

VIEWPOINT

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The Evolution of Gender

In its 2001 report entitled *Exploring the Biological Contributions to Human Health: Does Sex Matter?*, the Institute of Medicine (IOM) called on biomedical researchers to step up their investigation of sex and gender as critical variables affecting health.¹ In support of their appeal, the authors noted rapidly growing evidence for important distinctions between males and females at every level of existence, from the sociological level down to the molecular level. The authors proposed that increased understanding of the roles of sex and gender in health and disease could advance preventive, diagnostic, and therapeutic health care practices. The IOM report thus listed several recommendations for future investigations of sex differences.

The report also listed several barriers to research progress, foremost among them being “the inconsistent and often confusing use of the terms *sex* and *gender* in the scientific literature and popular press.”¹ The confusion in terminology does not lie in the use of the word *sex*, defined in the IOM report as “the classification of living things, generally as male or female according to their reproductive organs and functions assigned by the chromosomal complement.”¹ Rather, the confusion lies in the use of the word *gender*. Interestingly, the genesis of the confusion can be traced directly back to the 1950s and the writings of psychologist John Money, who had devoted his career to the study of patients with various disorders of sex development.² To facilitate discourse about patients whose sex was unclear due to genetic, hormonal, or genital ambiguities, Money borrowed the word *gender* from linguistics, where it is used to designate masculine, feminine, or neuter aspect of words, and repurposed it in “sexual science” to be “the umbrella term which refers to the totality of masculinity/femininity.”² Money then coined the phrase “gender role” to indicate whether his patients thought of themselves—and presented themselves in public—as either male or female. By the mid-1960s the word *gender* was adopted outside of sexual science by psychoanalytic writers and soon thereafter by feminist writers to mean the “socially constructed” (vs biologically determined) aspects of male-female differences,³ that is, the stereotypic psychological and behavioral characteristics presumably shaped by societal expectations. As the term *gender* was increasingly used to describe all people, not just those with disorders of sex development, it eventually became synonymous with *sex*. Currently, *sex* and *gender* are frequently used interchangeably in scientific writing, often within the same document, with both words referring to whether individuals are biologically male or female.³ Hence the confusion.

A return to the definition of *gender* as the term that subsumes masculinity and femininity (vs male and female) would clear the confusion and could also have implications for the study of health and disease. *Gender*,

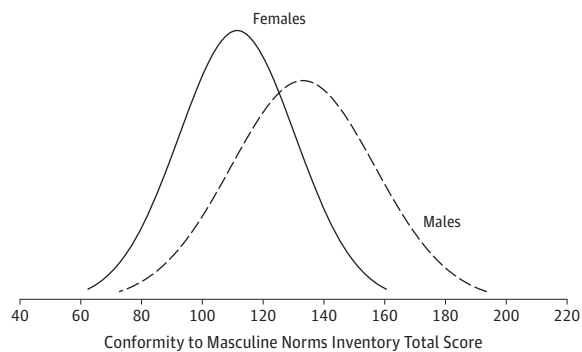
in this sense, is related to *sex*, in that masculinity and femininity refer to behavioral and psychological characteristics that tend to be associated with males and females, respectively. However, it is important to note that both males and females differ widely in the degree to which they manifest gender characteristics that are typically viewed as either masculine (eg, aggressive, stoic) or feminine (eg, nurturing, expressive). This point is illustrated in the Figure, which shows the relationship between sex and masculine gender characteristics. The Figure was derived from data collected from participants who completed the Conformity to Masculine Norms Inventory,⁴ which is a questionnaire that measures tendencies toward masculine gender characteristics by assessing respondents' level of agreement with each of 94 statements (eg, “I never share my feelings.” “It is important for me to win.”). In this study, both males and females endorsed widely varying levels of masculine gender characteristics, with significant overlap between the sexes.

So, what does this word play have to do with biomedical research? The answer is that *gender* (ie, subsuming masculinity and femininity) appears to have its own significance in the study of health and disease. In fact, several studies suggest that individual differences in degree of masculine and feminine gender characteristics are associated with morbidity, mortality, and health behaviors. For instance, a large longitudinal study demonstrated that greater levels of masculine gender characteristics assessed in early adulthood were significantly related to increased mortality over the next several decades, even after adjusting for unhealthy lifestyle habits (eg, smoking, obesity, risk-taking). Importantly, this finding held true for both sexes, ie, female and male participants who manifested higher levels of masculine gender characteristics than did their same-sex peers were also more likely to die at any given age. Furthermore, mortality rates were highest for the most masculine males and lowest for the most feminine females.⁵ Another study found similar relationships. In this population-based study, participants were assessed at age 55 years using various measures of physical functioning, health behaviors, and personal characteristics, and they were followed up longitudinally over the next 17 years. Among men, lower scores on a scale measuring feminine gender characteristics were significantly related to higher mortality from coronary heart disease, even after adjusting for smoking, body mass index, and systolic blood pressure. No associations, however, were found between gender characteristics and mortality among females.⁶

There is also strong evidence that gender characteristics are influenced by biological factors. Several large-scale twin studies showed that masculine and feminine gender characteristics demonstrate substantial

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Figure. Masculine Gender Characteristics by Sex



heritability,⁷ to a degree comparable with that found with common dimensions of personality characteristics.⁸ These findings are particularly important in that they belie the notion that *gender* is strictly socially constructed. They also raise the intriguing possibility that there may be constitutional characteristics associated with gender (eg, genetic, hormonal) that may also have a direct influence on health.

Gender characteristics, as defined in this way, are akin to personality characteristics, in that both terms refer to psychological and behavioral predispositions that are derived from an interaction be-

tween genes and environment^{7,8} and that have an impact on a broad range of important outcomes.^{5,6,9} In addition, from a psychometric perspective, both gender and personality subsume a number of distinct and measurable dimensions: 2 in the case of gender and 3, 5, 7, or more in the case of personality, depending on the particular theory of personality. The principal difference between gender and personality is that gender characteristics are more explicitly associated with sex (although it should be noted that sex differences are also seen in certain personality characteristics). Incidentally, even though it has also been used interchangeably with *gender*, the term *gender role* might be reserved to refer to those behavioral characteristics that are more clearly the sole product of societal expectations within the cultural context, such as manner of dress, adornment, and grooming; behavioral displays that are considered most appropriate for one's sex; and engagement in tasks differentially associated with males and females.

In summary, *sex* and *gender* are associated, but they are not the same. Each variable is worthy of study in its own right. The few studies described above illustrate the value of considering *gender* as a continuous and not a categorical variable in the investigation of various health outcomes. Given the association between *sex* and *gender*, studies of relationships between gender characteristics and health outcomes could lead to insights into mechanisms underlying broader categorical differences between the sexes in terms of morbidity, mortality, and health behaviors.

ARTICLE INFORMATION

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