



GRANTS DAYS 2021

Gender Dimension for Better World/Health: Fueling Excellence in Research and Education

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Outline for today:

Arguments for integrating sex and gender analysis (gender dimension) in the whole biomedical/STEM field



- Differences matter (**facing challenges together for better health**);
- **Why?**
 - Better science,
 - Better education
 - Better healthcare,
 - To attract grants and support.
- **Gendered Innovations that serve to all**
(we harness the power of sex & gender analysis for discovery)

Health and Disease

WHO: "Health is the state of complete physical, mental, and social well-being, not just the absence of disease or sickness."

"Differences in health and illness patterns of men and women are attributable both to sex, or biology, and to gender, that is, social factors such as powerlessness, access to resources, and constrained roles."

Susan Phillips, Int J Equity Health.

2005; 4: 11

Today's global economy expands health concerns beyond borders.

Focusing on personal choices to achieve your optimal health as well as the health of those around you.

(Empowerment; Responsible Research and Innovation, With and for Society HORIZON 2020).

The Commission will:

12. Propose as of 2021, in line with the Horizon Europe programme objectives, the development of **inclusive gender equality plans** with Member States and stakeholders in order to promote EU gender equality in R&I

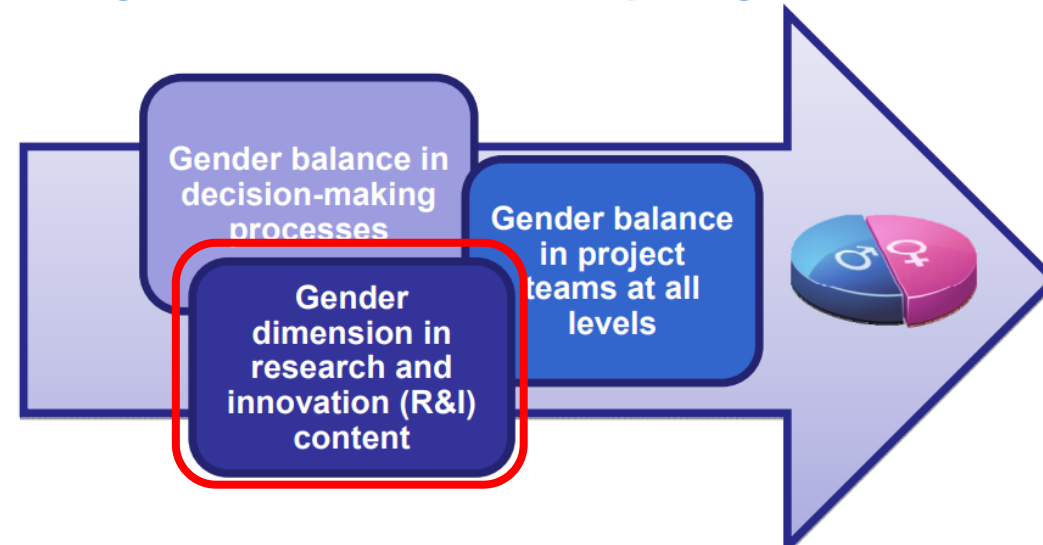
Health/STEM: the League of European Research Universities (LERU)

Hefei statement (LERU 2013): *“University research drives innovation, helps respond to major national and global problems and helps to provide the narratives that make it possible to understand a rapidly changing and increasingly volatile world”.*

- Global challenges require comprehensive, multidisciplinary, evidence based, (sex/gender/diversity) inclusive solutions;
- A concerted global effort to support and implement gender dimension is needed (LERU 2015).



3 Objectives for Gender Equality in H2020



What does gender dimension mean?

Integrating the gender dimension in research content means taking into account the biological characteristics of both females and males (sex) and the evolving social and cultural features of women and men, girls and boys (gender). ▼ And Gender diverse people!

Gender dimension- GEPs in R & I



Gender dimension in research and innovation content

Take care of the needs/interests of both men and women when you prepare research and innovation projects.

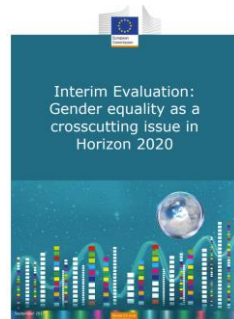
2018-2019 work programme:

110/473 topics for call for proposals have an explicit gender dimension in health, transport, food, secure societies, industrial leadership...

2020 work programme:
119/337 total topics gender-flagged (35.3%)



HORIZON 2020
Closing **gender** gaps in Research and Innovation



Even if EU policies in place from 2014:

...fewer than expected proposals with sex and gender analysis;

...evident lack of training on gender dimension (2017).



<https://act-on-gender.eu/act-videos>

https://ge-academy.eu/ge-uploads/2021/11/GEP-HorizonEU_GE-Academy-Final-Event_18-11-21_AP-1.pdf



Gender Equality in Horizon Europe

Remains a high priority: **Art. 6a.5** of the Framework Regulation **sets legal basis**

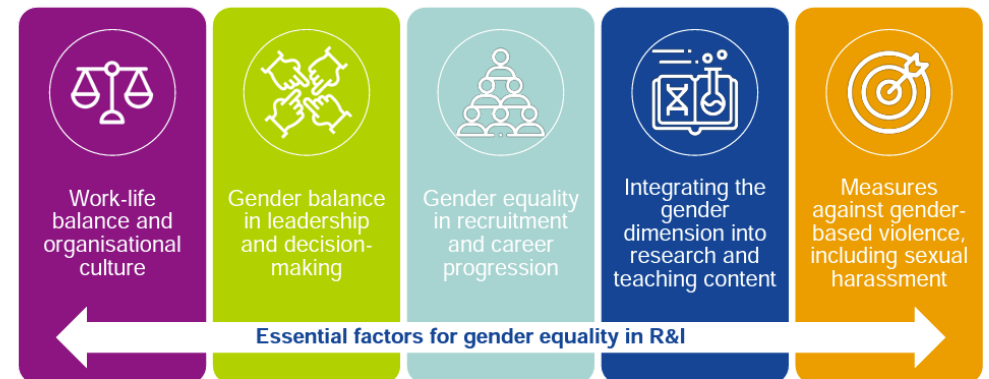
Gender is a cross-cutting priority as per **Art. 2** of Specific Programme

Line of activity under **Pillar II, Cluster 2** on **gender equality** in all social, political, economic and cultural domains, also addressing intersections between gender and other social categories, such as disability, sexual orientation and ethnicity.

Dedicated funding for gender equality in R&I policy initiatives under 'Strengthening the ERA/Reforming and enhancing the European R&I system'

- ❑ Broad line: 'Supporting **gender equality** in scientific careers and in decision making, as well as the integration of the **gender dimension** in research and innovation content'
- ❑ in Broad line: '(...) supporting the modernisation of universities and other research and innovation organisations, through **gender equality plans** and comprehensive approaches to **institutional changes**.(...)'

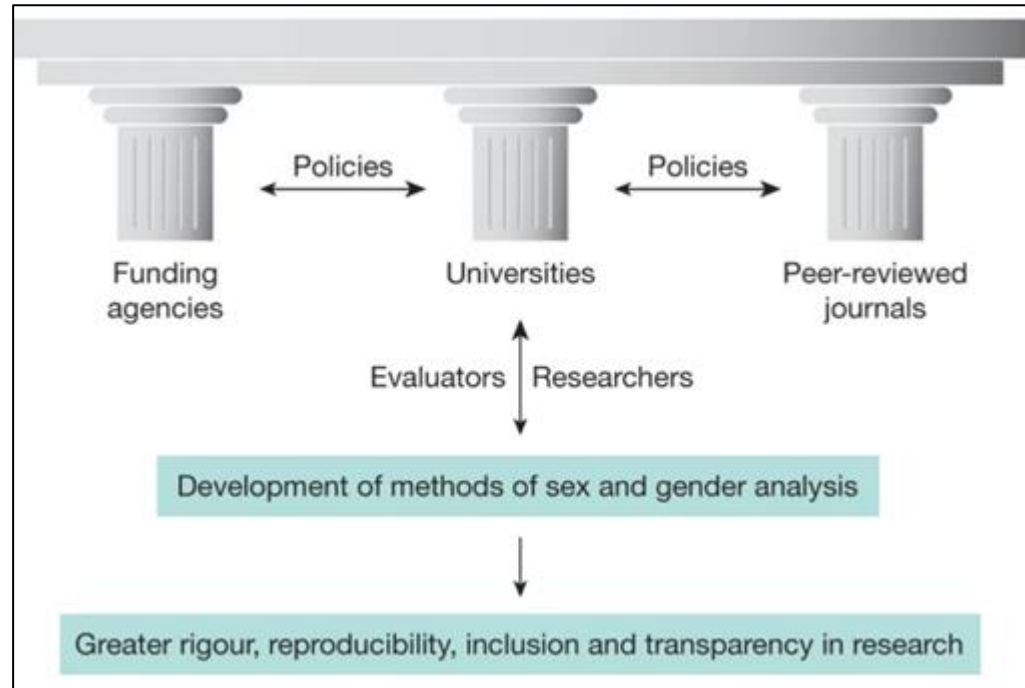
Recommended GEP content areas



Gender dimension – work in progress

Science policy:

Policy is one driver of discovery and innovation that can enable sex and gender analysis in science and technology.
(adopted from Nature 575, 137-146 (2019))



Communities of Practice active to
advance gender equality in R&I

<https://act-on-gender.eu/>

Innovations!

Sex & gender analysis for discovery:
Gendered innovations!!

EU: Communities of practice (CoP)

Collectives of representatives with a shared domain of interest in advancing the implementation of the European Research Area gender goals.

<https://staff.ki.se/about-gendered-innovation-alliance>

Why the implementation of the Gender Dimension adds value for R & I?



<http://genderedinnovations.stanford.edu/>

- **Sex and gender bias in research, medicine and health care:**
 - is expensive by terms of lives and costs,
 - (STEM) limits scientific, professional creativity, excellence, and benefits to society,
 - Limits researchers and innovators to question gender norms and stereotypes, and rethink standards and reference models,
 - limits business opportunities and in –depth understanding of diverse gender needs, behaviors and attitudes etc.
 - Limits the production of goods and services better suited to new markets etc.

Business case:

Science (26.3.2010): Between 1997 and 2000, 10 drugs were withdrawn from the U.S. market because of life-threatening health effects—8 of those showed greater severity in women. United States General Accounting Office. (2001). *Drug Safety: Most Drugs withdrawn in Recent Years had Greater Health Risks for Women*. Washington, DC: Government Publishing Office.

The cost of developing a drug ranges between \$350 million and \$5 billion and 95% of drug candidates fail (*Arrowsmith 2011; Herper, 2013*).

Including sex and gender as research variables bring down costs, promote discovery of disease mechanisms, and save lives.

WHI (*Joshua A. Roth et al., Annals of Internal Medicine (2014) 60, 9:594-602*), Each \$1 spent returned \$140 to US taxpayers in health care savings!

Gender dimension for better health/STEM

We need to do better!
We need to do this together!

- ✓ Educate (at all levels)
- ✓ Embrace the knowledge
- ✓ Communicate
- ✓ Embrace overall diversity
- ✓ Momentum: twin approach

Definition of Terms:

EVERY CELL IS **SEXED AND EVERY PERSON IS **GENDERED****

GENDER

GENDER IS A MULTIDIMENSIONAL PSYCHOSOCIAL CONCEPT

IDENTITY

- ✓ Inner sense of self as masculine, feminine, both, or neither
- ✓ Cisgender, transgender or gender-nonconforming

ROLES

- ✓ Societal and environmental expectations
- ✓ Influences on everyday actions, e.g. caregiving
- ✓ Career you pursue, role in family, etc.

RELATIONS

- ✓ Interpersonal interactions eg. family, workplace dynamics

INSTITUTIONALIZED

- ✓ Distribution of power in political, educational, social institutions in society
- ✓ Shapes social norms



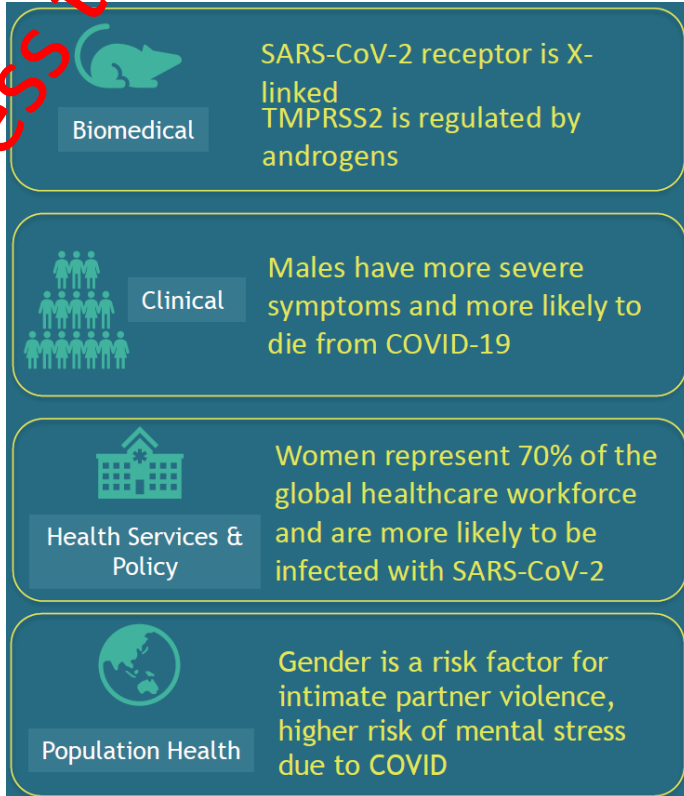
SEX

Biological attributes of humans and animals, physical and physiological features, chromosomes, gene expression, hormones and anatomy. Sex is usually categorized as female or male but there is variation in the biological attributes that comprise sex and how those attributes are expressed.

Stress test!

Real world example: gender dimension is needed!

COVID-19 REINFORCES THE IMPORTANCE OF SEX & GENDER ACROSS THE RESEARCH SPECTRUM



<https://www.mcgill.ca/going-fwd4gender/covid19>
<https://ki.se/covid-19/covid-19-portalen?ga=2.196043371.672246847.1602424071-535644620.1544560591>
<https://staff.ki.se/doctoral-programme-in-development-and-regeneration-devreg-and-gendered-innovation-alliance> Adjusted after CIGH

NATURE COMMUNICATIONS | (2021)12:4015 | <https://doi.org/10.1038/s41467-021-24265-8> | www.nature.com/naturecommunications

Lack of consideration of sex and gender in COVID-19 clinical studies

Emer Brady¹, Mathias Wullum Nielsen², Jens Peter Andersen¹ & Sabine Oertelt-Prigione^{3,4}✉

Abstract

Sex and gender differences impact the incidence of SARS-CoV-2 infection and COVID-19 mortality. Furthermore, sex differences influence the frequency and severity of pharmacological side effects. A large number of clinical trials to develop new therapeutic approaches and vaccines for COVID-19 are ongoing. We investigated the inclusion of sex and/or gender in COVID-19 studies on ClinicalTrials.gov, collecting data for the period January 1, 2020 to January 26, 2021. Here, we show that of the 4,420 registered SARS-CoV-2/COVID-19 studies, 935 (21.2%) address sex/gender solely in the context of recruitment, 237 (5.4%) plan sex-matched or representative samples or emphasized sex/gender reporting, and only 178 (4%) explicitly report a plan to include sex/gender as an analytical variable. Just eight (17.8%) of the 45 COVID-19 related clinical trials published in scientific journals until December 15, 2020 report sex-disaggregated results or subgroup analyses.

Investigating sex differences can highlight otherwise ignored mechanisms and should, hence, be an essential component of robust, reproducible, and socially relevant research.

Stress test!

COVID-19 REINFORCED THE IMPORTANCE OF SEX & GENDER ACROSS THE RESEARCH SPECTRUM

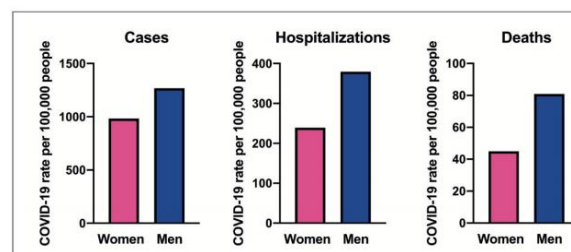
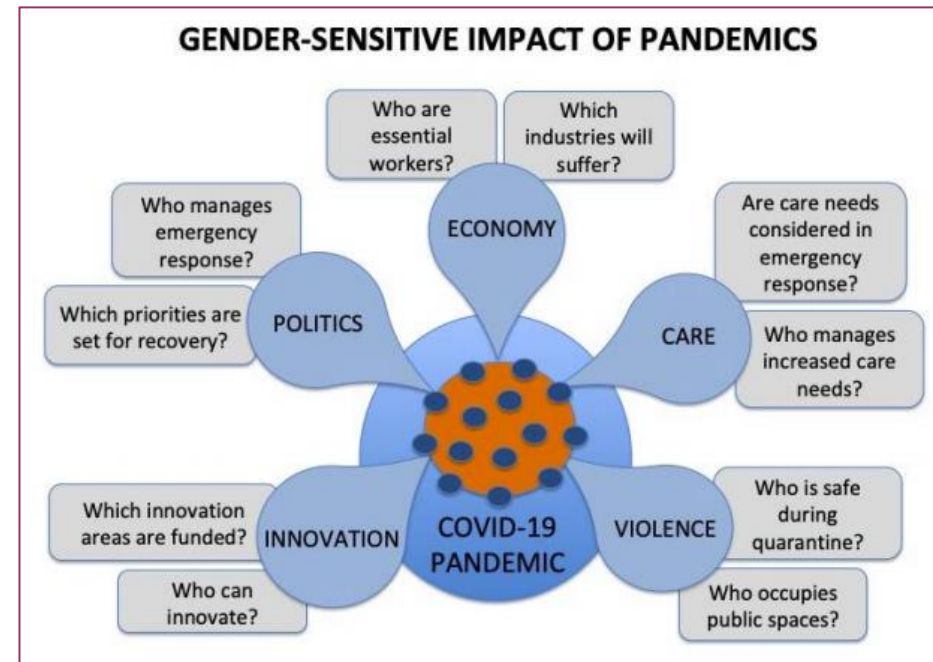
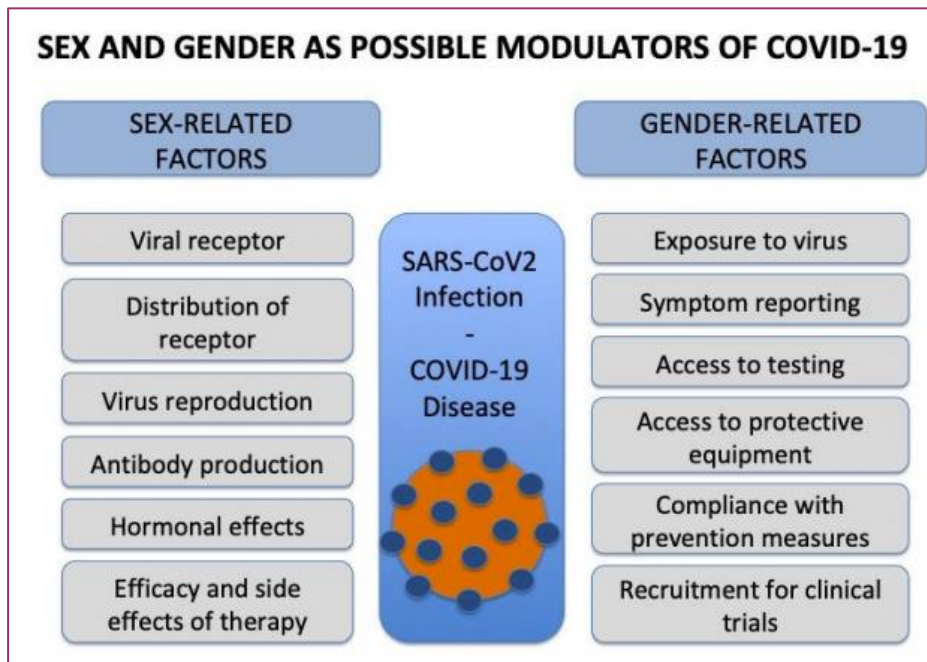


Figure 15. Sex Disaggregated numbers for COVID-19 cases, hospitalizations, and deaths per 100,000 people in NYC, (with permission) from, Klein SL et al. (2020)



Real world example: gender dimension is needed!

(Career progression+ decision-making processes impaired - **research inequity gap**)

COVID-19 REINFORCES THE IMPORTANCE OF SEX & GENDER ACROSS THE RESEARCH SPECTRUM

AUTHORSHIP: GENDER GAP BEFORE AND DURING THE PANDEMIC!

COVID-19 HAS AMPLIFIED THE PERSISTENT GENDER INEQUALITY IN ACADEMIC MEDICINE!

Women integrate more gender and sex variables into their research and improving its relevance for all.

Female **first** and **last authorship** for COVID-19-related publications was **lower** (23% and 16%) vs. female authorship in 2019.

The number of women who authored preprints to arXiv (an online archive for preprints of scientific papers) rose only by 2.7% between 2019 and 2020, compared to a 6.4% rise for men.

Women represent only a quarter of COVID-19 experts in the media and a quarter of the members of national task forces.

Sebo et al 2020; Andersen et al 2020; Viglione 2020; Rajan et al 2020, Nielsen et 2017

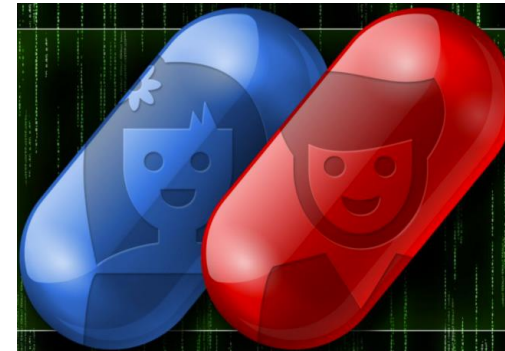
Stress test!



A real world examples: Pain!

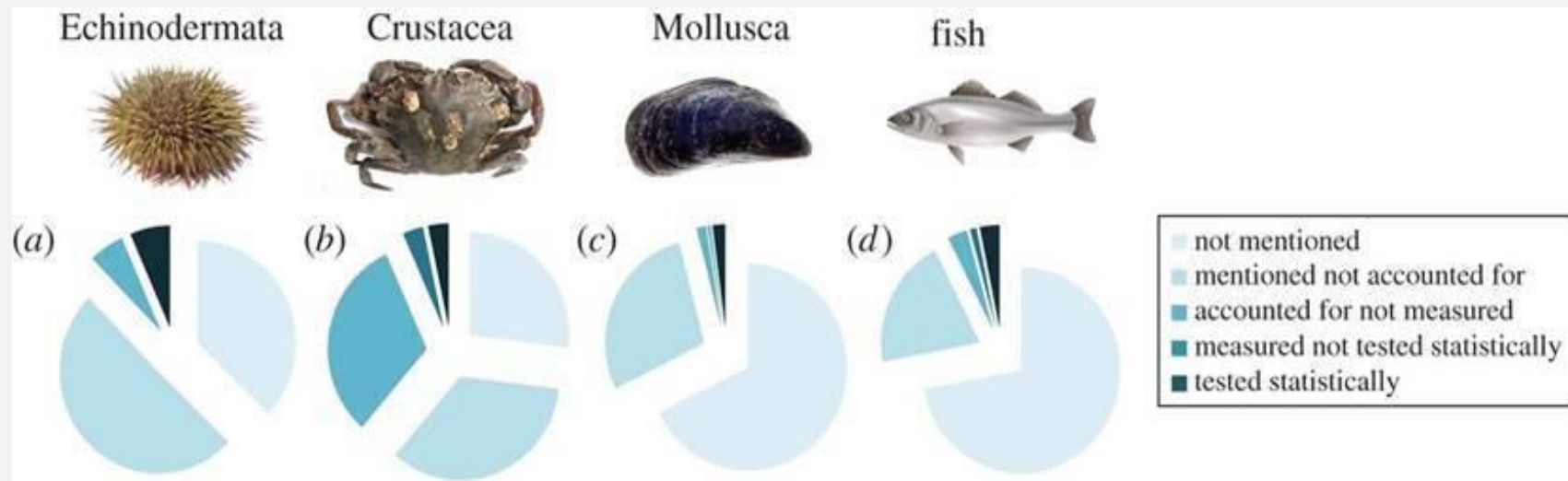
Chronic pain hypersensitivity is mediated by **microglial cells** in **male mice** and by a completely different type of immune cell, likely **T-cells**, in **female mice**.

This sexual dimorphism suggests that male mice cannot be used as proxies for females in pain research and drug development (*Nature Neuroscience* 2015).



Fewer than 4% of studies analyze by sex

Ellis, R. et al. (2017). Does sex really matter? Explaining intraspecies variation in ocean acidification responses. *Biology letters*, 13(2), 20160761.



A real world example:

Convolutional Neural Networks

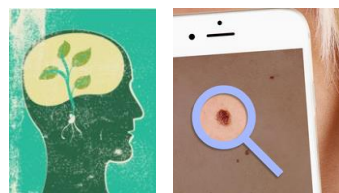
Recent applications of deep learning have been successful diagnosing skin cancer.

Esteva, A., Kuprel, B., Novoa, R. A., Ko, J., Swetter, S. M., Blau, H. M., & Thrun, S. (2017). Dermatologist-level classification of skin cancer with deep neural networks. *Nature*, 542(7639), 115.

But the dataset of 129,450 images is dominated by European Americans and contains **few images from people with darker skin**. The performance of the classifier across different populations is unknown.

Should be Free from (human) bias, unfairness and discrimination

Food for Thought



RESEARCH ARTICLE

Can machine-learning improve cardiovascular risk prediction using routine clinical data?

Stephen F. Weng^{1,2*}, Jenna Repe^{3,4*}, Joe Kai^{1,2†}, Jonathan M. Garibaldi^{3,4‡}, Nadeem Qureshi^{1,2‡}

¹ NIHR School for Primary Care Research, University of Nottingham, Nottingham, United Kingdom, ² Division of Primary Care, School of Medicine, University of Nottingham, Nottingham, United Kingdom, ³ Advanced Data Analysis Centre, University of Nottingham, Nottingham, United Kingdom, ⁴ School of Computer Science, University of Nottingham, Nottingham, United Kingdom

* These authors contributed equally to this work.
† These authors also contributed equally to this work.
* stephen.weng@nottingham.ac.uk

A real world example: Google Search

- Men are 5 times more likely than women to be offered ads for high-paying executive jobs.

No one meant this to happen; it is unconscious bias. **The bias already existed in the data that algorithm was trained on.**

Datta, Amit, Michael Carl Tschantz, and Anupam Datta. "Automated experiments on ad privacy settings." *Proceedings on Privacy Enhancing Technologies* 2015.1 (2015): 92-112.

Food for Thought



Google's algorithm shows prestigious job ads to men, but not to women. Here's why that should worry you.

By Julia Carpenter July 6, 2015



A recent screenshot of Google images for "CEO."

Fresh off the revelation that Google image searches for "CEO" only turn up pictures of white men, there's new evidence that algorithmic bias is, alas, at it again. In a paper published in April, a team of researchers from Carnegie Mellon University claim Google displays far fewer ads for high-paying executive jobs...

Innovations in women's CVD

Cardiovascular risk



The blood vessels in a woman's heart are smaller in diameter and much more intricately branched than those of a man. Those differences offer one explanation for why women's vessels may become blocked in a different pattern than those in men. Women's heart attack symptoms and the patterns seen on a heart-screening test can differ, sometimes leading to a wrong diagnosis—or worse—missing the signs of an oncoming heart attack.



Women are often the primary caretakers of children, household needs, and aging family members, and they are more likely to delay prevention and treatment for chronic conditions like heart disease.

Gendered solutions

Analysing sex

- has led to understanding that heart disease in women often has a different pathophysiology versus men – particularly in younger adults;
- has also led to new diagnostic techniques and better symptomatology;

Analysing gender

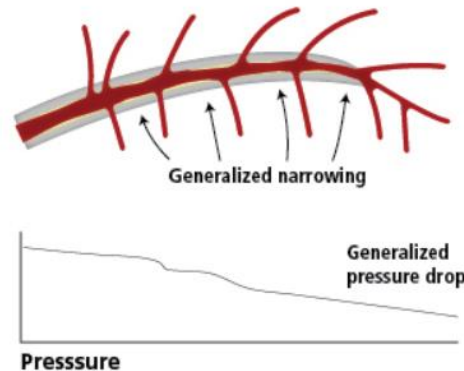
- has led to increase understanding of risk factors and prevention.

Coronary Angiograms for Patients with Chest Pain

Women are more likely to have minor or no obstruction

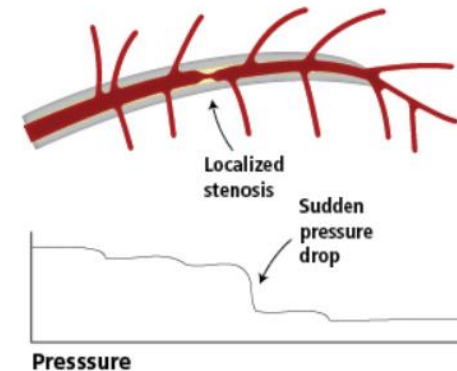
Diffuse atherosclerosis

Most often seen in younger women with IHD



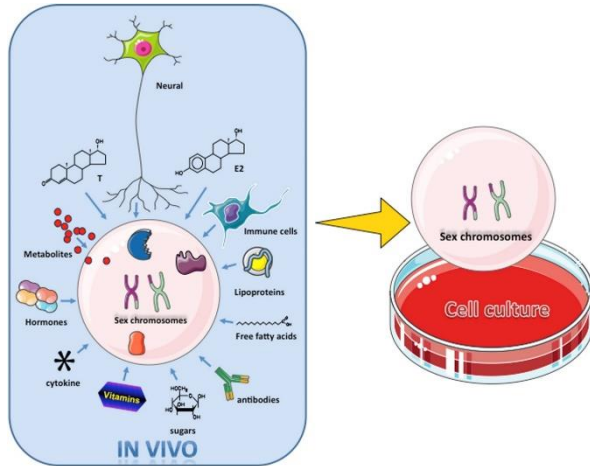
Obstructive atherosclerosis

Most often seen in men and older women



Adapted with permission from (K. Lance Gould, 1999).

Each cell has Sex



Cell Metabolism
Volume 25, Issue 6, Pages 1216-1230 (June 2017)
DOI: 10.1016/j.cmet.2017.04.033
Adv Healthc Mater. 2021 Jan;10(1):e2001034.

Addis et al. *Biology of Sex Differences* 2014, 5:18
<http://www.bsd-journal.com/content/5/1/18>



RESEARCH

Open Access

Human umbilical endothelial cells (HUVECs) have a sex: characterisation of the phenotype of male and female cells

Roberta Addis^{1†}, Ilaria Campesi^{1,2†}, Marco Fois¹, Giampiero Capobianco³, Salvatore Dessole³, Grazia Fenu¹, Andrea Montella¹, Maria Grazia Cattaneo⁴, Lucia M Vicentini⁴ and Flavia Franconi^{1,2,5}

ADVANCED SCIENCE NEWS

www.advancedsciencenews.com

ADVANCED HEALTHCARE MATERIALS

www.advhealthmat.de

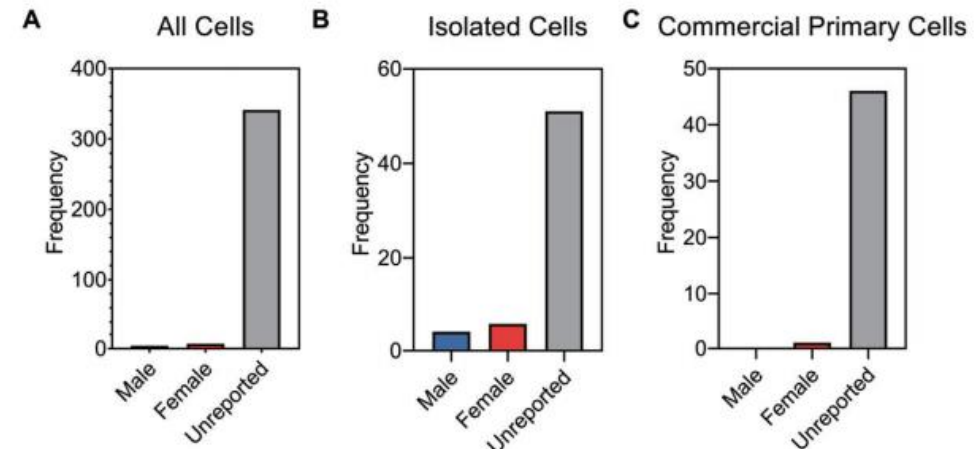
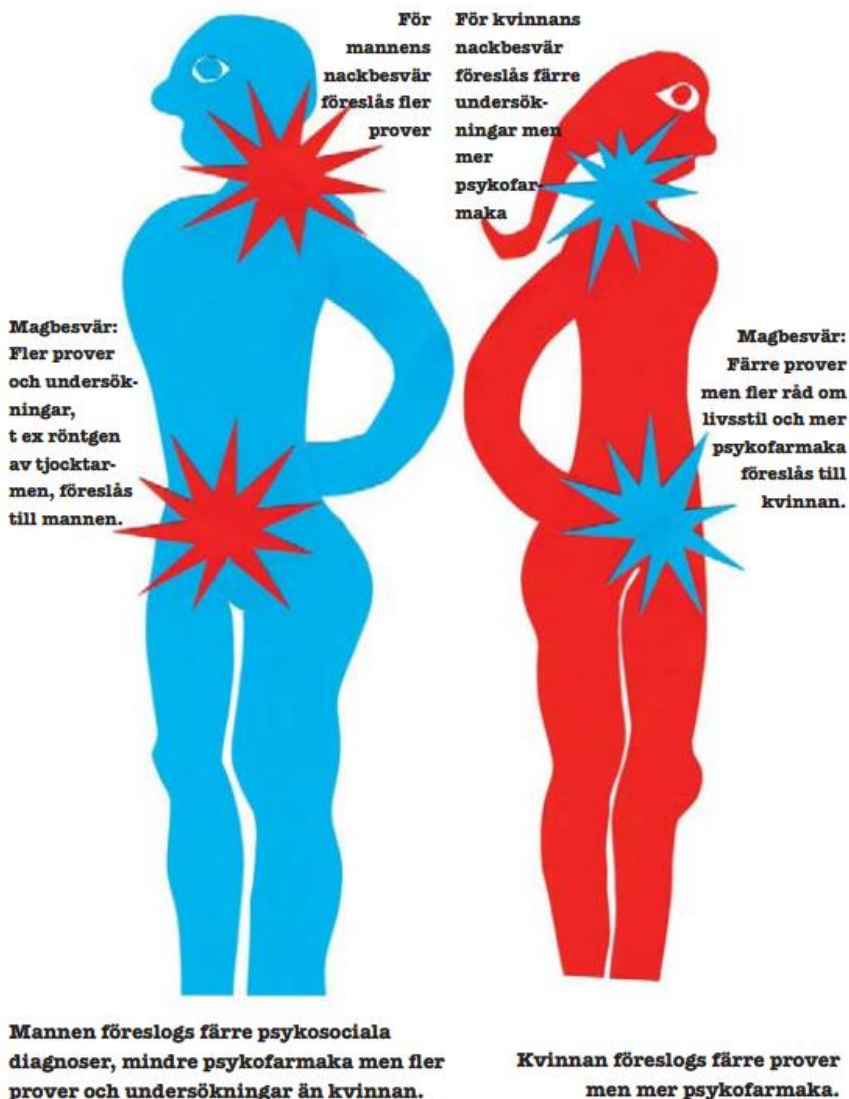


Figure 1. Breakdown of cell sex for all the cell cultures reported (A); for all primary cells isolated or harvested "in-house" (B); and for all primary cells purchased from commercial vendors (C). For our survey, we recorded whether the cells used were reported as male, female, or if the sex was unreported.

Vid lika symptom vill läkare behandla kvinnor och män olika...



(c) JÄMSTÄLLDHET I HÄLSA OCH VÅRD

Education at all levels!

Doctors treating patients differently is a reminder for all of us about implicit bias;

Bias Against Female Teachers?

Gender of experimenter has significant effect on a range of variables!

(pls see review by Chapman et al 2018).

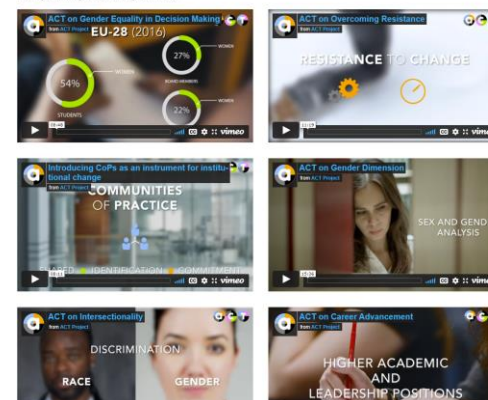
Doctors treating patients differently is a reminder for all of us about implicit bias:

Similar symptoms-different treatments:

Women – less investigations, more psychopharmaceutic.

Men – less psychosocial diagnoses, less psychopharmaceutic, but more tests.

In-depth analysis and experiences



<https://act-on-gender.eu/act-videos>

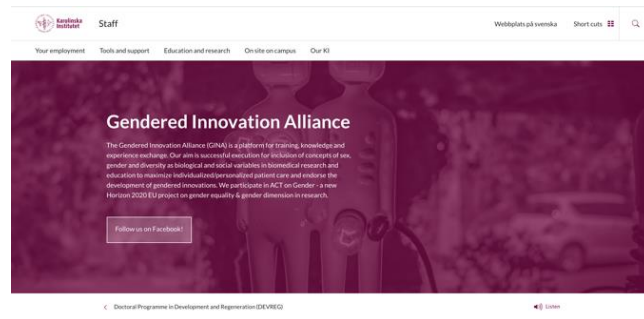


Which journals include sex and/or gender in author instructions

- Nature
- The Lancet
- PLoS one
- Circulation
- Stroke
- Circulation Research
- Arteriosclerosis, Thrombosis, and Vascular Biology
- Hypertension

■ *And more...*
<https://genderedinnovations.stanford.edu/sex-and-gender-analysis-policies-peer-reviewed-journals.html>

Science needs your involvement! Where to start!



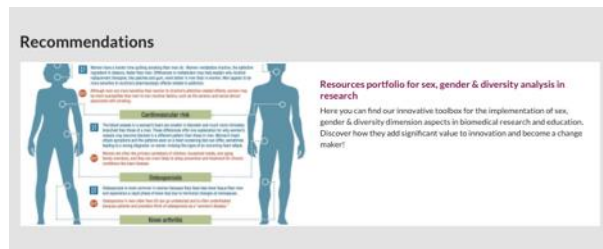
KI GENDERED INNOVATION ALLIANCE WEBSITE

OUR PLATFORM

Gender dimension in focus for research & educational content.

RESOURCES PORTFOLIO

Toolbox for the implementation of sex, gender & diversity dimension aspects in biomedical research and education.



News



Gendered Innovations



please feel free to join at <https://orwh.od.nih.gov/career-development-education/e-learning/bench-bedside>



GENERA: Gender Equality in Physics and beyond

Welcome to the website of the GENERA CoP, an international Community of Practice (CoP) supported by the Horizon 2020 project ACT. The GENERA CoP is committed to the goal of monitoring and improving the implementation of gender equality plans and measures in the physics research field and STEM fields. We share the vision of a diverse and open research culture within the physics community and beyond.

https://ec.europa.eu/info/research-and-innovation/strategy/strategy-2020-2024/democracy-and-rights/gender-equality-research-and-innovation_en

<https://ec.europa.eu/research/participants/docs/h2020-funding-guide/other/event210421.htm>



Science needs your involvement!

- Gender dimension for better health, STEM field and **WORLD!**
- Use “gender lens”, be gender sensitive!
- Gendered innovations!
- Spread the word! Push boundaries and be the leader others follow – **CoP.**
- Diversity adds value for innovation!
- One day the world will **THANK YOU!**



I have a dream!

Each PhD project at KI must include aspects on Gender Dimension!

We are not there yet! But!

#ACTonGender

Contact us!

Karolina.Kublickiene@ki.se

KI Gendered Innovation alliance



**Karolinska
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