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## 4 SEX, GENDER, AND VULNERABILITY

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### INTRODUCTION

Gender is a particularly complex social determinant of health because it interacts, and is closely identified, with biologic dimensions of vulnerability. Research efforts to understand 'what gender does' to health are particularly challenging for several reasons. Principal among these is that sex and gender are frequently conflated in the epidemiologic and medical literature. While a growing number of health studies claim to include an analysis of gender, they use the terms sex and gender interchangeably, and go no further than including sex/gender as one bivariate category in their analysis. By using the terms gender and sex interchangeably, the public health literature implicitly endorses the notion that gender is an extension of sex. Recent studies offer us disaggregated data by sex, but such data alone do little to further our understanding of whether

observed sex differentials are attributable to underlying chromosomal sex differences, to gender experience, or a combination of factors.

Why would this matter? Because our approach to interventions could be different depending on the answer; sex-linked vulnerabilities, attributable to *gendered experience*, may open debate about prevailing gender norms, and whether gendered expectations may be leading to more harm than good. An acknowledgement that certain aspects of gendered behavioural expectations are harmful to health, or even potentially fatal, begs a discussion on whether re-visioning gender may be warranted for public health purposes.

It is the intention of this paper to compare the 2002 global Disability-Adjusted Life Years (DALYs) for males and females, and to discuss how biologic differences in sex chromosomes contribute to a subset of these differentials through intrinsic vulnerabilities (e.g. birth asphyxia among males,

What health outcomes can we attribute to sex or to gender

glaucoma among females). A further subset of health conditions, with large differentials by sex, are more directly attributable to gendered patterns of work and social experience (e.g. road traffic accidents among males, trachoma among females), while another subset of health conditions illustrates how sex and gender vulnerabilities may be overlaid on one another in ways that can exacerbate sex differences in outcome, or mitigate risks (e.g. the female excess in blindness). A residual group of health outcomes that disproportionately affect one sex remain mystifying (e.g. the high burden of gout among males, the high burden of depression among females), because our current understanding of causality is incomplete.

In the second part of the paper, it is argued that gender effects on health are characterized by a capacity for adaptation over time and space, in response to fashion, media, or public policy. As such, they invite the possibility for interventions that directly target health risks due to gendered behaviours. Yet, even when the impact of gender on health is substantial, and appears amenable to intervention, there have been limited such efforts to intervene. This hesitation to intervene, when gendered socialization and gender discrimination harms, is not only costly to human health, but suggests an abiding unwillingness to design policies or programmes that might instrumentally challenge gendered identities. A more open reflection on gender interventions is called for in the interest of health.

Define sex vs. gender

## DEFINITIONS

Before proceeding, let me affirm the definitions used in this paper. The term *biologic sex* refers to the developmental differentiations in anatomy and physiology that are a direct consequence of the inherited composition of sex chromosomes (46,XX versus 46,XY karyotypes). It is this difference in sex chromosomes that leads to differentiation of the gonads, steroid production, and, eventually, secondary sex characteristics. The cascade of differentiating events is well underway in the unborn foetus at 20 weeks, and accelerates once again at puberty. Both before birth and after puberty it is the dramatic quantitative differences in the production of hormones (i.e. androgens

and estrogens) that serve as the intermediaries between the sex genotype (i.e. the inherited sex chromosomes) and the manifestation of physical characteristics observed in post-pubertal males and females (Federman 2006). It is the phenotype of sex<sup>1</sup>, or whether an individual is judged to look male or female by others, that evokes a constellation of gendered social expectations, responsibilities, and obstacles; such a gendered experience incurs health risks unrelated to chromosomal sex itself.

## SEX DIFFERENCES IN DISEASES

To conduct a review of sex, gender, and vulnerability, one must have sex-disaggregated data. Such data are increasingly available in the health field, but not in all countries or international databases. The aggregate data, used for this analysis, are taken from the World Health Organization's (WHO) original Global Burden of Disease (2002) estimates of disability adjusted life years (DALYs), by age, sex, and cause, *without age-weighting or discounting* (DALYs [0,0]). DALYs provide an aggregate measure of healthy years of life lost due to premature death or disability. These estimates are extremely rough, as they reflect the many extant gaps in regional, and, thereby global, epidemiologic data. Epidemiologic data may be subject to systematic biases, including intrinsic sex and gender biases (Sundby 1998, Hanson 2002). For example, select conditions are known to be under-reported, by one sex or another, due to gender-based fears of stigma and discrimination (e.g. infertility or domestic violence among females, sexual dysfunction among males). In select regions of northwest India, China, and South Korea, child health data may be more accurate for male children, given the persistent evidence of son preference (Das Gupta et al. 2003), and the discrimination against health-seeking for girl children (Chen et al. 1981, Das Gupta 1987, Das Gupta et al. 2003).

Furthermore, the estimation of DALYs requires the generation of disability weights, i.e. subjective estimations of how 'burdensome' a given illness is for a human life. These estimations have been found to vary substantially, depending on the

local culture and professional status of those undertaking the estimations (Sadana 1998, Jelsma et al. 2000). In Zimbabwe and Cambodia, for example, non-professionals weighted infertility as substantially more burdensome than did the Burden of Disease experts. Other conditions affecting marriage prospects for women, such as vitiligo, were also ranked higher by local evaluators in Cambodia, leading to criticism that disability weights reflect the gender biases of elite male health professionals<sup>2</sup>.

Substantial criticism has also been raised over the use of age-weighting and discounting in the DALY, but use of these adjustments is optional, and the present analysis makes use of DALYs without weighting or discounting (DALYs [0,0]). While a full account of the arguments against age-weighting and discounting are beyond the scope of this paper, the rationale for age-weighting, i.e. an a priori assumption that a given year of life at different ages has greater or lesser value to society, is persuasively rejected by Anand and Hanson (1997, 1998). With regard to discounting, it is sufficient to quote Beermann (1999): 'Ethical criteria become relevant to this question, because, health (or life-years) is a basic aspect of life, so that correspondingly there exists a basic right to health. The specific ethical problem in this context is the problem of justice between generations and the general answer to the problem is that current and future generations must be treated equally<sup>3</sup>.

Acknowledging the underlying weaknesses in epidemiologic coverage of the DALY, and possibilities for systematic underreporting for the poor, and for women's conditions, these estimates still remain the best available source on the relative global status of health outcomes, especially if used without age-weighting or discounting, as provided here. Based on the 2002 global data for all ages combined, the 10 leading causes of lost DALYs, among females and males, are listed in Table 4-1. The first three leading causes are similar for males and females, at least when viewed in large aggregate ICD-10<sup>4</sup> categories: lower respiratory conditions, HIV, and diarrhoeal disease, top the list for both sexes. Thereafter, sex differences of relative magnitude emerge, with ischemic heart disease, low birth weight, malaria, cerebrovascular disease, and birth trauma, on both lists, but with differences in absolute numbers of DALYs, as well as relative rank order. The overall greater DALY burden, among males worldwide, is evident in the absolute numbers of DALYs lost in the top 10 conditions (e.g. the tenth ranked condition for males is still accounting for 44 million DALYs worldwide); females, on the other hand, have two conditions on their list that contribute less than 35 million DALYs.

The top 10 lists are also distinct in tell-tale ways, i.e. in the appearance of two injury-related categories on the male list (unintentional injury and road traffic accidents), and the appearance of unipolar depressive disorders on the female

*DALY - Healthy years of life lost due to premature death or disability*

Table 4-1. Top 10 causes of disease or disability for males and females, based on the number of total global DALYs lost at all ages. Data based on DALYs [0,0] published in 2002.

Males (all ages)		Females (all ages)	
Cause	DALYs	Cause	DALYs
1 Lower respiratory infections	99,057,981	Lower respiratory infections	97,801,108
2 HIV	78,020,596	HIV	73,516,955
3 Diarrhoeal diseases	71,883,930	Diarrhoeal diseases	67,296,145
4 Ischaemic heart disease	64,504,498	Malaria	52,646,469
5 Low birth weight	58,925,647	Low birth weight	51,321,438
6 Other unintentional injuries	49,236,025	Ischaemic heart disease	50,082,860
7 Malaria	47,184,421	Cerebrovascular disease	47,623,180
8 Cerebrovascular disease	46,437,060	Other infectious diseases	45,068,486
9 Road traffic accidents	45,112,383	Birth asphyxia and birth trauma	34,940,346
10 Birth asphyxia and birth trauma	44,068,687	Unipolar depressive disorders	32,507,673

list. The relative and absolute importance, of accident and injury to men's health, emerges under many separate conditions in the Global Burden of Disease (GBD) statistics. Alcohol contributes to road traffic accidents, especially fatal accidents. A cluster of health outcomes, that include substance abuse (alcohol or drug), and their direct or indirect consequences (such as traffic accidents), are consistently in excess among males (see next section for further discussion).

Women's vulnerability to unipolar depression, in the top 10 list, is echoed by excess female DALYs for a range of other psychiatric conditions, including panic disorder, post-traumatic stress disorder, and obsessive compulsive disorder (see Table 4-2b); the excess female DALYs for these outcomes is found in many national and cross-national studies (Hallstrom 2001, Angst et al. 2002, Hopcraft and Bradley 2007). Several authors have highlighted possible gender biases, in current diagnostic instruments, that would lead to under-diagnosis of male depression (Rutz 1999, Bech 2001, Moeller Leimkuehler et al. 2007). The feminist community, in fact, has questioned, for some time, assumptions that women are inherently vulnerable to mental illness (Chessler 1972). Ironically, the diagnosis and gendered causes of depression may receive more concerted attention, given the growing interest in male depression (van Grootheest et al. 1999, Han et al. 2006, Moeller Leimkuehler et al. 2007). A more compelling perspective, on male/female sex differences, is provided by looking at conditions for which there are large disparities in DALYs by sex. Tables 4-2a and 4-2b include all conditions for which the male/female discrepancy in total DALYs is more than 25% of the lesser value; they list conditions for which males or females, respectively, have a 25%, or greater, excess in overall DALYs.

### ATTRIBUTING HEALTH OUTCOMES TO SEX OR GENDER

As shown among the conditions listed in Tables 4-2a and 4-2b, one can start to parse out a subset of outcomes that are intrinsically linked to an XX or XY genotype and sex-linked differences in function (and vulnerability). For others, vulner-

Sex vs. gender

SEX - haemophilia, testicular + prostate cancers, male respiratory syndromes, low birth weight, exposure to tobacco riskier for female lungs.

abilities are clearly associated with specific types of jobs and social exposures that are socially divided between the sexes. A further group of conditions are impossible to classify as attributable to sex or gender, either because both dimensions are involved in complex ways, or because the level of fundamental research is inadequate.

Differences in health outcomes, that are linked to an XX or XY karyotype (see Table 4-3a), include the risk of haemophilia among XY karyotypes, and the vulnerability to testicular and prostate cancers made possible by the karyotype encoding the growth and development of a prostate and testes; likewise, corresponding XX karyotypes allow the development of a cervix and ovaries. Male foetal lung development is also distinct from that of females in utero, such that male pulmonary function matures more slowly, contributing to more respiratory distress syndromes and lung-related injuries among male newborns. The male excess of 35-50%, for a wide range of respiratory-related causes of death in the newborn, including infant respiratory distress syndrome (IRDS), sudden infant death syndrome (SIDS), upper respiratory infections, and asphyxia (Stevenson et al. 2000), are increasingly theorized to reflect an X-linked recessive allele, i.e. a sex-linked chromosomal vulnerability (Mage and Donner 2004), contributing to the 'newborn male disadvantage' in low birth weight as well<sup>4</sup>. Conversely, differences in the biology of male and female lungs also suggest that an equivalent exposure to tobacco smoke leads to a greater risk of molecular aberrations (i.e. mutations) in female lungs (Patel et al. 2004). While the sex genotype does not cause these outcomes, it is a necessary pre-condition to the outcome, distinguishing a sex-linked vulnerability, i.e. a vulnerability not experienced by members of the opposite sex. Health outcomes, such as testicular cancer or low birth weight, for example, may also be caused by environmental risks or poverty, respectively, but they also reflect sex-specific vulnerabilities.

Gendered expectations, imposed on members of each sex, impact health in a variety of ways. Divisions of labour between the sexes underlie some of the most obviously gendered differences in health outcomes, such as the greater risk of drowning among males worldwide, because of

Gender - men drowning b/c of jobs women burnings b/c cooks

Table 4-2a. Select health conditions for which DALYs lost to males are at least 25% above those lost to females.

Condition	Male DALYs	Female DALYs	Male DALYs/ Female DALYs
War	9,306,296	1,131,676	8.223
Gout	4,246,359	572,741	7.414
Alcohol use disorders	14,810,111	2,662,637	5.562
Road and traffic accidents	45,112,383	9,532,961	4.732
Violence	27,470,156	6,810,306	4.034
Other intentional injuries	496,974	126,953	3.915
Drug use disorders	6,006,662	1,616,742	3.715
Lymphatic filariasis	6,248,138	2,056,275	3.039
Mouth and pharynx cancers	4,751,823	1,991,476	2.386
Lung cancer (trachea & bronchus)	15,232,399	6,687,840	2.278
Liver cancer	9,409,480	4,208,880	2.236
Drowning	13,983,352	6,795,333	2.058
Bladder cancer	1,913,556	964,949	1.983
Anorectal atresia	49,504	25,843	1.916
Hepatitis B	2,645,774	1,408,635	1.878
Poisoning	8,927,574	5,011,169	1.782
Oesophagus cancer	5,266,748	3,049,496	1.727
Trypanosomiasis	1,741,306	1,043,857	1.668
TB	37,298,748	22,944,907	1.626
Peptic ulcer disease	4,574,045	2,939,246	1.556
Stomach cancer	9,576,685	6,171,105	1.552
Schistosomiasis	1,025,505	666,404	1.539
Other unintentional injuries	49,236,025	32,020,194	1.538
Falls	14,429,845	9,532,961	1.514
Cirrhosis of the liver	14,613,849	9,734,719	1.501
Renal agenesis	104,192	69,973	1.489
Self-inflicted injuries	21,665,217	15,201,138	1.425
Leprosy	198,328	142,864	1.388
Leishmaniasis	1,970,613	1,462,594	1.347
Onchocerciasis	355,411	264,327	1.345
Other malignant neoplasm's	9,324,018	6,993,333	1.333
Inflammatory heart disease	5,650,277	4,387,989	1.288
Appendicitis	359,687	281,805	1.276
Benign prosthetic hypertrophy	3,747,386		
Prostate cancers	3,254,128		

their roles as fishermen and boatmen, and, by contrast, the greater number of burnings among women, due to their responsibility for cooking and fire-tending (see Table 4-3b).

Gendered differences in occupational health risk are, however, only the tip of the iceberg. Gendered leisure activities and ways of coping with life stress, shaped by social messaging about what leisure activities a male or female should

Gendered leisure activities & coping w/ stress

undertake, result in differential rates of cigarette smoking, alcohol, and drug use, and a cascade of associated health risks. Cigarette smoking continues to be more common among men in much of the world, contributing not only to lung, mouth, and bladder cancer (Meisel 2002), but also to an estimated one-third of the male excess in reported tuberculosis (TB) cases (Watkins and Plant 2006). Differential gendered obligations to children, the

gendered obligations to children.

Table 4-2b. Select health conditions for which DALYs lost to females are at least 25% above those lost to males.

Condition	Female DALYs	Male DALYs	Female DALYs/ Male DALYs
Breast cancer	11,733,351	44,483	263.772
Gonorrhoea	2,888,421	264,196	10.933
Chlamydia	2,888,421	264,196	10.933
Trachoma	2,475,721	811,980	3.049
Migraine	8,802,838	3,146,812	2.797
Post-traumatic stress disorder	1,883,391	720,628	2.614
Rheumatoid arthritis	4,259,468	1,672,682	2.546
Panic disorder	3,594,381	1,844,713	1.948
Alzheimer and other dementias	12,818,790	7,213,869	1.777
Osteoarthritis	15,629,274	9,149,400	1.708
Other musculoskeletal disorders	3,518,880	2,093,852	1.681
Fires	12,768,433	8,223,566	1.553
Unipolar depressive disorders	32,507,673	21,133,650	1.538
Iron-deficiency anaemia	9,025,199	6,077,808	1.485
Other oral diseases	95,088	65,503	1.452
Insomnia (primary)	1,894,676	1,362,610	1.390
Multiple sclerosis	1,000,898	722,796	1.385
OCD	2,330,821	1,705,743	1.366
Other intestinal diseases	88,928	65,128	1.365
Cataracts	21,454,199	15,729,865	1.364
Rheumatic heart disease	6,184,772	4,548,016	1.360
Vision disorders, age-related	12,714,330	9,413,331	1.351
Glaucoma	3,304,452	2,464,786	1.341
Other genitourinary systems diseases	3,668,296	2,842,889	1.290
Japanese encephalitis	658,357	522,117	1.261
Other maternal conditions	15,062,497		
Maternal sepsis	8,688,660		
Maternal haemorrhage	7,602,986		
Cervix uteri cancer	6,322,294		
Abortion	5,967,628		
Obstructed labour	4,851,864		
Hypertensive disorders	3,889,105		
Ovary cancer	3,174,156		
Corpus uteri cancer	2,075,423		

Table 4-3a. Sex-specific vulnerabilities.

XY vulnerabilities	XX vulnerabilities
Haemophilia	Breast cancer
Prostate cancer	Ovarian cancer
Testicular cancer	All maternal causes
Birth asphyxia and trauma	Chlamydia
Low birth weight	Rheumatoid arthritis
Acute starvation	Osteoarthritis
Renal agenesis	Glaucoma
	Cataracts (in part)

sick, and the community affect exposure to infections (e.g. trachoma, influenza), and the structure and responsiveness of the health system itself biases care. For example, there is evidence of more renal transplantation for males than females, controlling for medical need and patient interest (Alexander and Sehgal 1998), and fewer referrals for women than men for angiography, despite identical clinical characteristics (Schulman et al. 1999). The literature provides substantial documentation of gendered divisions in health

Table 4-3b. Gendered vulnerabilities.

Male gender vulnerabilities	Female gender vulnerabilities
Falls	Fires
Drowning	Trachoma
Road traffic accidents	Cataracts (in part)
Self-inflicted injuries	? Panic disorders
Lung cancer	? Depressive disorders
Drug use disorders	? Post-traumatic stress disorders
Alcohol use disorders	? Insomnia
Cirrhosis of the liver	? Migraine
Bladder cancer (in part)	
TB (in part)	

care experience (see Doyal 1995, Annendale and Hunt 2000, Östlin et al. 2001, Sen et al. 2002, among others).

One of the challenges in studying how gender affects health, is the near-ubiquitous assumption that sex-linked genetic differences in biologic capabilities (e.g. women's ability to give birth and breastfeed, men's upper body strength), justify professional and social exclusions that, in turn, come with certain health risks. It is tempting to treat sex and gender as if the latter is a natural extension of the former, especially for health conditions that result from women's roles in homemaking (e.g. fires) and childrearing (e.g. trachoma), or men's work in heavy labour (e.g. falls, drowning). This extends to subtle but widespread assumptions about the inevitability of interpersonal violence, i.e. that males are naturally inclined to violence, and even genetically motivated to control the women in their lives, at times by force. Use of the terms 'gender' and 'sex' interchangeably endorses such a perspective, implying that gendered behaviours and vulnerabilities are an organic consequence of genetic sex; there is much support for such an approach among social conservatives, rationalized as a division of labour rooted in nature, or divine intent.

The excess incidence of depressive and other mental health difficulties among females, begs research on the relative contributions of sex chromosome-linked vulnerabilities versus gendered experience, or the possibility that the relevant diagnostic criteria are, themselves, gender-biased,

*women depression - sex or gender*

leading to over-diagnosis of women, or under-diagnosis of men (Moeller Leimkuehler et al. 2007). Astbury comments, 'notions of women's biologically based vulnerability or proneness to [mental] disorder have proved rather resistant to change', while not subjected to empirical investigation (Astbury 2002: 147). Rising interest in men and depression will certainly heighten the attention to possible gender biases in diagnoses, but more analysis is warranted on at least two other questions: whether there are social advantages (for men) in constructing women as vulnerable to mental illness and whether the world is organized in ways that so limit women's options, and so heighten their fears that depression (and panic-disorder) are understandable.

Men's greater vulnerability to alcohol-related disorders has been commented on by Astbury (2002, citing Allen et al. 1994) as possibly exaggerated by reporting bias, i.e. if women selectively avoid reporting alcohol problems. While this may be the case, the DALYs for alcohol-related outcomes, including cirrhosis, gout, and road traffic accidents, are each consistently and strongly in excess for males, supporting the likelihood of greater alcohol-related disorders among males, even in the event of under-reporting by females.

Traffic accidents are not only one of the 10 highest causes of global DALYs for males, but they offer a potent area for gendered analysis of cause and debates over policy. The following case draws on a paper by this author, prepared for the WHO in 2002 (Snow 2002). Globally, males sustain approximately 70% of all traffic accident deaths, and over 70% of all traffic-related DALYs per year. Much of the male excess in traffic accidents can be attributed to men's greater access to vehicles, and their roles as drivers. In general, males have more experience than females in driving all types of vehicles, and socialization of males emphasizes mastery over motorized transport of all kinds. So, does the excess male involvement in traffic accidents simply reflect more (gendered) driving time? US data allow an analysis of crashes, adjusted for total vehicle miles travelled: when controlling for males' excess exposure, the sex difference in crash involvement disappears. However, the same adjustment fails to account for excess male involvement in fatal crashes. The excess risk for

*men - alcohol*

*men crash more bc drive more*

*however men die more*

fatal crashes among males is especially dramatic among the youngest drivers, and largely attributable to speed and alcohol (Maio et al. 1997, Odero 1998). Males are not only more likely than females to drive after they have been drinking but, when simulated driving was evaluated among 18-year-olds who had their blood alcohol raised experimentally, girls were found to drive more cautiously as they got drunker, while boys became more reckless (Oei Tian and Kerschbaum 1990).

To what extent is such risk taking encouraged as part of masculine identity i.e. a way of 'doing' male gender, or a sex-linked predisposition of the genotype? Investigations of the biologic basis of male risk-taking have been largely inconclusive. Complex studies of twins find more sensation-seeking behaviour among those with greater in utero exposure to androgens (Daitzman et al. 1978, Resnick et al. 1993), but the magnitude of the effects are small, and variations in childrearing cannot be excluded. Even in the event of a sex-linked genetic predisposition to risk-taking among males, we also have powerful social and media messages that promote risk-taking as a signature means of demonstrating masculinity. Courtenay (2000) argues that dismissing risks, in general, is a crucial means by which males construct their gender. Recognizing that some degree of risk-taking has positive value in modern life, the outstanding question may be whether, and how, risk-taking tendencies might be shaped or regulated to avoid endangering males and, more generally, society (Snow 2002).

For a range of health outcomes, with large differences between the sexes, sex and gender vulnerabilities may both be, in effect, compounding or mitigating one another. The challenge here is to undertake a careful desegregation of measured affects that may be caused by sex or gender, often in the midst of other independent causes. Blindness offers a compelling example of a health outcome, attributable to a combination of sex and gendered causes that heightens female risk, resulting in almost 150 blind women for every 100 blind men in the world. This example draws on the research of Courtright, Lewallen, and colleagues who have undertaken a model effort to disentangle sex and gendered causes of blindness (see Abou-

Gareeb et al. 2001, Courtright and Lewallen 2002, Lewallen and Courtright 2002).

Women bear approximately two-thirds of the global burden of blindness; results of a meta-analysis suggest a pooled age-adjusted odds ratio of 1.43 (95% CI 1.33-1.53) (Abou-Gareeb et al. 2001). This reflects several dimensions of heightened risk for women: a 10-15% greater incidence of cataracts, the leading cause of global blindness which, Courtright and Lewallen (2002) propose, is due to sex-linked inherent risks for women. To this is added a 2.5-3 times greater risk of trachoma-related blindness among adult women than men. As the proportion of active infections is similar among boys and girls, the greater number of active infections among adult women is attributed to their greater contact with infected children. These disparities in vulnerability are compounded by men's greater access to cataract surgery in many parts of the developing world. Hence, the global excess of female blindness is attributed to an (hypothesized) sex-linked vulnerability to cataract, a gendered risk of trachoma, and a gendered distribution of eye care services. This analysis is particularly helpful in that the authors have identified gendered dimensions which, by definition, are amenable to intervention, such as delivering more cataract surgical services to women.

## IMPLICATIONS FOR RESEARCH AND POLICY

The causal factors responsible for many of the sex differences in health, listed in Tables 4-2a and 4-2b, remain poorly understood, including those causing TB, depression, osteoarthritis, Alzheimer's and dementia, migraine, and gout. TB and depression deserve special concern, due to the magnitude of global DALYs lost to these two conditions. The higher proportion of male cases of reported TB may reflect underlying sex-based genetic vulnerabilities, or cultural and service barriers that limit case-reporting among women, or some combination of both (Thorson et al. 2004, Weiss et al. 2006). Given the high global burden of TB for both sexes, there should be sustained efforts to explore all social vulnerabilities, including those attributable to gender.

Blindness is sex + gender

Better understanding of systematic biases in diagnosis, willingness to screen, or access to care would shed light on male and female vulnerabilities alike, furthering TB control for all patients. Recent data, from Malawi, Bangladesh, India, and Colombia, found that women were more likely than men to drop out of care during TB diagnosis, while men were less likely than women to complete treatment once diagnosed (Weiss et al. 2006). The way that gender interacts with stigma, to affect compliance with care, can differ significantly by locale, depending on local confidence about TB treatment, and gendered aspects of the marriage and job markets (Thorson et al. 2004, Weiss et al. 2006). A cautionary lesson from the emerging data on gender and TB is the apparent local mutability of how gender affects health seeking. In the case of TB, generalizations seem difficult. Variations don't preclude national or even regional interventions, but they do call for robust specification of *how* gender impacts health seeking in a given setting.

With regard to depression, substantial gender biases in diagnosis cannot be excluded. Some diagnostic scales include questions about frequent crying or irritability, behaviours that are already laden with gender implications. It is tempting to parallel the female DALYs lost to depression, and other mental health conditions, with the excess of male DALYs lost to negative coping behaviours, such as alcohol or drug use, violence, and risk-taking. The possibility has been raised by several authors (Rutz 1999, Bech 2001, Moeller Leimkuehler et al. 2007), that depression in women, and alcohol use and risk-taking in men, are gendered manifestations for similar underlying distress. Pollack (1998) argues that current cultural standards, in the west, trap boys into a 'boy code' of macho, self-negating behaviours, that emphasize bravado, extreme daring, and attraction to violence, and it remains an active social norm to shame boys who fail to comply with such behaviours. Pollack states that such codes lead to loneliness and distress for a large proportion of boys, putting them at social risks throughout life. Such theories are supported by evidence that males progress to depression after periods of aggression and alcohol abuse that are not observed in females (Bech 2001), and by evidence that depressed men are more likely than women to cope

by increasing their sports activity and alcohol consumption (Angst et al. 2002). The social or genetic determinants of these differences warrant much closer scrutiny. In the event that gender socialization itself contributes substantially to depression or negative coping, public information (at the least), and possibly regulation, warrant consideration<sup>5</sup>.

## THE MUTABILITY OF GENDER

If one agrees that gendered behaviours are subject to socialization then, at least theoretically, the DALYs attributable to gendered behaviours that endanger people should be responsive to intervention. Recent history suggests that gendered health behaviours can change in response to marketing, fashion, or public legislation. In the case of smoking, both the percentage of smokers and the incidence of lung cancer in many high-income countries, such as the USA, have shifted towards equity, even as overall rates of smoking have declined. In the USA, for example, the proportion of adult males who smoke has dropped by 55% in the past 40 years, from just over half of all adult males in 1965 to fewer than a quarter in 2004 (American Lung Association 2006). Impressively, a large proportion of US males dropped smoking as a requisite accessory of masculinity; over the same period, however, women's relation to smoking has been less clear-cut. Women have always smoked less than males; in fact, smoking was a means of doing 'maleness' precisely because it was something most women did not do. Therefore, smoking has been associated with rebellion from restrictive gender norms, and effectively marketed by the cigarette companies as a symbol of liberation<sup>6</sup> (Brown 2000). The decline in female smokers since 1965 has been less than among males (about 45%), leaving the percentage of adult male and female smokers in the USA closer to equity than ever before (e.g. 23.4% of males and 18.5% of females currently smoke) (American Lung Association 2006).

In middle- and low-income countries, there is typically a much larger sex gap in smoking; the percentage of male and female smokers, respectively, is 51% and 18% in Mexico, 40% and 7% in Zambia, 22% and 2% in Iran, and 29% and

Women to do  
smoke to do  
masculinity  
↳ liberation

2% in India (Pampel 2006). In many countries, female smoking continues to be regarded as immodest and unfeminine, and is strongly discouraged in all but quite elderly women. Given that similar social constraints on western women's smoking gradually lifted as women moved into public and professional roles, there is concern that women's emerging autonomy in poorer countries will also lead to increased smoking (Patel et al. 2004, Pampel 2006), aided by cigarette companies' efforts to sell smoking as an attractive attribute of a modern woman.

While cigarette companies readily promote change in gender norms to sell smoking, public health advocacy has made only a few concerted attempts to explicitly address gendered imagery to promote health. One such programme, that targeted female smoking, was undertaken by the Irish National Health Promotion Strategy 2000–2005, with a campaign that concentrated on the unattractiveness of smoking, to challenge media images of female smoking as fashionable. Following the campaign, the percentage of young women, aged 18–35, who smoked, dropped by an average of 4%, with proponents encouraged that the gender-targeted approach was a contributing factor.

A much more expanded and long-term effort was initiated in Sweden two decades ago, to promote healthy gender norms. The Swedish Government initiated educational policies in the 1980s that explicitly sought to end stereotyped gender patterns in society. Curricula are required to challenge traditional gender messages. These policies were extended to Swedish pre-schools in 1998 (Lpfo 1998), and both Sweden and France now claim that their pre-schools avoid war toys and fashion dolls. The long-term impact of these efforts deserves scrutiny, not the least for how they impact health behaviours and outcomes.

In the African context, anti-HIV campaigns explicitly challenge aspects of gender identity that endanger young people. The loveLife billboards in South Africa, question gendered assumptions about male control in sexual and romantic relationships, and provide young people (and all viewers) with an alternative gender vision of equitable, negotiated partnerships. However, loveLife is not alone, though perhaps more innovative in their messaging than others. Social mar-

keting firms, such as New Start, promote condom use, HIV testing, and family planning, with ads that incorporate images of a new responsible male. The longer-term impact of such messages is largely untested and warrants evaluation, and it would be particularly worthwhile to examine how such expanded messaging efforts may evoke behaviour change in non-reproductive and non-sexual domains. What, for example, might be the impact on female depression, or men's negative coping behaviours? The health and social costs of gender stereotyping warrant more systematic enquiry, and more quantitative evaluation.

In the West, most restrictions on men's or women's behaviours (e.g. employment or mobility) have now been disallowed in the interest of gender equity, with the exception of restricting pregnant women's exposure to occupational hazards. Yet, the magnitude of the global DALYs lost to road traffic accidents among males (and the acknowledged impact of restrictive licensing) might warrant another exception. Current legislated and non-binding health policies for traffic accidents and alcohol consumption are sex-neutral. Licensing and alcohol restrictions when driving are the same for both sexes in all countries, with the important exception of several states in the Middle East. Automobile insurance companies have long differentiated between males and females, compensating for the excess male risk of traffic accidents through sex-disaggregated premium scales, and close scrutiny of risky behaviour among young males. An intervention looking for high impact on sex-specific DALYs would entertain sex-specific applications of graduated licensing, a higher age for licensing males, a higher age for legal consumption of alcohol by males, or a policy of zero-tolerance for male drinking and driving.

Gender equality legislation in the USA currently disallows such sex-specific discriminations unless sex-specific risk behaviours are proven to be genetically or biologically based (Komers and Finn 1998); occupational restrictions of pregnant women are allowed under this exception, i.e. because only females become pregnant. This is a somewhat ironic exception in the case of dangerous masculine behaviours, such as drinking and driving, because the logical extension of the restriction is that those arguing that

autonomy  
women  
→ more  
smoking

male risk-taking is programmed 'in their genes', are, in fact, offering a rationale for sex-specific restrictions. Arguments that such behaviours are socialized negate any legal chance at regulation (at least in the USA), but place the DALYs due to men's risk taking (or violence, or negative coping) on our doorstep, as a public pathology that we have created, and that we are responsible for changing. Trials that examine efforts to reduce gender stereotyping of males as risk-takers, and promote 'doing gender' in less dangerous ways, are plausible at a significant scale.

A parallel argument might apply to female depression, panic disorder, or OCD. Again, if it's 'all in her genes', then special protections may need to be retrieved from the dustbin of recent history. Conversely, if these excess female DALYs are judged to be a consequence of gendered experience, then public health considerations alone might prompt a re-examination of the health and social costs of gendered expectations and discriminations.

In many respects, the loveLife campaign already offers a radical challenge to female vulnerability, identifying female stereotypes of positive subservience to be deadly, and encouraging self-regard. It is notable that the loveLife campaigns have been particularly controversial, with accusations of using 'overly intellectual' and 'obscure' messages. Gender stereotyping in literature, television, and curricula are increasingly under fire, but much of modern media continues to re-enforce gender messages that can only exacerbate the health patterns observed in the global DALYs. Despite the eloquent reasoning of legal theorists, such as MacKinnon (1987), who have challenged the free-speech defence of sexist media on the principle that such 'speech' endangers women, even violently sexist images remain protected. Such arguments may be more persuasive if they gave greater emphasis to the extent that gender stereotyping endangers the healthy lives of both women and men.

## CONCLUSION

While a longstanding academic and activist discourse has emphasized that gender stereotypes and discrimination are harmful to women's health, the

global DALYs underscore negative health effects of gender for both males and females. In the various treatments of gender and health to date, there has been far too little attention given to the potential impact of interventions that offer alternative gender images for both males and females, and evaluate their public health impact. The global changes underway in smoking offer evidence that gendered health behaviours change with social messaging, marketing, and fashion; such mutability challenges suggestions that gender is simply an organic extension of sex.

To the extent that chromosomal sex dictates human capability, it would appear to provide an impressive array of options for 'doing gender', suggesting that the species, at the least, is highly adaptive and amenable to experimentation and adoption of new habits. Given the extent of psychiatric conditions leading to lost DALYs among females, and the extent of male DALYs lost to negative coping, one has to wonder at the paucity of larger-scale efforts to examine how these health costs might be mitigated by a concerted effort at alternative social messaging about gender. Interventions that would explore and promote affirming ways of 'doing gender' may ultimately constitute 'best buys' for health and society.

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## NOTES

1. Phenotype is the observable physical characteristics of an organism, or the appearance of an organism resulting from the interaction of genotype and the environment. At birth, infants are typically identified as being male or female, based on the appearance (i.e. phenotype) of their external genitalia; a minority of infants have 'ambiguous' genitalia, and require genotyping to identify their chromosomal sex as male or female.
2. Others have criticized the very notion of characterizing an 'every-person's' response to any given illness, because the true human burden of disability