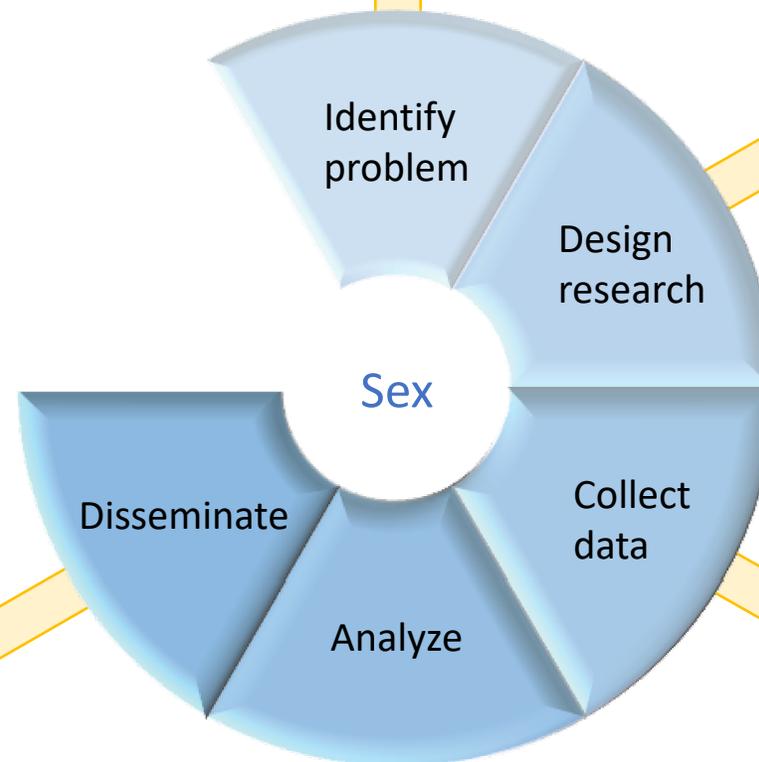


# ANALYZING SEX

enhances all phases of research

- Sex may play a role in all studies involving human or non-human animals (Karp, 2023).
- 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](#)

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