

Gendered Innovations in Orthopaedic Science

Let's Talk About Sex, Baby: Gendered Innovations in Orthopaedic Science

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What is the difference between sex and gender? And honestly, who cares?

On the first question: It depends. And the second: I will wager we all care, since at least in the context of

Note from the Editor-in-Chief: I am pleased to introduce “Gendered Innovations in Orthopaedic Science,” a quarterly column written by Amy L. Ladd MD. Dr. Ladd is a Professor in the Department of Orthopaedics at Stanford University, and President of the Ruth Jackson Orthopaedics Society. Dr. Ladd will provide commentary on gender issues in orthopaedics.

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orthopaedic science and musculoskeletal health, issues of sex and gender matter tremendously. Musculoskeletal disorders and diseases top the list of national disability causes, and occupy a significant share — if not the majority — of the financial and societal burden of U.S. healthcare [10]. Demographic studies indicate that a disproportionate number of women are diagnosed with osteoporosis and osteoarthritis, yet various studies implicate disparate treatment between men and women for these diseases. Arguably, studies are incomplete and underfunded. We, as the purveyors and thought leaders of the critically important musculoskeletal healthcare delivery system, need a seat at the table when it comes to transforming science, and ultimately the care of our patients. The February editorial in *Clinical Orthopaedics and Related Research*® [7] took on this underreported topic with Leopold and colleagues aptly noting, “We probably do not know the full extent of the harm we may be causing because the reporting of results by gender is so inconsistently performed in medical and surgical trials in our specialty.”

So what are the best terms to use: sex versus gender; sex/gender; or sex and gender? At best, it is a murky

matter of biology and society, especially defining where the two shall meet. Facebook Chief Operating Officer, Sheryl Sandberg related the not-so-surprising opinion of a male executive colleague: “It’s easier to talk about your sex life in public than to talk about gender” [9]. Understanding these terms is key for clear communication and relationships with our patients and our families, so I will take a stab at some working definitions and clarification. For simplicity, the more inclusive “sex and gender” suffices in most cases. Strictly speaking, “sex” is biology, if we are not talking about the social context of one’s sex life. Genotype or chromosomes relate to sex; “female” and “male” are adjectives of sex describing the noun “rat,” “rabbit,” or “human” (or more precisely, *Homo sapiens*). Sex includes all phases of development — from the cell division process of meiosis that affords sexual reproduction in the first place, to cells, tissues, and organs undergoing mitosis. Issues that can be defined in purely biological — that is genetic — terms, involving comparisons between or among the different possible germ cell lines (XX, XY, XXY, etc in humans, for example), constitute issues of sex. This also includes incomplete or ambiguous

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representation, such as aberrations of inheritance and happenstance: genetic disorders currently identified through an agreed upon scientific process. Valgus knee posture is more common in human female adults than male adults, presumably because of a wider pelvis necessary for childbearing. Osteoporosis is most common in postmenopausal white women. These are issues related to sex.

“Gender” is society’s perception of sex: assigned or assumed roles and behavior that may be related (or not) to the biology of being inherently female or male. Genotype reacting with environment = phenotype. Examples like mothers are better nurturers, fathers are better providers, and other elements that form part of the “unconscious bias” pervading socioeconomic norms and healthcare, and that are not genetically determined, represent issues of gender [11]. A surgeon’s choice of an axillary incision for a young woman undergoing shoulder instability because of its better cosmetic appearance is a decision based on gender, not sex. A study reporting orthopaedic surgeons recommended TKA 22 times more frequently if an identical radiograph was indicated as male rather than female is a decision based on gender, not sex [1]. These are examples of the bias of stereotype.

But sex and gender often exist in a morass of circumstances. Take, for example, ACL injuries. The propensity

of ACL injuries accompanying peak estrogen levels in young female athletes is an issue of sex. The incidence of ACL injuries in college athletes is one of both sex and gender: the number of male versus female athletes and specific sports played; the protective gear worn, the turf, and who ultimately gets surgery are not clear-cut issues of sex or gender. (College campus gender-neutral policies about sexual orientation are a more common example of this often confusing topic). In summary, approach questions of biology using the term “sex,” questions of social context with the term “gender,” and when both questions are in play, use “sex and gender.”

When I was in medical school, all conditions and measurements seemed to be standardized to the 75 kg white male — the prototype. Although annoying at the time, my revisionist approach 30 years later is, “well, you have to start somewhere.” As science and teams of scientists have addressed diseases, conditions, and epidemiology, we can thankfully now say that children are not just little adults, the elderly metabolize drugs differently as organ systems slow down, and disease entities and conditions affect the female sex — surprise — differently than their male counterparts.

Gendered Innovations is a scientific initiative that examines sex and gender as a variable for investigation,

advancing science and technology across the globe under the helm of Stanford professor Londa Schiebinger [5]. Asking specific questions related to sex and gender in orthopaedics is our own version of Gendered Innovations® promoted by the Ruth Jackson Orthopaedic Society (RJOS) and its various liaisons, with a goal of yielding better results and improving the end game of musculoskeletal science and health care. Meaning, if we examine a topic such as osteoporosis with a lens that examines similarities and differences between men and women (incidence, age, comorbidities) we learn more about the entire body of knowledge on the topic. Osteoporosis is such a great example in our specialty of how improving the question begins to address the problem. For instance, before male bone mineral density standards were established [8], osteoporosis was largely viewed as solely a postmenopausal white female affliction, and arguably marginalized as the “little old lady disease.” Once standards were established, the male incidence of osteoporosis is much higher than ever imagined, and the overall morbidity and first-year mortality after hip fracture is greater in men than women [6]. At the very least, this refined approach promotes awareness. At the very best, the recognition promotes innovative ways to prevent, treat, and build a team invested in the

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process. To date, our RJOS liaisons and partnerships include the U.S. Bone and Joint Initiative, Orthopaedic Research Society[®], Women's Health Issues Advisory Board of the American Academy of Orthopaedic Surgeons, the Perry Initiative, and now, a new partnership with CORR[®]. We seek to grow a team that promotes young scientists and leaders of tomorrow, and what better way to interest girls and young women in the process.

And while on the topic, the incidence of fragility fractures is ten-fold that of heart attack and breast cancer, and their comorbidities far-reaching [3, 4, 6, 8, 10]. Osteoporotic fractures, with their resultant morbidity and mortality on the rise, are a public health issue we all should recognize and treat. The Seattle Heart Watch program and pink ribbons for breast cancer awareness are successful campaigns that have forever changed public recognition of common and life-threatening diseases. Gendered Innovation in orthopaedic science presents an opportunity to raise public awareness, and create campaigns that promote funding, education, and research in a similar way. Who knows? Maybe we can promote a bone health

ribbon, with little condyles on each end (much like Pebbles' ponytail holder in *The Flintstones*). Here lies an opportunity to improve diagnosis, prevention, and treatment of musculoskeletal disease and disorders: one baby, one child, one man, and one woman at a time.

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