Exercising Caution: The Production of Medical Knowledge about Physical Exertion during Pregnancy

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Abstract. In this article I explore the production of medical knowledge about exercise during pregnancy in the latter half of the 20th century, illustrating how debates about the safe limits of maternal exercise were rooted in long-standing anxieties surrounding the female reproductive body as well as epistemological questions concerning what counts as knowledge or evidence in the scientific realm. By drawing to the surface the "rules of formation" for the production of knowledge about the pregnant body, I aim to bring to light the contingent nature of this knowledge—never neutral but always bound up in relations of power.

Keywords. exercise, women, reproduction, risk

Résumé. Dans cet article, j'explore, au cours de la seconde moitié du 20e siècle, la production des connaissances médicales sur l'exercice des femmes pendant leur grossesse. Cela dans le but d'illustrer la façon dont les débats sur les limites de sécurité de l'activité physique maternelle étaient enracinés dans le maintien de vieilles angoisses autour du corps de la femme enceinte ainsi que les questions épistémologiques concernant ce qui compte comme connaissances ou preuves dans le domaine scientifique. En révélant les « règles de formation » applicables à la production de connaissances sur le corps de femmes enceintes, j'ai pour objectif de mettre en lumière la nature contingente de cette connaissance – jamais neutre, toujours liée aux relations de pouvoir.

Mots-clés. exercice, femmes, reproduction, risque

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INTRODUCTION

In November 1968, *Obstetrics and Gynecology* published an editorial by Winnipeg physician Michael Bruser, in which he critiqued the Western medical community's habit of providing vague, cautionary guidelines about appropriate exercise during pregnancy.[1] Such guidelines, asserted Bruser, had little scientific or clinical basis but unquestioningly reiterated long-held notions about the frailty of the pregnant body. The editorial was symptomatic of a fissure or break in the way of thinking about the physical capabilities of the pregnant body that began to occur in the late 1960s and which laid the groundwork for the development of a new area of specialization linked to the fields of exercise science, sports medicine, and obstetrics/gynecology: exercise and pregnancy science. In this paper, I explore the production of knowledge about the active pregnant body within these fields in the latter half of the 20th century, drawing upon a wide range of medical texts and journals as well as popular literature to chart the professional power struggles that emerged as scientists and physicians in North America sought to more clearly define the limits of safe exercise for pregnant women.[2]

Underpinning this article is the premise that medicine and culture are inextricably linked. Medicine—as a central social institution in Western societies since the 19th century—plays a key role in shaping how we understand ourselves, our bodies, the world we live in, and the way we act in it. Conversely, culture shapes medical (and scientific) views and opinions, influencing the questions that are asked, the research that is carried out, and to a certain extent the answers that are "discovered." The pregnant body, in particular, is imprinted by social history. As Hanson reminded us in her book, *A Cultural History of Pregnancy (1750-2000)*, it is a body that is doubly mutable: "It is mutable in the obvious sense that it undergoes continuous physiological (and sometimes pathological) change, and mutable culturally, in that it is viewed through constantly shifting interpretive frameworks."[3] That is to say, while significant physical changes can be observed in the pregnant body over the gestation period, "pregnancy" is also a social construct, differently framed and experienced in different cultural and historical contexts. And indeed, the landscape of prenatal exercise has changed over the 20th century, shaped by shifting social norms and emerging cultural issues.[4] The rise of second wave feminism in the 1960s, the health and fitness boom of the 1970s, and contemporary fears of an "obesity epidemic" are just some of the factors that have influenced understandings of physical activity during pregnancy and the advice provided—or withheld. However, despite changes in the way that we understand the pregnant body, one constant has remained: societal anxiety about the reproductive body and the need to delimit proper physical activity (along with numerous other

lifestyle behaviours) to ensure the health of the mother and, most of all, the fetus. On one level, then, this article is about exercise and pregnancy, but at the root it is about the anxieties and concerns regarding the reproductive female body—especially the pregnant body—that pervade Western society.

To aid in my analysis, I draw upon the work of Michel Foucault who conducted a range of historical studies with the aim of understanding the different ways in our culture that humans develop knowledge about themselves, and how this knowledge has shaped the way that individuals make sense of and act in the world.[5] One strategy used by Foucault as he sought to disrupt systems of power through his historical analyses was to unpick the "rules of formation," those unwritten rules that undergird certain ways of thinking and in turn produce particular forms of knowledge—for example, the detailed tables to assist categorization that were popular in the 18th century or "evidence based medicine" guidelines in the contemporary context, which rank scientific knowledge based on its purported objectivity.[6] Following this strategy, I examined medical documents and texts with an eye towards the procedures, support structures, criteria of evidence, and forms of proof (i.e., the discursive practices) that determined what counts as knowledge/truth at different times, shaping the exercise prescriptions given to pregnant women at particular moments.

Another analytical strategy put forth by Foucault was to conduct a "history of the present" which entails looking for strangeness in all relationships (contingencies) instead of cause-effect patterns.[7] By looking for contingencies we see that there is nothing *necessary* about the relationship between two events; what we might now accept as "truth" could have been different. This allows us to avoid falling into the trap of false progressivism—that is, the modernist notion that scientific knowledge "accumulates in a unilateral fashion and contributes to human advancement."[8] Attention to contingencies reminds us, for instance, that the current exercise and pregnancy guidelines are not necessarily more "objective" (and therefore "better") than those in the late 19th century but remain embedded in power relations. Utilizing these general strategies, I attempt to draw to the surface the "rules of formation" for the production of knowledge about the pregnant body, illuminating the contingent nature of this knowledge—never neutral but always bound up in relations of power.

"WHO SAYS ATHLETES CAN'T BE PREGNANT?" QUESTIONING "ACCEPTED" KNOWLEDGE

From the late 19th century and into the first decades of the 20th, popular medical opinion cautioned pregnant women against the dangers of

overexertion during pregnancy.[9] While gentle physical activity was encouraged in order to help women prepare for childbirth (and fulfill their "biological destiny"), appropriate exercise included easy walking, simple calisthenics, or light housework—and was never to be taken to the extreme. Physicians' exercise advice thus reinforced normative gender roles and (re)inscribed women into the domestic realm—and this advice remained the status quo well into the 20th century. During the late 1950s and into the 1960s, however, cracks began to appear in the discursive field of physical activity and pregnancy as texts published in the newly developing field of sport medicine referred to a number of pregnant women competing in high level athletic competitions, including the Olympic Games.[10] While several of these texts questioned the safety of such behaviours and advised against them (despite acknowledging that no ill effects had been reported), long-held assumptions about the abilities of the pregnant body began to be called into question. One of the most outspoken was the previously cited Canadian physician Michael Bruser who, alongside his critique that existing medical texts said little about sporting activities during pregnancy beyond stressing the need for caution and common sense, pointed to the illogic of texts suggesting that physical activity to any degree of violence is "contraindicated" during pregnancy, yet in the next sentence cites a list of pregnant athletes who competed in the Olympic games—with no adverse effect on the progression of pregnancy or the fetus.[11] Bruser further suggested that it has generally been considered that a large number of conditions (such as abortion, premature labour, abruption placentae and others) may occur spontaneously without physical activity or stress being a major factor in their production, and "unless and until it is proved that any of these conditions occurs as a result of physical activity, it would appear to be an exercise in timidity to disallow such physical activity through fear of such events."[12] The questions being asked by Bruser and some others (primarily Eastern European researchers who surveyed elite female athletes at major athletic events and/or studied their obstetrical records to assess the impact of athletics on pregnancy and childbirth)[13] suggest that after years of thinking about the pregnant body as incapable of more rigorous levels of exertion—especially in the sporting realm—individuals were beginning to question the status quo. The "rules of formation" shaping what was "sayable" about the active pregnant body were shifting and creaking.

Throughout the 1970s, there was a growing sense of permissiveness with regards to appropriate activities for pregnant women on several fronts—within the sports medicine literature, government health promotion texts, and the consumer culture industry. And discourse espousing the benefits of exercise during pregnancy continued to grow in the early 1980s.[14] Fitness guru Jane Fonda created a popular workout pro-

gram called *Jane Fonda's Pregnancy, Birth, and Recovery Program*,[15] and following the trend of the late 1970s, women's magazines continued to publish articles on prenatal calisthenic programs[16] and advice on engaging in aerobic exercise during pregnancy.[17] And it was not only the fitness industry promoting prenatal exercise. As part of its larger *ParticipACTION* initiative, of which a central aim was to teach Canadians to take responsibility for their health by engaging in physical activity, the Canadian government published a book called *Fitness and Pregnancy* that encouraged pregnant women to maintain at least their pre-pregnancy fitness levels through a combination of aerobic and muscle toning/stretching exercises.[18]

This apparent shift in the discursive field of physical activity and pregnancy should not be considered a "linear" progression in the understanding of the female body (i.e., the result of a Western culture "enlightened" about the abilities of women) but rather contingent on other social developments that occurred around this time. Two such factors are the health and fitness boom of the 1970s in which individuals in the fitness industry recognized women as a niche market and promoted their participation in physical activity,[19] and the neo-liberal shift in governance from the 1970s onwards characterized by the de-regulation, privatization, and withdrawal of the state from collective social provisions in Western society. In the context of the health care system, pressure is placed on citizens to take personal responsibility for their health through lifestyle management (including regular moderate exercise).[20] Another key development was the rise of the women's movement in the mid-1960s and throughout the 1970s in which women sought equality in a number of realms, including sport.[21] And to be sure, in some instances the call to be physically active while pregnant was overtly linked to second wave feminism such as was seen in the feminist magazine *Ms,* which featured a story in 1978 entitled "Who says athletes can't be pregnant?" The bold title was followed by the subheading: "You can—and should—swim, run, jog, row, exercise, cycle, skate and play tennis, squash, volleyball, soccer, softball, basketball, field hockey."[22]

The more liberal ideas regarding physical activity during pregnancy in circulation in the 1970s were therefore not "necessary" but emerged out of the messy confluence of social factors described above. And while it might be tempting to view these more liberal ideas as symbolic of the growing "freedom" of the active pregnant woman, viewed through a Foucauldian lens she was merely encountering new and different forces—for instance, pressure from the fitness industry to purchase gym passes and equipment and a liberal feminist ideology that constructed physical activity during pregnancy as "necessary" for the modern woman.

The promotion of calisthenic and muscle toning exercises for pregnant women (with an emphasis on building abdominal/pelvic strength and flexibility to help to "train" for birth) was not new but the advocacy of more rigorous aerobic exercise was, of course, antithetical to the prescriptions provided to pregnant women by the medical profession for many years. This change to the contours of the playing field encountered resistance as some health care professionals as well as pregnant women wondered exactly how much was prudent—if any at all.[23] These questions and concerns were met with a rapid increase in research on the topic in the 1980s as exercise scientists and individuals in the health profession sought to produce knowledge that would allow them to more clearly define the limits of safety.[24]

Researchers who produced scientific knowledge about exercise during pregnancy in an attempt to delimit appropriate levels of exertion were not necessarily making a conscious effort to "keep women down," for many of their theoretical concerns about the dangers of exercise during pregnancy were (and are) logical from a medical perspective. At the same time, however, the mounting anxieties about the pregnant exerciser must (once again) be placed within the social context of the time. The growing participation of pregnant women in sports and fitness activities (both high level and recreational) was, as discussed above, tied to the emergence of second wave feminism and challenged long held notions about the physical capabilities of pregnant women and the social roles of women more generally. There was, then, something of a backlash to the idea that pregnant women were now running, playing tennis, and performing aerobics. But anxieties were also likely exacerbated by the reconfiguration of the pregnant body in the latter half of the 20th century whereby the expectant woman was increasingly being constructed as a risk to the fetus and responsible for controlling this risk to ensure a healthy pregnancy. Weir, for example, illustrates how the creation of the concept of "perinatal mortality" (death before, during and after birth) in the late 1950s first troubled the idea that life begins at birth, marking a shift in the status of the fetus and a re-direction of biopolitical strategies toward ensuring the well-being of the fetus (as opposed to maternal health).[25] Moreover, the "reproductive revolution"—which began in the late 1960s with the approval of birth control and led to the abortion debates of the 1970s—repositioned reproduction as a "choice" and the mother and fetus as separate entities, even adversaries.[26] Adding to this, technological advances in fetal imaging and assessment (amniocentesis, ultrasonography, and fetal monitoring) meant that the fetus could literally be seen, monitored, and tested and was more firmly established as a patient in its own right, with needs separate from (and often placed above) those of the mother.[27]

Perhaps most relevant to these increasing anxieties around the reproductive body (and women's growing appetite for physical activity dur-

ing pregnancy) was the emergence of medical research linking women's behaviours and lifestyle during pregnancy to congenital birth defects.[28] Identified risk factors for birth defects included drug and alcohol use, exposure to environmental toxins, alcohol consumption, tobacco smoking[29]—and exercise during pregnancy. Writing in the *Canadian Journal of Applied Sport Sciences*, Bagnall and colleagues noted that since even a small amount of alcohol ingested by a pregnant woman leads to a decrease in fetal breathing movements, and given that maternal smoking had been shown to reduce fetal body movements "[i]t is conceivable that maternal exercise can also affect the fetus by altering the transfer across the placental barrier and altering considerably the fetal environment."[30] And in a 1979 editorial in the *JAMA*, Dr. Carl Schaefer warned that marathon running might pose a teratogenic effect during early pregnancy.[31] Citing recent studies showing an association between birth defects and episodes of maternal hyperthermia, he concluded that marathon runners who experienced sustained increases of core temperature into the "high fever" range might also be at risk.

In short, the more liberal exercise advice linked to second wave feminism, the fitness boom, and the neo-liberal push for personal responsibility for health butted up against a more conservative discourse engendered by resistance to the changing roles of women and the reconfiguration of the relationship between mother and fetus (fuelled in part by second wave feminism) whereby the pregnant woman was thought to present a risk to her baby. It was in this context of change and uncertainty that individuals in the field of exercise science (as well as sports medicine and obstetrics/gynecology) began to engage in a careful examination of exercise during pregnancy. We see how the rise of exercise and pregnancy science in the 1980s and the debates about how much was safe, which carried on into the 1990s, were not "necessary" but rather born of a whole series of complex relations between other social factors.

DEFINING SAFE LIMITS: THE RISE OF EXERCISE AND PREGNANCY SCIENCE

By the early 1980s, physiologists and scientists had identified (and had a better understanding of) the adjustments occurring in the respiratory and cardiovascular systems of the pregnant woman in order to accommodate the growing fetus—although there was uncertainty as to the exact mechanisms causing some of the changes.[32] An increase in oxygen consumption, ventilation, blood volume, and cardiac output (the amount of blood that is pumped by the heart per minute) as well as a decrease in systemic vascular resistance were among the changes identified. Given that physical activity influences many of the same variables as those

altered during pregnancy (i.e., heart rate, ventilation rates, and substrate utilization), there was concern about the possible *interactive* effects of pregnancy and exercise. Mullinax and Dale, for instance, reasoned that if exercise brings about physiologic alterations similar to those during pregnancy, when pregnancy and exercise were combined there would be "a doubled physiologic impact"—with the fetus possibly suffering the consequences.[33] In their oft-cited review article on exercise and pregnancy in the *American Journal of Obstetrics and Gynecology*, Lotgering and colleagues explained that "when the stress of strenuous physical activity is superimposed upon that of pregnancy, the metabolic demands of the gravid uterus may come in conflict with those of the exercising muscles."[34]

Based on their understandings of the physiology of both pregnancy and exercise, as well as their theories about the interaction between the two, researchers (made up of individuals in such fields as physiology, exercise and sport science, perinatal biology, and obstetrics/gynecology) had several common concerns about prenatal exercise.[35] It was postulated that maternal exercise would result in a redistribution of blood flow to the woman's working muscles and away from the pregnant uterus. This would in turn force the fetus to compete with maternal skeletal muscles for three elements: oxygenated blood (potentially leading to fetal hypoxia and distress); essential substrates such as glucose (possibly contributing to fetal growth restriction); and heat dissipation (potentially leading to fetal hyperthermia and potential birth defects). The possibility that maternal exercise—especially strenuous exercise such as long distance running—would negatively impact fetal outcomes by leading to premature labour and/or lower birth weights was another identified risk. There was also the long-standing anxiety that the impact of stress forces created by certain physical activities (i.e., running, aerobics) on the large pregnant uterus might cause membrane rupture, placental separation, premature labour, direct fetal injury, or umbilical cord entanglement.[36] Reflecting back on the situation some 20 years later, Canadian researchers Wolfe and Davies noted that "as a result of the conflict between the postulated benefits and risks, the idea that a dose-response relationship existed between the quantity and quality of exercise and maternal/fetal well-being quickly emerged."[37] There was, however, uncertainty regarding exactly what constituted the "optimal zone" for exercise during pregnancy—due in large part to the contradictory nature of many of the study findings—and a common conclusion of review articles published in the 1980s was that more research was needed in order to come to definitive conclusions.[38]

Methodological difficulties were identified as a central barrier to the study of exercise during pregnancy.[39] Ethical considerations prevented pregnant women from being tested under strenuous circumstances (i.e.,

exhaustive exercise near term), making it difficult or even impossible to determine the extent to which exercise responses differed as a result of pregnancy per se, and for a similar reason there was no data regarding fetal outcomes under strenuous circumstances.[40] As a result, the most reliable physiologic data at the time was derived from animal studies—although researchers pointed out that even these studies were of questionable reliability. In their 1989 review of the state of knowledge on exercise during pregnancy, Wolfe and colleagues noted that physical conditioning studies involving lab animals had resulted in conflicting observations.[41] The varying experimental results, they noted, "may be related to differences in the species being studied, the modality, intensity and duration of exercise employed, presence or absence of familiarization of animals to exercise before pregnancy, and methods and timing of fetal outcome assessment."[42] It was also acknowledged that animal studies were (and are) of limited applicability to humans due to physiological differences (e.g., quadrupeds are less subject to venous pooling, they eliminate heat by a different mechanism).[43]

Researchers agreed that more studies needed to be conducted on humans, but such investigations had to be large scale and well-controlled in order to avoid the interaction of confounding variables. "The effect on fetal outcome of a single factor such as exercise," explained Lotgering et al., "is easily obscured by the wide normal variation in outcome caused by a multitude of variables, including genetic and socioeconomic factors, nutrition, environmental factors, 'stress,' and so forth. Thus, the question of whether physical activity affects fetal outcome can be answered only by large, well-controlled prospective epidemiological studies. We know of no such study in pregnant women."[44]

According to researchers, many of the exercise studies lacked suitable control groups. As Wallace and Engstrom explained, "randomization of subjects into treatment groups is nearly impossible since exercising people are rarely willing to stop exercising for significant periods of time."[45] Thus, researchers were unable to randomly assign participants into experimental groups and control groups—a methodology which provides maximum validity within the positivist paradigm. Studies of pregnancy outcomes of women who engaged in *vigorous* exercise were perceived as even more methodologically unsound as they were based on a few case studies and anecdotal evidence from elite and/or Olympic athletes who had continued to compete while pregnant. In addition to the small sample sizes and lack of control groups, review articles noted that there was also little consistency in exercise protocols used between the studies, which made it difficult to cross-compare data and likely contributed to the inconsistent results across the various studies.[46]

Early anecdotal evidence and case studies that had spurred some physicians to alter their exercise advice and encourage pregnant women

to engage in physical activity were thus being called into question when assessed by what were becoming accepted as more rigorous research standards. Under these new standards or "rules of formation," randomized control trials (RCTs) were privileged as the most reliable form of knowledge, and other knowledges (those not quantitative or RCT-based) were viewed as less "true" or dismissed altogether. The privileging of RCTs is reflective of the move towards a system known as "evidence based medicine," (EBM) in which researchers engage in a systematic review and/or meta-analysis of all studies deemed relevant to a topic, using a standardized "Hierarchy of Evidence" that "ranks 'evidence' according to the reliability and verifiability of the epidemiological research design used, from randomized controlled trials at the top to physicians' anecdotal reports and case studies at the bottom."[47] The resulting evaluative information can then be used to create "evidence-based guidelines" and facilitate "evidence-based decision-making" in the clinical setting.[48] The package of quantitative techniques and procedures currently known as EBM is generally agreed to have been founded by a group of colleagues at McMaster University in the mid-1980s,[49] and EBM was used in the context of pregnancy and childbirth early on in the movement as three obstetricians published a text called *Effective Care in Pregnancy and Childbirth*[50] that was "a landmark in the development of an authoritative knowledge of birthing practice."[51] Although EBM would not rise in prominence until the following decade, critiques of the methodological shortcomings of existing research concerning exercise and pregnancy reflected this coming trend; what had previously counted as knowledge in the eyes of some was being critiqued as inconclusive and uncertain when judged through the "rules" of a positivist paradigm.

The perception that research around exercise during pregnancy was "poor" and therefore inconclusive created uncertainty with respect to just how much was safe, leading to differing opinions within the scientific and medical community. Within the academic and trade journals where these opinions were shared by a range of individuals (i.e., nurses, general practitioners, sport medicine professionals, and obstetricians/gynecologists who interpreted existing research and created guidelines), there was notable variation with respect to the types of activities deemed to be appropriate, at what stage of her pregnancy a woman should begin to exercise (and if she should begin at all, if she was previously sedentary), as well as the optimal target range with respect to duration, frequency, and intensity.[52]

Snyder and Carruth, professionals from a Department of Nutrition and Food Sciences, provided the following guidelines based on their interpretation of the data: walking was an excellent activity for pregnant women but "jogging should be discouraged, at least in the later

stages of pregnancy, due to the progressive lordosis characteristic of the last trimester. Jogging could present a problem with balance and place a strain on the pelvic ligaments, which are softening due to the hormone changes of advancing pregnancy."[53] They went on to explain that "maternal heart rate should not exceed 140-150 bpm (depending on fitness level) for approximately 15 minutes, 3-5 times a week" and concluded that "because of the paucity of information about exercise during pregnancy and the stress it may create for the fetal heart rate and breathing movements, a conservative approach seems justified due to our limited knowledge." Also advocating caution were Morton, Paul, and Metcalfe (researchers situated in the area of cardiovascular health) who explained that "there are some types of exercise more suitable for the pregnant woman. These include walking, swimming, and bicycle riding."[54] They also laid out limits regarding exercise frequency and duration (healthy pregnant women could work at 60-70% of MHR for no more than 30 minutes three times weekly).

Others, however, provided advice that was less prescriptive and restrictive. In their book *The Complete Sports Medicine Book For Women* (intended for the layperson), Shangold (an obstetrician/gynecologist) and Mirkin (a pediatrician) stated that in the absence of obstetrical complications a woman could probably continue exercising at "the same perceived level of exertion" right up until delivery.[55] They also explained that "despite some old wives' tales to the contrary, exercising does not increase a woman's chances of having a miscarriage or stillbirth" and provided a long list of sports recommended throughout pregnancy, including jogging, softball, basketball, roller skating, waterskiing, downhill skiing, and aerobics. They did not provide specific heart rates or any *don'ts* but stressed the importance of listening to one's body.[56] Similarly, Dr. Panter, an obstetrician from New York, published an article in *Parents* magazine entitled "Sports and Exercise in Pregnancy" in which he outlined some "sensible" guidelines based on the specific experiences of some of his patients. He advocated walking and swimming as the best exercises for pregnant women but also noted that jogging and even downhill skiing were safe, as long as the pregnancy was healthy and women recognized their body's signal to rest.[57]

Judy Lutter, President of the Melpomene Institute (a grassroots feminist health centre in the US), also refrained from providing specific guidelines concerning intensity, duration and frequency of exercise.[58] Women wishing to run throughout pregnancy were advised to continue but to be aware that they may need to decrease exercise speed, intensity and frequency, should avoid exercising to exhaustion (and overheating/dehydration), and should resist making preset (and unrealistic) goals regarding their running. Lutter (who was neither a physician nor an exercise scientist) based many of her recommendations on a

survey conducted by the Melpomene Institute in which women were asked about their pregnancy and exercise experiences. The Melpomene Institute research thus privileged women's voices as opposed to laboratory studies measuring heart rate, cardiac output, and other physiological variables. The data produced using this women-centred approach would receive a poor rating according to the rules of evidence-based medicine but was deemed by Lutter and her organization to provide a valid basis for shaping exercise recommendations.

That a women's health organization weighed in on the question of "how much"— and that the key piece of advice provided was to "listen to your body"—suggests that in the early to mid-1980s, the issue of exercise during pregnancy was about more than "what is safe." Given the perceived methodological shortcomings of existing research, the identification of an "optimal zone" for exercise during pregnancy was elusive, allowing the ideological, political, and professional commitments of the experts to emerge in their exercise prescriptions/recommendations. Lutter, for instance, took a clear feminist stance, recognizing—and even promoting—the validity of women's experiences and in doing so also challenged long-standing notions of the incompatibility of the pregnant body with vigorous exercise; other health professionals such as Shangold and Mirkin as well as Panter also encouraged women to listen to their bodies but were not as overt in their promotion of a feminist position. Rather, as practising physicians, they appeared to be of the view that their clinical experiences with physically active pregnant women (i.e., discussions with and examinations of them) were a valid form of knowledge in the absence of definitive laboratory evidence. In other words, as physicians who regularly met with pregnant women and rarely (if ever) observed negative consequences they deemed to be related to exercise, they would likely draw upon these experiences and provide more liberal guidelines; exercise scientists/physiologists who worked with pregnant women exclusively in a laboratory setting (and who were perhaps more entrenched in the culture of EBM) might not be as liberal in their advice—and a similar situation might hold for those obstetricians who, in their everyday practices, encountered high-risk pregnancies.

Differing exercise advice thus reflected questions about what type of knowledge (women's experiences, clinical observations, RCTs) should be accepted as the dominant discourse in the growing field of prenatal exercise research. It also mirrored health practitioners' divergent views about the inherent riskiness of the pregnant body and the degree of trust that could be placed on women's ability to monitor their responses to exercise.[59] Those with reservations about encouraging women to listen to their bodies preferred to set safe parameters; others, however, suggested that pregnant women could follow their common sense and safely listen to their bodies.

POWER PLAYS AND EPISTEMOLOGICAL DEBATES: CREATING A "GOLD STANDARD"

In May 1985, the American College of Obstetricians and Gynecologists published a set of guidelines entitled "Exercise During Pregnancy and the Postnatal Period"[60]—and what was previously a difference of opinion between individuals in the health care and scientific community took the shape of a debate as professional organizations weighed in on the matter. According to the introduction of the ACOG guidelines, the central motive behind their creation was to compile expert knowledge that physicians could pass on to pregnant women to use to monitor and regulate their exercise practices and reign in their "competitive spirit."[61] Professional power, however, also appears to have been a motive. Firstly, the guidelines were positioned as a panacea to the unscientific (and therefore dangerous) advice provided by "nonprofessionals" who were marketing programs to pregnant women which contained medical content that was "often inappropriate, inaccurate, or incomplete."[62] Secondly, and although not stated as explicitly, the guidelines were also likely intended to counter the less restrictive advice being put forth by other professionals within the research and medical community—such as Shangold and Mirkin. Shangold, in particular, was often cited in popular literature providing her more liberal brand of advice.[63] As will become clear in what follows, establishing the guidelines thus allowed the creators to increase their authority in the emerging field of exercise and pregnancy—as well as weigh in on social issues of the time (i.e., the boundaries of appropriate behaviour for pregnant women).

In an article featured in *The Physician and Sportsmedicine* almost a year following the release of the ACOG guidelines, assistant editor Michele Gauthier explained that "since the ACOG guidelines for exercise and pregnancy were released almost one year ago, they have been the subject of some controversy. Some critics contend that the guidelines are too general, others think they're too specific. ACOG stands behind the guidelines."[64] According to Gauthier, some exercise researchers, athletes and physicians disagreed with the guidelines, complaining that they lacked input from other professionals beyond the eight member ACOG committee led by Dr. Raul Artal (in particular the American College of Sports Medicine was not consulted); that the "sweeping conclusions" articulated in the guidelines were not based on existing data; that the guidelines were overly conservative in nature and failed to acknowledge individual differences in women's fitness levels; and finally, that the ACOG may have unwittingly set a legal standard with the result that physicians lacking knowledge on exercise and pregnancy would closely adhere to the guidelines because of possible legal complications.[65] The previously mentioned Dr. Shangold was particularly outspoken in

her critique of the guidelines and of the lead researcher/author of the publication, Dr. Artal, stating in the *Physician and Sportsmedicine* article that:"[t]here are rather sweeping conclusions that are not based on his or any other data…For instance, the guidelines tell you to avoid bouncy movements. There is no reason; no data on this activity."[66]

The rather heated debate appears to have stemmed (at least in part) from a power struggle between a few key people, the most prominent (based on my review of the literature) being Artal and Shangold—and the larger organizations with which they were affiliated. At that time, Shangold was an Assistant Professor of Obstetrics and Gynecology, Director of the Sports Gynecology Center at Georgetown University, and chair of Sports Gynecology Society of ACOG, while Artal was an Associate Professor of Obstetrics and Gynecology and of Physical Education and Exercise Sciences at the University of Southern California, and head of the ACOG committee that created the exercise and pregnancy guidelines.[67] Both thus had expertise in the areas of obstetrics/gynecology and sport science/medicine, and were well-known names in the emerging field of pregnancy and exercise science. That said, Shangold was apparently more rooted in the sport medicine community (she was also an editorial board member of *The Physician and Sportsmedicine*). Artal, on the other hand, appears to have had stronger affiliations within the ACOG as evidenced by the fact that although Shangold was on the original ACOG planning committee for the exercise and pregnancy guidelines, the finished product clearly reflected Artal's opinion (and perhaps the ACOG mandate) that physicians should err on the side of caution where the safety of the mother and fetus are concerned. This stood in contrast to Shangold's view (likely in line with the larger sports medicine community and the readership of *The Physician and Sportsmedicine*) that physical activity is an important part of life and that all healthy women (pregnant or not) should be encouraged to engage in it.

Controversy (and confusion) about the safety of prenatal exercise and the appropriate limits for pregnant exercisers continued (and even grew) into the late 1980s and early 1990s as professional organizations and the key individuals behind them remained entrenched in their positions and the 1985 ACOG guidelines continued to draw comment. Numerous articles were published in family practice journals (by physicians, nurses, and midwives) weighing the relative risks and benefits of exercise during pregnancy, with some recommending the ACOG guidelines and others providing alternative suggestions.[68] And after an initial period in which the ACOG guidelines were simply outlined in popular magazines such as *Glamour*, *Chatelaine*, *Harper's Bazaar,* and *Runner's World*,[69] the debates and uncertainties circulating within the medical community emerged in the popular press.

While the debate was tied in part to organizational politics (and power plays by individuals within these organizations) as well as to epistemological questions concerning "what counts as knowledge," it was the object of the knowledge under debate—the reproductive body—which fueled the controversy. Indeed, feminist scholars have demonstrated how throughout the 20th century, Western physicians and scientists have continued to medicalize the female body, expressing concern about the impact of intense exercise on female reproductive health—namely menarche, menstruation, the ability to conceive (fertility), pregnancy and menopause—resulting in the prescription of (often limiting) exercise for females at all stages of life.[70] Such exercise prescriptions are not neutral or objective but bound up in relations of power shaped by social and cultural concerns regarding appropriate gender roles, and it is questionable whether or not such debates would be waged over whether the male could be trusted to listen to his body when engaging in physical activity. As Verbrugge observed, "there is a substantial literature about both men's and women's physiological and endocrinological responses to exercise, including changes in heart rate, adaptation to temperature and altitude, and variations in hormone levels. Few studies, however, specifically examine the effect of exercise on men's reproductive health."[71]

It is easy to get caught up in the controversy around appropriate exercise prescriptions and in doing so lose sight of the fact that all of the players subscribed to the idea—to a certain extent—that the pregnant woman needs to be hyper-aware of her body, monitoring its response and engaging in self-surveillance. The vociferous debates concerning "what counts as knowledge" and "how much is safe" constituted the pregnant body as the object of scientific enquiry, in need of surveillance—whether by the direct gaze of a health professional or the woman herself. Such surveillance has the potential to shape women's subjective experience of pregnancy and exercise, robbing it of enjoyment and turning it into a guilt- and anxiety-ridden excursion.

CONCLUSION: "IMPORTANT GAPS REMAIN"

By the late 1990s exercise physiologists and obstetrician/gynecologists had weighed the potential risks and benefits of prenatal exercise and come to a general agreement that moderate exercise was safe for healthy pregnant women who were free of a standardized list of contra-indications. Pregnancy and exercise had grown into a specialty area with its own body of knowledge: guidelines and checklists had been created by professional organizations such as the ACOG, Society of Obstetricians and Gynecologists of Canada (SOGC) and Canadian Society of Exercise Physiology (CSEP)/Health Canada, and endorsed by other professional

groups such as the American College of Sports Medicine (ACSM) and the Canadian Academy of Sport Medicine (CASM). In fact, in 2003 the SOGC and CSEP co-published Canadian national guidelines for exercise during pregnancy and the postpartum period, which were touted as the first-ever guidelines for prenatal exercise to be supported by both obstetricians and exercise scientists and the first to be quantified using the evaluation of evidence-based guidelines.[72]

Given the perceived need for prudence where the pregnant exerciser is concerned, however, a common refrain in research articles in the mid- to late 1990s—and even today—was that substantial gaps and limitations remain in the body of knowledge surrounding exercise during pregnancy, and that more research—research that is more methodologically sound (i.e., rated higher on the scale of EBM)—is needed to refine advice concerning appropriate exercise limits for women.[73] The privileging of EBM reflects broader developments in Western biomedicine and culture in the 21st century whereby EBM has increasingly assumed "a position of symbolic authority in clinical decision-making," also shaping research agendas, formulating policy, and allocating financial resources.[74] Indeed, the neo-liberal Western healthcare system (characterized by the calculative regimes of accounting and financial management) is a natural bed-fellow with EBM which, with its purported objectivity, promises to increase the effectiveness and efficiency of care in the clinical setting by providing health care providers with a guide for "best practices" while also saving money by demonstrating to policy makers and administrators which therapeutic interventions are most effective and should therefore receive the greater allocation of resources.[75] Social scientists have critiqued this "way of knowing" whereby certain types of knowledge are celebrated for their purported "objectivity" or freedom from bias, while ignoring the social, historical, and political contexts that "lend them their currency and power."[76] "[T]he problem with EBM," argue Murray et al., is that "at best, it downplays, and at worst, it utterly disavows the subjective elements operating at the heart of its own system."[77] And indeed, as I've tried to illustrate throughout this paper, advice regarding the active pregnant body has never been neutral or objective but inextricably bound up with the social and cultural context in which it was created.

It is perhaps tempting to suggest that today's less conservative advice is "better" (and less embedded in power relations) than the more restrictive guidelines provided by physicians in the late 19th century. However, we must remain wary of such modernist views that inspire notions of "false progressivism." To illustrate, I point to the latest trend in exercise and pregnancy advice as seen in the current ACOG and SOGC guidelines: that healthy pregnant women *should* engage in moderate exercise—even emphasizing the risks of *not* doing so.[78] Significantly, this

advice comes at a time when pregnancy has been identified as a major cause of the "obesity epidemic" in Western society.[79] It is argued that women are gaining too much weight during pregnancy, are "programming" the fetus to be an overweight/obese adult, and are failing to lose the extra weight post-pregnancy.[80] Exercise during pregnancy has thus taken on new significance and moderate exercise is being constructed within a growing amount of medical literature as a tool to prevent the "maternal-fetal diseases" of overweight/obesity and diabetes in both the mother and child.[81] In this context, exercise in pregnancy has become one solution to the so-called obesity epidemic and a normalizing practice that women must engage in to be good mothers and healthy, productive citizens. The active pregnant body remains bound up in relations of power.

NOTES

1 Michael Bruser, "Sporting Activities during Pregnancy," *Obstetrics and Gynecology*, 32 (1968): 721-25.
2 Relevant articles published over the time period of interest were gathered using several databases and search methods, and a range of "pregnancy" and "exercise" related terms were used to seek relevant articles/texts. The PubMED database was used to search for exercise/pregnancy related articles published from 1950 to the present, and popular literature from the time period 1950-1982 was gathered by entering several keyword combinations into the Readers' Abstract Retrospective database. The Readers' Guide Abstract was used to search for relevant articles published from 1982 to the present. Also examined were a number of key obstetrical/medical texts referred to in the various journal articles that I collected. The majority of research appearing in the English language articles identified through my search of the PubMED database was conducted in the United States or Canada, suggesting that North America was a key player in the development of exercise and pregnancy science in the latter half of the 20th century. It is therefore the geographical focus of this paper.
3 Clare Hanson, *A Cultural History of Pregnancy: Pregnancy, Medicine, and Culture, 1750-2000* (New York: Palgrave Macmillan, 2004), p. 3.
4 Shannon Jette, "Governing Risk, Exercising Caution: Western Medical Knowledge, Physical Activity and Pregnancy," PhD thesis, University of British Columbia, 2009.
5 Michel Foucault, "Technologies of the Self," in Paul Rabinow and Nikolas Rose, eds., *The Essential Foucault: Selections from Essential Works of Foucault, 1954-1984* (New York and London: The New Press, 2003), p. 145-69; see also Pirkko Markula and Richard Pringle, *Foucault, Sport and Exercise: Power, Knowledge and Transforming the Self* (London and New York: Routledge, 2006), p. 24.
6 Michel Foucault, "On the Archaeology of the Sciences: Response to the Epistemology Circle," in James Faubion, ed., *Aesthetics, Method and Epistemology: Essential Works of Michel Foucault, 1954-1984, Vol. 2*, Robert Hurley, trans. (New York: The New Press, 1998), p. 297-333.
7 Gavin Kendall and Gary Wickham, *Using Foucault's Methods* (London: Sage, 1999), p. 5-9.
8 Markula and Pringle, *Foucault, Sport and Exercise*, p. 27.
9 Patricia Vertinsky, *The Eternally Wounded Woman: Women, Exercise and Doctors in the Late Nineteenth Century* (Manchester and New York: Manchester University Press, 1994), p. 72-73; Jette, "Governing Risk," p. 139-50.

10 Jette, "Governing Risk," p. 169-79; see for instance G. Erdelyi, "Gynecological Survey of Female Athletes," *The Journal of Sports Medicine and Physical Fitness*, 2 (1962): 174-79; and David Ryde, "The Effects of Strenuous Exertion on Women," *The Practitioner*, 177 (1956): 73-77.
11 Bruser, "Sporting Activities," p. 722.
12 Bruser, "Sporting Activities," p. 724.
13 See for instance Erdelyi, "Gynecology Survey," p. 176-77; E. Gendel, "Pregnancy, Fitness, and Sports," *Journal of the American Medical Association (JAMA)*, 201 (1967): 125-28; and E. Zaharieva, "Survey of Sportswomen at the Tokyo Olympics," *The Journal of Sports Medicine and Physical Fitness*, 5 (1965): 215-19.
14 Jette, "Governing Risk," p. 192-94.
15 Femmy DeLyser and Jane Fonda, *Jane Fonda's Pregnancy, Birth and Recovery Workout* (New York: Simon and Schuster, 1982).
16 See for instance Jan Hart, "Pregnant, Fit, and Happy!" *Parents*, 58 (December 1983): 84-88; "Jane Fonda's Workout for Prenatal Energy," *Chatelaine*, 56 (July 1983): 29; and Lee MacCallum, "New—Dos and Don'ts for Exercising Safely," *Glamour*, 83 (August 1985): 184.
17 See for instance Joanna Cole and Holly Laibson, "Exercise during Pregnancy," *Parents*, 58 (February 1983): 39-42.
18 Fitness Canada, *Fitness and Pregnancy* (Ottawa: Minister of Supply and Services, Canada, 1983).
19 Susan Bordo, *Unbearable Weight: Feminism, Western Culture, and the Body* (Berkeley, Calif.: University of California Press, 1993), p. 185-212.
20 Margaret MacNeill, "Social Marketing, Gender, and the Science of Fitness: A Case-Study of ParticipACTION Campaigns," in P. White and K. Young, eds., *Sport and Gender in Canada* (Oxford: Oxford University Press, 1999), p. 215-31.
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24 To illustrate this point, a PubMED search of the term "exercise and pregnancy" yielded 8 studies from 1950-1969, 20 studies from 1970-1979, and 141 studies from 1980-1990. See Jette, "Governing Risk, Exercising Caution," p. 199.
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26 Elizabeth Armstrong, *Conceiving Risk, Bearing Responsibility: Fetal Alcohol Syndrome and the Diagnosis of Moral Disorder* (Baltimore: The Johns Hopkins University Press, 2003), p. 196-98.
27 Armstrong, *Conceiving Risk*, p. 14, 192-96; Ellie Lee and Emily Jackson, "The Pregnant Body," in Mary Evans and Ellie Lee, eds., *Real Bodies: A Sociological Introduction* (Hampshire: Palgrave, 2002), p. 115-32.
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61 ACOG, "Technical Bulletin Number 87," p. 313.
62 ACOG, "Technical Bulletin Number 87," p. 313.
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