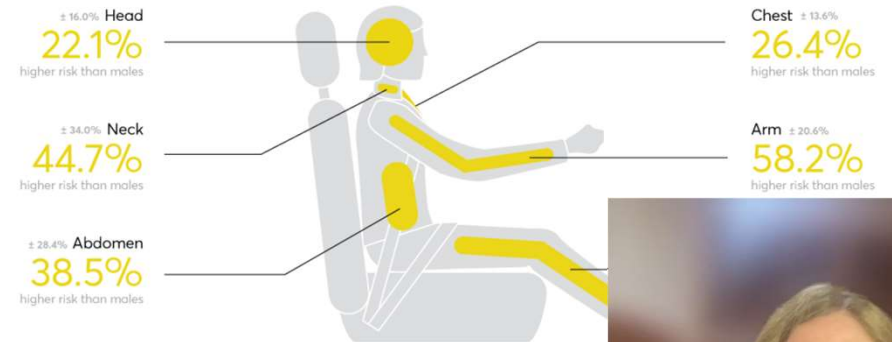
Drug effect: aspirin does not reduce risk of myocardial infarction in women. (Berger 2006)

Artificial Intelligence training: Voice recognition software 70% less likely to detect female voice. (Perez 2019)

Body morphology: women have a 17% (+/- 1.5%) risk of fatality and a 73% increased risk of moderate injury in a motor vehicle accident. (NHTSA 2013)



Female increased risk of injury: increase of risk for moderate injuries compared with age-matched male.



Narrowing the Gap

Considerations

- Stop biases being carried through to the next generation - collaboration.
- Design research with suitable power to understand sex-based differences.
- Engage female aircrew with why female specific research and data essential to making the right improvements for all – closed forums.
- Make it clear if research findings can only be applied to one gender.



Servicewomen's Health Improvement Focus Team: Women's Health Policies and Initiatives to Improve the Lived Experience of Servicewomen.



Team lead: Ms Lisa Horder Policy and Initiatives Team. Ms Sophie Arana, Wg Cdr Jemma Austin, Lt Col Andy Child, Col Anne Fieldhouse OBE, Cdr Jenna Kelway, Cdr Laura Parker. Supported by: Ms Zirka Callaghan, Mr Joel Newsome-Hubbard, Wg Cdr Lottie Philips-Girling, Sgt Ldr Rhian Watts.

SHIFT

4100 women contributed to the inquiry.

Government's response to report:

- Lived experience of servicewomen must become an MOD priority.
- Servicewomen's Health improvement Focus Team (SHIFT) stood up for a 6-month sprint to deliver the recommendations around women's health policies and initiatives.
- All outcomes delivered within 6 months - celebrated on 8 Sep 22 at the House of Lords.**



House of Commons
Defence Committee

Protecting those who protect us: Women in the Armed Forces from Recruitment to Civilian Life

Menstrual Health

Menstrual health is a key part of female health and wellbeing.

The military environment introduces many challenges to achieving this.

2022DIN01-092-Supply of Menstrual Waste Pouch for Service Personnel

The personal menstrual waste pouches enable discreet and reliable management of any used period product in any location.



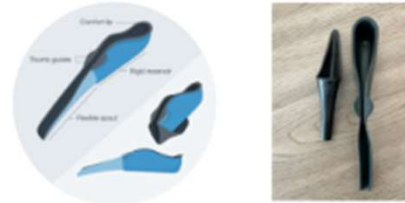
They can be operated one-handed and survive the extremes of military environments.

2022DIN01-095-Supply of Menstrual Support Box (MSB) for Service Personnel

The MSB is a kit box provided to support SP in an austere location who may be experiencing an unexpected bleed or have run out of their own supply.

The MSB contains a range of period and hygiene support products.

Urinary Health



Austere conditions (that limit access to toilet facilities) can drive urination avoidance behaviours. This increases risk of heat illness and negatively impacts cognitive and physical performance and physiological response to acceleration forces and altitude.

2022DIN-091-Supply of Urination Support Device (USD) for Service Personnel

The USD enables SP (who wouldn't usually be able to) to 'stand to pee'. This avoids the need to squat and expose in challenging environmental conditions (from the cold to mosquitos!). The design enables confident one handed use leaving the other to hold back kit or steady against vehicle movement. And with a long, fixed spout ensures uniform and boots stay dry.



Whole Force Education

Handbook written to inform readers on optimising women's health within the context of military environment - sea, land and air.

Aims to improve education on the basic needs of servicewomen for all Service Personnel.

- Normalise conversations.
- De-stigmatise periods.
- Contribute to the operational effectiveness of the UK Armed Forces.

Written for all service personnel and contains a commanders guide.

Available to all via gov.uk. Can be accessed by anyone including potential recruits.



Sex and gender differences relevant to aerospace medicine:

- Culture
- Acceptance
- Training/Learning Styles
- Behavioural choices
- Risk taking behaviour



- Anthropometrics:
 - Size & Proportion
 - Strength
- Anatomy
- Buoyancy
- Voice communication

- Thermoregulation
- Motion Sickness
- Acceleration force tolerance
- Decompression sickness

- Reproductive Potential
 - Pregnancy
 - Contraception
 - Menstruation
- Hormonal influence
- Menopause
 - Symptoms of relevance



Conclusions & Considerations

- Hydration and urination have become de-coupled in aviation
- This can present an operational risk to flight safety and human performance.
- Maladaptive behaviours are prevalent across all platform types and services, but systemic inequity through male design bias is leading to a higher prevalence in female aircrew.
- Alongside anatomical and physiological differences (including menstruation), other factors such as legacy design of kit, equipment and facilities, result in additional barriers for female aircrew.
- Urinating whilst airborne is not an equitable experience for male and female aircrew.
- Where else may this phenomenon be occurring in aerospace medicine?





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- Dr Ross Pollock – Project support.

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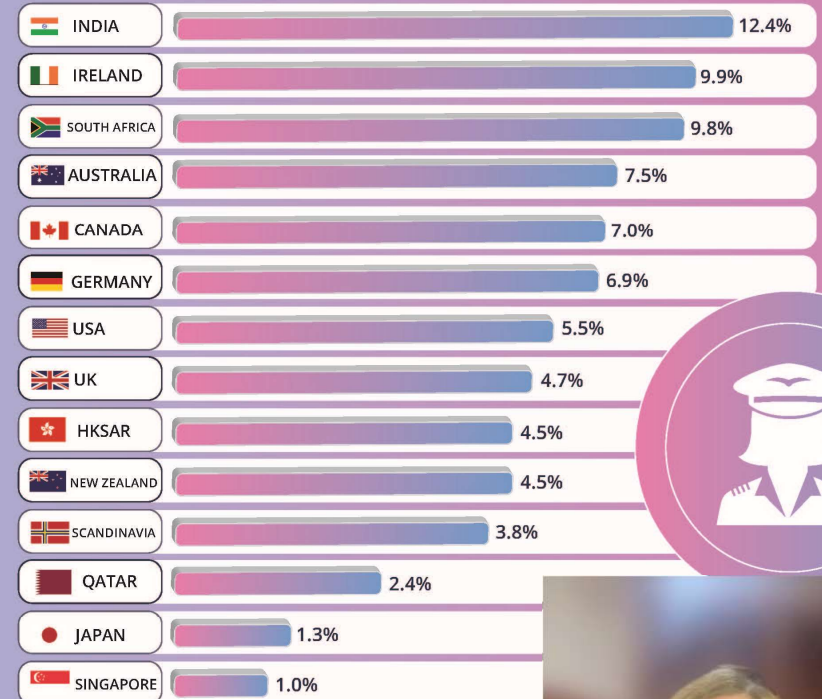
Why is identifying a gender data gap in aerospace medicine important?

- Majority of aerospace medicine research is male-centric.
- Female aircrew numbers likely to increase.
- Getting it right is safety critical.

‘The determination and maintenance of the health safety and performance of persons involved in air and space travel.’
(Aerospace Medicine Association)

How Countries Are Measuring Up On Gender Equality in the Flight Deck

isa⁺²¹



Source: International Society of Women Airline Pilots 2021
www.ISA21.org



Improving coverage in aerospace medicine education



Fundamentals of Aerospace Medicine:
Dedicated chapter - 'Women's Health Considerations in Aerospace Medicine'

Ernsting's Aviation and Space Medicine:
Index review – 107 lines in 5th edition.
Section planned for next edition released in 2023.

Menopause: HRT does now get a mention

