



CIHR IRSC

Institute of Gender and Health

Institut de la santé des
femmes et des hommes

A GENDER, SEX AND HEALTH
RESEARCH CASEBOOK

What a
Difference
SEX and
GENDER
Make



Canadian Institutes
of Health Research

Instituts de recherche
en santé du Canada

Canada



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PART I



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About the Canadian Institutes of Health Research – Institute of Gender and Health

The Institute of Gender and Health (IGH) is one of the 13 institutes that make up the Canadian Institutes of Health Research (CIHR), the Government of Canada’s health research investment agency. IGH is the only organization in the world with a mandate to fund research on gender, sex and health.

The mission of IGH is to foster research excellence regarding the influence of gender and sex on the health of women and men throughout life, and to apply these research findings to identify and address pressing health challenges.

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The production of *What a Difference Sex and Gender Make* would not have been possible without the immense contributions of many in all stages of the process, including:

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- the IGH Institute Advisory Board; and
- the IGH staff.

Foreword

It is with great pride that we present this gender, sex and health research casebook, *What a Difference Sex and Gender Make*. The CIHR Institute of Gender and Health (IGH) is the world's first, and to date the only, health research funding institute with a specific focus on gender, sex and health. For over 10 years we have supported research that fills critical knowledge gaps related to the health of women, men, girls, boys and that advances the science of gender, sex and health—some of this stellar work appears in the pages that follow.

We can no longer assume that drugs, devices, interventions and policies are equally appropriate for men and women. In Canada, men die younger than women, while women experience a heavier burden of chronic illness. There are numerous differences in how men and women behave with regards to their health, their use of the health system and their responses to therapies. There is also great diversity within populations of women and of men, as well as important similarities between men and women that need to be considered in prevention and treatment.

Our purpose in developing this casebook is to showcase the difference that accounting for sex and gender makes in health research. The casebook is a resource of concrete examples—from across the gamut of health disciplines and topics—of how gender and sex considerations are being incorporated in health research and why this is important. This advances our wider commitment to fostering the integration of gender and sex as routine considerations in all domains of health research, a focal point of IGH's knowledge translation (KT) strategy.

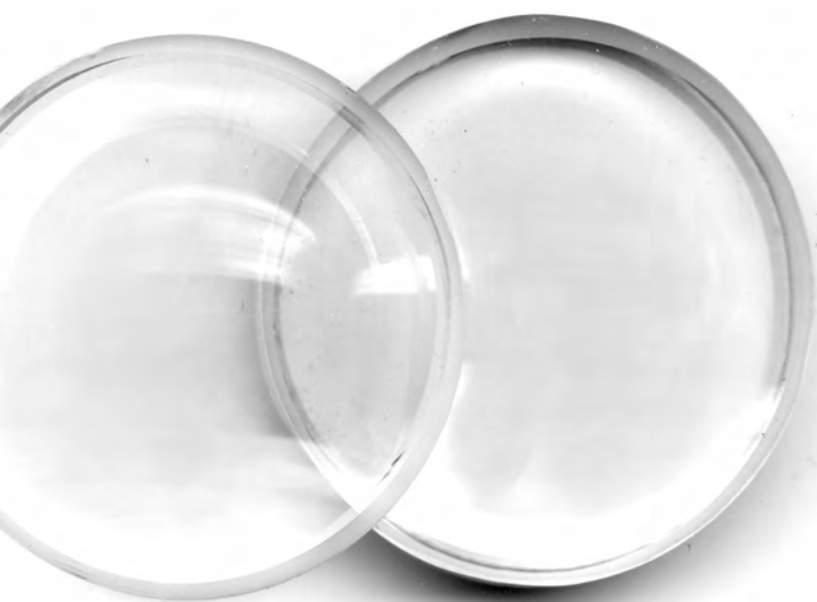
It is the position of IGH that *all* health research should consider the influence of gender and sex in any phenomena of study. If our research designs do not take sex and gender into account, the evidence we generate may be incomplete or simply incorrect; we risk not only doing harm (such as extrapolating findings based on male samples to females), but also missing critical opportunities to improve health (for example, not detecting the benefits of an intervention in a subgroup of men). We recognize that there are research questions where sex and gender are not relevant—but irrelevance should be determined by scientific rationale, not oversight. This casebook will serve as a guide for health researchers looking to incorporate gender and sex into their work.

We hope that this casebook will circulate far and wide in support of research to improve the health of *everybody*.

DR. JOY JOHNSON

Scientific Director

CIHR Institute of Gender and Health



INTRODUCTION What difference do sex and gender make?

In this collection, you will find examples from a diversity of disciplines and health foci where accounting for sex and gender in health research has advanced what we know, improved how we do research and made the products of health research more useful. This is the difference that sex and gender make. What this casebook demonstrates is that this difference is significant; there is much to be gained from the routine integration of gender and sex across the health research spectrum.

Each of the 12 chapters in this volume illustrates how health research processes and outcomes can look different when the influences of sex and gender are considered. Written from a critically reflective vantage point, the chapters share researchers' experiences in how they came to understand and engage gender and sex in their work. *Questions to consider* are included to encourage readers to explore ways that sex and gender can benefit their own work.

What a Difference Sex and Gender Make will be of interest to a range of audiences. For trainees and newcomers to gender, sex and health research, this casebook offers a reference point to begin a foray into the field. For researchers contemplating taking up sex and gender in their studies, this collection offers examples of how this can be done. For the wider gender, sex and health research community, this casebook aims to spark new ideas and approaches to drive the field forward. We hope that this resource will be shared with colleagues and the next generation of gender, sex and health researchers.

What is gender? What is sex?

Gender is generally viewed as a social concept. The *Gender, Sex and Health Research Guide* describes gender as “socially constructed roles, relationships, behaviours, relative power, and other traits that societies ascribe to women and men” (CIHR, 2010, para. 2). *Sex*, on the other hand, is often equated with the physical body, essentially the “biological and physiological characteristics that distinguish females from males” (CIHR, 2010, para. 2). There are no universally accepted definitions or easy separation of these terms. At the Institute of Gender and Health, we make a social/biological distinction between gender and sex with the caveat that they are interrelated and potentially inseparable. Our approach is to encourage researchers to identify the dimensions of gender and/or sex that are relevant to their research questions and to be explicit about how they operationalize these. We acknowledge that definitions of sex and gender are evolving as the science changes.

In this volume, the majority of the chapters subscribe to a social/biological division and use either gender or sex as relevant in their discussions. Others opt for the term *sex/gender* as an expression of the enmeshment of the social and the biological (see chapters 4, 6 and 9).

Casebook overview

This casebook is organized into three parts that focus on the difference that sex and gender make in terms of: (1) shifting the health research landscape, (2) strengthening science, and (3) translating research into action. While we have situated chapters within this three-part thematic, we note that many speak across these foci—and rightfully so; knowledge creation, research methods and knowledge translation are all part of the iterative process that we call research.

We begin in part I with examples of where integrating gender and sex has created new knowledge about health and illness. We have gleaned new insights about the mechanisms underlying disease, shifted paradigms of knowledge based solely on evidence derived from a single sex and improved the applicability of findings. In chapter 1, Mendrek chronicles her path to developing a program of research on gender and sex differences

in schizophrenia. She plots her own practical and political challenges in considering gender and sex in mental health research as a student and newer researcher against a turn in some areas of the field to recognize influences of sex and gender. Mendrek illustrates how a sex-blind approach risks generating erroneous findings. In chapter 2, Simard, Boucher and Tremblay describe how considering sex in their biomedical research on lung development led to better understandings of the health risks associated with premature birth for both boys and girls. Based on Tremblay’s long-standing research program, the trio explain how they have built sex into their experimental design and the benefits of doing so. Taking a historical view, in chapter 3 Juster and Lupien document how gender and sex changed the course of stress research. They demonstrate how stress is a case in point where the intersections of gender (social stressors) and sex (biological reactions) matter in determining the trajectories of stress-related conditions. Ending this section, in chapter 4, Tudiver and colleagues address the question “to whom does research evidence apply?” in their examination of how sex and gender are considered in systematic reviews. Systematic reviews are syntheses of multiple research studies on a given topic that are regarded as one of the most authoritative sources of scientific evidence. It is evident in these chapters that incorporating sex and gender in health research can reconfigure the knowledge status quo.

GENDER AND SEX **MAKE**
A DIFFERENCE
IN HEALTH RESEARCH.



Part II brings together cases that exemplify how taking sex and gender into account contributes to more robust methods and analytic frameworks. Our study designs frame the possibilities for what we can *know* and what we can *do* with our research evidence; including gender and sex expands the scope of those possibilities and provides a frontier for innovation. In an example from health care services in chapter 5, Fransoo demonstrates how a sex-based analysis can be an entrée into understanding the significance of other explanatory factors in relation to outcomes of interest. In chapter 6, Messing, Stock and Tissot draw on their research about the effects of prolonged workplace standing to illustrate why stratifying by gender in

multivariate statistical analyses reveals links between exposure and effect that may otherwise remain hidden. Savary, in chapter 7, shares analytic lessons learned about the importance of considering gender in assessing the implementation of a safety protocol in a male-dominated industry. Savary demonstrates how making gender an explicit factor in her research enabled her to uncover flaws in the safety plan that could not be explained by her initial approach. Closing this section, Bauer illustrates how the treatment of sex and gender in survey design can lead to the exclusion of transgender study participants. Bauer shows how sex and gender in survey question design can be addressed to be more inclusive of populations. These chapters present some of the myriad ways that gender and sex considerations contribute to more scientifically sound results.

The third and final section of this casebook focuses on moving research into action, also known as knowledge translation (KT). KT involves the translation of research evidence into domains such as policy and practice where it can be applied to improve health and health care. CIHR defines KT as “a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system” (*About Knowledge Translation*, n.d., para. 1). The chapters in this section demonstrate how integrating sex and gender into strategies for KT can lead to more streamlined utilization of research evidence and more tailored interventions. In chapter 9, Saint-Charles and

INCORPORATING GENDER
AND SEX IN HEALTH RESEARCH
IS **DESIRABLE** AND
DOABLE.

co-authors bring together two international examples from their team’s work that demonstrate how sex and gender shape conduits for the transmission of new knowledge about environmental risks and hazards. Banister and Begoray, in chapter 10, explore how gender influenced the

development and success of a sexual health literacy program for Indigenous female adolescents. Their context-specific approach to engaging with young women’s conceptions of gender provides a clear example of how gender can facilitate identifying knowledge users’ needs and the appropriate strategies

to meet them. Diaz-Granados and Stewart, in chapter 11, report how a sex- and gender-based analysis led to health-related policy changes at a national level in multiple countries; their work underscores the potential of using a sex and gender lens for generating wide-ranging impacts. Finally, Oliffe, Bottorff and Sarbit recount their development of the first-ever men-centred resource for reducing and quitting smoking. Their work illustrates how gender can be a catalyst to bridge the gap between knowledge and health behaviour change. By creating an intervention that tapped into masculine ideals, the team effectively packaged health messaging to be meaningful for men who smoked.

The diversity of examples contained herein underscores the transversal relevance of gender and sex to the study of health. As a collection, these cases paint a compelling picture of the difference that sex and gender make in health research.

Casebook editors

STEPHANIE COEN, IGH Knowledge Translation Manager

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PART I

**SHIFTING THE HEALTH
RESEARCH LANDSCAPE**

1 Sex and gender differences in mental health research

ADRIANNA MENDREK, *Université de Montréal*

Significant epidemiological and clinical data has amassed over the years indicating important differences between women and men in the prevalence, course and expression of various mental health problems. Yet, considering gender and sex in psychiatric research and clinical practice is still quite rare and most theories (especially neurobiological models), as well as available treatments (particularly pharmacotherapy), are based almost exclusively on findings in male subjects (animal and/or human).

As an undergraduate student in the Psychology Honours Program at Concordia University I became interested in gender research. The first major project that I designed assessed the relationship between masculinity and femininity (as measured by the Bem Sex Role Inventory) and self-esteem. Consistent with existing reports in this area, I found positive correlations between masculinity and self-esteem measures, and negative correlations between femininity and self-esteem. The following year, for my honours thesis project, I asked my potential supervisor, an expert in the behavioural neurobiology of drug addiction, if I could investigate sex differences in the rewarding properties of amphetamine in rats. Amazingly he said “yes,” and I found that female rats liked amphetamine more than males. Still, during

THERE ARE IMPORTANT SEX AND GENDER DIFFERENCES IN THE
PREVALENCE AND EXPRESSION OF NUMEROUS PSYCHIATRIC
DISORDERS THAT ARE OFTEN **OVERLOOKED IN
RESEARCH AND CLINICAL PRACTICE.**



my graduate and postdoctoral training, while continuing research on the neurobiology of motivated behaviour, and later while studying brain function in schizophrenia patients, it was difficult to convince my supervisors to invest in examining sex and gender differences by testing sufficient numbers of males and females.

There were numerous practical obstacles to doing this type of research—above all the fact that including both female and male rats in studies is more expensive and produces more variable results. Female rats have an estrous cycle—the equivalent of human menstrual cycle—that contributes to this variability. I began to understand these challenges as “facts of life” that unnecessarily complicated science and were best avoided. I stopped insisting on studying both male and female subjects. I was not certain anymore if studying sex and gender differences was a worthwhile endeavour. I convinced myself (partly because of my socio-cultural background and bias, and partly because of the lack of evidence to convince me otherwise) that the neurobiological sex differences were so negligible that they could be ignored in neuroanatomical and neurofunctional research.

However, with time, science proved me wrong: new evidence started emerging that pointed to undeniable differences between male and female organisms that were no longer restricted to reproductive organs and behaviour, but encompassed cognitive strategies, emotion processing, responses to stressful situations, and so on. Thus, when I finally established myself as an independent researcher, I decided to re-visit my initial research passion and examine potential sex and gender differences in severe psychiatric disorders.

I ventured into the literature and was surprised by what I discovered: Despite a wealth of research that established that some of the most prevalent psychiatric problems, including depression and anxiety disorders, are diagnosed more frequently and often have a more serious clinical course in women than in men, considering gender and sex in mental health research and clinical practice was still quite rare.

For example, the lifetime prevalence of major depressive disorder (MDD) in women is approximately twice that of men. Estrogen has been proposed

to be an important player in this sex difference because: (1) the rates of MDD are similar in girls and boys before puberty and among elderly people; and (2) mood often appears to fluctuate with changes in hormones, such as the low-estrogen premenstrual and postpartum periods when women are at increased risk for mood disorders (Freeman et al., 2004). Gender-related psychosocial factors have been identified as potential contributors to the differential prevalence of MDD in men and women. For example, experience of negative life events often gives rise to pessimistic attributional styles (how people attribute the causes of their life events) in girls but not in boys, making them more vulnerable to future depressive episodes in stressful situations (Nolen-Hoeksema, Girgus, & Seligman, 1992). The picture is further complicated by a clinical bias to diagnose depression in women more readily than in men.

When it comes to addictive, compulsive and obsessive behaviours, large discrepancies between the sexes have also been observed. For example, while eating disorders are more common among women than men (Steiger & Bruce, 2007), substance use disorders are more common in men (Becker & Hu, 2008). It is important however to point out that despite lower rates of drug abuse in women than in men, the number of women using and abusing prescription and illegal drugs is increasing. Following initiation, women tend to increase their rate of consumption and become addicted to alcohol, marijuana, opiates and cocaine more rapidly than do men. Furthermore, once addicted to a drug, women can find it more difficult to quit than men do (Becker & Hu, 2008). The underlying mechanisms of these sex differences remain unclear, but a few factors have been studied including the hormones estrogen and progesterone.

When I revisited the field I was primarily interested in schizophrenia and related psychoses and realized that very little research had focused on sex and gender differences in this complex and devastating condition. The risk of developing schizophrenia over one's lifetime is approximately 1%. It typically begins during late adolescence or early adulthood, often leads to a social and economic impoverishment and to great distress for patients and their families. Schizophrenia ends in suicide in 10–12% of cases (50% of patients will attempt suicide at some point in their illness). It is characterized by a heterogeneous clinical presentation with symptoms ranging from hallucinations and delusions (so-called positive symptoms), through to disorganized

behaviour, to social withdrawal, poverty of speech and lack of motivation (referred to as negative symptoms). Despite decades of scientific investigation we still do not know its causes—although we have some vague ideas about various contributing factors—or how to adequately treat schizophrenia (about 30% of patients do not respond to available pharmacological treatments).

There is still controversy as to whether there are sex differences in the lifetime risk of developing schizophrenia, but researchers and clinicians agree that in the younger population the risk is higher in men, while over the age of 40 the risk is higher in women. Other important sex differences in schizophrenia encompass premorbid function (poorer academic, occupational and interpersonal functioning in males than in females before the diagnosis), clinical expression (males tend to present with more negative symptoms, while females have more affective symptoms such as irritability, aggression and mood deregulation) and response to treatment (better in females than in males, but with more side effects in females) (Leung & Chue, 2000). Although these differences have been well documented, we still know very little about their underlying mechanisms. Consequently men and women with schizophrenia tend to receive similar psychopharmacological (drugs) and psychosocial interventions (group homes, occupational therapy), sometimes with suboptimal results. An example is the prescription of similar antipsychotic dosages resulting in more serious side effects in women who typically require smaller doses (Seeman, 2009).

All of this has motivated me to establish a research program devoted to examining neurofunctional, hormonal and psychosocial factors implicated in sex and gender differences in psychoses. The work in my laboratory to date has revealed an intriguing reversal of typical sex differences in performance and brain function during the performance of a visuo-spatial test

INCLUDING BOTH MEN AND WOMEN IN MENTAL HEALTH RESEARCH CAN
MAKE A SIGNIFICANT DIFFERENCE IN OBTAINED RESULTS. FOCUSING ON
A SINGLE SEX (WHERE NOT SCIENTIFICALLY WARRANTED) CAN LEAD
TO **ERRONEOUS GENERALIZATIONS**
AND LIMIT POTENTIAL PATHWAYS TO TREATMENT.



(mental rotation of three-dimensional figures) (Jiménez, Mancini-Marie, Lakis, & Mendrek, 2010), as well as during exposure to emotionally negative pictures (e.g., scenes depicting violence, war, sad faces), in schizophrenia patients (Mendrek, Mancini-Marie, Fahim, & Stip, 2007). Specifically, in one study we asked participants to perform a classic mental rotation task where participants are presented with pairs of rotated or unrotated figures and have to determine if the figures are identical or if they are mirror images. During this task, participants are scanned with functional magnetic resonance imaging (fMRI) (imaging that shows how the brain works). This task normally elicits better performance and greater brain activations in men than in women in the general population. In our study we have replicated the finding of superior performance and brain activations in control males relative to females, but the opposite pattern was present in patients with schizophrenia (Jiménez et al., 2010): females with schizophrenia exhibited a pattern of brain activation similar to non-schizophrenic males, and males with schizophrenia were more like non-schizophrenic females, as depicted in Figure 1-1. What is critical to note is that we would not have been able to detect this effect if we had included only one sex in our study.

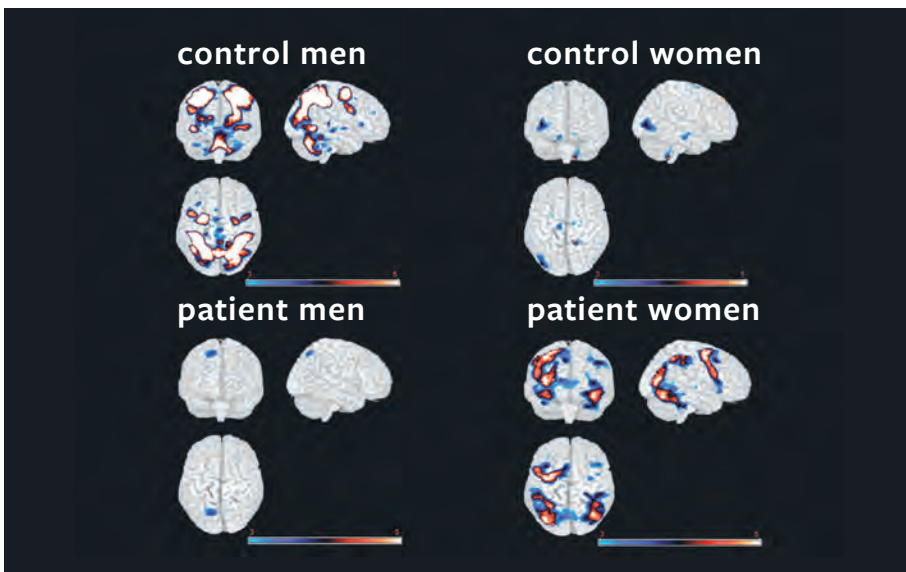


FIGURE 1-1 Brain activations during mental rotation in schizophrenia patients and in healthy comparison patients.

Unfortunately, an overwhelming majority of functional neuroimaging studies in schizophrenia consist of exclusively or predominantly male samples. Even if the samples are mixed, there is usually an insufficient number of women to allow for comparison between the sexes. In fact, had we only included men in our study, our conclusions would be only partly true. A male-only sample would have led us to argue that patients with schizophrenia were characterized by deficits in visuo-spatial processing at the behavioural and neurofunctional level when, in fact, it was only male patients who presented with a dramatic deficit; this deficit was not presented by female patients.

Our results suggest that women and men with schizophrenia may be characterized by different cognitive and neural anomalies. This is important because neurocognitive deficits represent a hallmark problem in schizophrenia and some cognitive remediation techniques have been developed recently to help patients in their daily activities. Characterization of differences in cognitive function and underlying brain circuitry could help in applying unique approaches appropriate for each sex. More generally, this research may contribute to developing better models and theories of schizophrenia, which would take sex and gender into consideration. It is possible that the factors contributing to the development of psychoses are different in men and women.

Larry Cahill has been exploring sex and gender differences in emotional memory over the past 10 years with some striking results. In closing, the following by Cahill is an important methodological point:

The striking quantity and diversity of sex-related influences on nervous system function argue that the burden of proof regarding the issue has shifted from those examining the issue in their investigations generally having to justify why, to those not doing so having to justify why not. (Cahill, 2010, pp. 29)

QUESTIONS TO CONSIDER

- ① Given that there are significant differences between women and men in the brain, behaviour and mental health, how can you design studies to account for these differences and apply some of this knowledge in clinical practice?
- ② Are there any gender biases that could influence the way you view and interpret scientific results and transmit them?

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2 The influence of Mars and Venus on lung development: implications for biomedical research and beyond

**MARC SIMARD, ERIC BOUCHER AND
YVES TREMBLAY, *Université Laval***

Introduction

Our laboratory team investigates the expression and activity of enzymes involved in the metabolism of steroidal hormones (primarily androgens and glucocorticoids) in lung development and maturation (Seaborn, Simard, Provost, Piedboeuf, & Tremblay, 2010). Our basic science research takes place in a clinical setting dealing with pulmonary diseases associated with premature birth, such as respiratory distress syndrome and bronchopulmonary dysplasia. In cases of extreme prematurity, boys are at greater risk of developing these diseases than girls of comparable gestational age. However, the impact of sex on lung development must be placed in context. Although many sex differences, such as the higher incidence of respiratory distress syndrome in boys, are well established, others, such as time lags in the expression of certain genes, are not well understood. Sex differences are not limited to direct or indirect effects of the steroid hormones secreted

by the gonads (testes, ovaries); they can also appear as temporal and spatial differences in the pulmonary inactivation or activation of those same hormones and their precursors.

In this chapter, we raise three relevant questions based on our experience of including sex as a biological variable in biomedical studies, addressed in turn below. We provide some possible answers that demonstrate why sex is a critical component in the development of solutions to improve the health of premature babies. For definitions of terms we use throughout this chapter, please consult Table 2-1.

TABLE 2-1 Glossary of Terms

Androgen	Family of steroid hormones responsible for male sex characteristics, normally produced by the gonads (e.g., testosterone).
Glucocorticoid	Family of steroid hormones known for their role in immunity, glucose metabolism and stress response, normally produced by the adrenals (e.g., cortisol).
Local androgen metabolism	Local inactivation and/or activation of androgens outside of the gonads.
Respiratory distress syndrome and bronchopulmonary dysplasia	Functional and structural pulmonary anomalies frequently observed among children born prematurely.
Pulmonary surfactant	A complex mixture of lipids and proteins that is necessary for normal pulmonary function and prevents the lungs from collapsing.
Meta-analysis	Statistical method combining the results of several studies to more adequately address one or more research hypotheses raised individually in each of the studies.
Statistical variance	Measure used to evaluate the dispersion of samples or measures as compared to their average value.
Confounding factor	Factor that can introduce a bias because it is simultaneously linked to what is being measured and to another factor.

Why consider sex in basic biomedical research on lung development?

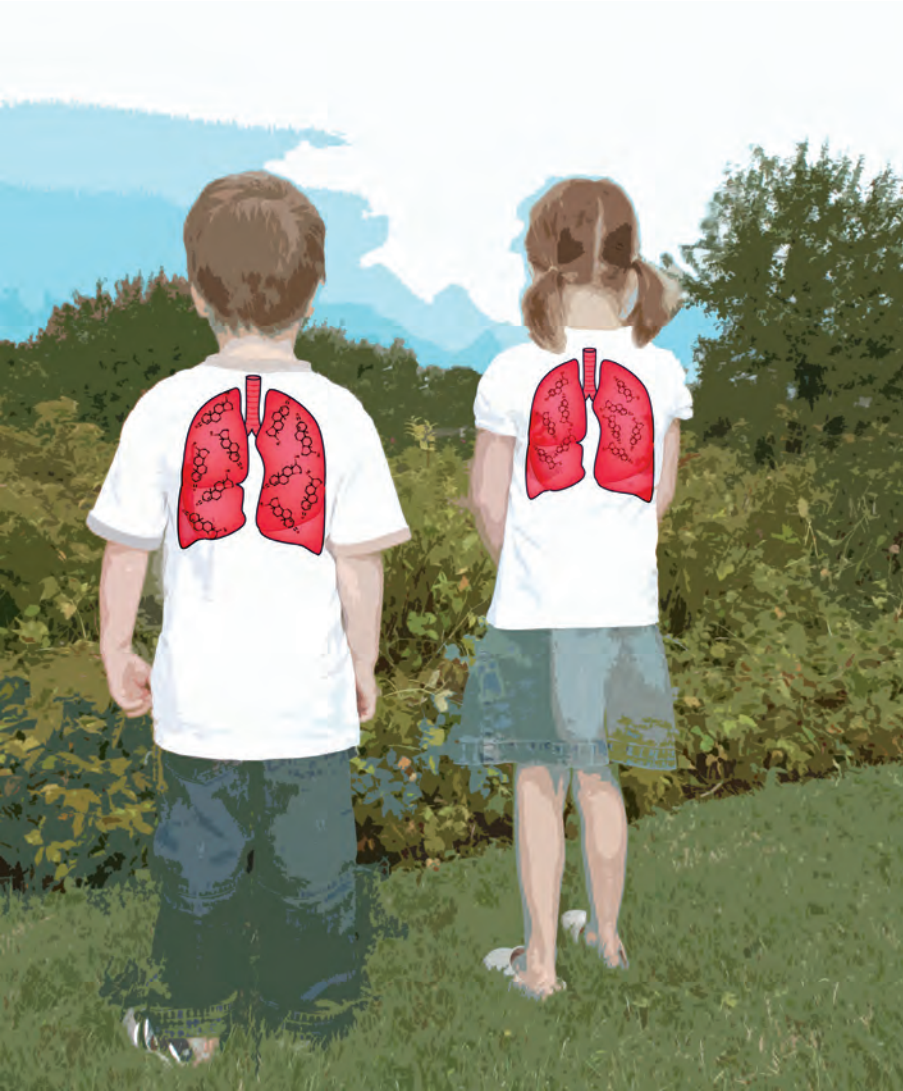
Sex is a crucially important factor in research on lung development because males and females show hormonal, physiological, genetic and morphological specificities both in normal lung development and in the cause of certain pulmonary diseases. For example, male lungs are exposed to higher levels of androgens than female lungs at several stages of lung development as a result of their production in the testes. Because the ovaries are not producing equivalent levels of androgens at that same developmental stage, exposure to androgens in females and males during development is asymmetrical. This asymmetrical exposure to androgens has many consequences; in particular it creates a normal delay in the onset of the synthesis of pulmonary surfactant (a complex mixture of lipids and proteins that prevents pulmonary collapse) for male fetuses. This delay—and hence, lower levels of surfactant until later in development—makes males born prematurely more susceptible than females to respiratory distress syndrome. However, hormonal differences between males and females precede observed sex differences in lung development by several weeks in terms of the onset of pulmonary surfactant synthesis and other pulmonary dimorphisms. The influence of sex on lung development is therefore not limited to a difference in hormone levels at a given point in time, but continues and is manifested in many or even all of the events governing lung development and diseases.

THE STUDY OF THE **HORMONAL, PHYSIOLOGICAL,
GENETIC AND MORPHOLOGICAL SPECIFICITIES**

OF MALES AND FEMALES IN LUNG DEVELOPMENT AND
CERTAIN PULMONARY DISEASES IS NECESSARY TO HIGHLIGHT THE
FULL COMPLEXITY OF THE INFLUENCE OF SEX AS A
FACTOR IN LUNG DEVELOPMENT.



Many mechanisms necessary for lung development have been identified, such as the delaying and accelerating effects of androgens and glucocorticoids (another family of steroid hormones), respectively, on the production of pulmonary surfactant. In the case of pregnancies at risk of premature delivery, antenatal administration of glucocorticoids reduces the incidence of respiratory distress syndrome and its consequences.



Horizon(s) by Stéphanie Cloutier and Tommy Seaborn.

While we observe a link between the actions and regulatory mechanisms of androgens and glucocorticoids and sex differences in the process of lung maturation, cause and effect relationships are still poorly understood, especially in relation to later stages of development. For example, a meta-analysis recently published by our research team that addressed the influence of sex on the effectiveness of antenatal glucocorticoid administration confirmed that this treatment is effective in the prevention of respiratory distress syndrome and ultimately in the reduction of mortality among extremely premature male and female newborns (Roberge et al., 2011). The same analysis, however, also pointed to differences in the effectiveness of different types of glucocorticoids by sex, suggesting that future studies should investigate what type of glucocorticoid is most effective based on the infant's sex. Many other questions persist about the use of glucocorticoids. In particular, why do many fetuses, regardless of sex, not respond to antenatal treatments (Jobe & Ikegami, 2000)? In addition, unlike the case of respiratory distress syndrome, a connection between androgens and the higher incidence in male neonatal bronchopulmonary dysplasia has yet to be demonstrated.

For these reasons as well as those suggested by our work, studies on lung development cannot ignore the influence of sex and should consider all of the common and distinguishing factors characterizing lung development in both sexes. In this context, our team has decided not to limit its studies to the influence of sex and sex hormones in processes and pathologies for which a sex difference has previously been identified, but to consider the influence of sex as a factor, in all its complexity, in all aspects of lung development.

How can sex be incorporated in basic biomedical research?

Obviously, our team is not the only group to point out the importance of considering sex when analyzing data on lung development. This point was raised in a recent letter published in the *American Journal of Respiratory and Critical Care Medicine* (Kauffmann, 2010). Still, incorporating sex into our research efforts was no easy feat. It required extensive changes to our approach. We had to focus more on sex in our literature reviews; formulate

hypotheses that let us include sex as a factor; plan our experiments and collect our samples accordingly; and pay special attention to sex in our data analysis, including our statistical analyses. To investigate the influence of sex on lung development, one must therefore not only include samples from females and males, but also design a methodological framework by which this influence can be analyzed. To ensure the greater statistical rigour that including sex as a factor implies, it is necessary to gather a larger number of samples, and these samples must be of superior quality. For example, to avoid having either sex be overrepresented and introducing a bias in the analysis of results, similar numbers of male and female subjects must be included for every condition and developmental stage to be studied.

Studies on lung development often attempt to compare samples from several different developmental stages. The addition of sex as a factor contributes additional statistical variance and demands that the variability due to the other factors be minimized. For example, in our mouse model, we now use mating protocols that minimize uncertainty regarding gestational age. Even in the absence of identifiable sex differences, this approach is still desirable, because it ensures more representative results for a population that is heterogeneous with regard not only to sex, but to numerous other factors as well.

Incorporating the influence of sex into all aspects of our research has enabled us to discover a local androgen metabolism (local inactivation and/or activation of androgen) that is common to both sexes. This suggests that there is also a beneficial role for androgens in normal lung development in both sexes. Likewise, we have also identified several genes that are expressed differentially or not according to sex or as a function of lung development. Because we have made sex such a central consideration in our

INCORPORATING SEX AS A FACTOR
IN OUR RESEARCH REQUIRED
EXTENSIVE CHANGES
TO OUR APPROACH TO
ALL OF THE STAGES OF OUR RESEARCH
AND ENABLED US TO IDENTIFY
MECHANISMS SPECIFIC TO ONE SEX
AND OTHERS COMMON TO BOTH SEXES.



research, sex has become far more than simply a confounding factor. On the contrary, it has enabled us to describe important developmental differences between females and males linked to gene expression and hormone levels. Understanding these differences has, in turn, led us to more effectively analyze their impacts and to integrate them into a lung development model that includes both sexes.

THE INTEGRATION OF SEX IN OUR BIOMEDICAL STUDIES ENABLED US TO ***PUSH THE ENVELOPE WITHIN THE PARADIGM OF EXTREME PREMATURETY*** BY REQUIRING US TO ALSO CONSIDER COMPLEMENTARY INSIGHTS FROM OTHER DISCIPLINES, INCLUDING SOCIAL SCIENCES.



How can biomedical research extend beyond the physiological aspects of sex?

Our research experience has taught us that both research questions and research findings can involve aspects that go far beyond the physiological differences between sexes. Because of the particular clinical setting in which we do our research, issues of critical concern in other fields such as epidemiology, psychology, ethics and law have arisen. As well, it is clear that there is an increased need for effective knowledge translation. These have all emerged from our initial biomedical concerns.

Characterizing the risk factors associated with prematurity and the influence of sex on various conditions that can affect premature newborns are important foci for biomedical research. At the same time, it is also very important to investigate the impact of sex and its physiological effects on the long-term prospects for children born prematurely, in terms of their integration into society, their academic and professional performance and their social skills. The ethical and legal implications are also quite significant, because situations where children are born at

the threshold of viability raise issues of ethics and values—and the legal framework, in Canada at least, leaves much room for interpretation. Males born at the threshold of viability have higher mortality rates, exhibit a higher incidence of neonatal pulmonary pathologies and are thought to also have higher rates of psychosocial developmental problems. This raises many ethical questions for parents and the caregiving team concerning how this knowledge should be integrated in the decision process related to neonatal care and guidelines. Should this information be given to the premature boys' parents and, if so, how? Should those epidemiological facts be reflected in medical decisions or guidelines on resuscitation of extremely premature neonates?

To that end, we ran an online multidisciplinary discussion forum that addressed various questions linking sex and extreme prematurity. Participants from several different disciplines combined their knowledge and together developed a transdisciplinary synthesis of the key issues. This transdisciplinary groundwork became the basis of a book on sex, extreme prematurity and the improvement of practices, policies and decision-making processes linked to the male disadvantage from birth at the threshold of viability and for babies born at the threshold of viability in general (Simard & Gagné, 2010).

Conclusion

The integration of sex has not only added value to our work, but it has also taught us a great number of things. One of the lessons we learned is that to be successful, the integration of sex as a factor and the evaluation of its impact on various biological processes must be carried out at all stages of basic biomedical research. We also discovered that studies including sex as a factor are not limited to the obvious differences and that the results obtained from these approaches may be unexpected; nevertheless these differences are crucial and may point in new directions that would otherwise have remained unexplored. The integration of sex in the questions, experimental approaches and directions of biomedical research constitutes a new paradigm for biomedical research requiring multidisciplinary exchanges and transdisciplinary thinking.

QUESTIONS TO CONSIDER

- ① Why should sex be considered a factor in biomedical research on lung development?
- ② How can the concept of sex be successfully incorporated into biomedical research, and what are its benefits?
- ③ How can biomedical research extend beyond the physiological aspects of sex?

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3 Sex and gender in stress research: the metamorphosis of a field

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Every cell is *sexed*, every person is *gendered* and every organism is *stressed*. Stress is, for good or for ill, a natural part of life until death (Lupien, 2010). Over the last decades, stress researchers have begun incorporating sex and gender into ever evolving perspectives that have crystallized into better understanding of stress and coping. This chapter will document this metamorphosis to guide future research. First, we define stress. Second, we describe paradigm shifts that brought sex differences to the fore in theoretical and empirical stress literature. Third, we explore how sex and gender perspectives of workplace stress interact to enhance understanding of chronic stress.

Defining stressors, distress and stress responses

At the Centre for Studies on Human Stress (www.humanstress.ca), we surveyed the general public and found that popular definitions of stress do not match scientific ones. For the public stress is synonymous with time pressure, whereas scholarly definitions divide stress among constructs like

stressor inputs, *distressing* processes and *stress response* outputs. According to Dr. Sheldon Cohen, three broad interconnected traditions exist for measuring stress: (1) *environmental perspectives* (e.g., objective stressor frequencies and exposures to aversive circumstances); (2) *psychological perspectives* (e.g., subjective distress of stressors quantified using questionnaires, interviews); and (3) *biological perspectives* (e.g., physiological markers like stress hormones or cardiovascular functioning). Each of these traditions is complementary and in our esteem best understood in combination.

Decades of research have shown us that the psychological ingredients involved in stressful recipes of life include Novelty, Unpredictability, Threat to the ego/self and/or diminished Sense of control (just remember the acronym NUTS). These ingredients are additive and uniquely salient: we all have differential sensitivities to NUTS (Lupien, 2010). Indeed, psychological stress research started with Dr. John Mason’s work in the 1960s using parachutists and other groups of people voluntarily undergoing stressful situations. A comprehensive definition of stress, which takes these inherent individual differences into account, was formulated by Dr. Bruce McEwen: stress is any real or interpreted threat to an individual’s well-being that results in biological and behavioural responses.

When facing stressful situations involving NUTS elements, we activate *stress responses*. Suffice it to say that this involves two complex biological systems that ultimately call into action our elite stress hormones (see Figure 3-1). The first wave involves the swift release of monamine known as *adrenalin* within

OUR UNDERSTANDING OF THE
STRESS-DISEASE LINK WAS
UNTIL RECENTLY
LIMITED TO MALES.



seconds, followed by the production of the steroid *cortisol* within minutes. Surges in these stress hormones mobilize energy stores by turning fat into sugar and allocating it throughout our bodies. This maximally facilitates the notorious “fight-or-flight” response first described by Dr. Walter Cannon. The most important point to remember is that without stress responses, our ancestors would not have been able to fight, flee or freeze when facing mammoths and other predators eons ago.

Stress is therefore an inherently adaptive phenomenon that keeps us

breathing and breeding. Nevertheless, while acute stress responses are healthy, chronic stress can lead to potential malfunctions in essentially every biological system. This is because every cell can receive biochemical messages from stress hormones that will consequently alter their functions. When stress hormone concentrations fall into ranges that are too high or too low, normal adaptation transforms into maladaptation. This biological deterioration was first investigated by Dr. Hans Selye in Montreal during the 1930s, so it is with pride and penance that we can say that the idea that chronic stress can “get under our skin” is a Canadian concept.

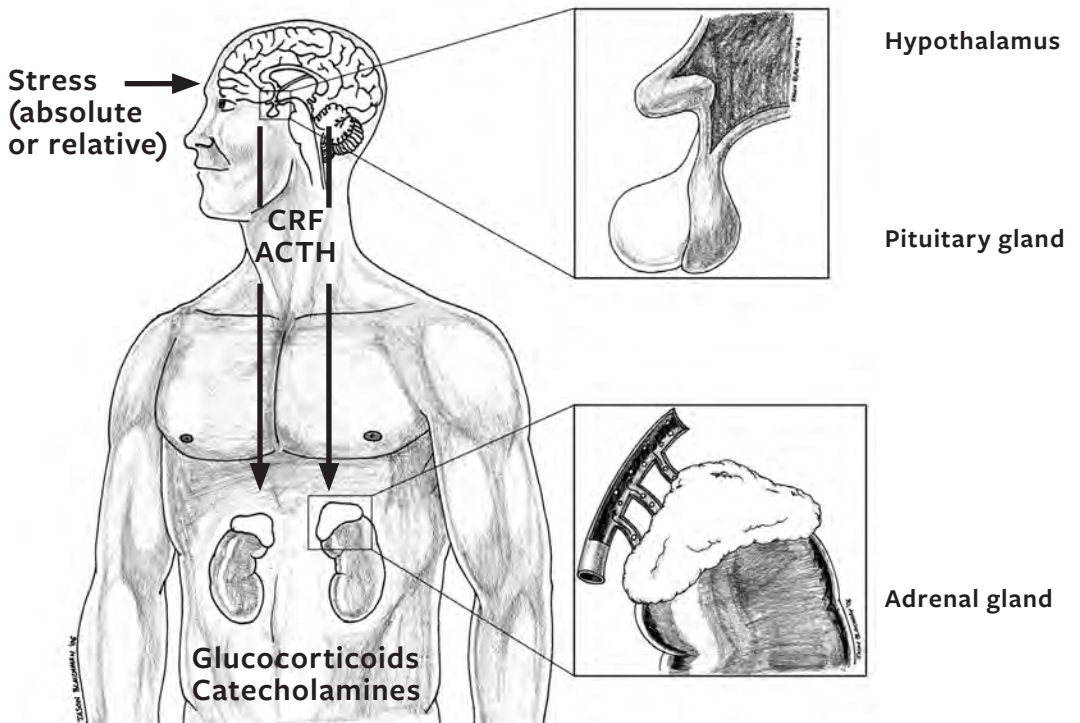


FIGURE 3-1 Schematic of stress responses. Stressors (absolute or relative) in the environment must first be detected to trigger two systems. Within seconds, catecholamines like adrenalin are released into circulation as part of the sympathetic-adrenal-medullary axis. Followed next within minutes is the production of glucocorticoids like cortisol as part of the hypothalamic-pituitary-adrenal axis. Note: CRF = corticotrophin-releasing factor; ACTH = adrenocorticotrophic hormone. (Artist: Jason Blachman.) Image reproduced from “The effects of stress and stress hormones on human cognition: Implications for the field of brain and cognition,” by S. Lupien, F. Maheu, M. Tu, A. Fiocco, and T. E. Schramek, 2007, *Brain and Cognition*, 65, p. 211. Copyright 2007 by Elsevier. Reproduced with permission.

So far, we have given a brief history of the stress field and its definitions with one major caveat: the stress response has primarily been tested in males. Up until as recently as 1995, females represented a mere 17% of human participants or animal subjects in biological stress studies (Taylor et al., 2000). Females were excluded because reproductive events like menstruation, menopause and pregnancy lead to fluctuations in sex hormones (e.g., estrogens) that modulate stress hormone levels and potentially confound data. When the senior author of this chapter started in this field, it was taken for granted that you recruited males, stressed them, made them spit (we measure cortisol easily in saliva) and wrote up findings that were supposedly generalizable across sexes. Today, it is much harder to publish in strong journals if females and males are not included, representing an important paradigm shift that we now address.

Adam without Eve: the genesis of stress research using both sexes

In the beginning, the brains of living creatures and eventual cave(wo)men slowly developed ever better mechanisms for detecting threats, mobilizing stress responses and surviving. Here we need to make the distinction between *absolute stressors* (e.g., predators, natural disasters) that threaten our survival and invariably lead to stress responses in comparison to *relative stressors* (e.g., traffic, public speaking) that threaten well-being only if the person deems them stressful based on NUTS elements (Lupien et al., 2006). Throughout evolution, we have faced *ancient stressors* that have disappeared (e.g., mammoths) and *modern stressors* (e.g., bosses), but our brain still reacts as though we were hunter-gatherers.

In part, because of morphological differences, cavemen were more likely to be the hunters than cavewomen, which might explain why modern men consistently mobilize more intense stress responses. This makes sense, since evolutionary pressures will be appropriated by one sex that then selectively contributes, over countless generations, to physiological sex differences and gender-related behaviours. For cavewomen, this perhaps meant more gathering and nurturing behaviours. Now let's fast-forward to 2000 AD when Dr. Shelly Taylor postulated that females might have evolved a unique stress response unaddressed in hitherto male dominated studies.

DUE TO EVOLUTIONARY AND SOCIO-CULTURAL PRESSURES,

SEX AND GENDER DIFFERENCES EXIST IN SENSITIVITIES TO ENVIRONMENTAL STRESSORS, PSYCHOLOGICAL DISTRESS AND BIOLOGICAL STRESS RESPONSES.

Dr. Taylor and other eminent stress researchers proposed the female-typical “tend-and-befriend” response as an alternative to the male-typical fight-or-flight response. The central tenet here is that instead of utilizing physical retaliation when faced with threats, women focus on behaviours that protect vulnerable offspring and maintain social bonds (Taylor et al., 2000). This theory has received compelling support; still, it is unclear whether these responses are due to sex, gender or both—or whether these are observed because of how our own gendered assumptions factor into our research designs.

When facing acute stressors men tend to benefit from their female partner’s social support by secreting less stress hormones, whereas women produce more stress hormones in the presence of their male partner than in the presence of a stranger (Kirschbaum, Klauer, Philipp, & Hellhammer, 1995). Interestingly, research subsequent to this pioneering study found that women benefited from same-sex friends’ presence when distressed. Many studies like these conducted by our German colleagues have been instrumental in bringing considerations of sex differences into stress laboratories. Since then, other investigations have turned their attention to how sex and gender interact. In our next section, we examine how these interactions can help explain differences in stress-related diseases vis-à-vis workplace distress and beyond.

Sex and gender interactions in workplace stress research

Perceiving stressors, interpreting threats and generating stress responses fundamentally differ between sexes and as a function of gender. Women self-report more stressors and distress than men and consistently report more physical health symptoms, but men are more stress responsive and die younger. These types of sex differences are central to studying stress, but can be limited by focusing solely on dichotomous sex differences in the

absence of gender perspectives. Indeed, women display increased stress hormone levels when confronted by social rejection challenges (Stroud, Salovey, & Epel, 2002), whereas men tend to be more reactive to achievement-based stressors (Dickerson & Kemeny, 2004). This suggests that differential gender-based attributions might be involved. An important challenge has been to understand how to study the dynamic nature of sex and gender throughout lifespan development in relation to stress-related disease trajectories that actually change throughout history.

As a point in case, consider cardiovascular disease: once a predominantly male pathology, it now claims at least 41% of all deaths of Canadian women in comparison to 37% for men. This reversal might be better explained by gender roles than by sex if we consider socio-cultural changes over the last decades. For instance, the World Bank, International Labour Organization, and World Health Organization report that women have increased their

participation in the workforce by 126% over the last 30 years and now represent 42% of the entire global labour force. Regrettably, higher levels of stress for working women who must often balance multiple work-family roles and responsibilities can strain their health and well-being. Ground-breaking work by Dr. Marianne Frankenhaeuser and colleagues from Scandinavia has consistently shown that women in non-traditional occupations (e.g., managers, engineers) self-report more masculine or assertive gender roles that put them at greater risk of stress-related diseases. The gender influence represents an important form of strain that can adversely trickle into other life domains.

THE INTERACTION
BETWEEN SEX AND GENDER
BEST EXPLAINS HOW
**CHRONIC STRESS
LEADS TO WEAR
AND TEAR** THAT
ULTIMATELY CONTRIBUTES TO
STRESS-RELATED DISEASES.



Indeed, workplace overload and social injustices can lead to *spill-over effects* (work stress to home distress) and *over-spill effects* (home stress to work distress). Here too the sexes differ: Female managers do not disengage as much after work as male managers (Lundberg & Frankenhaeuser, 1999; Lupien, King, Meaney, & McEwen, 2000). This has consequences for everyone, as elevated levels of stress hormones after work mediate the effect of job demands and job control elements in predicting health care costs. Note

that one third of Canadians report chronic stress at work that puts them at increased risk of depression, burnout and anxiety disorders, to name a few. These statistics are distributed differently among men and women and as a function of masculine or feminine gender-roles. Taken together, sex and gender interact to exacerbate our vulnerabilities to chronic stress that can have dire consequences on health and well-being.

After decades of advances nationally and internationally, stress researchers now can objectively measure chronic stress by assessing biological recalibrations of what we call *allostatic load* (McEwen & Stellar, 1993). This “wear and tear” is believed to occur when stress hormones go off-kilter and topple over onto other biological systems like a “domino effect” trailing toward disease (for a review, see Juster, McEwen, & Lupien, 2010). For example, neuroendocrine, metabolic, immune and cardiovascular malfunctioning will occur when stress hormone functioning collapses. Our own research has focused on the biopsychosocial signatures associated with allostatic load and diverse stress-related conditions (e.g., burnout, geriatric depression) that distinctly affect vulnerable populations (e.g., elders, workers, sexual minorities). We have observed that this approach to quantifying chronic stress is linked to one’s sex, gender, sexual orientation, age and occupational characteristics. Indeed, different biomarker clusters (e.g., cortisol, blood pressure, cholesterol) are often more likely to be exacerbated in one sex or another throughout the life cycle, but in ways that depend on constitutional (genetics, development, experience), behavioural (coping and health habits) and historical (trauma/abuse, major life events, stressful environments) factors that are often gender specific (Juster, McEwen, & Lupien, 2010). As demonstrated by increasing prevalence of cardiovascular disease in women, this array of factors is dynamic.

To conclude, it is now becoming clear that the biopsychosocial antecedents and functional consequences of high allostatic load are best understood by taking into account sex and gender together. The paradigm shifts that have fostered inclusion of sex and gender have served as the impetus for accelerated advances in our understanding of who develops which stress-related diseases. As we move toward person-centred paradigms, we acknowledge that progress in stress research has benefited most by investigating sex and gender in synergy and not separately.

QUESTIONS TO CONSIDER

- ① How might risk or protective factors affect the impact of sex on what you are studying?
- ② Even if the body of evidence related to what you are studying is based on single-sex data, how can you probe further for the possible influences of sex and gender?

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4 Challenging “dis-ease”: sex, gender and systematic reviews in health

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VIVIEN E. RUNNELS, *University of Ottawa*

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Systematic reviews in health provide evidence to guide clinical decisions, technology assessments, health policies and further research. Since 2005, our Sex and Gender Working Group on Systematic Reviews has been engaged in a project to ensure that systematic reviews in health are attentive to sex and gender differences and similarities, with the goal of improving health outcomes for women and men. This initiative arose from a long-standing sense of “dis-ease” about what we know and do not know about health evidence, tempered with some optimism for change.

Back to the future

For two of us (Madeline, Sari) this dis-ease began with work in the women’s health movement in the 1970s. We developed consumer health information, wrote policy briefs and were part of coalitions promoting quality care, including safe, effective and rational use of pharmaceuticals for women.

Collaborating with other researchers, health practitioners and consumers, we reviewed the scientific evidence for contraceptives (e.g., Dalkon Shield IUD, Depo-Provera), interventions in childbirth (e.g., fetal monitoring), menopause (e.g., hormone therapy) and medical devices (e.g., breast implants) and gained insights into the medicalization of women’s lives.

We learned from two cases in particular that clinical decisions not rooted in sound evidence could lead to serious harm. First, despite evidence in the 1950s about lack of efficacy of diethylstilbestrol (DES) to prevent miscarriage (Dieckmann, Davis, Rynkiewicz, & Pottinger, 1953), the drug was promoted in advertisements in major medical journals and prescribed

until the 1970s, with subsequent dire consequences for the offspring of women to whom it was given. Second, hormone therapy (HT) was prescribed as a standard of care to healthy post-menopausal women based on limited results from observational studies and assumptions about the benefits of estrogen replacement. In 2002, results from

IDENTIFY WHO MAY OR MAY NOT BENEFIT FROM PARTICULAR INTERVENTIONS BY KNOWING **TO WHOM THE EVIDENCE DOES OR DOES NOT APPLY.**



randomized controlled trials demonstrated more harm than benefit from HT but by that time thousands of women prescribed HT had experienced breast cancer, heart disease, stroke and dementia (National Heart, Lung & Blood Institute, n.d.). Documents now reveal the many ways manufacturers promoted the benefits and downplayed harmful effects of HT to doctors and women (Fugh-Berman, 2010).

We were also concerned about women’s exclusion from clinical trials. It was widely assumed that most conclusions derived from research on male subjects—animal and human—could be extrapolated to females. These cases and others made us cautious about health evidence.

We learned to carefully review the design and quality of studies in order to evaluate the reliability, validity and applicability of the results. We asked: Who was included and excluded in terms of sex, age, ethnicity, socio-economic background and other characteristics? While policies supported greater inclusion of women in clinical trials since the early 1990s, gaps remained. Women

continued to be under-represented in particular study areas (e.g., cardiovascular trials), while men were under-represented in others (e.g., rheumatoid arthritis). Children and the elderly were commonly excluded. We sought to understand the implications of these research practices for health equity.

We tried to “disentangle” and weigh different forms of potential bias in published studies, such as pharmaceutical industry funding of authors and research; reporting short-term (usually positive) results from a study; citing relative versus absolute risks; failing to report or adequately assess adverse events; and extrapolating from limited observational studies or small trials to broad clinical use among diverse populations.

By the beginning of the 21st century, progress had occurred in understanding the complex dynamics of sex and gender as social constructs and determinants of health. There was strong evidence about sex and gender differences in pharmacokinetics and pharmacodynamics, genetic expression, prevalence, onset and severity of diseases, subjective experiences of conditions such as depression and chronic pain, responses to health interventions, the utilization of health care systems and many other processes that influence health. We hoped newly published research would clearly identify to whom the results applied, including whether sex and/or gender differences were relevant or not to the findings.

However, despite Canadian and international policies supporting and even mandating sex and gender analysis (Health Canada, 2009), primary studies and systematic reviews did not consistently report sex-disaggregated data nor analyze the implications of sex and/or gender for the findings (Blauwet, Hayes, McManus, Redberg, & Walsh, 2007). Our dis-ease about the quality of health evidence and potential for harm remained.

The Sex and Gender Working Group on Systematic Reviews: what we’ve done

Early in 2005, Madeline suggested we engage the Cochrane Collaboration, an international network of researchers who carry out systematic reviews in health, in a dialogue to encourage sex/gender analysis in Cochrane reviews. (Note that we use the term sex/gender in relation to analysis to acknowledge the interrelationships among these concepts.) We were familiar

RESEARCHERS AND SYSTEMATIC REVIEWERS NEED **PRACTICAL TOOLS TO OPERATIONALIZE AND MEASURE SEX/GENDER** IN RELATION TO OTHER HEALTH DETERMINANTS AND

TO ELUCIDATE THE CONTEXTS WITHIN WHICH HEALTH INTERVENTIONS OCCUR.



with Cochrane’s origins identifying sound practices in maternity care and its reputation as the “gold standard” of reviews. We saw an opportunity to apply the analytic tools of sex/gender analysis to “a review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyze data from the studies that are included in the review” (Cochrane Collaboration, 2005). The review process encouraged presentation of demographic data and subgroup analyses to help answer the question: To whom does the evidence apply? As well, some Cochrane researchers were beginning to address equity-related issues, including gender, in reviews.

Our first presentation was at the 4th Canadian Cochrane Symposium, December 2005 (Boscoe & Tudiver, 2005). With trepidation we stood before a sizable audience to present key concepts of sex/gender analysis, the mandate for this work in Canada and internationally and some challenges to implementation. Drawing examples from cardiovascular diseases and total joint arthroplasty, we made the case that rigorous sex/gender analysis contributes to better science. Noting that recent reviews revealed almost no analysis of sex or gender, we proposed systematically including sex/gender analysis in systematic reviews. We found enthusiasm for this initiative and agreed to collaborate with members of the Campbell and Cochrane Equity Methods Group.

By 2007 our duo had seamlessly expanded to include Marion and Vivien, doctoral students in Population Health at the University of Ottawa. We designed a research project to determine whether and how a sample of Cochrane systematic reviews on cardiovascular diseases addressed sex and/or gender (they did not!), then sampled the primary studies on which the reviews were based to see if the systematic reviews replicated gaps in the primary studies (they did!). We developed and tested a sex/gender appraisal tool for systematic reviews and adapted it to appraise primary studies and protocols for new research (Boscoe, Doull, Runnels, & Tudiver, 2009; Doull, Runnels, Tudiver, & Boscoe, 2010) and for planning systematic reviews (see Figure 4-1).

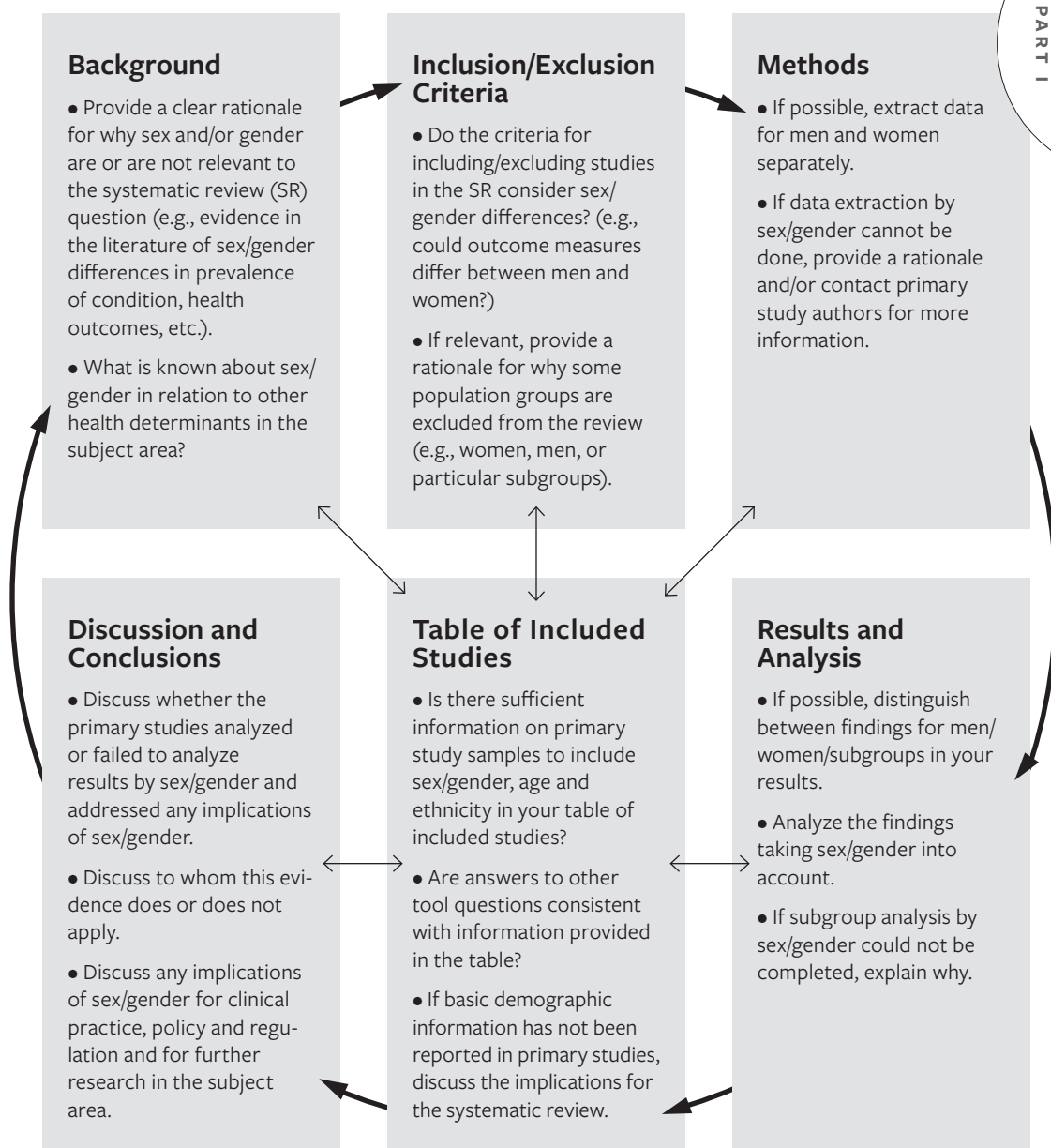


FIGURE 4-1 Integrating sex and gender in systematic reviews: a planning tool. Adapted from “Sex and gender in systematic reviews: A planning tool,” M. Doull, V. E. Runnels, S. Tudiver, and M. Boscoe, 2011, May, Presentation at Combining forces to improve systematic reviews: Gender, equity and bias. Ottawa, Ontario. Adapted by original authors.

We have benefited from numerous collaborations and discussions with researchers, policy analysts, health practitioners, reviewers, librarians, students and women's groups in Canada and internationally. To facilitate dialogue among systematic reviewers and users of health evidence, in May 2011 we hosted a two-day meeting, *Combining forces to improve systematic reviews: Gender, equity and bias* (Ottawa, Ontario). Thirty participants shared approaches and methodological challenges in identifying: To whom does the evidence apply? All agreed to combine forces and developed an action plan to improve the applicability of systematic reviews. Our Working Group serves as a hub for this emerging community of practice and plans to provide methodological and conceptual guidance for systematic reviews relating to sex/gender analysis.

What we've learned

Our work has provided us with insights into how knowledge is constructed, organized and translated. As our collaboration progressed, these insights emerged as moments of realization about sex, gender and evidence (see "Aha!" moments). The questions that need to be asked before embarking on a journey through the knowledge system are: Who decides what will be studied and, how will it be studied?

"Aha!" moments

Prior to this project, I was working on a systematic review about HIV-positive women. Finding studies that included only women or reported outcomes for women was challenging. This frustrated and surprised me. The questions posed by researchers often reflected assumptions about sex and gender; young men are mostly asked about violence and aggression but rarely about love and young women about their powerlessness but not about their power. Through our collaboration, I see more clearly how understanding the effectiveness of interventions for men, women and children remains elusive when differences are not parsed out and assumptions are unchallenged.

~ Marion

I was surprised when I had an “aha” moment—an authentic intellectual realization that the majority of studies (evidence) on which we base all aspects of medical and clinical practice, diagnosis and prognosis, choice of treatments, prescriptions and care, understanding of adverse events, etc. were deeply if not primarily influenced by sex and gender, and that such influences were rarely considered. This realization was not only shocking but it shook me up. It seemed particularly unfair and unscientific, not just to women and girls but also to boys and men. This “aha” moment eventually was converted from a single event into an ongoing, different and critical approach that has forced me to ask questions not just directed towards women’s health, but to the framing of many issues.

~ Vivien

As summaries of evidence distilled from primary studies, systematic reviews are an end point of knowledge production. Even in the area of cardiovascular diseases where sex and gender differences are known and ignoring them may result in harm, our research determined that reviews replicate omissions from primary studies. These results helped us recognize the added value if sex/gender analysis had been applied throughout the knowledge production process from primary studies to systematic reviews—in formulating the research question, developing a protocol, choosing methods, collecting data, reporting, analyzing and discussing results and their implications, including who benefits and who does not from an intervention. Asking about sex and gender at each stage to identify or rule out potentially significant differences contributes to quality assurance of evidence.

DESPITE MANY POLICY STATEMENTS AND ROBUST RESEARCH ABOUT SEX AND GENDER DIFFERENCES, **LITTLE PROGRESS HAS BEEN MADE IN ADDRESSING THE APPLICABILITY OF RESEARCH FINDINGS.** INCENTIVES AND ACCOUNTABILITY MECHANISMS ARE NEEDED TO ENSURE POSITIVE CHANGE.



We have also gained insights into how sex and gender are complex constructs revealing the interrelationships among biological and social processes across the life course. While there is a rich transdisciplinary literature addressing these dynamics, we are still in the early stages of developing conceptual approaches and methodological tools to explain and measure these processes and interactions with other health determinants and identities. Few primary studies or systematic reviews in our research included even basic contextual information about sex and gender differences in prevalence and severity of a condition or addressed the different challenges which men and women of different ages and backgrounds might face experiencing disease and accessing care.

We see a need for practical tools that researchers and systematic reviewers can use to operationalize and measure sex and gender in relation to other health determinants and the contexts within which health interventions occur. The challenge is to find effective, systematic ways appropriate to a particular research question that can effectively combine conceptual approaches and methods, including ethnographic and other qualitative methods in order to strengthen the evidence for improved health outcomes.

QUESTIONS TO CONSIDER

- ① How will you identify to whom the evidence applies or does not apply?
- ② How will you identify who may or may not benefit from an intervention?

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PART II

**STRENGTHENING
SCIENCE**

5 My mum, my dad, and sex differences in cardiac care: how a sex-based analysis revealed the importance of age

RANDALL FRANSOO, *University of Manitoba*

It was the younger of my two older sisters who called to tell me our dad had just suffered another major heart attack. It was the spring of 1988 and my parents were visiting with friends during a stopover on the drive home from their winter getaway in Arizona. Their host was in the midst of roofing his garage, so naturally my dad got right to work carrying bales of shingles up a ladder onto the roof. My then 68-year-old dad already had a significant cardiac history, beginning with the heart attack that precipitated his unwelcome early retirement some 13 years earlier.

He'd been rushed by ambulance to the nearest hospital and was told he needed emergency bypass surgery on three or possibly four arteries. The big question for me and my five siblings was: who was going to go? As much as we all wanted to go, that was neither practical nor in anybody's best interest. With just a few moments' discussion it became clear that the best option was for the two "girls" to go; the older being our mother's best friend and support, the younger with significant medical training and vocabulary. The four boys, of which I am youngest, had no role but to sit by our phones to wait and hope.

THROUGH THIS COLLABORATIVE RESEARCH PROJECT, I LEARNED THE IMPORTANCE OF CAREFUL ATTENTION TO SEX AND AGE IN HEALTH SERVICES RESEARCH. AND THE GOVERNMENT, THE REGIONAL HEALTH AUTHORITIES AND THE PEOPLE OF MANITOBA (AND BEYOND) LEARNED THAT

CARDIAC CARE AFTER AMI IS “BLIND” TO SEX. AS IT SHOULD BE.



expensive and risky procedure would not be undertaken if it weren't clearly the best thing to do? I didn't read far into this literature because it was riddled with terms I didn't understand, and what I did understand was too depressing. Thankfully my dad's surgery went well and he enjoyed a good recovery.

Fast-forward to 2004, by which time I'd changed career paths from engineering, through biomechanics and physiology, into health services research. I was a new research scientist at the Manitoba Centre for Health Policy (MCHP) and was just given my first lead role on a major research project. The report was on sex differences in health status and health care use in Manitoba. The objective was to create an atlas-style report, with all indicators calculated separately for males and females (Fransoo et al., 2005). I had a strong interest in researching cardiac care given my dad's history of heart disease, and with the few things I'd heard about a "sex bias" in this area, I decided early on to dedicate one of the chapters of that MCHP report to cardiac care. The key findings were subsequently published in *Healthcare Policy*, including a complete literature review and discussion (Fransoo et al., 2010).

That cardiac care chapter (and for that matter, the entire MCHP report) would have been much less interesting had it not been for the remarkable group of collaborators I was working with: the Need To Know Team, plus a number of local experts on men's health and women's health. The Need To Know Team is an award-winning collaborative research group led by my

Driven by curiosity and my inability to remain idle, I decided to do some reading about bypass surgery. It was all Greek to me—literally, as at that time I had absolutely no medical or research training; I was a junior industrial engineer at Nortel. So imagine my surprise when the first few articles I found about bypass surgery were split almost 50-50 regarding the effectiveness of "the procedure" as they called it. How could this be? Surely such an invasive, ex-

mentor Dr. Patricia Martens, with representatives from each of the 11 Regional Health Authorities in Manitoba and key staff from Manitoba Health. It was this group’s insistence that all analyses be stratified by age in addition to sex that led to the most important insights.

We started by analyzing the population-based rates of the four chief cardiac procedures: cardiac catheterization, angioplasty, stent insertion, and bypass surgery. Cardiac catheterization, also known as an angiogram, is a diagnostic procedure used to identify the extent and location of blockage in the coronary arteries. It is the gateway to the other procedures, as the knowledge gained from this procedure is used to determine what should be done next in a patient’s cardiac care. Angioplasty is when a tiny balloon is inflated inside a narrowed artery to enlarge it and increase blood flow. Most angioplasties are now followed by a stent insertion: a hollow metal cylinder is inserted in the artery following the angioplasty to hold the artery open. Bypass surgery is when severely blocked segments of coronary arteries are removed and replaced by grafts from elsewhere in the body.

Our population-based results mirrored previous findings that cardiac procedure rates were twice as high among males as females (Ayanian & Epstein, 1991; Chandra et al., 1998; Jaglal, Goel, & Naylor, 1994; Pilote et al., 2004). This seemed to reflect what was commonly referred to as the “sex bias” in cardiac care: that males receive more aggressive treatment than females. Here’s where the story gets interesting.

Like many things in health care, there is no definitive way to identify all the people who “should” have an angiogram. However, there is little disagreement that most patients diagnosed with an Acute Myocardial Infarction (AMI or heart attack) should (Tran et al., 2003). So our next step

UP WITH COLLABORATION! MANY OF THE KEY FINDINGS THAT CAME OUT OF THIS RESEARCH WERE THE RESULT OF IDEAS AND INPUT THAT CAME FROM OUR PARTNERS RATHER THAN THE RESEARCHERS THEMSELVES (MOST NOTABLY, THE DESIRE TO DO ALL ANALYSES BY AGE IN ADDITION TO SEX).

was to create a cohort of people experiencing an AMI. Manitoba's uniquely rich data system (Roos, Gupta, Soodeen, & Jebamani, 2005) allows a more complete cohort to be created than elsewhere in Canada because, in addition to hospital data, individual-level vital statistics are available. This means we could include both those hospitalized for their AMI (the usual case-finding method) and those who died because of their AMI but without being admitted to a hospital (e.g., died on the way).

The first important finding was in the raw numbers: While heart disease combined with stroke now claims as many lives among women as men (Public Health Agency of Canada, 2009), the incidence of AMI remains substantially higher among men. Of the 6,844 AMI cases, 4,199 (61.3%) were among males with 2,645 (38.7%) among females. These numbers prompted an immediate re-interpretation of the procedure rates: given that more AMIs occurred among males, we should have expected to see more procedures among males. This simple sex difference in raw numbers explains a significant portion of the difference in procedure rates, but is not the end of the story. However, it does demonstrate that comparing population-based rates of procedures is not particularly insightful for finding "real" sex differences or biases in treatment rates. It should be noted here that our data only allow identification of sex, not gender, so the differences seen in the results may reflect sex (biological) differences, or gender (social) differences, or a combination of both.

Then we proceeded to follow the cohort for one year. We found that among all AMI patients who survived and were hospitalized, a significantly higher proportion of males than females received a cardiac catheterization during their AMI hospitalization (36.8% vs. 26.9%). As with the initial population-based rates, this finding appeared to be consistent with a significant sex and/or gender bias in cardiac care. However, this too is not the end of the story.

The next factor to account for was age, as previous studies have shown that on average, males experience AMIs 8–10 years younger than females (68 vs. 76 years in our cohort). On its own this may not seem like a particularly startling difference, but it turns out to be critical because it interacts with the final factor: the steep decline in procedure rates with age. As shown in Figure 5-1, the proportion of male and female AMI patients who receive

cardiac catheterization during their AMI hospitalization drops from over 50% among men and women aged 40–44 years, to under 10% for those 85 years or older. The overlapping confidence intervals indicate that in every 5-year age group, there was no significant difference between the rates for males versus females. This combination of factors completely confounded the initial findings.

So we found there was actually no sex and/or gender bias in cardiac care, though patient age at AMI was critical. Men are not treated more aggressively than women, but younger AMI patients are treated more aggressively than older AMI patients. And because women are older when they experience AMIs, they are less likely to receive these invasive treatments. Within every age group, men and women were treated equally—a finding which is reflected in virtually all studies on this topic done since 1995 (for complete literature review see Fransoo et al., 2010).

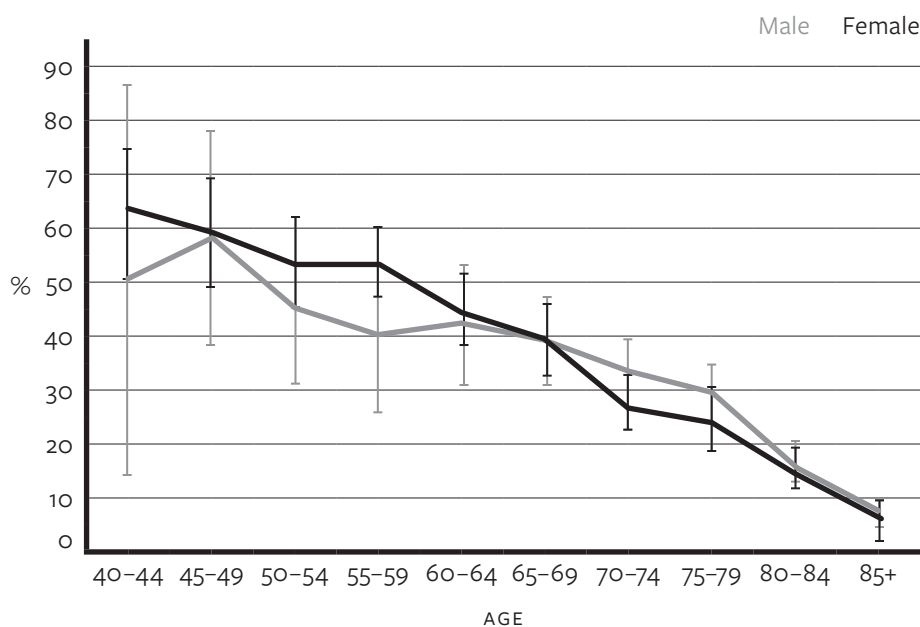


FIGURE 5-1 Percent of AMI patients receiving cardiac catheterization, by sex and age group. Reproduced from “Age difference explains gender difference in cardiac intervention rates after acute myocardial infarction,” by R. R. Fransoo, P. J. Martens, The Need To Know Team, H. J. Prior, E. Burland, D. Chateau, and A. Katz, 2010, *Healthcare Policy*, 6, p. 95. Copyright 2010 by Longwoods Publishing Corporation. Reproduced with permission.

BEFORE CONCLUDING THAT A SEX OR GENDER DIFFERENCE REPRESENTS A SEX OR GENDER BIAS IN TREATMENT PATTERNS, WE HAVE TO DO WHAT WE CAN AS RESEARCHERS TO ENSURE **ALL OTHER THINGS ARE EQUAL.**

Conclusions

It was via our sex-based analysis that we were able to uncover the important effect of age on rates of treatment after AMI. Analyzing by sex provided a window to better understand the mechanisms underlying apparent inequalities. That said, demonstrating equality among males and females in rates of treatment after AMI does not negate gender- and sex-related differences or issues in cardiac risk factors, diagnosis, patient preferences or treatment effectiveness.

All of this is reassuring news—for my sisters, and especially for my mum now approaching her 85th birthday without heart problems, but glad to know that should her luck change, her treatment will be as good as her husband’s was.

Epilogue

About 14 years after the bypass surgery (three years before this research project began), my father fell and suffered a massive stroke from which he never recovered. He lived another (difficult) year and a half in a nursing home before dying a dignified death from pneumonia, the diagnosis Sir William Osler famously referred to as “the friend of the aged.”

QUESTIONS TO CONSIDER

① Do your usual research methods need a refresh? Perhaps a sex-specific analysis is required to provide the answers needed. Many health phenomena are distributed unevenly within age and sex groups—so *adjusting* for these variables can actually hide important trends in the data.

- ② Can we know when the “final truth” has been established? Be cognizant of the prospect that things may change. Just because a sex and/or gender difference (or a lack thereof) was documented at one time does not mean it will remain so indefinitely.

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6 Work exposures and musculoskeletal disorders: how the treatment of gender and sex in population-based surveys can affect detection of exposure-effect relationships

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One Quebec worker in five suffers from work-related musculoskeletal disorders (MSD) (Arcand, Labrèche, Stock, Messing, & Tissot, 2001). Our research team has been exploring workplace exposures associated with these disorders. This chapter presents why we considered men and women separately in our research, and in doing so, what we learned about the health effects of work.

A note on terminology—conceptually, sex refers to the biological specificity of women and men, and gender refers to social factors. In empirical research with workplace populations we often find it hard to distinguish whether observed male-female differences are due to biological or social factors. We therefore use the term sex/gender where appropriate.

The 1998 Quebec Health and Social Survey (QHSS-98) asked 11,735 workers about significant musculoskeletal pain at various body sites that interfered with their usual activities “often” or “all the time” over the previous 12 months. When we looked at the data, we found that the prevalence of pain at some body sites was higher for women, while at other sites it was higher for men or there was no significant sex/gender difference. After accounting for all significant workplace exposures and personal factors measured in the study that might influence pain at different body sites, our multivariate analyses revealed that female sex/gender was significantly associated with neck, lower leg/calf and foot/ankle pain in the total population. This relationship has been found in other studies.

We had a particular interest in the effects of prolonged standing, which had not been extensively studied in relation to MSD. Most of the Quebec population usually stands at work (Tissot, Messing, & Stock, 2005). We wanted to know whether standing was associated with back or lower extremity pain and how that relationship was influenced by other workplace exposures, such as heavy lifting or exposure to vibration. The QHSS-98 included questions about workers’ usual working posture and their mobility.

In initial (bivariate) analyses, we found that some lower extremity pain was associated with prolonged standing in what appeared to be sex/gender-specific ways. While both women and men who usually stood at work reported significantly more ankle/foot and lower leg/calf pain than those of their same sex/gender who usually sat, the increase was more marked among women. Women who usually stood at work had 58% more ankle/foot pain and 83% more lower leg/calf pain than men who usually stood at work, a highly significant difference. In the final (multiple logistic regression) models, prolonged standing was clearly associated with distal lower extremity pain symptoms for both men and women, and female sex/gender was strongly associated with these symptoms even after controlling for the other significant relevant factors measured in the study (Messing, Tissot, & Stock, 2008).

Why did women who stood have more pain than men who stood? One explanation could be that postures of women who stand differ from those of men who stand. A person who usually stands can be walking, leaning, crouching, running, bending, and so forth. In fact, we found that women who stood at work were significantly less likely to move around than men who stood (Table 6-1).

TABLE 6-1 Mobility and Job Control Among Standing Workers: 1998 Quebec Working Population Aged 15 and Over, Working at Least 25 Hours per Week

	Women %	Men %
Free to sit at will	19	17
Move long distances	33	44
Move short distances	34	28
Standing in a fixed or relatively fixed position	14	11

Note. Data from R. Arcand, F. Labrèche, S. Stock, K. Messing, and F. Tissot, 2001, p. 548.
 $p < 0.001$, chi-square test

There could also have been sex/gender differences in the effects of the same conditions. In another study, we found that women hospital workers who stood still for a long time at work had many more symptoms of circulatory problems than men exposed to the same condition; the reasons for this were unknown and could be associated with sex or gender (Ngomo, Messing, Perreault, & Comtois, 2008).

In order to learn more about the relationships between musculoskeletal pain and workplace exposures, including standing, we had to decide how to treat sex/gender in our analyses. Sex/gender is often treated as a confounder in multivariate analyses. A confounder is a factor that can cause or prevent the outcome of interest, is associated with the exposure variable(s) under investigation and does not lie in the causal pathway that links the two. For example, if women in the general population are more likely to suffer from a disease and there are more women exposed to a potential cause of the disease, researchers often control for sex/gender by a mathematical procedure. However, if women have higher rates only because they are concentrated in specific jobs that expose them to work-related factors that increase their risk of the disease of interest, then female sex/gender is associated with the disease only because women are more exposed. In this case sex/gender is not a true confounder, because it does not have an independent relationship to disease risk along a separate causal pathway; it acts as a substitute or proxy for exposure-related variables. Controlling for sex/gender would therefore result in underestimation of a true exposure-effect relationship.

We could have dealt with this problem by measuring the interactions between sex/gender and each exposure variable and each outcome from the beginning of the analysis, but this would have been extremely cumbersome. We therefore decided to use another statistical procedure, stratification, where data on women and men are examined separately (Messing et al., 2009).

The completed analyses constituted the first-ever extensive examination of prolonged standing, other workplace exposures and musculoskeletal symptoms in the lower back and lower limbs (Messing et al., 2008; Tissot, Messing, & Stock, 2009). We found that standing and several other workplace exposures were associated with these symptoms. We could give details about how sex/gender was situated in the causal pathway. First, sex/gender was related to the prevalence of some exposures. For example, exposure to whole-body vibration was extremely low among women and unwanted sexual attention similarly infrequent among men. If stratification had not been done, some associations that were true for only women or for men would not be found or would be significantly underestimated and, if found, would be inappropriately attributed to both. Also, the effects of unmeasured exposures may be concealed if sex/gender is controlled for. Women take more steps than men in the same service and factory jobs, probably because women's stride length is shorter (Laperrière, Ngomo, Thibault, & Messing, 2006). Taking more steps might have increased the

TREATING SEX/GENDER AS A CONFOUNDER MAY LEAD TO MISSING SIGNIFICANT RELATIONSHIPS BETWEEN THE OUTCOME OF INTEREST AND IMPORTANT EXPOSURE VARIABLES. IN MULTIPLE LOGISTIC REGRESSION ANALYSES OF RELATIONSHIPS BETWEEN OCCUPATIONAL OR OTHER ENVIRONMENTAL EXPOSURES AND HEALTH OUTCOMES, **STRATIFICATION BY SEX/GENDER IS PREFERABLE** TO CONTROLLING FOR SEX/GENDER IN AN ANALYSIS OF THE TOTAL STUDY POPULATION.



risk of foot pain for women. The number of steps at work was not measured in the QHSS, and controlling for sex/gender would have eliminated the effect of women's shorter stride length on foot pain.

Several other expressions in the survey instrument did not measure the same exposure among male and female respondents. For example, "handling heavy loads" (about 10% of women, 23% of men reported handling heavy loads frequently or all the time) could correspond, among women and men, to loads with different characteristics; a large proportion of heavy loads handled by women may be patients or children, who must be handled in different ways from inert objects. Four of the top 20 professions of women in Quebec are of this type, but none of the top 20 male professions are (Institut de la statistique du Québec, n.d.).

Another finding was that an exposure variable could correspond to

different extraprofessional contexts among women and men. Such might be the case with the variable "works over 40h/wk and living with two or more children," which was associated with low back pain among women who work standing but not among men. This difference may be related to variations in the workload associated with caring for children for women compared to men. In this case, better measurement of exposures associated with domestic responsibilities would be useful.

WHILE SEX AND GENDER CAN BE DISTINGUISHED CONCEPTUALLY,

IN MANY OCCUPATIONAL OR ENVIRONMENTAL HEALTH STUDIES IT IS OFTEN IMPOSSIBLE TO TELL WHETHER, AND TO WHAT DEGREE, PHENOMENA UNDER STUDY RELATE TO SEX, GENDER OR BOTH.



For example, a situation where women are exposed to a specific factor at a higher level than men may lead to an erroneous finding of a greater effect of the same exposure on women (this is called intra-stratum confounding). If the exposure being studied is called "repetitive work" but women's repetitive work is more repetitive than men's, women may show more effects. In other words, if the crude questionnaire-based measure of some work exposures were not able to distinguish important differences in intensity, frequency or duration of exposures that may exist between

women and men, identical responses of each would not have the same meaning (Messing et al., 2003).

When we examined the literature, we found that few studies carefully examined potential explanatory factors for the sex/gender differences they found (Messing & Stellman, 2006). We think that if data on the relationships between health outcomes and occupational factors such as standing are examined without understanding the role of sex/gender, our understanding of the relationships can be flawed. Associations between exposure and outcome would have been missed in non-stratified analyses when opposite effects were observed for the two genders/sexes.



Photo: Karen Messing

Cashiers in Sao Paulo, Brazil. Unlike North American sales personnel, European, Asian, South American and African cashiers work in a seated posture not associated with lower extremity or back pain.

If we had used unstratified analyses, several associations with risk factors would have been overlooked if we had omitted the sex/gender interaction terms, particularly when the relationships between an outcome and an exposure variable went in opposite directions for men and women. Given the fact that women and men are usually found in relatively segregated jobs, many exposures are usually present or primarily present for one or the other. Therefore, only large study populations or the oversampling

of non-traditional job assignments would allow analyses with all relevant interaction terms. In fact, interactions between sex/gender and exposures can only be studied when the exposure is present at sufficient levels for both men and women. Consequently, when carrying out multiple regression analysis to study exposure-outcome relationships, a stratified analysis is preferable for most study populations. However, stratifying for sex/gender may not be sufficient; our research group is now exploring methods by which age and other socio-demographic variables that influence workplace and extraprofessional exposures should be handled, since stratification for all simultaneously is impractical in commonly used sample sizes.

Conclusions

Our overall aim in doing these studies was to improve conditions in the workplace that adversely affect health. With the studies on the health effects of standing, we wanted to examine the evidence relative to getting seats for workers whose jobs would allow them to sit. Since evidence supports a relationship between prolonged standing and several adverse health effects, both women and men who stand at work might well benefit from access to seats. To improve the health of *both* women and men in relation to a workplace exposure associated with pain, a *sex/gender-differentiated* analysis turned out to be absolutely necessary.

QUESTIONS TO CONSIDER

- ① What does biological sex mean in relation to the phenomena you are studying? Are there biological sex differences that are situated on the causal pathway between exposure and outcome? What are they and where are they on the pathway?
- ② What does gender mean in relation to the phenomena you are studying? Are there environmental differences associated with gender that are situated on the causal pathway between exposure and outcome? What are they and where are they on the pathway?

- ③ Does your study population vary in terms of age, socio-economic status, ethnicity or other characteristics? How do these interact with sex and gender to produce the exposure-outcome relationships you are studying?

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7 The influence of gender in the implementation of an integrated management system in an industrial work environment

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This chapter relates the story of undertaking my doctoral research in seven plants of a large aluminum smelting complex in Quebec belonging to one of the world's largest aluminum producers. This industry sector is well known for its major environmental and occupational health and safety risks.

My research dealt with an implementation analysis of an integrated management system (IMS) for environment, occupational health and safety (Savary, 2009). An implementation analysis investigates the determinants involved in the deployment and application of an intervention, the effects of the intervention, and the influence of contextual factors on both the application and the effects of the intervention. The IMS I looked at was based on two risk prevention standards: International Organization for Standardization (ISO) 14001, an internationally accepted standard for environmental management, and Occupation Health and Safety Assessment

convinced me a posteriori that, in order to appreciate the scope of influence of gender on the IMS implementation process, it was necessary to disentangle it from other elements of organizational culture—to examine gender as a contextual factor in its own right.

Why examine gender separately?

First, doing so provides more accurate explanations of the context and the degree of implementation. Second, it allows us to perform a more robust qualitative analysis of variations observed in the degree of implementation.

How can gender be disentangled from other elements of organizational culture?

In order to bring out gender as a standalone influencing factor, I dissected the research process—from the sample composition to the interviewees’ discourse—while paying attention to non-verbal communication such as sustained eye contact, looking away, prolonged silences or stopping suddenly mid-sentence. This analysis revealed the following characteristics:

a) A predominantly male sample

Although gender was not a criterion in selecting the participants, my purposeful sample of 35 persons consisted predominantly of men and included only four women, who were classified as professionals. All four of the women worked as environmental or occupational health and safety coordinators and were among the employees accountable for the results of the IMS in their respective plants. There were very few women assigned to upper management positions as evidenced by the plant’s organizational chart and as confirmed by observations made during site visits.

b) Professional mobility that favoured men

Through interplant mobility, all men in the sample had held various positions and made their way up the organizational ladder. These opportunities helped them accumulate a richer experience of the organization, which imbued them with knowledge of the realities of these plants, including the

INCLUDING GENDER AS A CONTEXTUAL FACTOR IN ANALYZING THE IMPLEMENTATION OF AN INTEGRATED MANAGEMENT SYSTEM FOR ENVIRONMENT, HEALTH AND SAFETY ENABLES **MORE ACCURATE EXPLANATIONS AND MORE RELIABLE PREDICTIONS** OF THE DEGREE OF IMPLEMENTATION.

daily operation. They used this knowledge as professional and social capital. Such mobility was scarcer for the women who were targets of criticism for not having “gotten their hands dirty enough to understand our work and come in and tell us what to do.” The result was a weakened perceived legitimacy of these women’s recommendations related to risk-management programs that they were supposed to implement.

c) The “superman syndrome”

In general, the men’s discourse emphasized inclusion, intolerance and rejection, and the difficulty of collaboration: “Metal workers are tough guys and very clannish. It’s not easy to get accepted into a clan. There are rules, and you have to respect them.”

In this highly regulated environment, where the operators worked under tremendous physical constraints and conditions of high risk, certain risk-control activities were already in place before the IMS was implemented. Hence, several employees were, as they said, “used to controlling risks, because we’ve been dealing with them for many years,” and no longer considered them a threat to occupational health and safety or to the environment. Risky situations were often seized as opportunities to earn other employees’ respect and admiration as “a real tough guy who isn’t afraid of anything.” Anyone who was cautious was regarded as a coward and likely the target of ridicule. In most of these plants the superman syndrome prevailed. Workers got their self-esteem from telling themselves “I’m not afraid of danger, I’m no softy.” This delayed the application of the risk-management programs.



With such entrenched attitudes, how could the company successfully cultivate safety behaviour? One of the approaches to achieving safety behaviour was to caution or report co-workers who were working unsafely. This went against the spirit of solidarity that characterized the “clan” in these plants, where reporting a fellow worker was regarded as treason. As one plant worker said, “You can’t ask a metalworker to report his buddy—he just won’t do it.”

To overcome this constraint, managers adopted a strategy of “getting closer” to the workers by visiting the shop floor regularly to evaluate their safety behaviours publicly. Visits to the shop floor by male managers were perceived by plant operators as a legitimate exercise of a male manager’s authority. Yet, the same operators viewed site visits from female managers differently; they were perceived as auditions whereby the women had to prove themselves under close operator scrutiny. For female managers it was necessary to take up a particular gendered identity and role vis-à-vis their male supervisees in order to succeed with the same getting closer strategy as the male managers. These gendered dynamics emerged from the masculinization of the implementation process. The success of implementation of

the IMS was contingent on how the female managers adhered to this particular expression of femininity.

There were six main strategies to adopting this particular feminine identity and role:

1. Dress and talk like a guy.

In order for the female managers to demonstrate their respect for the plant operators and avoid rejection, they adopted a masculine dress code and masculine language. As one male manager observed, “To be accepted, you have to fit in and identify yourself with the guys by wearing the same clothes, speaking the same language, and not getting upset if they are not polite.”

2. Seek the acceptance of the clan.

Any differences in dress or language were also regarded as a sign of not belonging to the clan, which could result in the risk-prevention programs being sabotaged. One male manager, in describing the difficulties of implementing the IMS in another plant where the manager was a woman, explained:

I’m not like that girl [manager]. I dress like the boys, and they see themselves in me. I’m not embarrassed by their way of dressing, and they accept me. If they accept you, they’ll walk through hell for you. If not, they’ll make you go through hell yourself.

3. Charm the men.

If dressing and talking like the guys didn’t do the trick, the women could always try a little charm. For example, the health promotion campaign on the use of protective equipment succeeded because, according to the participants, it was run by a woman who knew how to “turn on the charm.” “There’s no denying that this woman has some charms that the others don’t,” observed a male plant worker.

4. Be “nice” and “pretty.”

One aspect of risk management was reporting accidents/incidents. To avoid seeming like “a wimpy girl who couldn’t handle a little boo-boo,” many of the men did not file such reports. They would boast about their cuts and burns as if they were medals of honour. But in those plants where the nurse was

regarded as “nice and pretty,” the number of accidents/incidents reported was much higher: “The nurse here is really pretty and really nice—she has real charisma, and the guys love to go see her to report even the tiniest scratch.”

5. Show love.

Being charming wasn’t enough—the women also had to show some love. This involved establishing a reciprocal relationship with a maternal quality. In their interviews, several male respondents expressed nostalgia about that “good woman” who had succeeded in implementing several elements of risk management. “When she dealt with us, we felt that she loved us, and that she respected us.” In exchange for this “love,” the workers demonstrated greater compliance with the safety rules and wholly accepted this woman’s recommendations: “When a guy feels that you love him, he’ll do anything you want.”

6. Pay for your mistakes.

Because the female professionals were evaluated in part on the success of the implementation, they could find themselves indirectly “punished” for having failed to build the personal rapport with the operators needed to facilitate the development of the desired safety behaviour. According to one male manager, noting the challenges the women faced in succeeding:

The operators can decide whether or not to do what you ask. They’ll do it when you’re there, but when you’re not there, they don’t give a darn. You’re the one who’s accountable for the results. You’re the one who’s going to pay.

As the above discussion makes clear, gender influenced three of the five stages of the IMS implementation process.

At the planning stage, when the hazards in the plants were being identified, the superman syndrome distorted the perception of these hazards and the assessment of risk. For this reason, certain hazards could not be identified, thus, the risks associated with them could not be addressed in the systematic risk-management programs generated by the IMS.

At the implementation stage, the presence or absence of female managers determined how intensively the risk-management programs were applied. In plants where women were responsible for implementing the IMS, the

risk-management programs were used less intensively.

At the monitoring stage, the superman syndrome biased the identification of new risks by minimizing or side-stepping them. The proposed corrective measures could therefore not succeed in correcting the situations of non-compliance leading to these new risks.

EXPLICIT ATTENTION TO GENDER SUPPORTS THE DEVELOPMENT OF **MORE EFFECTIVE, TAILORED RISK-PREVENTION PROGRAMS** IN ENVIRONMENT, HEALTH AND SAFETY.



Conclusion

In my experience in the aluminum smelting industry an organizational culture framework was not sufficient to explain the outcomes of implementing the IMS because it did not include the gender dynamics at play. Accounting for gender as an explicit contextual factor that can influence the process of implementation can enhance the efficiency of integrated environment, occupational health and safety risk-prevention programs.

QUESTIONS TO CONSIDER

- ① How can you detect whether an influential contextual factor such as gender is masked by other factors, such as organizational culture?
- ② How can gender be teased out from the cultural context or organizational culture in which it is embedded for further analysis?
- ③ What important new findings are generated when gender is examined, both separately and in relation to other factors, such as organizational culture?

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8 Making sure everyone counts: considerations for inclusion, identification and analysis of transgender and transsexual participants in health surveys

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Trans (transgender, transsexual or transitioned) people represent a broad range of individuals who, though potentially quite different from each other, share the common experience of knowing themselves to be a gender that is not congruent with their birth sex. A recent increase in research on, and interest in, trans health issues has been sparked by evidence of extreme social and health-related inequities. As chair of the Population Databases Project within Sexual and Gender Diversity: Vulnerability and Resilience (SVR), a research team in lesbian, gay, bisexual and transgender (LGBT) health, I worked to assemble a database of population health databases that included measures of sexual orientation or gender identity. While most included no measure of gender identity, measures have recently begun to appear, for example in the Massachusetts Behavioral Risk Factor

Surveillance System. As a principal investigator on a community-based study of trans health (Trans PULSE), I have increasingly been approached by researchers asking how to alter their demographic questions to identify trans participants. In the course of my work, I have noted that identifying trans participants often does not lead to better research on trans health, and in fact this effort to be inclusive can have the unintended consequence of total exclusion. If that seems counterintuitive, let me illustrate with an example from my own early research.

In 1997, I collected survey data to address the question of whether

CONSIDERING **HOW TRANS PARTICIPANTS WILL BE INCLUDED** IN ANALYSES OF DATA IS CRITICAL TO THE PROCESS OF DECIDING WHICH MEASURES TO INCLUDE TO IDENTIFY THEM.

women who have sex with women are at increased risk for sexually transmitted infections (STIs). I was proud that, unlike any survey I had seen, I made mine inclusive of trans women. I asked participants if they were transgender, and I was specific that when participants reported on their sex partners, we were talking about the partner's genital sex, not gender identity, as we were looking

at STIs. Three trans women filled out the survey. Yet, when it came time for analysis, I ended up doing what many well-intentioned researchers do: I deleted them from my analysis. Why? I had utterly failed to think my project through the entire analysis stage. I had no information about the anatomical sex of the *participants* and the timing of any anatomical changes with regard to the timing of any STIs. I did not know what body parts or tissues were involved, and obviously this had implications for risk of contracting an STI.

While trans people participate in research studies of all kinds, thoughtful strategies for explicit inclusion within health surveys are critical for two reasons. First, where numbers of trans participants are sufficiently large, they will allow us to assess the health of trans people and identify inequities. Second, they will provide sufficient information to group trans participants with cisgender (non-trans) participants for sex- or gender-specific analyses.

Identifying trans survey participants

Measures developed for studies *within* trans populations can use community-specific language that other surveys cannot. Given that most people in population-level studies will be cisgender, a small amount of confusion, and the resulting misclassification, could result in a group being considered trans that is actually composed largely of confused cisgender participants.

There is no consensus on how to identify trans participants, though some considerations have been laid out (SMART, 2009). Items that add an option in addition to “male” or “female” to a sex or gender question may provide an expanded space for those who do not identify as either male or female, but it cannot be expected that all trans people will check a “transgender” or “other, please specify” box. It also just seems that an “other” box is, well, literally othering. Moreover, unless they are “check all that apply,” such questions force trans participants to choose between indicating they are male (for example) or trans, and inadvertently send the message that if you are trans you still don’t qualify as male or female. “Check all that apply” options are an improvement, but some trans people may still not check a transgender box, as they don’t personally identify as “transgender,” and interpretation issues will remain. For example, if someone checks “female” and “transgender,” it will be impossible to be certain whether that individual falls on the male-to-female or the female-to-male spectrum. Adding more detailed response options to male and female in a “check only one” item, such as “transgender, male-to-female” may help, and this approach has undergone cognitive testing with favourable results in youth (Conron, Scout, & Austin, 2008).

Identifying trans participants is not enough:
dimensions of sex and gender

Identifying trans participants in large samples will allow for analyses that look at health-related measures among trans participants as a group or comparisons of trans to cisgender participants. However, while cisgender participants are typically assumed to have anatomy, hormones and lived gender consistent with their gender identity, assumptions about any of these cannot be made for trans participants. Thus, interpreting factors that contribute to health outcomes will remain difficult.

A good measure for gender identity is thus not sufficient. This sounds odd, given that in common Canadian English trans people are to gender identity what gay, bisexual and lesbian people are to sexual orientation. However, sexual orientation has three dimensions—attraction, behaviour and identity—and these have been incorporated into recommendations for multiple survey items (SMART, 2009). Similarly, gender identity is only one dimension of transgenderism or transsexualism, and provides limited information for health research without consideration of other dimensions.

Gender identity itself assesses a person’s own innate sense of being male, female, both or neither. Sometimes “transgender” or other trans-specific labels are offered as identity options. Based on our analysis of Trans PULSE data collected in Ontario, while most trans people had either a male/masculine or female/feminine identity, about 1 in 5 identified in some way as both, neither, or gender fluid (Coleman, Bauer, Scanlon, Travers, & Kaay, 2011). While most were aware at a young age that their gender did not match their body, only about half had socially transitioned to live full-time in their felt gender and another 30% did so part-time. Trans Ontarians were also split nearly equally into four groups: those who had completed a medical transition, those in process, those who were planning, and those who either were not planning to medically transition or for whom the concept was irrelevant. Completing a medical transition did not refer to any particular combination of hormones and surgeries, but rather to what each person required. Thus, despite the fact that gender identity does not match birth sex, one may live for many years without making changes to day-to-day lived gender, hormones or anatomy. Changes in each of these can each occur independently at different times across a lifetime. Simply knowing that a survey participant is trans will rarely provide information needed to analyze factors impacting their health.

**THOUGHTFUL INCLUSION OF
TRANS PARTICIPANTS** PROVIDES

INFORMATION NEEDED FOR MORE SPECIFIC ANALYSIS OF
SEX AND GENDER FOR CISGENDER PARTICIPANTS AS WELL.



In reflecting on the above, I have developed a framework (Table 8-1) to break down key dimensions of sex, gender and transsexualism/transgenderism to assist other researchers in identifying and developing measures appropriate to their research.

TABLE 8-1 Dimensions of Sex and Gender

Transsexualism / transgenderism	Sex	Gender
Falls under trans umbrella (gender identity ≠ birth sex)	Chromosomal sex	Gender identity / felt gender
Trans identity ^{*,**}	Sex assigned at birth	Lived gender [*]
	Hormonal milieu ^{**}	Conventional masculinity or femininity ^{*,**}
	Genital and reproductive organs ^{**}	
	Secondary sex characteristics ^{**}	

Note.

* May change over time with social transition

** May change over time with medical transition

Dimensions to be captured will depend on the theory underlying the research question. For example, a study of long-term cancer risks would require information on endogenous and exogenous hormonal exposure as well as anatomical sex. A study involving gendered social roles would require knowing in which gender one lived their day-to-day life and perhaps measures of conventional masculinity and femininity. As many analyses include a breakdown by sex or gender, complexity needs to be captured in data intended for multiple uses.

Example series of items from a cohort study

Below I present questions I designed for the Ontario Health Study (Canadian Partnership for Tomorrow Project, Questionnaire Team, 2010) that were added to the baseline survey in 2011. This example is not prescriptive, but rather a descriptive starting point for those designing questions for thoughtful inclusion of trans participants in health research. The questions are designed to be simple, capture necessary information, and be worded in a way that will stand the test of time with regard to changes in personal identities and community politics. As this study will generate a large data set, following participants over time to assess their long-term risks for cancers and other relatively rare outcomes, it was important to capture multiple dimensions of sex and gender related to disease risk and the need for screening, though not all dimensions were needed.

I used a single question for participants to indicate trans status. While this has not undergone cognitive testing, I designed it to: (1) be simple and short; (2) acknowledge some diversity among trans people, including that some do not identify as transgender or transsexual, but as having a particular medical history; and (3) not confuse cisgender participants.

1. **Do you consider yourself to be trans (transgender, transsexual, or a person with a history of transitioning sex)?**
 - a. Yes
 - b. No
 - c. Don't know

This question serves as a screener for a skip pattern, and thus was the only question asked of cisgender participants. The remaining items are asked only of participants who checked “Yes” or “Don't know.”

2. **What was your assigned sex at birth?**
 - a. Male
 - b. Female
 - c. Undetermined

3. What is your felt gender? (Alternate: What gender do you know or feel yourself to be?)
- Male or primarily masculine
 - Female or primarily feminine
 - Both male and female
 - Neither male nor female
 - Don't know
4. What gender do you currently live as in your day-to-day life?
- Male
 - Female
 - Sometimes male, sometimes female
 - Third gender, or something other than male or female
5. Have you undertaken any of the following to medically transition sex? (Check all that apply)
- Hormone therapy
 - Hair removal (electrolysis or laser)
 - Mastectomy or chest reconstruction (an operation to remove breasts or construct a male chest)
 - Breast augmentation (an operation to make breasts larger using implants)
 - Hysterectomy (an operation to remove the uterus)
 - Oophorectomy (an operation to remove the ovaries)
 - Metoidioplasty (an operation to free the clitoris)
 - Phalloplasty (an operation to construct a penis)
 - Orchiectomy (an operation to remove the testicles)
 - Vaginoplasty (an operation to construct a vagina)
 - None of the above

Note too that option a in item 5 serves as a flag for later questions on current medications. In the absence of such a section, questions on specific hormonal regimens would need to be included.

THE **LACK OF ESTABLISHED MEASURES
FOR TRANS PARTICIPANTS DOES NOT
PRECLUDE** THE DESIGN OF SIMPLE QUESTIONS TO

CAPTURE KEY DIMENSIONS OF SEX AND GENDER, THOUGH FUTURE
RESEARCH EVALUATING THESE MEASURES IS STILL NEEDED.



Additional considerations in developing measures:
temporality and language

In a prospective cohort study with repeated measures over a long time period, questions can be asked for current or recent (e.g., past-year) status, as changes will be captured over the course of data collection. In cross-sectional or retrospective studies, it may be necessary to also collect dates in order to determine whether health-related outcomes occurred before or after changes in lived gender, hormonal milieu or anatomical sex.

The framework I have developed for sex and gender dimensions may be adapted across languages, though as trans identities and conceptualizations of gender vary with linguistic tradition, direct translation of survey items is not ideal. Researchers will need to do background research to understand trans people's conceptualizations of themselves within their linguistic culture.

Moving forward

I present these considerations as a starting point for conceptualizing sex and gender in ways that allow for meaningful inclusion of trans participants in survey research. Capturing multiple dimensions within the Ontario Health Study will allow for accurate assessment of risk and screening for particular cancers and other conditions based on anatomy, as well as assessments of the effects of hormones and lived gender. While in the future we may be able to ask one set of detailed sex and gender questions of all survey participants, current evidence suggests that cisgender people often conflate

sex and gender as they experience an easy confluence and assumed concordance (Conron et al., 2008). Nevertheless, the framework presented has the potential to improve research on cisgender participants by challenging assumptions that male and female categories capture specific information on hormones and anatomy, which while often true for cisgender participants, is not always the case.

QUESTIONS TO CONSIDER

- ① Which dimensions of sex or gender are important to the theory underlying your research? Consider this for cisgender participants as well as trans participants.
- ② How will trans and cisgender participants be grouped in your analysis? If you wish to analyze trans participants separately, will you have adequate sample sizes?
- ③ Beyond identifying trans participants and characterizing sex and gender in meaningful ways, are there other areas of your study that negate the possibility of trans experience or of having trans family members or partners? Are survey skip pattern designs created for men or women suitable for trans men or women?

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PART III

**TRANSLATING RESEARCH
INTO ACTION**

9 Diffusion of environmental health information: the role of sex- and gender-differentiated pathways

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This chapter presents what we regard as critically important aspects of incorporating sex and gender into environmental health research and interventions. The ideas presented here are based on our research on the diffusion of new knowledge and practices regarding health problems associated with environmental contaminants in Latin America. Our research adopts an ecosystem approach to health. Regarded as a milestone in public health in Canada (Webb et al., 2010), this approach has emerged over the past few years in response to the complexity of the numerous problems in which health and the environment are intertwined. Gender equity is one of the pillars of this approach, which calls for the incorporation of sex and gender into research and interventions. We use the expression sex/gender to refer to both the biological and social differences between men and

women, given the difficulty in distinguishing between these differences (Messing, 2007).

In our research we have tried to better understand the role of sex/gender in the diffusion of information and the adoption of practices that promote health. Two of our studies are particularly interesting in this regard: one on the adoption of new dietary practices to reduce exposure to mercury in the Brazilian Amazon (Mertens, Saint-Charles, Mergler, Passos, & Lucotte, 2005), and the other on the adoption of behaviours to help reduce exposure to pesticides among farmers and their families in Costa Rica (Rioux-Pelletier, Saint-Charles, Barraza, & van Wendel de Joode, 2009). We used mixed methods in both studies that included social networks analysis and content analysis from interviews and discussion groups.

Men talk about sports . . . Women talk about clothes . . .

Men talk about sports, and women talk about clothes—or at least, that is a common stereotype reflecting the idea that men and women have diverging interests (Bischoping, 1993). In fact, it is common to regard subjects discussed with one's own sex/gender as important and those discussed by another sex/gender as trivial (Bischoping, 1993; Alder & Proctor, 2011).

Our research led us to a conclusion consistent with these observations: In any given social context, women and men are, indeed, most concerned with those interests and areas of expertise that are commonly regarded as specific to their sex/gender. This phenomenon has influenced the diffusion and adoption of new health practices. We found that individuals might not feel very concerned, as women or as men, by certain subjects involving the interests and areas of expertise associated with the other sex/gender. Given this finding, we attempted to answer three questions as follows.

How do sex and gender affect the diffusion of health information?

Individuals establish and develop their relationships on the basis of perceived similarities (homophily) (Rogers, 2003), which may be expressed through various characteristics, such as age, ethnicity, sex/gender or similar values and behaviours (McPherson, Smith-Lovin, & Cook, 2001). Regarding the

diffusion of practices that promote better health, the behaviours of men and women can therefore be expected to be more strongly influenced by members of their own sex/gender. Moreover, actual and perceived divergences associated with sex/gender strengthen the tendency to prefer same-sex/gender discussion partners, thus creating differentiated diffusion pathways.

By distinguishing sex/gender in our analysis of relationship structures, we observed that discussions about the issues we were examining occurred mainly between members of the same sex/gender. We were therefore in the presence of two different diffusion networks, differentiated by sex/gender. Consequently, any intervention that does not recognize these differentiated diffusion pathways might inadvertently concentrate information within networks based on similarity. The extent to which access to information is limited to one sex/gender reduces the likelihood of reaching the entire community. Thus, failure to account for the differences in diffusion pathways according to sex/gender might increase distances and inequities between men and women, particularly with regards to health.

TO PROMOTE EQUITY

IN THE DIFFUSION OF HEALTH
INNOVATIONS IT IS IMPERATIVE TO
CONSIDER SEX/GENDER-DISTINCT
DIFFUSION PATHWAYS.




How do sex and gender affect the adoption of new practices that promote health?

One of the primary objectives of research and interventions based on an ecosystem approach to health is to reduce health risks. The methods used to achieve this objective often include the promotion and adoption of new practices by members of the communities concerned. The adoption of a new practice is a complex process that takes time and that is affected by the structure of the community's social networks, the characteristics of these new practices and the characteristics of the individuals concerned (Rogers, 2003; Kincaid, 2000; Valente, 2010).

When we examined the sex/gender-differentiated networks in our study communities, we found that men and women could have different opinion

IT IS IMPORTANT TO ACCOUNT FOR THE DIFFERENCES IN INTERESTS AND EXPERTISE THAT ARE ATTRIBUTED TO MEN AND WOMEN **IN A GIVEN SOCIAL CONTEXT.**



leaders. Opinion leaders are people who can reach and influence a greater number of people within a relational network (Valente, 2010). As a result, we observed that because of the perceived interests and expertise of women and men in a given subject area, the opinion leaders in the global network might be men in some cases and women in others. In our research in the Brazilian Amazon, we found that because of women's significant involvement in issues of health and diet they tended to play a central role in the discussion network on a community-wide scale and tended thereby to favourably influence the introduction of new practices in this domain. Meanwhile, some of the men, who opposed the new practices, were opinion leaders in the men's network—a phenomenon that impeded the diffusion of the new practices in men's networks. We observed a similar phenomenon in Costa Rica, but with the opposite pattern. Because the issue of pesticides is of greater concern to men, the diffusion network was less effective in reaching women. Women therefore had more limited access to information about pesticides and little tendency to adopt protective behaviours. Lastly, in the Amazon, we found that in terms of promoting health practices, those women who adopted new practices acted as intermediaries by linking the men's and women's networks, through their spousal relationships.

In short, any failure to consider the differing information diffusion networks—in this case shaped by sex/gender roles in the community—with regard to the subject of a study or intervention may cause problems in diffusing new practices and may obstruct the flow of information within the community.

How do spousal relationships affect the diffusion and adoption of health practices?

Since the heterosexual couple relationship served as an important link between the women's and men's networks in the communities we worked with, we also examined intra-relationship interactions. In the Amazon, we

observed that men who regarded their spouses as discussion partners were more likely to adopt new health practices. In Costa Rica, the importance of the spousal relationship in the diffusion pathway was revealed by the impact of its absence. In the Costa Rican study, both women and men rarely perceived their spouses as partners in the discussion on pesticides and the health risks that they pose, even though the protective behaviours adopted by any individual are likely to affect his or her household as well. Thus, most people participating in our research did not know whether their partners had adopted any protective behaviours or what protective behaviours they had adopted. The lack of discussion between spouses about the problems posed by pesticides worked against the diffusion of new health practices.

To sum up, even if diffusion pathways develop preferentially through relationships among people of the same sex/gender, interactions between men and women are essential for the diffusion of new health practices. We therefore believe it important to consider sex/gender in planning any research or intervention, inasmuch as discussions between men and women contribute to expanding the pool of knowledge for all and, in the case concerned here, to the adoption of healthier behaviours.

Conclusion: lessons learned

We believe that the lessons we have learned about considering sex/gender in our research can be helpful for other studies on the diffusion of innovations in the fields of health and the environment.

By applying an approach that included network analysis, we concluded that diffusion pathways are distinct according to sex/gender. To promote equity in the diffusion of health innovations, we hope that this lesson will encourage health actors to consider the diversity of the structures of relations between men and women. It will also be important to consider other potential pathways differentiated according to other aspects of identity, such as age, ethnicity and occupation, and how these intersect with sex/gender pathways.

Environmental health issues affect many aspects of people's lives. For example, the problem of mercury contamination in the Amazon affects not only human health and diet, but also fishing and agriculture. Integrating sex/

gender provided an additional perspective on the complex interplay among health and environmental issues, by underscoring the role of various opinion leaders and of communication patterns between men and women. In particular, the concept of differentiated diffusion pathways convinced us of the importance of taking into account sex/gender as a structuring factor in diffusion and health research. Our research also taught us the importance of considering the differences in interests and expertise that are attributed to women and men in a given social context. When examining sex/gender, we wish to stress the need to explore knowledge diffusion networks within specific social contexts without a preconceived notion of what is (stereo) typically feminine or masculine. The differentiated diffusion pathways for men and women also point to the importance of identifying places where sharing can take place. Places where men's and women's discussion networks can connect are essential for the diffusion of health and environmental knowledge and practices. We illustrate these lessons learned in Figure 9-1.

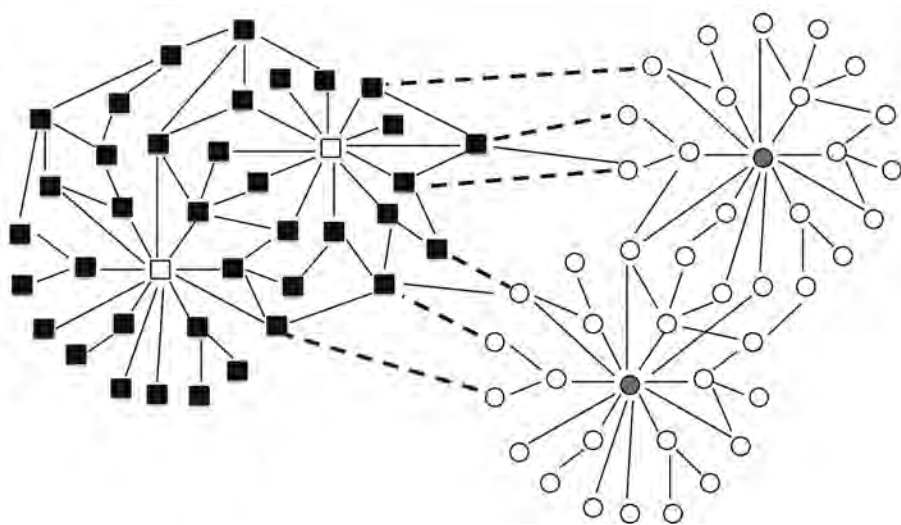


FIGURE 9-1 Network model of sexed/gendered knowledge diffusion pathways. Men (square) and women (circle) form densely connected subgroups, concentrating information in networks of similarity. Opinion leaders are men (blank square) and women (grey circle) with large numbers of connections and constitute same-sex/gender sources of information. The connections between the men's and women's discussion networks—the majority of which are formed by conjugal links (dotted line)—illustrate the importance of sex and gender relations for the diffusion of health and environmental knowledge and practices.

In research or interventions aimed at the adoption of healthier behaviours, integrating sex/gender-related issues makes it possible to better identify persons who could encourage diffusion and influence the pace of diffusion as well as the inclusion of certain groups or individuals. Moreover, considering sex/gender also leads us to examine whose interest is most readily elicited according to how the subject of the research or intervention is formulated and presented to members of the community.

In addition, our research raises ethical reflections on the impact of interventions that are likely to reinforce or modify existing relationship structures between men and women. Indeed, since diffusion pathways are different for men and women and sharing of knowledge among women and men seems to contribute to the adoption of healthier behaviours, two strategies for initiating a process of diffusing new knowledge or practices can be envisaged. The first would be to build on the structure of the network already in place, by working to follow and therefore reinforce different diffusion pathways for men and for women. The second would be to encourage men and women to discuss health problems and issues together, especially within the context of the spousal relationship.

THE ***LINKS BETWEEN WOMEN'S AND MEN'S***

DISCUSSION NETWORKS APPEAR TO BE ESSENTIAL FOR THE DIFFUSION OF HEALTH AND ENVIRONMENTAL KNOWLEDGE AND PRACTICES, IN PARTICULAR WITHIN SPOUSAL RELATIONSHIPS.



QUESTIONS TO CONSIDER

- ① How do sex and gender affect the diffusion of health information?
- ② How do sex and gender affect the adoption of new practices that promote health?
- ③ How do couple or spousal relationships affect the diffusion and adoption of health practices?

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10 Reflections on gender relations in an Indigenous female adolescents' sexual health literacy program

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In this chapter we focus our reflections on “one layer of gender” (Johnson, Greaves, & Repta, 2009)—gender relations—as it applied to a community-based sexual health literacy program that we designed for Indigenous Canadian female students. The participants were adolescents—a group too often characterized as dysfunctional, with issues “leading to low educational attainment” (Vasudevan & Campano, 2009, p. 316), despite much evidence to the contrary that celebrates their abilities to learn. In conducting our program we maintained awareness of how *intersectionality*—that is, the “interaction of dimensions of inequality—such as gender, class, race or sexuality” (Winker & Degele, 2011, p. 51)—affected the young people we worked with. Not only were we contending with gender issues faced by young women, especially in their relationships with their boyfriends, but also the discrimination they encounter as Indigenous people.

BUILDING RELATIONSHIPS REQUIRES CULTURAL AND GENDER
SENSITIVITY BY EDUCATORS AND RESEARCHERS. ESTABLISHING
RELATIONSHIPS **BUILT ON MUTUAL RESPECT**
CAN SUPPORT EFFECTIVE KNOWLEDGE TRANSLATION.



Locating gender and culture in our study

Adolescents have multiple literacies within their social worlds. We understood that multiple literacies—not only reading and writing but also oral, visual and multimedia communication—are social practices requiring identity work (Vetter, 2010). These young women wanted information about sexual health literacy practices, such as ways to communicate effectively with peers, including those with whom they had intimate relationships. With this in mind, we attempted to situate the educational program to be relevant to the young women’s own life experiences. We defined health literacy as “the ability to access, understand, evaluate and communicate information as a way to promote, maintain and improve health in a variety of settings across the life-course” (Rootman & Gordon-El-Bihbety, 2008, p. 3).

The ten participants were Indigenous young women between the ages of 14 and 16 attending a rural secondary, community-based school that was operated by the local Indigenous band school board. The school was the focal point for many of the community’s activities. Members of the local community, especially women, were often involved in delivering aspects of school programs and ours was no exception.

In developing our program we acknowledged that traditional Indigenous teachings have been shown to help shape young Indigenous women’s positive self-image and identity and that gender is “an interactional and structural reality that transcends the individual while at the same time shap[es] personal identity” (White, 2007, p. 12). We therefore invited two women, a local Elder and an Indigenous mentor (a teaching assistant at the school) to help develop and deliver the curriculum and help us to learn about the local Indigenous culture and literacy practices. Through their participation we became aware of the power of these women as cultural leaders. These women’s gender-sensitive practices included the traditions of storytelling, working in groups, and relying on each other.

The Elder was especially instrumental in identifying the need for the sexual health education program to be conducted in the community:

It's very useful because we need to keep educating our kids and our relationships. Actually with the [dating] relationships—they see nothing wrong with them, even if they're bad, because it's so normal for them to be seeing [bad relationships] in the community and we want to teach them that [these are] not normal, it is wrong, that [a healthy relationship] is better for them. And that's what we hope to accomplish through this whole thing, right?

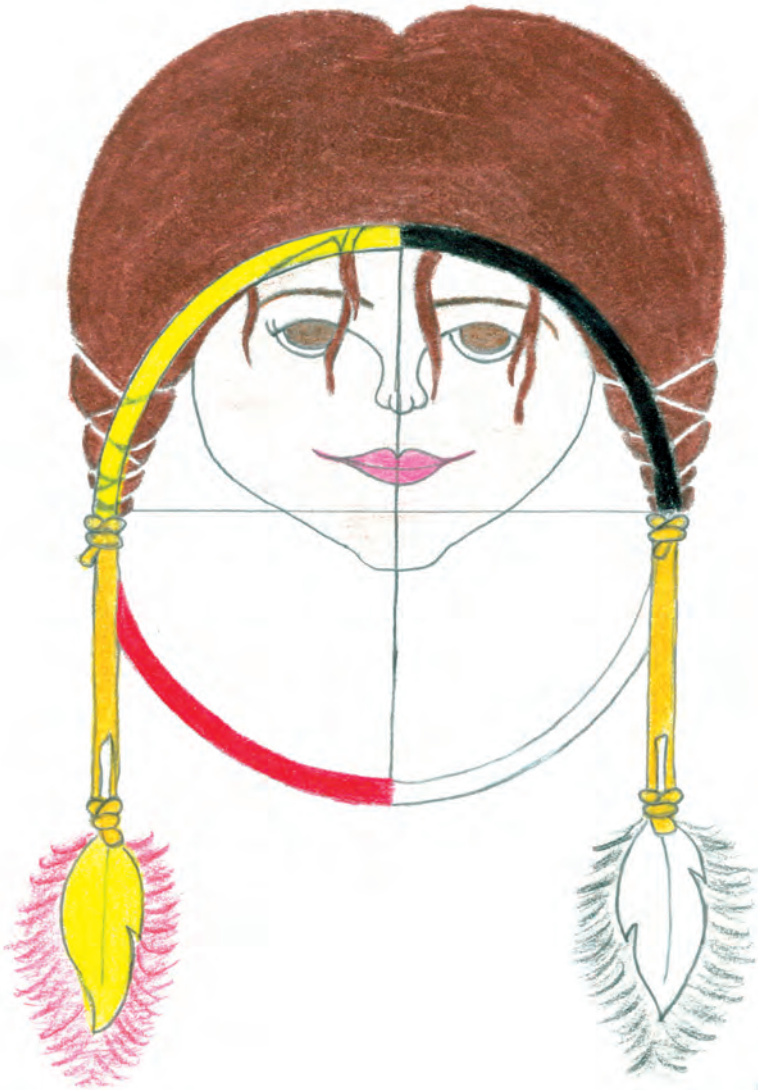
In addition to our position as researchers, we took on roles as teachers and educators. We delivered the curriculum side by side with the Elder and mentor weekly over a 16-week period in 90-minute group sessions during school hours. This sexual health curriculum included information, skill building and social action. We focused some of our teaching on gender roles and how they influence young women's identities. Traditional gender roles were at play in this community; while the young women had a model in the Elder and mentor, each of these women was struggling to be heard in a male dominated band (see below for the Elder's use of the term, *wild woman*).

Gendering a health literacy program for female adolescents

Our approach to gender-sensitive and culturally appropriate sexual health literacy practices was rooted in these young women's unique cultural and relational context. In tailoring our approach, we adopted three main strategies.

1. Establish relationships built on trust and mutual respect.

Relationship building requires cultural and gender sensitivity. Our use of a group format was congruent with the ways women understand, communicate and construct meaning and with Indigenous ways of knowing, particularly what Couture (1991) calls "mind-in-relational activity." In using a group format we were cognizant that female adolescents' same-sex peer relationships are ideally characterized by self-disclosure, caring and validation and that these gender-specific qualities would contribute to the development of mutual respect and trust in the group.



Authentic Voice by artist Violet Sampson. Artwork commissioned by researchers.

Bringing women such as the Elder, mentor, but also ourselves (the university researchers and teachers) into positive interactions with the young women helped create respectful, trusting, empowering relationships that were fundamental to their identity development and sexual health literacy enhancement. To help support the young women's self-confidence we needed to create opportunities for them to express their agency through their active involvement in learning. For example, a learning environment with an atmosphere of acceptance facilitated the young women's oral literacies such as the ability to speak within the group while being able to comfortably and directly express themselves. They also wrote in private journals, drew and created visual depictions of their understandings. The development of outlets for these Indigenous young women's voices using a variety of literacies was crucial to their learning.

2. Share power.

Non-hierarchical ways of engaging with female adolescents can help establish respect for their gender, for their developmental stage and for their Indigenous culture. Moje and MuQaribu (2003) acknowledge that just asking students to participate is not enough to ensure that ideas will be shared if “. . .the experiences that students have are not valued—or worse, are considered problematic” (p. 208). Issues of power are always present when those with less power speak in groups with those having more relative power according to a particular hegemony. Foucault (1972) said, “We know perfectly well that we are not free to say just anything, that we cannot simply speak of anything, when we like or where we like” (p. 216, as cited in Moje & MuQaribu, 2003, p. 204). The female adolescents in our study expressed the desire to exercise their power to make individual contributions to group projects, especially those in which they contributed positively to their home community.

SHARING POWER. NON-HIERARCHICAL WAYS OF ENGAGING WITH FEMALE ADOLESCENTS CAN HELP ESTABLISH RESPECT FOR THEIR GENDER, FOR THEIR DEVELOPMENTAL STAGE AND FOR THEIR INDIGENOUS CULTURE.



As is customary in this particular Indigenous community, conversations followed the method of circling. In the discussion circle, an eagle feather was passed from hand to hand to denote the speaker. Speaking and listening was a deeply rooted cultural practice for conveying mutual respect. Incorporating this practice in our teaching offered each person in the group a chance to speak, thus allowing the opportunity for each to have her say. Such feminist circling practices can help flatten relational power hierarchies.

The Elder modeled her sense of agency and power as a female leader through storytelling, listening and orally sharing ways to take positive action. For example, she told the story of holding a small handmade doll—or *wild woman* symbol—in band council meetings to give her confidence to speak in her role as the first woman appointed to the council.

3. Make transparent the available discourses about gender relations.

The young women in our project were especially interested in their peer relationships, both with each other and also in terms of their heterosexual dating practices. Lewis and Fabos (2005) remind us that reformulating gendered social relationships exists “within a set of available discourses about gendered identities and relationships, the kind of discourses, for instance, that position girls as communicative and relational and boys as oblivious, impenetrable, or resistant” (p. 489). In order to identify discourses at play for the young women in this project, we offered them opportunities to name discourses about gendered identity. For example, we involved them in a critical analysis of stereotyping in media images of male and female adolescents and discussed how these depictions may influence the day-to-day gender roles of teens. They noted the stereotypical gender roles (such as passive young women and active young men) and the predominance of Caucasian faces in the images.

One young woman spoke of how gender expectations shape female adolescents’ identity:

Like when a girl likes to play football or something and she’s scared of what people will think about her. ‘Cause it’s not the stereotype . . . like most people would expect girls to do whatever, like to clean up and stuff like that but that’s just the stereotype.

TRANSPARENT CAN HELP TO **FACILITATE PROCESSES OF KNOWLEDGE TRANSLATION.**

.....

Another young woman spoke of double standards for female and male adolescents regarding their roles in intimate heterosexual relationships:

So that's one thing that just confuses me in a relationship—how a guy can still look around at all those girls and stuff like that. That's one thing that really gets to me. And then they get all toughed about it and stuff like that.

We had more to learn from the Elder. After witnessing what she viewed as the success of the program, particularly in terms of facilitating young women's oral literacies, the Elder affirmed the need for more gender work, for example, to design a young men's group that would be sensitive to male adolescent gendered needs in learning about sexual health. She said, "[We need] to share this information with the boys. The boys need to learn that they are part of the relationship issues and hopefully can change some of those behaviours when they see it and hear this." Indeed, upon returning to the community the following year to deliver the program to another group of young women we observed steps taken to affirm the Elder's view. The community had established a young men's talking group led by a male school counsellor and male Elder that met weekly throughout the school term. According to the Elder, the group provided space for young men to more openly share personal experiences and reconfigure traditionally held gender relations (cf. Creighton & Oliffe, 2010) among themselves and with adults in the group.

Conclusion

Knowledge about sexual health is contextual and relational and informed by multiple ways of knowing (Swartz, 2009). We engaged these young women in a teaching and learning context which created space for them to build relationships with each other and with others in the community. We learned that as sexual health literacy educators our gendered teaching approaches and relational way of working with Indigenous female adolescents was critical to supporting young women's sexual health literacy learning.

QUESTIONS TO CONSIDER

- ① How can sexual health curricula be tailored by gender to help adolescents have healthy relationships?
- ② How can learning environments strengthen interconnections across genders and generations in a community?
- ③ How can sexual health educators create equitable sexual health learning contexts in which adolescents' individual, gendered and cultural realities are acknowledged?

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11 Changing health systems with a sex and gender lens

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Drawing on our experience with a multicountry research project comparing national health policies and general and mental health outcomes, we demonstrate how incorporating sex and gender into health system research can profoundly change health system policies and strategies. We define health systems research as an area that addresses questions pertaining to issues in the process or operation of a health system as a whole and includes broad questions on health system governance, financing, utilization, service delivery, referral and quality of care (Arah, Klazinga, Delnoij, Ten Asbroek, & Custers, 2003; Remme et al., 2010). Interventions aimed at improving health systems performance have the potential for wide-ranging impacts because they enhance the efficiency and effectiveness of health services for populations or communities.

Applying a sex and gender lens to health systems research allows us to identify knowledge gaps and evaluate gender inequities in health. In turn, this information can be used to create or revise policies and health system strategies to make them more gender-sensitive, with the goal of improving

health system performance and quality of care for a population. This lens is particularly vital in low and middle income country settings where societal norms regarding gender roles often result in differences that disadvantage women and girls; they experience lower wages, smaller representation in formal employment, increased care-giving burden, increased exposure to violence and greater poverty compared to men and boys. As a result, women and girls are less likely to seek out or access health care services, have fewer services available to them and have more physical and mental illnesses compared to men and boys (Sen & Ostlin, 2008).

IT IS FEASIBLE TO EVALUATE NATIONAL HEALTH SYSTEM PERFORMANCE FROM A SEX- AND GENDER-BASED PERSPECTIVE, BUT WE MAY BE RESTRICTED TO MEASURING SEX RATHER THAN GENDER DUE TO **DATA LIMITATIONS.**



Our project, Gender-sensitive Health Indicators (GeSHI), aimed to measure gender equity in general health, mental health and health policies at a national level in low, middle and high income countries in the Americas: Peru, Colombia and Canada, respectively. Although previous reports and studies examined gender inequities in health systems at smaller operational levels,

such as a hospital or clinic, this study was the first to examine gender and sex inequities in low or middle income country health systems. Our international research team was composed of investigators from a variety of fields (e.g., psychiatrists, psychologists, epidemiologists, statisticians and government policy makers) from all three countries. Our team obtained data from the three countries for this pilot project and focused on the measurement of gender equity in general, in mental health status and in health policies.

We initially aimed for a broad definition of gender that included socially constructed roles, values and expectations beyond the typical binary terms (e.g., feminine or masculine). However, we performed an environmental scan of reports on national health system performance in low and middle income countries that showed that health performance was rarely measured by gender, and a non-binary definition of gender was virtually absent due to data limitations. Therefore, we decided to focus on *sex* and the societal constructs that make up binary gender roles as a first priority. We decided

to define gender equity as men and women experiencing equal health service accessibility and availability according to their particular health needs. In other words, no avoidable or unjust differences exist between the sexes. Therefore, we harmonized data between countries so that we could obtain similar measures and analyzed according to sex and other factors.

Through this study we learned that the process of generating and communicating knowledge on gender inequities is essential to improving health systems. Our project began by designing and implementing a project that could generate new knowledge and highlight knowledge gaps on gender inequities in health in all three countries. Once we had results, we worked collaboratively to develop the key messages from this research that would be communicated to stakeholders in all three countries. The process of developing and communicating our results eventually led to uptake of knowledge and stimulated change.

Doing health systems research differently with sex and gender

Incorporating a sex and gender lens into health system research changes the process by which we conduct research. We initially believed that the reasons for evaluating gender equity in health would be intuitive to the Peruvian, Colombian and Canadian investigators involved in planning the research project; however, this assumption became our biggest challenge. In the planning stages of the research, the Canadian investigators (including us) presumed that our Colombian and Peruvian colleagues were in complete agreement with the project. Based on their input and comments during the application for funding, we thought they were already convinced of the need to examine gender equity in health systems. It was only at our first face-to-face meeting held in Colombia that we realized the extent of differences in perspectives among investigators.

Some of our male and female colleagues in Peru and Colombia had different views when it came to gender equity and to applying sex- and gender-based analysis. Indicators that we considered imperative were deemed by some of our Colombian and Peruvian counterparts to be low priority. These differences in understanding surfaced throughout the project, particularly since partnerships and contacts changed more frequently in Peru and Colombia

KNOWLEDGE TRANSLATION OF SEX- AND GENDER-BASED
RESEARCH IN GLOBAL HEALTH SHOULD BUILD CONSENSUS
AND **BE INCLUSIVE OF DIFFERENT
PERSPECTIVES AND VIEWS.**



compared to Canada. We had to continually develop relationships from scratch and establish new common understandings. We overcame these challenges by building skills and knowledge about gender equity in health systems with each new contact. We also initiated a standardized decision-making process for the selection and interpretation of gender equity indicators that utilized input from all investigators. Each investigator critically reviewed each indicator and the reason for its inclusion; then we independently ranked the indicators and the top 50% were discussed until consensus was reached.

Through this collaborative work, a local sex and gender mindset began to take shape in our partner research groups. During the course of the research, three 3-day meetings were organized for all research personnel involved in the project. These meetings strengthened local knowledge and skills in gender equity research by providing data analysts, coordinators, epidemiologists, psychologists and psychiatrists with seminars on: (1) the importance of evaluating gender equity in health system performance; (2) the process of selecting indicators for measurement of gender equity; (3) gender- and sex-based analysis; and (4) knowledge translation for gender equity in health. It became clear to us that the local research capacity to evaluate gender equity had been strengthened when several of our Colombian and Peruvian team members later initiated related activities outside of the project.

Advancing health systems knowledge with sex and gender

Using a sex and gender lens in health systems research can generate new knowledge on gender inequities in health systems and highlight knowledge gaps, as exemplified through our GeSHI project. In evaluating the gender sensitivity of national health policies our research team found that eight out of ten gender-sensitive health policies were addressed in all countries (Stewart et al., 2009), as shown in Table 11-1. As a result, we saw an opportunity to raise awareness regarding the lack of gender-sensitive health policies in paternal leave laws in Peru and gender-sensitive media regulations in Colombia.

TABLE 11-1 Examining the Existence of Gender-Sensitive Health Policies in a Low, Middle and High Income Country

Policy indicator “Existence of . . .”	Low income Peru	Middle income Colombia	High income Canada
1. Maternity leave laws	Yes	Yes	Yes
2. Paternal leave laws	No	Yes (Partial)	Yes
3. Laws on sexual and reproductive rights	Yes	Yes	Yes
4. Regulations to allow family planning upon request and 5. Policies that consider family planning a right	Yes	Yes	Yes
6. Regulations for voluntary interruption of pregnancy for therapeutic reasons, rape or incest	Yes (Partial)	Yes (Partial)	Yes
7. Publicly available emergency contraceptives	Yes (Partial)	Yes (Partial)	Yes
8. Policies supporting equal opportunities and/or gender equity	Yes	Yes	Yes
9. Media regulations to avoid sex discrimination and promote gender equality	Yes	No	Yes
10. Laws that consider attention to and prevention and eradication of intra-family violence and sexual abuse against women	Yes	Yes	Yes

Note. Adapted from “Examining gender equity in health policies in a low- (Peru), middle- (Colombia), and high- (Canada) income country in the Americas,” by D. E. Stewart, L. Dorado, N. Diaz-Granados, M. Rondon, J. Saavedra, J. Posada-Villa, and Y. Torres, 2009, *Journal of Public Health Policy*, 30(4), pp. 444–447. Copyright 2009 by Palgrave Macmillan. Adapted with permission.

HEALTH RESEARCH THAT INTEGRATES

GENDER AND SEX CAN INCITE

**MAJOR STRUCTURAL
CHANGES** AT THE HEALTH

SYSTEMS LEVEL WHEN INNOVATIVE

KNOWLEDGE TRANSLATION

STRATEGIES ARE EMPLOYED.



the comparable indicators: the largest between-country difference was maternal mortality (highest in Peru) and the largest gender inequity was mortality from homicides (Colombia) (Diaz-Granados, Pitzul, et al., 2011).

Similarly, our project pinpointed knowledge gaps in gender inequities as related to mental health systems. We selected 22 mental health indicators, but could only feasibly measure 7 in all countries and successfully compare one of the indicators between countries. The comparable indicator (suicide attempts) showed similar gender inequities in Peru and Canada, but showed equity in Colombia, which was unexpected (Diaz-Granados, Wang, et al., 2011). Our project demonstrated that existing data are inadequate for evaluating gender inequities and limit cross-national comparisons in mental health.

Our project also highlighted knowledge gaps in the gender-sensitivity of general health systems. Although we selected 17 general health indicators, only 12 could be feasibly measured by sex and gender in each country, and 9 of these were comparable between all three countries. With the results from this part of the study we advanced the field by highlighting key findings from

Changing health systems with sex and gender

By evaluating gender inequities in health systems in our GeSHI project we created a unique opportunity to communicate the need for a sex and gender approach in health systems improvement. A vital component of the strategy for communicating our results was the development of our key research messages. Our team collectively developed and selected the key messages to deliver to our stakeholders (e.g., government, policy makers, academics, providers, non-governmental organizations). This process was challenging given our team's different perspectives and priorities regarding gender and sex values and norms. Since we had encountered this challenge before, we implemented a similar decision-making strategy. We included

each investigator's perspective by standardizing the composition, identification and selection of key messages (Reardon, Lavis, & Gibson, 2006). Each investigator was responsible for composing three messages for each part of the study (health policy, general health and mental health). We then pooled these messages and independently ranked them according to importance and actionability. The top five messages were reviewed and determined by consensus.

We communicated these key messages in several ways including: oral presentations at scientific meetings held in each country; media interviews and colloquia held in Peru and Colombia in which members of the media and the public participated; presentations made to government stakeholders including female Congress members in Peru and Colombia; and publishing three academic articles in peer-reviewed journals on each of our substudies (health policies, general health and mental health) (Diaz-Granados, Pitzul, et al., 2011; Diaz-Granados, Wang, et al., 2011; Stewart et al., 2009).

The implementation of our communication strategy raised awareness of the need to include a sex and gender perspective in health systems evaluation. One of our key initiatives was a presentation delivered by our Peruvian team to the Peruvian Congress on the comparison of existing gender-sensitive health policies in all three countries. This presentation highlighted the lack of existing paternal leave and abortion policies in Peru compared to Colombia and Canada. As a result, in 2009, Peruvian policy changed to include paternity leave consisting of 100% paid leave for three to five days. The Peruvian Congress also decided to include more comprehensive abortion laws (i.e., to include women exposed to sexual violence and those carrying fetuses with severe deformities) on the policy agenda.

In Colombia, our team shared results with the Colombian Congress about existing gender inequities in mental health. The Congress later decided to design and develop a national mental health strategy and action plan that included a routine evaluation of gender equity. Our Colombian team also presented our research findings at a Colombian conference focused on women's mental health. The media took interest in this event, and subsequently several female journalists convened a group to develop a report advocating for more respectful media portrayal of women.

Conclusion

Using a sex and gender lens allowed us to develop new knowledge on opportunities for health system improvements by identifying existing gender inequities in health policies and general and mental health status. The GeSHI project showed us how vital it is to foster global collaborations in order to improve gender equity in health. Through our international, multidisciplinary team, we advocated for the inclusion of sex and gender in future health system evaluations and stimulated change in gender-sensitive health policies by presenting cross-national results to local stakeholders.

QUESTIONS TO CONSIDER

- ① How can sex and gender in health systems research change the process in which we conduct this type of research?
- ② How can sex and gender in health systems research make a difference in research outcomes and result in change?

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12 Mobilizing masculinity to support fathers who want to be smoke free

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Our research began with an interest in finding better ways to support pregnant and postpartum women in their efforts to reduce and quit smoking. We focused on social contexts and interactions in domestic settings that influenced women's smoking (Bottorff et al., 2005; Bottorff et al., 2006). By involving women and their heterosexual partners in this research and using gender relations as an analytical lens, we recognized an untapped possibility for supporting women's tobacco reduction.

Our findings indicated that expectant and new fathers often continued to smoke even after their partner had reduced or quit. Men's constructions of their smoking were linked to masculine ideals and identities (e.g., independence and strength), as were rationales for their continued smoking (Bottorff et al., 2006; Oliffe, Bottorff, Johnson, Kelly, & LeBeau, 2010; Oliffe, Bottorff, Kelly, & Halpin, 2008). Many men used smoking to manage work-related stress. This enabled them to delink their smoking from direct fathering while connecting with masculine ideals in catalyzing paid work as the conduit to being a good provider and partner. Female partners affirmed

the linkages between men's smoking and work, and were largely ineffective in influencing men's tobacco reduction and cessation (Bottorff et al., 2010). Yet, as men became new fathers and engaged in direct care of their babies, alignments with previously held masculine norms appeared to shift, and they started to rethink their attitudes toward smoking (Bottorff, Radsma, Kelly, & Oliffe, 2009; Greaves, Oliffe, Ponic, Kelly, & Bottorff, 2010). Aspirations to be good fathers and role models for the children were at odds with smoking, and a renewed interest in quitting smoking followed. Despite this increasing interest, few men were successful in becoming smoke free and they pointed to the lack of targeted resources and support for smoking cessation for new fathers (Bottorff et al., 2009). Based on our understandings of gender and gender relations with men's smoking, we reasoned that a men-centred approach was needed. Smoking cessation at this time of men's lives could significantly aid their health, support women's tobacco reduction efforts during pregnancy and the postpartum period, provide smoke free environments for children and strengthen the overall well-being of their family.

As our team began developing a new approach to support tobacco reduction among new fathers, many questions arose. How could we develop an effective intervention while still respecting linkages between fatherhood, smoking and masculinity? How could we support men to be autonomous decision makers and avoid adding to the stigma and guilt men experienced in relation to smoking? We decided to draw on the expertise of men and other stakeholders to provide us with direction through gender-specific and innovative consultation sessions designed by a knowledge broker, an intermediary who helped to bridge interactions between researchers and users of research (dads who smoked).

A total of ten consultation sessions were conducted in urban and rural locations to share our research findings about fathers and smoking, and to seek counsel from the participants about how best to use this knowledge to support new fathers in their efforts to reduce and quit smoking. We staggered the dates and times of the sessions to allow for "learnings along the way" to be incorporated into the subsequent sessions. Invited participants included community health professionals, new fathers who smoked or quit during their partner's pregnancy or postpartum and new mothers whose male partners smoked.

HEALTH PROMOTION MESSAGES THAT INTEGRATE **MEN'S**
TESTIMONIALS CAN PROVIDE OTHER MEN WITH
PERMISSION AND MASCULINE ROLE MODELS TO CHANGE
LONG-STANDING PRACTICES AROUND SMOKING.



Planning consultation sessions provided an opportunity for us to be innovative in design, content and process. The objective was to design the sessions to promote reciprocal learning and the collaborative, participatory co-production of knowledge. Since jigsaw puzzles are universal, interactive and demand problem-solving abilities, we reasoned they would work as a visual method for sharing research information and prompting discussion. With this in mind, we created jigsaw puzzles by using images that captured key messages from our research findings.

The images depicted in the puzzles were used to prompt interaction whereby participants could make connections and provide commentaries about the images and men's smoking. We also speculated that puzzles would help to establish a stimulating environment and encourage innovative ideas for transitioning the findings toward interventions. The puzzles were used as an introductory warm-up activity to capture the interest of the participants and to engage them with the research findings in a competitive, yet collaborative and enjoyable way. We also used the images as large wall posters to encourage reflection on and discussion about the research findings. We emphasized the position of the participants as experts and insiders in relation to tobacco and tobacco reduction as we explored their direct smoking and cessation experiences to distil effective supports. Participants were encouraged to move beyond their personal experience, to use their expertise to be creative and solution-oriented.

The participants' validation of our qualitative findings increased our confidence in using this knowledge as a foundation to develop targeted intervention resources. Despite disparate backgrounds and ages, the men in our fathers' consultation groups created a sense of camaraderie and connectedness. Fatherhood was consistently highlighted as a life changing event that continued to influence the men's lives. They spoke openly about their young infants and the role they hoped to play in their children's lives. We also observed in these consultation sessions that the men shared many of the same challenges associated with smoking cessation as the men in our earlier

studies. They responded attentively to personal accounts of efforts to reduce or quit smoking shared by other men in the group, were willing to teach each other by providing tips, and indicated they would benefit from peer support. Many participants also expressed disappointment about the lack of programs and specific resources to help fathers reduce or stop smoking.

Based on the knowledge gained in the consultation groups about smoking and fatherhood, and the connections to masculinity and gender relations, we decided to start with a booklet that specifically addressed fathers who smoked. The purpose of the booklet was fourfold: (1) to catalyze shifts in masculine roles associated with fathering by leveraging dissonance with current smoking practices; (2) to engage new dads in thinking about being a dad who was smoke free; (3) to educate new dads about the health effects of second-hand smoke and smoking; and (4) to inspire new dads to reach a “tipping point” for beginning to reduce and quit smoking.

In group discussions, we developed a set of principles to guide the specifics of a men-centred approach in developing a booklet for fathers who smoked. These included:

- using strength-based positive messaging to promote change without amplifying stigma, guilt, shame and blame;
- fostering an emotional connection to positive identity characteristics (e.g., fathering) with being smoke free as a motivational strategy for tobacco reduction and cessation;
- reflecting desires by men to be autonomous and decide their own path to being smoke free, while recognizing that men may make different decisions at different times;
- privileging men’s testimonials to reflect common challenges amid an interest in reducing and stopping smoking and create a sense of peer support;
- presenting information and images in the booklet to promote men’s interaction and engagement with the materials;
- developing a resource that complemented rather than duplicated information provided via other smoking cessation resources; and
- ensuring a masculine look and feel to the booklet.

Guided by these principles and the empirical evidence, we drew on our rich database of men’s narratives to begin to build the booklet. Although the process was challenging and generated many debates about and revisions to the content, we were encouraged by the opportunity to be innovative in the development of this new resource. Given that the dads spoke so passionately and positively about how becoming a father had forever changed their lives, the emotional connection with their baby became an obvious way to begin. We soon realized that using first person accounts and selecting the appropriate images to convey our messages would be key to engaging men in reading and using the information presented in the booklet. Woven through these stories and images is a respect for the honest realities of men’s situations and the challenges they face as new dads.



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In the booklet, we wanted to build on the discord men experienced and articulated about their smoking amid shifting masculine roles. Thus, we included an activity for dads to test their knowledge about smoking facts by responding true and false to statements such as: “The child of a parent

who smokes is twice as likely to smoke as the child of a non-smoker.” The pages following this focus on personal reflection and challenge readers to consider their identity as a dad and what it means to be a *guy who smokes* as opposed to a *dad who smokes and wants to quit*. We drew on data from our interviews to illustrate the way this dissonance played out, being careful to highlight the strength needed to acknowledge and address such issues while avoiding any shame and blame.

We also wanted to reinforce men’s reasons for reducing and stopping smoking drawing on their constructions of the “right reasons.” The inspiration for this section came from one dad’s reference to “adding rocks” to his “pile of reasons” to quit smoking. On this page, alongside an image of a pile of rocks, dads were invited to identify their personal “rocks” from an established list and to contribute additional rocks if they wished. We also included a poignant quote from one of the dads, who said: “Once you have that newborn in your hand, I mean it’s like the world stops. That’s the moment you think about the future, and how much your life has changed. Why not go that extra step?”

We incorporated brief personal stories from dads about their efforts to reduce and quit smoking as a way to present tobacco reduction and cessation options and to support men’s desire to be autonomous decision makers. As well, we included dads’ self-talk to strengthen the sense of peer support in the booklet. Supporting men’s autonomy with respect to reducing and stopping smoking represented a marked departure from commonly accepted smoking cessation approaches (e.g., beginning with advice to set a quit date, and so forth) and prompted team discussions about the information presented in the booklet and the perceived lack of professional advice. This discussion helped us clarify (and recommit to) the primary purpose of the booklet being a motivational resource for dads who smoke and recognize that taking a gendered approach provided us an avenue to try something new. We included information on the back cover about free smoking cessation resources and the choice was left to men about using them.


AS MEN’S **MASCULINE**

IDEALS TRANSITION, THERE IS GREAT POTENTIAL FOR ENGAGING MEN WITH THEIR HEALTH AND THE WELL-BEING OF OTHERS.



We worked collaboratively with an innovative marketing company to develop a masculine look and feel to the booklet. The title and image for the cover was chosen to reflect the masculinities represented in our data. Purposeful in design to support the intent of the booklet, the content and images were arranged to lead toward an emotional conclusion, which would act as a trigger to motivate new dads to take that first step to becoming smoke free. Feedback on the first draft of the booklet by men’s health experts, tobacco control experts and a group of fathers was incorporated into the final version of the booklet, entitled *The Right Time, The Right Reasons* (Olliffe, Bottorff, & Sarbit, 2010).

IMAGES ARE IMPORTANT ANCHORS FOR TEXT-BASED MESSAGES
BECAUSE THEY CAN GARNER MEN’S **EMPATHY AND
ENGAGEMENT** WITH THE STORY THAT IS BEING TOLD.



In conclusion, a focus on masculinities and heterosexual men provided us with new insights to smoking behaviours and important directions for developing a tobacco reduction and cessation resource targeting new fathers. Rather than a “how to quit” guide, the focus of *The Right Time, The Right Reasons* is on encouraging men to consider the advantages to being a dad who does not smoke and putting the decisions about smoking cessation into their hands. The innovative approach to behaviour change reflected in this booklet focuses on mobilizing transitions around masculine ideals to leverage behaviour change when men become fathers.

QUESTIONS TO CONSIDER

- ① What masculine ideals can be mobilized to promote men’s health?
- ② How might work in women’s health and gender relations inform men’s health interventions?

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