

# Measuring sex and gender; existing instruments

Module Study Design and Research,  
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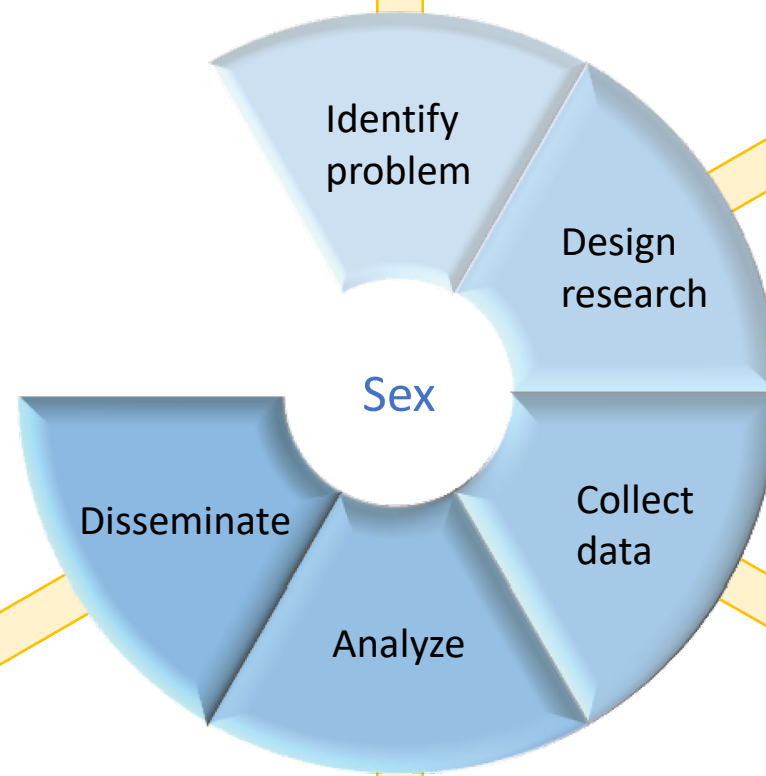
# Measuring Sex

- Consider sex as a covariate, confounder or explanatory variable
- What sex-related characteristics are of relevance to your study? (e.g. genetic, physiological, hormonal, anthropometric, biomechanical, injury thresholds, levels of pain tolerance, etc.)
- Subjects of study: intersex subjects, hermafroditic animals
- Examine overlaps between and variations within groups of different sexes
- Report the sex of your subjects, even in single-sex studies
- Report the sex distribution of the cells, animals, or human subjects

# ANALYZING SEX

enhances all phases of research

- Sex may play a role in all studies involving human or non-human animals
- Perform a literature review to identify how sex may be of relevance to your study (Moerman et al., 2009).
- Consider whether sex is a covariate, confounder, or explanatory variable
- Consider what sex-related characteristics are of relevance to your study (e.g. genetic, physiological, hormonal, anthropometric, biomechanical, injury thresholds, levels of pain tolerance, etc.) (Tannenbaum et al., 2019)
- Consider how sex-related factors interact with gender, ethnicity, age, socioeconomic status, lifestyle, etc.
- Consider what opportunities have been missed in the past as a result of failing to analyze sex



- Report the sex of your subjects, even in single-sex studies
- Report the sex distribution of the cells, animals, or human subjects
- Report how information on sex was obtained
- Disaggregate reported results by sex
- Ensure that sex variations are properly visualized in the tables, figures, and conclusions
- Avoid overemphasising sex differences. Are observed sex differences of practical significance? (Maney et al., 2016; Ribbon et al., 2014)
- Report all results: positive, negative, and inconclusive
- Consider following the SAGER publication guidelines (Heidari et al., 2016).

- Sex may serve as a direct explanatory factor or act as a potential modulator for associations between other factors; drawing a causal diagram helps make underlying assumptions explicit (see e.g. Buckley et al. 2017)
- In experimental studies, consider factorial designs to reduce the sample size required for sex-based comparisons (Buch et al. 2017; Miller et al. 2019)
- Consider how sex should be conceptualised in data collection; does your research concern physiological, hormonal, anthropometric, or biomechanical aspects? (Tannenbaum et al., 2019)
- In longitudinal research, consider how reproductive history may influence the cohort under investigation; will, e.g., data acquisition be impacted if females get pregnant during the study?

- Consider how to collect information on intersex subjects and hermaphrodite animals
- Include adequate numbers of females and males and, where relevant, intersex or hermaphrodites of different configurations in research samples
- Record information on factors that intersect with sex (e.g. age, life-style, socioeconomic status)
- In experiments, consider how the sex of the researcher may impact research outcomes (Chapman et al. 2018)
- In survey research, questions about gender should not be used as a proxy for birth sex
- In product and systems design, data collection should pay careful attention to anthropometric, biomechanical, and physiological factors that vary by sex (Tannenbaum et al., 2019; Jingwen et al. 2012)

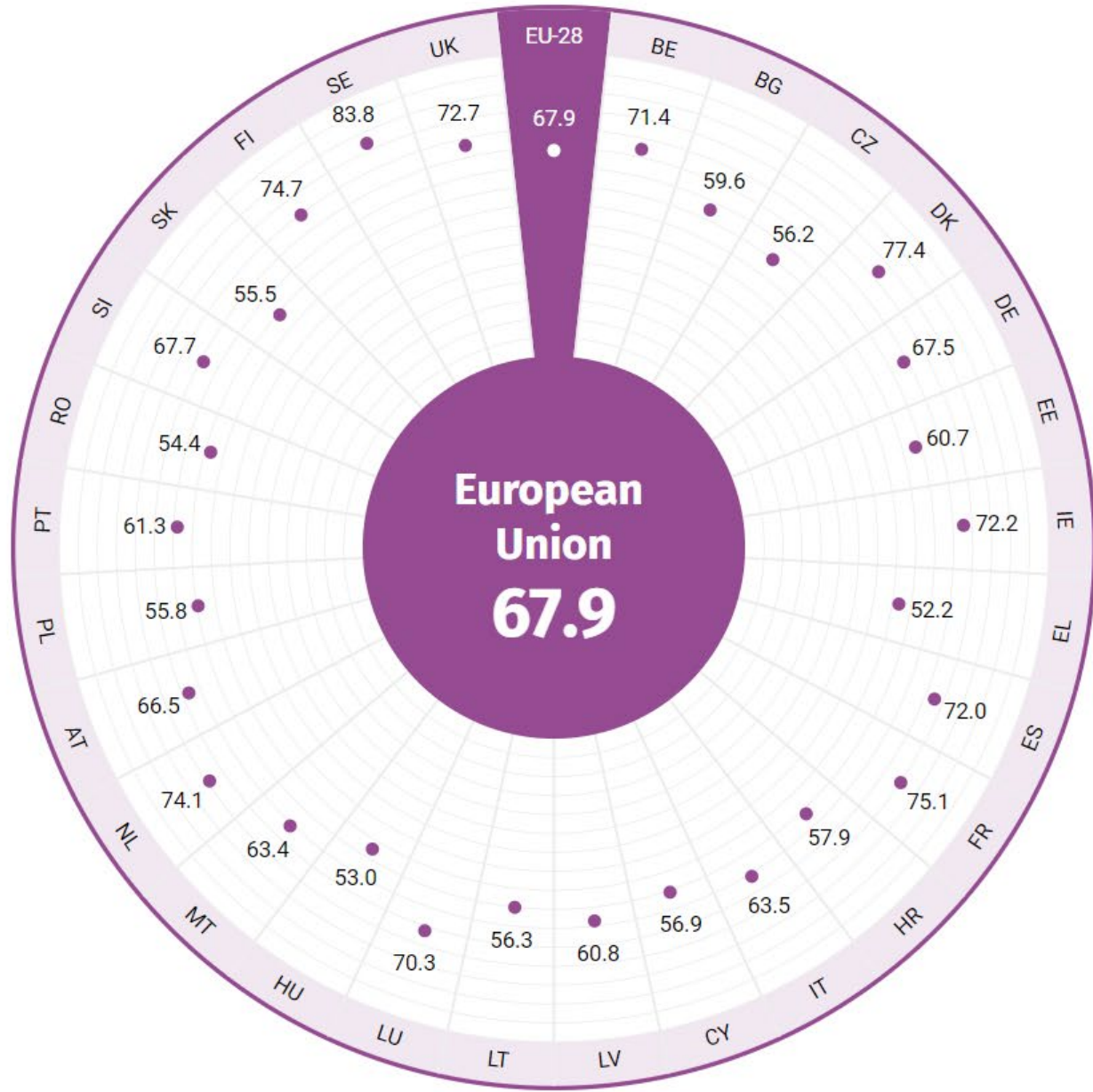
- Examine overlaps between and variations within groups of different sexes (see, e.g., Maney et al., 2016)
- Consider the source of any sex difference observed, including the role of environmental, genetic, hormonal, or anthropometric factors
- When examining sex differences, adjust for possible intersecting and confounding factors (e.g. age). Overlooking confounding factors may result in overemphasising sex differences
- In longitudinal studies, examine how observed sex variations evolve over time
- Analyze how observed sex differences may vary by factors such as age, ethnicity, socioeconomic status

# Measuring Gender

- Susan Phillips 2005 : Defining and measuring gender: A social determinant of health whose time has come *Int.J of Equity in Health*, 4(1):11
- Defining, operationalisation of concept
- Measuring why?
- Measuring how?
  - Levels: individual, interpersonal, societal (f.e.EIGE index)
  - Index, scores, variables
- NO gold standard

# Gender Equality Index

- The Gender Equality Index is a composite indicator that measures the complex concept of gender equality and - based on the EU policy framework - assists in monitoring progress of gender equality across the EU over time
- <https://eige.europa.eu/gender-equality-index/2020/>



# Individual / interpersonal level

- Various ways to proceed:
  - single variable
  - individual gender-related characteristics
  - validated questionnaires
  - theory or data driven scores

# Gender scores

- Composite measure derived from a dataset:
- Pelletier R, Ditto B, Pilote L. A composite measure of gender and its association with risk factors in patients with premature acute coronary syndrome. *Psychosomatic medicine*. 2015;77(5):517-26.
- Tadiri et al. Methods for Prospectively Incorporating Gender into Health Sciences Research. *Journal of Clinical Epidemiology*. 2020;129:191-7. doi:10.1016/j.jclinepi.2020.08.018



# Gender variables for health research

- Why develop a new measure?
  - Development started in Stanford in 2017 (after Pilote's publication)
  - Multidisciplinary group
  - Most important motivation ; to move beyond labeling behaviours as 'masculine' or 'feminine'; critique of BEM questionnaire.
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- Nielsen et al. Gender-related variables for health research. Biology of sex differences volume 12 : 23 (2021)

# Background I

- In this paper, we argue for Gender as a Sociocultural Variable (GASV) as a complement to SABV. Despite several efforts to examine gender and health, the field lacks adequate tools to assess gender. To address this problem, we set out to develop a new instrument— the Stanford Gender-Related Variables for Health Research (GVHR).
- More importantly, moving forward, it is important to recognize that it is no longer sufficient to reduce gender to a two-dimensional spectrum stretching from “masculinity” to “femininity,” i.e., concepts which were historically construed as complementary oppositions, with a man being one thing and a woman being the opposite (for example, rational/emotional; public/private; mind/ body). These concepts are too broad and imprecise to be useful in health research. Given that the goal is to provide physicians and policy makers with gender-related health interventions, measures of gender-related behaviors, such as caregiving or risk-taking, should be labeled as such

# Background II

- To address these limitations, we develop a new gender-variables instrument. This step toward developing more comprehensive and precise survey-based measures of gender, in relation to health, builds on insights from gender theory to capture key aspects of three dimensions of gender that can be deployed quantitatively in diverse clinical research or large health surveys: (1) Gender Norms , (2) Gender-Related Traits, and (3) Gender Relations each of which may correlate with sex assigned at birth or self-reported gender identity, without a predetermined coding of that behavior as masculine or feminine. Thus, we adopt a multidimensional understanding that seeks to capture how intrapersonal, interpersonal, and institutional aspects of gender intersect to shape people's health and illness.

# Explaining GVHR's I

- In this paper, we argue for Gender as a Sociocultural Variable (GASV) as a complement to Sex as a Biological Variable (SABV). Sex (biology) and gender (sociocultural behaviors and attitudes) interact to influence health and disease processes across the lifespan—which is currently playing out in the COVID-19 pandemic. This study develops a gender assessment tool—the Stanford Gender-Related Variables for Health Research—for use in clinical and population research, including large-scale health surveys involving diverse Western populations. While analyzing sex as a biological variable is widely mandated, gender as a sociocultural variable is not, largely because the field lacks quantitative tools for analyzing the influence of gender on health outcomes.

# Explaining GVHR's II

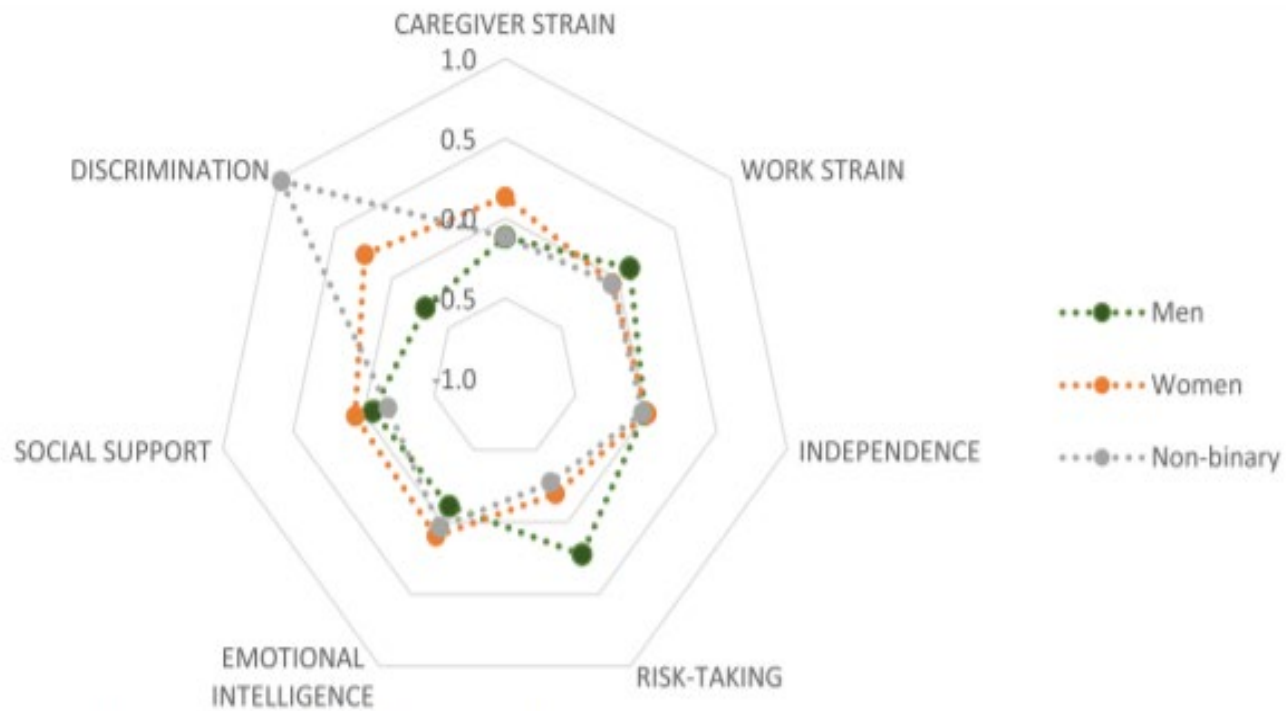
- **Methods:** We conducted a comprehensive review of English-language measures of gender from 1975 to 2015 to identify variables across three domains: gender norms, gender-related traits, and gender relations. This yielded 11 variables tested with 44 items in three US cross-sectional survey populations: two internet-based (N = 2051; N = 2135) and a patient-research registry (N = 489), conducted between May 2017 and January 2018. **Results:** Exploratory and confirmatory factor analyses reduced 11 constructs to 7 gender-related variables: caregiver strain, work strain, independence, risk-taking, emotional intelligence, social support, and discrimination. Regression analyses, adjusted for age, ethnicity, income, education, sex assigned at birth, and self-reported gender identity, identified associations between these gender-related variables and self-rated general health, physical and mental health, and health-risk behaviors.

# Explaining GVHR's III

- Conclusion: Our new instrument represents an important step toward developing more comprehensive and precise survey-based measures of gender in relation to health. Our questionnaire is designed to shed light on how specific gender-related behaviors and attitudes contribute to health and disease processes, irrespective of—or in addition to—biological sex and self-reported gender identity. Use of these gender-related variables in experimental studies, such as clinical trials, may also help us understand if gender factors play an important role as treatment effect modifiers and would thus need to be further considered in treatment decision-making.

# 7 GVHR's

- Gender norms
  - Caregiver strain
  - Work strain
- Gender-related traits
  - Independence
  - Risk-taking
  - Emotional intelligence
- Gender relations
  - Social support
  - Discrimination



**Fig. 1** Gender-related variables capturing specific behaviors and attitudes. The figure displays the z-scores for the seven gender-related variables for respondents seeing themselves as men (green), women (orange) and gender fluid/Non-binary (grey) in sample 1 ( $N = 1893$ )



# Summarized:

- The questionnaire is designed to shed light on how specific gender-related behaviours and attitudes contribute to health and disease processes, irrespective of - or in addition to - biological sex and self-reported gender identity.

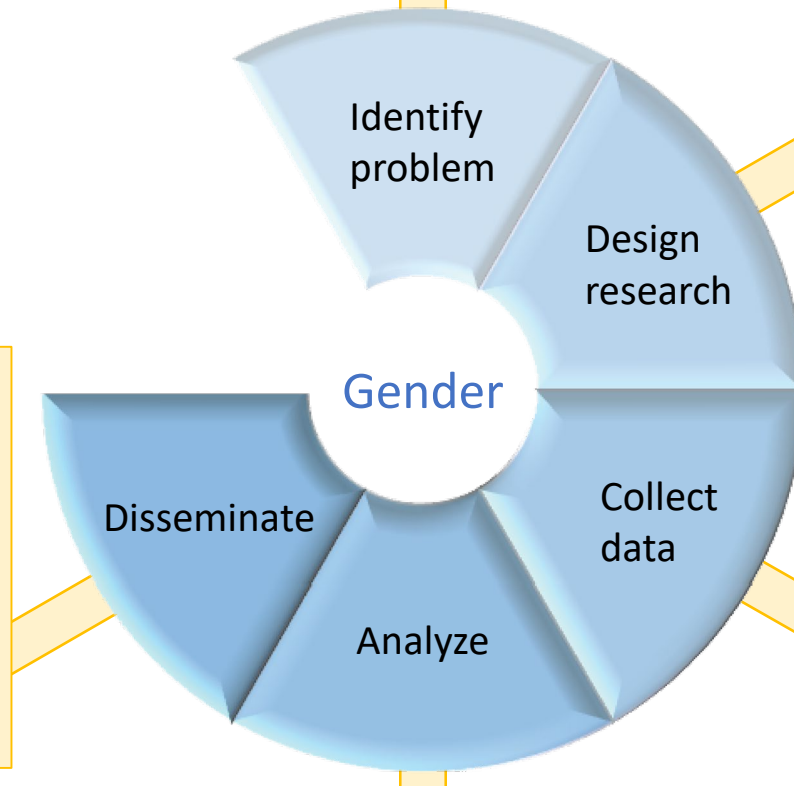
# Food for thought / own research

- Are sex and gender relevant to your research topic/ problem?
- Do you intend to look into sex and/or gender related variables?
- Do you intend to measure gender?
- If yes, what do you hypothesize as relevant : gender norms, gender-related traits, gender relations?
- How to tackle the interaction of sex and gender?
- How to consider intersecting factors: ethnicity, SES, sexual orientation, (dis)ability
- Diversity versus inclusion ?

Nielsen et al: Making gender diversity work for scientific discovery and innovation  
Perspective Nature Human Behaviour | VOL 2 | OCTOBER 2018 | 726–734 |  
[www.nature.com/nathumbehav](http://www.nature.com/nathumbehav)

# ANALYZING GENDER

enhances all phases of research



- Gender may play a role in all studies involving humans (Tannenbaum et al., 2019).
- Perform literature searches with adequate terms for "gender" and "sex" (Oertelt-Prigione et al., 2010).
- Consider the project's relevance in relation to different [gender identities, norms, and relations](#).
- Consider [relevant factors intersecting with gender](#) (age, socio-economic status, ethnicity, etc.).
- Reflect upon your own gender assumptions in relation to the project.
- Consider what opportunities may be missed by failing to analyse gender and intersecting factors

- Consider how to [involve diverse groups of research subjects/end-users](#) in the project life-cycle to ensure inclusive solutions.
- Consider which methods (qualitative and quantitative) are suited for examining the gender dimensions of relevance to your project.
- Use appropriate sample sizes for gender comparison (Sell, 2017).
- When [measuring gender in survey research](#), ensure that your instrument has been psychometrically validated in the target population (Steenkamp & Baumgartner, 1998).
- Inspect your [analytical concepts, categories, and theoretical models](#) for misguided or stereotypical assumptions.
- Consider the risk of stereotyping or excluding relevant groups.

- Report sample [characteristics by gender, sex, and relevant intersecting variables](#).
- Report how information on gender identity was obtained.
- Disaggregate reported results by sex and gender.
- Report all results: positive, negative, and inconclusive.
- Ensure that gender variations are properly reported in tables, figures, and conclusions.
- Avoid overemphasizing gender differences. Are the observed variations of practical significance? (Nelson, 2017).
- Consider following the SAGER publication guidelines (Heidari et al., 2016).

- Collect data across gender characteristics (e.g. gender norms, gender identities, and gender relations) and intersecting factors.
- In survey research, use [the two-step approach](#) to collect data on gender identity and birth sex (Deutsch et al 2013). Ensure that all participants feel safe disclosing their gender identity.
- Ensure equal access for women, men and gender-diverse individuals. Is oversampling needed to ensure a sufficient number of gender-diverse participants? (Vaughan, 2017).
- Consider how gender relations between researchers and participants may impact data collection (Chapman et al. 2018).

- Conduct analyses of relevant factors related to [gender norms, gender identity, and gender relations](#) (Nielsen et al., forthcoming).
- When [using existing data](#), consider the cultural or institutional contexts in which the data were generated for potential gender biases.
- Examine similarities *between* groups (i.e. men, women, and gender-diverse individuals) and variations *within* groups (Hyde, 2005).
- Examine how observed differences between women, men and gender-diverse individuals relate to gender norms and relations.
- Examine how observed gender differences [vary by factors such as age, ethnicity, socioeconomic status](#).
- In longitudinal studies, examine how observed gender variations evolve over time.
- Consider how gender norms, identities and relations intersect to shape people's experiences, opportunities and practices.