PERCEPTIONS AND EXPERIENCES OF WOMEN WHO CONTINUE VIGOROUS PHYSICAL ACTIVITY DURING PREGNANCY

JULIE DOWNEY

Perceptions and Experiences of Women Who Continue Vigorous Physical Activity during Pregnancy

Julie Downey

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Faculty of Medicine
Memorial University of Newfoundland
St. John's, Newfoundland

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ABSTRACT

Despite medical evidence suggesting that exercise during pregnancy does not cause any harm to the developing foetus, anecdotal reports would suggest that many pregnant women are reluctant to exercise. The purpose of this project was to explore the experiences of highly active women who continued with vigorous physical activity during their pregnancy(s), to clarify the reactions of and the advice they received from people around them and how they responded to those reactions. In-depth semi-structured interviews were conducted with ten pregnant women aged between 30 and 45. Detailed analysis of the interview transcripts identified a number of consistent themes. All of the women viewed exercise as a critical part of their lives and demonstrated a strong exerciser identity. They all reported experiencing negative encounters and limitations being placed on them regarding their exercise behavior during pregnancy. However, all of the women reported that they maintained their vigorous activities throughout their pregnancies in spite of these reactions. Many women reported that they felt that their pregnancy experiences were being medicalized and that they felt pressured to follow their physician's advice and to downgrade their activity levels. All of the women reported that a variety of supports were very important to them continuing with their exercise routine including their spouses, other exercising women, encouraging research, and supportive physicians. These results are discussed with reference to pre-natal education for expectant mothers and their spouses and for professional education for health professionals.

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"When the mother of the race is free, we shall have a better world, by the easy right of birth and by calm, slow, friendly forces of evolution."

Charlotte Perkins Gilman

1860 - 1935

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CHAPTER 1

INTRODUCTION

Today, participating in exercise is actively promoted for both men and women with growing evidence supporting the importance of physical activity for health. A wealth of irrefutable scientific evidence has accumulated to show the effectiveness of regular physical activity in the prevention of chronic diseases such as cardiovascular disease, diabetes, cancer, obesity, osteoporosis, and depression (Warburton, Nicol & Bredin, 2006). It is therefore, not surprising that the past few decades have seen physical activity become more important for women, with women of all ages being encouraged to exercise throughout the lifecourse. However, despite this general promotion of exercise, there continues to be speculation regarding the adverse effects of exercise on one group of women – those who are pregnant. Dempsey (2005) stated that pregnant women represent one segment of the population that has received limited attention with regard to clearly articulated guidelines that promote physical activity as a lifestyle choice compatible with good health and disease prevention. This study considers the particular challenge faced by pregnant women who choose to remain highly active throughout pregnancy.

Statement of the Problem

It has been estimated that in North America approximately one quarter of women planning a pregnancy also plan to maintain physical activity during the pregnancy (Clapp, 2000). However, the recommendations put forth by several professional bodies are not always encouraging. The latest recommendations for Canadian women choosing to continue exercising throughout pregnancy prepared by Wolfe and Davies (2003) encourage active pregnant women to engage in moderate intensity exercise three to five

times per week, for a duration of 15 to 30 minutes. This exercise prescription is then followed by the warning that women who participated in structured exercise five or more times per week had an increased chance of delivering a low-birth weight infant compared with women who exercised three of four times per week. The Canada Physical Activity Guide, Canada's national document on prescribing physical activity all but ignores exercise during pregnancy with a brief note in the Physical Activity Readiness Questionnaire (PAR-Q) which states to delay becoming much more active if you are or may be pregnant (Public Health Agency of Canada, 1998).

The current guidelines of the American College of Obstetricians and Gynecologists also encourage regular activity during pregnancy, although they suggest that the type, duration, and intensity of exercise be limited (Clapp, 2000). Sheffield (1997) argues that many of the recommendations for physical activity during pregnancy have been based more on cultural and social mores than on scientific evidence. However, there is an expanding body of scientific evidence that suggests that fit women can continue with vigorous exercise during pregnancy with few limitations and that there are many benefits to be had by both the mother and the foetus. For the purpose of this study, vigorous exercise is defined as a regimen of sustained anti-gravitational exercise such as running, cross-country skiing, aerobics, etc.

Pregnancy is a time when many active women choose to down scale their intensity of exercise or stop exercising altogether. Clarke and Gross (2004) reported that women often receive confusing advice from their physicians regarding exercising throughout pregnancy and are often discouraged by family and friends. Although research on how exercise impacts on pregnancy and the foetus has resulted in many encouraging

findings, society at large may not be supportive and comfortable with the idea of pregnant women being highly active throughout their pregnancies.

Purpose of the Study

Despite medical evidence suggesting that exercise during pregnancy does not cause any harm to the developing foetus or mother, anecdotal reports would suggest that many pregnant women are reluctant to exercise (Clapp, 1998). This study posed the following research question: What are the experiences and perceptions of highly active women who plan to continue with vigorous physical activity during pregnancy? The purpose of this project was to explore the experiences of these women and to clarify the reactions of and the advice they received from people around them and how they responded to those reactions.

This research is of importance because although there is a significant body of research supporting exercise during pregnancy there is no apparent research on the experiences of women who continue with vigorous exercise when pregnant. With many women today planning to maintain their exercise regimes during pregnancy, as reported by Clapp (2000), it is critical that healthcare providers and society in general are prepared to accept and advise these women. Having an understanding of the experiences of highly active pregnant women will enable healthcare providers to provide the appropriate support and information these women will need.

CHAPTER 2

LITERATURE REVIEW

This chapter provides an overview of the benefits of physical activity, the gender specific benefits for women, followed by a review of the benefits for women when pregnant. In order to have an understanding of how the environment for exercising differs between males and females the literature review will address the reasons why fewer women than men exercise, the impact the medicalization of women's health has had on women's activity choices, and why many active women choose to stop exercising when they become pregnant.

Benefits of Exercise

The list of benefits from engaging in regular physical activity has grown dramatically in recent years with each new study strengthening the case for regular exercise. Numerous diseases or precursors of diseases have been shown to be more common or develop more frequently in individuals and groups that engage in little or no physical activity, as compared with those who engage regularly in moderate or more vigorous physical activity. Vuori (2004) identified a list of over 20 diseases or states of ill health that have been found to be related to inactivity, with this number growing steadily during the past decades and including osteoporosis, osteoarthritis, breast cancer, colorectal cancer, uterine cancer, hypertension, cardiovascular diseases, depression, diabetes, gallbladder disease, Parkinson's disease, and chronic back pain.

The long list of benefits from maintaining a regular exercise routine is extensive. Fentem (1994) classified the benefits into four categories: enhancing function, maintaining reserve capacities, preventing disease, and ameliorating the effects of aging and chronic

disease. These health benefits of exercise are explicable in terms of physiological, psychological, and biochemical changes and improvements in function.

While the scope of the identified benefits of exercise in general is quite broad, among the key areas of research regarding exercise and its relationship to health is cardiovascular disease, which remains the leading cause of mortality for both Canadians and Americans (Tanuseputro et al., 2003, Jeffery, 2000). A review of the literature on the contribution of physical activity to the prevention of coronary heart disease, conducted by Warburton, Nicol, and Bredin (2006), concluded that people who are physically inactive are twice as likely to develop coronary heart disease as people who are regularly active. Warburton et al reported that physically inactive middle-aged women experienced a 52% increase in all-cause mortality, a doubling of cardiovascular related mortality and a 29% increase in cancer-related mortality. Marks et al (2006) explain that physical activity is likely to be protective against cardiovascular disease through a combination of effects on other recognized risk factors, on metabolic and regulatory processes, on the profile of cholesterol and blood lipid concentrations and clotting factors, possibly on arterial blood pressure, and through its role in weight control.

Another critical area of health research regarding the benefits of exercise is that of the chronic diseases of aging. Kujala (2006), in his systematic review of randomized controlled trials on exercise and chronic disease, reported that physical activity is one means of decreasing disability and increasing the number of independently living elderly people, as well as decreasing the costs to the healthcare system. Stewart's (2005) meta-analysis of studies on exercise and aging reported that exercise reduced and prevented a number of functional declines of aging resulting in improved cardiovascular functioning, reduction of risk of osteoporosis, improvements in postural stability and

increased flexibility and reduced risk of falls, improvements in cognitive functioning and depression and enhanced self-efficacy.

Some other important benefits of physical activity include research on its effects on cancer risk where moderate amounts of physical activity have been associated with measurable reductions in the risk of cancer. A literature review conducted by Warburton et al (2006) found that routine physical activity is associated with a reduction in the incidence of specific cancers, in particular colon and breast cancer, with moderate physical activity associated with an even greater protective effect than activities of less intensity. Boule, Haddad, Kenny, Wells and Sigil (2001) concluded from their meta-analysis on exercise and glycemic control that exercise is the cornerstone of diabetes therapy. Habitual physical activity, as reported in Boule et al, helps prevent non-insulin dependent diabetes mellitus by increasing insulin sensitivity and improving glucose tolerance. As well, physical activity has been shown to have many beneficial effects on mental health. Plante and Rodin (1990) reported that exercise improves mood and well-being, reduces anxiety, depression and stress, and has a positive effect on self-concept, self-esteem and self-assurance.

This wealth of information promoting the many benefits of physical activity is available ironically at a time when many people still continue to be inactive. According to the Canadian Fitness and Lifestyle Research Institute, 56% of Canadians were inactive in 2000/01; of the 44% who reported being active 24% were classified as moderately active and only 20% as active (Cameron, 2004). Cameron also reported that women tend to be the lesser active of the sexes. According to Stewart (2005) American statistics mirror Canada with approximately 30% of the American population performing no exercise at all, another 40% or so performing some exercise, and only about 27% of the adult

population engaging in exercise at the recommended levels that would provide protection against the chronic diseases that occur in aging. Stewart claims that this sedentary lifestyle is a major contributor to the leading causes of death among adults.

Gender Specific Benefits

There is a growing body of literature that recognizes that the effects and determinants of physical activity and exercise may be quite different for men and women (Belza, 2004). While many of the benefits of maintaining physical fitness through the life span are equally important for both sexes, there are gender specific benefits that should be noted. One critical area of research looks at women and heart disease and the beneficial effects of exercise on cardiovascular risk factors. Research has reported that cardiovascular disease is no longer a "man's disease", it is the leading cause of death among women in developed countries and is more lethal and less aggressively treated in women than in men (Wong & Wong, 2002). Wong and Wong analyzed the cross-sectional data from cycles 1 and 2 of the National Population Health Survey for Canada and reported that women with the lowest levels of physical fitness had a relative risk of death nearly five times higher than physically fit women.

Vigorous regular exercise has also been shown to have beneficial effects that may counter the effects of the physical discomforts associated with women's menstrual cycle. A study by Prior (2000) reported that symptoms of the menstrual cycle, such as pelvic pain, low back pain, headache, anxiety and depression, and fatigue were ameliorated through participation in an exercise program. Increased bone mineral density has also been associated with exercise in women of postmenopausal age, particularly exercise of the weight bearing type (Jeffery, 2000). Jeffery also identified progressive resistance

training programs, i.e., weight training, as the optimal type of exercise to promote bone mineral density.

Concerns Regarding Exercise During Pregnancy

With all the noted benefits of exercise it is not surprising that many active women want to continue to exercise throughout their pregnancies. Clapp reported in his clinical update in 2000 that exercise programs involving strenuous, prolonged physical activity such as aerobics, circuit training, stair climbing, and running remain a way of life for almost one quarter of women planning a pregnancy. Most of these women followed by Clapp continued their exercise regimen during pregnancy and many of the regimens exceeded the current sanctioned guidelines.

How much exercise a woman can perform at various times in pregnancy without compromising the growth and development of the embryo and foetus has become the focus of many studies since the early 1970s. The underlying concern has been that the exercise-induced increase in maternal body temperature, circulating stress hormones, caloric expenditure, and biomechanical stress coupled with decreased visceral blood flow could have adverse effects on multiple aspects of the course and outcome of pregnancy (Clapp, 2000). Likewise, it has been argued that the pregnancy-associated changes in maternal posture and centre of gravity, coupled with ligamentous laxity in the area of the pelvic girdle, may increase the risk of maternal injury and the possibility of direct foetoplacental injury from either blunt trauma or the shear stress effects of sudden motion (Clapp, 1995).

Potential adverse effects that have been attributed to exercise during pregnancy include premature rupture of the membranes, premature labour, congenital malformation, brain

damage, growth retardation, difficult labours, and maternal musculoskeletal injury (Clapp, 2000). However, the literature on exercise and pregnancy outcome does not support these concerns. To date, research has been developed covering many aspects of the impact of exercise on the health of the pregnant woman and the developing foetus. Clapp (1995) reported that there is a growing body of information which suggests that the cardiovascular, metabolic, thermal, and endocrine adaptations to pregnancy are not only accentuated by regular exercise but they also modify the physiologic response to exercise in a manner that is protective of the foetus.

Benefits of Exercising Throughout Pregnancy

Research indicates that healthy, fit women experiencing a normal pregnancy can and should continue their exercise programs in order to take advantage of key benefits for both themselves and their growing foetus. Clapp (2000) found that regular exercise reduced musculoskeletal complaints associated with pregnancy, enhanced feelings of well being, improved body image, and decreased maternal weight gain and fat deposition in late pregnancy. Stevenson (1997) reported that active women experience fewer physical symptoms of pregnancy, i.e., nausea, heartburn, leg cramps, insomnia, and that moderate regular exercise during a healthy pregnancy is likely to improve well-being when compared with a sedentary lifestyle.

Exercise during pregnancy has also been associated with improved self-esteem and body image as well as improved appetite and better sleep (Sternfield, 1997). The biological mechanisms for these are explained by Sternfield as hormonal and metabolic adaptations associated with improved cardiovascular functioning, alterations in catecholamine release and response, and increases in endogenous opiates above that which occurs with pregnancy itself.

Hatch, Levin, Xiao and Susser (1998), in their study on maternal exercise and timely delivery, reported that there was no adverse effect of maternal exercise during pregnancy on gestational length among live births; in fact more vigorous exercise appeared to reduce the risk of spontaneous preterm birth. Clapp (2000) also reports that women who continue to run or perform aerobic activities regularly throughout pregnancy have shorter labours with uncomplicated deliveries more than 85% of the time and that their babies tolerate labour well, show less behavioural or biochemical evidence of undue stress in late pregnancy and labour, are vigorous at birth, and do well in the immediate neonatal period.

Recent Canadian guidelines advising obstetric care providers regarding exercising throughout pregnancy goes further and recommends that women and their care providers should consider the risks of not participating in exercise during pregnancy (Wolf and Davies, 2003). Wolf and Davies list a number of concerns for non exercisers which includes: loss of muscular and cardiovascular fitness, excessive maternal weight gain, higher risk for gestational diabetes or pregnancy-induced hypertension, development of varicose veins and deep vain thrombosis, a higher incidence of physical complaints such as dyspnea or low back pain, and poor psychological adjustment to the physical changes of pregnancy.

Post Delivery Benefits for Mothers

Clapp (2000) studied the impact of exercise on mothers during the post-partum period and identified many benefits to be gained from maintaining physical activity. Using physical examinations and questionnaires he gathered follow-up data on 150 women addressing the areas of maternal well-being, fitness, weight and fat retention, bone density, abdominal muscle tone, musculoskeletal injury, and bladder function. He found

that more than 90% of women who maintained an exercise program during pregnancy continued to exercise after the birth, and, of these, 70% reached or exceeded their pre-pregnancy fitness levels. Clapp also reported that 30% more of the women who continued to exercise after delivery returned to their pre-pregnancy weight within one year and even more returned to their pre-pregnancy body fat level and regained their abdominal muscle tone rapidly. In addition, Clapp found that the women who continued their training programs after delivery reported a marked decrease in perceived levels of stress, a more relaxed maternal-child relationship as assessed by the parenting stress index, and a 60% decrease in symptoms of depression as assessed by psychiatric questionnaires.

With most women having to contend with some bladder control issues during pregnancy, a concern by many physicians and women have been that exercise during pregnancy and post-partum could accentuate bladder control problems. Clapp (2000) reported that during the immediate post partum period exercising women had a lower incidence of bladder control problems with 40% versus 60% of non exercisers reporting loss of bladder control; after a year the prevalence of occasional loss of bladder control dropped to 20% for exercisers and 42% for the non exercising group.

Offspring Benefits of Exercise During Pregnancy

Clapp also studied the effects of exercise during pregnancy on the morphometric and neurodevelopmental outcome of the offspring. Clapp's 1996 study followed 20 offspring of women who continued regular, vigorous, sustained exercised throughout pregnancy. Morphometric measurements were obtained at birth and at five years of age by a single, trained observer and compared with matched control subjects. Clapp reported that when compared with the matched controls at one year of age, the offspring of exercising

mothers exhibited slightly better motor skills but had identical mental skills and morphometry. However, at age five years they were much leaner than control offspring and performed much better on standardized tests of intelligence, particularly in the area of oral language skills. Clapp noted that it was not that the offspring of the exercise group were unduly lean but that the control offspring were a bit on the fat side; whether this would continue to be the case into adolescence and beyond is unknown at this time, but if it does, it may be critical to lowering the risk for a variety of chronic diseases prevalent in society today. The marked difference in scores on tests of general intelligence and oral language skills was un-expected and cannot be explained by the data but Clapp (1996) does hypothesise that it is possible that some factor associated with exercise, e.g., motion vibration, intermittent stress, fast heartbeat, may alter neurodevelopment in utero in a beneficial way. Clapp concluded that the offspring of exercising women showed no evidence of comparative deficit in any area of study and that this information should be reassuring to the exercising women and to those who care for them and their offspring.

A second study by Clapp in 1999 studied the offspring of 34 women who continued regular exercise during pregnancy and 31 matched controls that did not. Neonatal behaviour was assessed at five days after birth using the Brazelton Scales. The results indicated that the neonates born of exercising mothers had a different neurobehavioral profile as early as the fifth day after birth. These data supported the hypothesis that regular exercise throughout pregnancy alters early neonatal behaviour in a positive way, with the offspring born of exercising women being neurodevelopmentally a bit ahead of those born to less active women.

Clapp's 2000 clinical update on exercise during pregnancy identified that foetal benefits of maternal exercise seem to be caused by the effect of an intermittent reduction in uterine blood flow on placenta growth, placental function, and foetal behaviour coupled with a small but significant decrease in foetal nutrient availability. The physiologic result is that these foetuses are lean at birth and seem to have an increased tolerance to the physiologic stresses of late pregnancy, labour and delivery. Clapp hypothesised that the differences in the foetuses of the exercising mothers was caused by "imprinting" where the environmental factors experienced in utero i.e., noise, high blood sugar, rhythmic motion, etc., on postnatal growth and development may explain these differences in newborn behaviour and that these may persist throughout childhood and perhaps adult life.

In summary, there is evidence that indicates women experiencing normal pregnancies can engage in exercise with few restrictions [such as: contact sports, sky diving, down hill skiing, etc.] without compromising foetal growth and development or complicating pregnancy, labour or delivery. Sternfield (1997) found a lack of evidence for any harmful effects of exercise on pregnancy outcome, and goes on to say that for healthy well nourished women, exercise during pregnancy is safe and should be subject to few restrictions. Finally, Stevenson (1997) agreed that while important gaps in our knowledge of exercise and pregnancy remain, there was sufficient evidence to conclude that moderate exercise on a regular basis during a healthy pregnancy has minimal risk for women and their foetuses.

Women and Exercise

In spite of the many identified health benefits of exercise for women cross-sectional studies over the past ten years consistently report low levels of regular physical activity

among women in general. According to the Canadian Fitness and Lifestyle Research Institute men are more likely than women to be active and adults are less likely to be active with increasing age (Cameron, 2004). This being the case, encouraging women to become or stay active becomes an important issue. Unfortunately, these lower levels of reported physical activity for women are not surprising when one considers the history of women's involvement in physical activity and the medicalization of women's health.

A century ago, according to Vertinsky (1998), in the name of social and individual health, female behaviour was increasingly restricted by physicians and physical educators who outlined the range and scope of physical activity for girls and women. The advice for pregnant women was not to exercise in view of the supposed risks of physical reproductive harm and nervous strain. This advice, as described by Vertinsky, appeared to have not been based on empirical evidence but on cultural assumptions that had a particular non-medical use in ordering social and power relationships.

These longstanding propositions about women's capacity for sport and strenuous exercise developed in response to late nineteenth century medical interpretations of the biological theories about menstruation (Vertinsky, 1987). In issuing medical advice to middle class women physicians promoted a theory of menstrual disability that contributed substantially to a deepening stereotyping of women as the weaker sex. With menstruation seen as a pathological condition, physicians discouraged women from vigorous and competitive sports and from any physical exertion which they saw as overtaxing. A growing list of restraints was imposed on women with the medical advice coming to reflect and perpetuate women as physically inferior.

The past two or three decades have seen a great deal of change and advancement of access and opportunities for girls and women in health enhancing physical activity and sport. Thanks to a long list of feminists and researchers focusing on women's health issues we are beginning to see an improved environment for active women. One such woman, Charlotte Perkins Gilman, a feminist theorist in the late 1800's struggled to extend the parameters of physical activities for women within a patriarchal tradition of female confinement and subordination. Gilman viewed physical activity as a means to gaining personal autonomy for women and her writings have had a direct and enduring impact on removing the barriers blocking women from physical emancipation (Vertinsky, 2001).

Though encouraging signs of change are evident we still see girls and boys today, from a very young age, being directed toward different options for physical activity. Tarran (1995), in her examination of social attitudes and expectations that limit women's freedom to move in the world, writes that attitudes towards exercise are learned in childhood where girls are encouraged to be passive, docile, unadventurous, and safe while boys are encouraged to participate in more physical sports. Boys are expected to get dirty and be adventurous while girls are encouraged in activities that teach grace, not strength and speed. Tarran points out that though exercise has been shown to be of significant benefit to health and general well-being, women's bodies are consistently subjected to attitudes of femininity in western society, inappropriate appearance, and sexism.

Lensky (1995) reported that many girls and women have not had the opportunity to develop the motor skills necessary to participate and enjoy sports and physical activity. Women and girls have not learned to perform basic bodily movements confidently, and

many have not had the chance to develop such skills as throwing, catching, and hitting, either because of ineffective physical education programs, lack of parental encouragement, or cultural or societal prohibitions against strenuous physical activity, with this physical "illiteracy" among girls and women warranting serious attention.

Today, performance by males and females have approximated each other to varying degrees depending on the sport, with the difference in the world records set by the two sexes having shrunk to approximately a 6-12 percent difference in some sports (Hartman & Bung, 1999). The 2006 Olympics saw many female athletes compete in high risk sports like snowboarding and speed skating, with Canadian women out-competing the men and winning more medals than ever before.

Despite the growing interest and increased female participation in sport and recreational physical activities there is still much evidence that many women are still not active in physical activities. Not only are girls and women less likely to be physically active than men, but the more intense the activity in terms of energy expenditure, the greater the disparity between male and female participation rates (Vertinsky, 1998).

Another area of concern identified by Choi (2000) is the use of exercise as a beauty product for women. Choi explains that physical activity for women has become the latest commodity in a highly commercialized beauty culture where exercise is promoted as a way for women to lose weight and to change their bodies to become sexier rather than a way to improve their physical and psychological health. This construction of physical exercise as a beauty product can be viewed as another form of control of women's bodies by limiting the perceptions of the female body and perpetuating patriarchal notions of femininity. This can result in fewer women than men exercising because many

women may resist this patriarchal notion of the ideal body and shun exercise. Secondly, for those women who are motivated to exercise for beauty reasons the unrealistic goals set out before them may lead to dissatisfaction and drop out.

The Medicalization of Pregnancy

The many reported advancements in knowledge regarding the impact of exercise on women's health and pregnancy outcome have not necessarily led to a more supportive environment for active pregnant women. One reason for this may be the dominant medical model of pregnancy that views pregnancy as an illness. Medicalization, as defined in Cahill (2001), describes the expansion of medical jurisdiction into the realms of other previously non-medically defined problems. Gross (2000) states that the medicalization of pregnancy and childbirth has been going on throughout this century both in the west and more recently in developing countries, where pregnancy is viewed as a health condition which is inherently problematic. Cahill (2001) argues that dependence on the medical profession for both a safe outcome of pregnancy and conversely, safe prevention of the same, has been steadily nurtured.

Today women are encouraged to be passive recipients of medical care throughout their reproductive lives. Throughout pregnancy their health is managed through the provision of antenatal and obstetric care, which emphasizes the need to monitor health in order to reduce problems and minimize risk (Gross, 2000). This view of pregnancy as an illness and childbirth as a technological accomplishment on the part of the expert has placed pregnancy firmly in the control of the medical practitioner (Ussher, 2000). Unfortunately this emphasis on risk and health problems serves to move the attention away from the majority of women's normal experiences as expectant mothers. This is justified out of the need to reduce any complications and to identify and treat serious conditions of

pregnancy, which can significantly affect women's health, as well as that of their baby. Gross (2000) sees this desire to reduce adverse outcomes for a few as impacting on all pregnancies by over-emphasizing the health problems of pregnancy, rather than validating women's experience as mothers.

Contrasting with this lack of control women have over their own bodies during pregnancy is a second common discourse on pregnancy, one of rights and responsibilities (Gross, 2000). Women are often faced with the conflicting situation where on the one hand they are assigned to a passive role, as recipients of care, while on the other hand they are assigned an instrumental role whereby their actions will determine their child's future health, intelligence and success (Gross, 2000). Failure to act accordingly (for example, not attend antenatal appointments or continue running throughout pregnancy) may engender personal guilt and permit public criticism.

In 1985, the American College of Obstetrics and Gynaecology published the first guidelines for exercise in pregnancy. These guidelines tended to be very conservative, had an overall tone of caution, and were frustrating to healthy and fit pregnant women (Stevenson, 1997). The guidelines were updated in 1994 and again in 2002; however, though they showed more flexibility, they remained conservative. Although pregnant women have successfully undertaken much more vigorous activity while pregnant these guidelines do not come close to encouraging this level of activity. Reich (1987) has argued that the medical-legal environment, health-care professionals' lack of participation in research on exercise and pregnancy, and the physician's desire to "protect" and keep women in a dependent role may all contribute to an unsupportive atmosphere when making recommendations for activity for pregnant women.

These commonly viewed perceptions of pregnancy have placed highly active pregnant women in a position where, on the one hand they are becoming increasingly aware of the opportunities and benefits of maintaining their physical activity levels during a normal low risk pregnancy, yet they are living in a society where their actions are seen by many, especially the medical profession, to be irresponsible and even dangerous to the growing foetus. Taylor, Myers and Grasmick (1990), when investigating the social context in which pregnancy is embedded, indicate that expectations of pregnant women are that they will take responsibility for their own health and that of their baby, that is, they will behave "appropriately" in order to reduce any risks. It would seem that in western society "appropriately" is taken to mean abstain from vigorous exercise.

Why Pregnant Women Stop Exercising

With the growing list of benefits of physical activity over the last few decades, physical fitness has become increasingly more important to women of childbearing age; however, this is reported as a time when many women turn away from exercise (Clapp, 1998). Clarke and Gross (2004), in their study which looked at women's beliefs, behaviour, and information sources about physical exercise and pregnancy, found that many active women turn away from exercise when pregnant with over two-fifths of regular exercisers ceasing to engage in recreational physical activity completely. The prospective study which consisted of a series of semi-structured interviews throughout pregnancy of 57 nulliparous women found that 63% of the women reported that they stopped or reduced exercising when they became pregnant; 52% of these women said they were responding to advice and 32% referred to risks or dangers they believed to be associated with such activity.

The women who do choose to exercise throughout the course of their pregnancy(s) are often subjected to questions and advice during this period. However, it seems that little of this advice comes from their physicians and much comes from friends and family. Of the women in Clarke and Gross's study (2004), only 18% reported receiving advice on exercise and pregnancy directly from the health professionals involved in their antenatal care, with 22% reporting that they had often received confusing and contradictory recommendations. A frequent source of reported advice in late pregnancy came from family, friends and colleagues. At 25 weeks of gestation 59% of women who reported receiving advice from family members indicated that they had mostly been discouraged from being active; at 34 and 38 weeks this number had risen to 85%. Clarke and Gross noted that the advice from this group tended to nurture inaccurate perceptions of exercise and pregnancy and that the general consensus from this group was that pregnant women should limit their exercise.

Clarke and Gross (2004) concluded that women choose to decline or stop engaging in physical activity during pregnancy because of a combination of strong social, cultural and medical discourses that discourage physical activity in pregnancy. They noted that the women followed in their study were not aware of the many benefits available to them from continuing their exercise regimens and identified that there is much work to be done to improve the quantity and quality of advice provided to women regarding continued exercise during pregnancy. The question then becomes, for the highly active women who choose to continue vigorous exercise during pregnancy, how do they deal with the conflicting messages and perceptions they come in contact with regarding exercise and pregnancy and how is it that some of them are able to maintain their exercise regimen?

Deficiencies in the Literature

The literature to date has identified many benefits from exercising during pregnancy for both the mother and the developing foetus. However, many women seem to reduce their exercise participation during this period. The limited research would suggest that this reduction in participation is due to the discouragement from health professionals, family and peers. However, there is no reported research which has explored the experiences of women who continue to exercise during pregnancy. This study examines the experiences of those women who do continue with vigorous exercise throughout the course of their normal pregnancies.

CHAPTER 3

METHODOLOGY

Purpose of the Study

The purpose of this study was to explore the reported experiences of women who continued vigorous exercise throughout the course of their normal pregnancy and describe the perceived reactions of people around them, the advice these women received from their health care providers and others, and how they felt about themselves and their choice to exercise throughout the course of their pregnancies.

Research Design

This study utilized a qualitative research design, specifically the grounded theory study model as outlined in Strauss and Corbin (1998). The aim of the grounded theory study, as explained by Strauss and Corbin, is to seek understanding of the subjective realities of its participants and to create new and theoretically expressed ideas or new theories. One characteristic of qualitative research as described by Creswell (1994) is that the concept is "immature" due to a conspicuous lack of theory and previous research. Since this research project attempted to widen the meaning and explore the substantive areas where little is known about the experiences of women who maintain vigorous exercise throughout pregnancy, the grounded theory methodology best suited this project. The theory drawn from the data, in this case interview data, may offer insight, enhance understanding, and provide a meaningful guide to action.

This study utilized semi-structured, open-ended, one-on-one interviews. The interviewer used a simple interview guide in order to probe and explore the following topics: (a) the women's lifestyle behaviours in general, (b) their workout regiment, (c) information or

advice they had received from health care professionals and others, (d) the range of reactions they had experienced from people around them, and (e) the impact these comments had on them as mothers to be. The interview question list is available in appendix B.

Selection of Participants

Study participants identified for this research project included women who had been pregnant in the past ten years and had engaged in a highly active lifestyle before, during, and after pregnancy. A purposeful sampling approach was used where the researcher actively selects the most productive sample to answer the research question (Marshall, 1996). Qualitative research commonly uses the purposeful sampling technique since this method allows for participants to be selected who are best suited to provide a full description of the research topic. Research participants were approached at various fitness facilities in the city of St. John's. Fitness directors with the St. John's YM-YWCA and The Works at Memorial University of Newfoundland were asked to distribute an information package to women who had engaged in high levels of physical activity throughout their pregnancies. A list of names and telephone numbers of the women who received the information package was kept. These potential research participants were then contacted by the researcher by telephone.

Once contact was made with these women the research project was explained, they were questioned as to their suitability for this study and those that were identified as so were then invited to take part in the project. Once one participant was identified that participant often identified other women who could be potentially suitable and interested in becoming a part of this study, creating the snowball effect of finding other suitable research participants. The researcher then made contact with these women to discuss

the project and to solicit their participation. This combined method of solicitation of research candidates allowed the researcher to access sufficient suitable participants. As the study progressed it was identified that the number of new categories and themes emerging from the interview data started to decrease by the ninth and tenth interviews. Thus it was felt that data saturation was accomplished with the tenth interview.

The Participants

A sample of ten women with similar social background and extent of engagement in exercise during pregnancy were interviewed for this project. The participants ranged in age from 30 to 45, all lived in the St. John's, Newfoundland area, and were Caucasians. All were married with the exception of one common-law relationship. All were from middle to upper middle class families and all held some level of post-secondary education, many holding masters' degrees. All engaged in a highly active lifestyle before, during and after their pregnancies. These women were competitive and recreational runners, competitive tri-athletes, fitness instructors, and competitive team sport athletes. Their training regimes included engaging in daily physical training, often five to seven times per week,: running several times per week [five to 15 plus kilometer runs], triathlon training, team sports, teaching several fitness classes per week, etc. The intensity levels of their training activities would be considered moderate to high intensity training, where these women would be maintaining if not making fitness gains while pregnant. A typical training day for some of the research participants while pregnant would be a ten plus kilometer run or a one hour swim or an hour and a half gym workout. All of these women appeared to be within a lean to normal weight range and appeared to have very high energy levels.

Table 1 provides a description of all ten women who participated in this study. Included in each personal profile is a summary of their work out regimen, their educational background, and number of children.

Table 1: Personal profiles of research participants

Name	Age	Education	Profile
Penny	Early 40's	Master of Physical Education	Penny is a mother of two, a son ten and a daughter three and had her children while in her thirties. She works as a fitness and sport consultant for the Provincial government, is an all round athlete who throughout her pregnancies was a runner, competitive squash player and fitness class participant.
Kate	Mid thirties	Master of Education	Kate is a French teacher and a mother of a new born. She is a fitness instructor with the St. John's YM-YWCA who taught intense level fitness classes and was able to stay active all throughout her pregnancy.
Megan	Mid-thirties	Master of Business Administration	Megan is a mother of two, a daughter who is three and a son who is one and works in a professional position in marketing. She has been a fitness instructor for many years with the St. John's YM-YWCA and throughout her pregnancies, continued to teach and participate in vigorous exercise at the Y.
Lauren	Mid-thirties	Bachelor of Recreation	Lauren is a mother of three children: two sons who are five and three and a one year old daughter. She is a triathlete who maintained her training program throughout her pregnancies. She regularly runs the Tele-ten and competes in local triathlons.
Precilla	Mid-thirties	Undergraduate degree	Precilla is the mother of two children: a son who is four and a two year old daughter. She works in a professional position on a full time basis and is an all-round athlete who regularly runs local road races, plays team sports and remained highly active throughout her pregnancies.
Nadia	Mid-thirties	Master in Engineering	Nadia is the mother of two sons, four and six years old. She is a competitive runner who has trained with a professional coach and has competed nationally.

Deanne	Mid-forties	Master in Social Work	Deanne is the mother of two children, a daughter who is ten and a son who is eight. She works full time in the counseling field and was a competitive runner for many years. Deanne was able to maintain her training program throughout her pregnancies and continued to do some racing during that time as well.
Jillian	Late thirties	College Diploma in Nursing	Jillian is the mother of two, a daughter who is seven and a son who is four. She works part-time as a nurse and makes exercise a big part of her life. Jillian is a fitness instructor, a runner and a strength trainer and continued her training program throughout both of her pregnancies.
Sarah	Mid-thirties	Master degree	Sarah is the mother of four sons, all between the ages of five and two and works part-time in a professional counseling position. She was very active throughout all her pregnancies, maintaining a running program.
Jenna	Mid-thirties	College diploma	Jenna has a daughter aged two. She works for Memorial University in an administrative role and also works as a fitness instructor for The Works fitness centre. She taught and attended intense level fitness classes throughout her pregnancy.

Procedure

Among the most compelling reasons for adopting the qualitative approach, as viewed by Marshall and Rossman (1995), is the exploratory or descriptive nature of the design that assumes the value of context and setting and that searches for a deeper understanding of the participant's lived experiences of the phenomenon. The goal of this study was to listen to the research participants and to build a picture of their experiences. The data collected were descriptive in nature, utilizing semi-structured, open-ended, one on one interviews. These semi-structured interviews ranged in length from 40 minutes to one hour and fifteen minutes, were all conducted by the researcher and were audio-taped. A small and unobtrusive tape recorder was used for the interviews. This high quality

recorder, which had a built in microphone, was normally placed off to the side in order to help the participants feel less self conscious.

Interviews were conducted at the convenience of the participant, usually at their homes, late in the evenings after children had gone to bed, at their place of work or at the fitness facility of which they were a member. At the onset of the interview participants were informed of the purpose and design of the research project. They were each given an information package which included the consent form. The consent form was reviewed and discussed and then signed by each participant. The participant information/consent package is included in appendix C.

Marshall and Rossman (1995) describe the qualitative interview as more like a conversation than a formal event with predetermined response categories. Participants in this study were asked a series of open-ended questions identifying: their lifestyle behaviors in general, their workout regiment, information or advice they had received from health care professionals and others, the range of reactions they had experienced from people around them and the impact these comments had on them as mothers to be. The interview question list is available in appendix B.

The fundamental assumption of qualitative research is that the participants' perceptions of the phenomenon of interest should unfold as the participants view it, not as the researcher views it (Marshall & Rossman, 1995). In this study the interviewer initiated the topic areas and allowed the interviewee to guide the direction of the conversation based on her own particular interests and views.This design followed the inductive approach with the researcher building concepts, hypotheses and theories from the data

and maintaining a level of flexibility with the design in order to respond to emerging ideas.

Merrian (1988) has described the qualitative researcher as someone who is interested in meaning, how people make sense of their lives and experiences, with the qualitative researcher being the primary instrument for data collection. These interviews allowed the researcher to understand the meaning these participants held for their everyday activities while exercising through their pregnancy(s). The women were very eager and excited to talk about their pregnancy experiences and about being a mother. The conversations were very enjoyable and animated with the participants telling their personal stories.

Participants were informed that, at the conclusion of this study, a group presentation would be organized in order to present the findings of this study and to allow the participants to meet other women who had very similar experiences as they did during their active pregnancies.

Ethical Considerations

An application for ethics approval was submitted to the Human Investigation Committee (HIC) of Memorial University of Newfoundland and subsequently approved. A copy of the of the HIC clearance letter is available in appendix A.

Prior to data collection for this study informed consent was obtained from all study participants. A copy of the consent form is available in appendix C. To insure confidentiality all collected data were secured in a locked filling cabinet in the researcher's office. The identity of the research participants chosen for this study has been kept confidential through the research process and at no time has the participant's

name been associated with the information they provided during the interviewer. The participants were all given pseudonyms and any specific information such as names of children and spouse and employer were also changed to protect their identity.

Data Analysis

In qualitative data analysis several simultaneous activities engage the attention of the researcher: collecting information, sorting the information into categories, formatting the information into a story or picture, and actually writing the qualitative text (Creswell, 1994). Data analysis is the process of bringing order, structure, and meaning to masses of collected data (Marshall & Rossman, 1995). This process began with the transcription of the taped interviews. A graduate student from the School of Human Kinetics and Recreation was hired to assist with transcription of the data into print text. This student transcriber signed an oath of confidentiality prior to this process. Next, the researcher reviewed the tapes with the transcripts in order to ensure and verify what was transcribed. Data were also collected during the sessions in the form of note taking. These field notes collected during the interviews included demographics, reconstruction of dialogue, and reflective notes.

The print data were then reviewed for the identification of the themes inherent in the data. This began with the reading and re-reading of the transcribed data in order to become intimately familiar with the interviews. Each transcribed interview was read twice and on the third reading notes were written in the margins of each page. At this point a preliminary list of codes was developed.

The next phase of analysis involved the generating of categories, themes, and patterns inherent in the data. Identifying salient themes, recurring ideas and language, and

patterns of belief that link people and settings together are the most intellectually challenging phase of data analysis and one that can integrate the entire endeavour (Marshall & Rossman, 1995). To assist with this process a matrix table was prepared, as outlined in Marshall and Rossman (1995). This matrix was used to relate the key themes identified to the different research participants. As Marshall and Rossman state, generating categories of data to collect or cells in a matrix can be an important focusing device for a study. On a large piece of poster board the names of the participants were written down on one side with the main concepts running across the top. The individual cells contained the quotes relevant to the particular concept or theme.

Once the matrix was complete the "hurricane thinking" strategy was used in order to help further sort the data and uncover the patterns in the data (Kirby & McKenna, 1989). To start, the research question was placed in the centre of a poster representing the "eye of the hurricane". Next the categories identified in the matrix were placed around the eye, with the categories with the strongest ties placed closer to the centre or eye and those with weaker ties placed further from the eye.

The constant cross comparisons and matching of the data bits over time resulted in the hurricane pattern becoming more simplified and strengthened. This process was repeated many times with each new version of the diagram becoming more focused than the last, until the final pattern emerged which captured the meaning found within the data. This technique was essential in helping the data take form from a lot of very interesting quotes taken from the interviews to a clear picture of what the participants' experiences were saying to me. The final product, the hurricane diagram, demonstrated a visual picture of the themes found in the data. See page 63 of the results chapter to view the diagram.

Next, the researcher assessed the data for usefulness and credibility, and began the process of evaluating the plausibility of the developing hypothesis. The constant working with the data allowed the researcher to see the inherent patterns, which ultimately lead the researcher to being able to see what was important in the data and what she wanted to tell others. The final step was the writing of this report. Marshall and Rossman (1995) state that the writing of the report cannot be separated from the analytic process for the choice of words to summarize and reflect the complexity of the data, the researcher is engaging in the interpretive act, lending shape and form or "meaning" to the data.

Role of the Researcher

In qualitative designs the role of the researcher is that of the primary data collection instrument. This necessitates the identification of the researcher's personal values, assumptions and biases at the onset of the study (Creswell, 1994). Throughout my own normal and healthy pregnancies I was able to maintain my pre-pregnancy physical activity levels for the most part. This entailed engaging in moderate and intense levels of exercise several days a week which would include teaching high intensity exercise classes at the YM-YWCA, 30 to 60 minute runs, strenuous hiking, or using various gym cardio equipment. Out of my own personal experience with maintaining vigorous physical activity during pregnancy came the desire to find answers to the questions asked in this study.

I personally experienced very healthy pregnancies, was even more energetic than my normal high energy self, felt very comfortable exercising throughout my pregnancies, used commonsense when choosing activities, and was able to stay highly active up to the day of my children's births. During pregnancy I was followed by both my family doctor and an obstetrician. I received weekly checkups, had my blood and urine

sampled regularly, had internal examinations regularly, and had a number of bio-physical and ultrasound examinations throughout my pregnancies. I felt as though I was being well cared for and was very intrigued with all the examinations; however, I can recall a number of occasions when having all these assessments resulted in more scares than reassurance.

Being a very fit active person before my pregnancies and having followed a few role model women who, before me, maintained their exercise programs throughout their own pregnancies, I knew that that would be my goal as well. I researched the topic in great detail using journal articles and books and felt very comfortable with my plan to maintain my activity levels while listening to my body as things progressed. Both my family physician and my obstetrician were neutral and at times discouraging when it came to offering advice on exercise and pregnancy. My family physician encouraged me to downgrade my activity level although he knew my regular exercise routine, suggesting shallow water fitness classes or a pre-natal fitness program. My obstetrician would listen to me as I updated her on what I was doing as an exercise program but she would provide very little advice or opinion on what I was doing.

Throughout my own highly active pregnancies I experienced many negative as well as some very positive reactions from people around me. As a fitness instructor I received daily comments regarding "Should you be doing that?", "Do you think that is safe?" and so on. I would find myself providing explanations and educating these people on why what I was doing was safe. There were also many people who seemed to be inspired by what I was doing and commented that I was very healthy or that they wanted to be able to do the same when they became pregnant.

Having personally been pregnant and highly active, I came to this study with experiences, perceptions and biases on this topic. While every effort was made to ensure objectivity on my part my personal biases may have played a role in shaping the way I viewed and understood the data collected. I shared the women's sadness and guilt when they reported being confronted about their activity levels but I also shared their commitment to physical activity and their belief that they were well informed and not behaving irresponsibly.

CHAPTER 4

RESULTS

This chapter presents the findings of this study organized under four thematic categories: the belief in the value of exercise, the pressures to stop exercising, the resulting internal conflict the women experienced, and how they were able to overcome this conflict and have the courage to follow their exercise choices. The chapter concludes with a structured overview of the participants' experiences represented through a Hurricane Diagram.

Belief in the Value of Exercise

For all the women interviewed in this study there was a very strong commitment to a healthy lifestyle in general, with the transition to maintaining their exercise routine throughout their pregnancies being a very natural step. The study participants shared a number of very strong beliefs about the value of exercise in their lives, from the belief that exercise was their stress management tool, to the belief that exercise allowed them to enjoy pregnancy more, to the belief that it provided health benefits to their unborn baby.

Commitment to a healthy lifestyle

When describing the key health practices that were important to them, both pregnant and not pregnant, it was very clear that these women practiced very healthy lifestyle behaviors from: eating habits, non smoking/drinking behaviors, sleep/rest, stress management, staying physically fit and spirituality. Not only did they demonstrate very healthy lifestyles they also emphasized that exercise was not something that they were

willing to give up when they became pregnant. Deanne described her key healthy lifestyle practices this way:

> Well, important to me is exercise, eating properly, physical, emotionally, having emotional connections with people, having social supports, intellectually having reading, reading, getting new information on things, all of those things, I don't know what else would be, weight isn't so much. I think if you exercise and you eat properly that comes, that's hand in hand. I have never worried about my weight and I never weigh myself, that was more the concerns of people when I was pregnant, of how much I weighed, it wasn't for me. No really, oh you gained 6 pounds, really, as long as I was eating properly and eating good foods, exercising on a regular basis, working my heart, also relaxation, I find I need, I find running is relaxing.

Penny saw exercise as the pivotal piece when it came to a healthy and balanced lifestyle:

> I think the most important role for healthy living is exercise and I have always been a believer of that. If you exercise the rest will fall in place. You will not smoke. If you smoke and you exercise, chances are that you will stop. You will eat better. You won't overeat as much because in your heart you will feel that I have done all this exercise, I am not going to eat away my results.

Megan described the importance of exercise for her:

> I guess another way of asking that question is why do you exercise, and I, for a lot of reasons, but it all basically comes down to health, longevity and energy...I think it is important for them [the children], to be an example for them, and to live a healthy lifestyle. I guess that is one of the main roles or one of the main reasons why I want to exercise, and just for my own mental health and energy, and reliever of stress.

Healthier pregnancy

The research participants generally described feeling very healthy during pregnancy, with their expanding waistline not holding them back from doing anything and many being able to maintain their exercise programs up to delivery day. These women described their pregnancy experiences as having few of the commonly reported

"symptoms" of pregnancy. The few symptoms that were noted in this exercising group were nausea, food cravings, and sleeplessness at the very late stages of pregnancy. Sarah described her health during pregnancy this way "Nothing to stop me doing anything, like that, a symptom here and there, a bit of heartburn on the last one but nothing drastic".

Deanne described her healthy pregnancy experience:

> I had no nausea; I had nothing with Jenna, if you open the textbook normal pregnancy. They didn't even have me as high risk, I was 39, and they said to me, Dr. Brown said, keep running you are doing fantastic! Everything was normal, I had gained 26 pounds, my blood pressure, everything was normal, nothing ever went.

Pricilla saw exercise during her pregnancies as all about healthy living:

> Bottom line, my whole thing would be trust your body, do what's best for you and trust your body and your body will tell you when you can't do it or when you are not feeling good trust that. I wouldn't push on, it wasn't to keep weight off, it wasn't to look lean and slim, I mean I gained 40 and 30 pounds. And so that wasn't it, it was purposely for a good activity and healthy living.

Kate saw exercise as critical in her feeling good during her pregnancy:

> Excellent, I think it's fantastic. You know if we have another one it would be the exact same thing because in the end it helps all the more. And even after when you're fatigued and when you're sleep deprived and you know it helps. The fact that you can go and work out for an hour just brings you right back to yourself and it's tremendous. I mean, I would tell anyone to do some sort of exercise.

> <u>Belief that staying fit meant a better pregnancy and delivery</u>

For these women exercise during pregnancy helped them enjoy pregnancy more, helped them feel better about themselves and assisted in controlling some of the symptoms of pregnancy. Nadia described how she felt uncomfortable during the late stages of pregnancy and how exercise helped her:

> During pregnancy I found that as I got later in the pregnancy, ahh, you were getting bigger, umm, you know, it, I found later in pregnancy just going out for a run it just made you feel better. It just mentally made you feel better cause I found when you got bigger, when you where in pregnancy and you got bigger it's just, its not that the size, it's just you're not comfortable. You don't sit comfortably the same way; you don't sleep comfortably the same way. So I just found going out and having a run it was like kinda, oh that was good!

Deanne described the significance exercise has for her as:

> Central to my life and it balances me and it made me enjoy pregnancy much more...and that was the other thing, that's the one thing about being fit before pregnancy, the labour, I don't think it makes much difference with the labour, I really don't. The only thing it does, my own gut feeling is that I was older so I think my body was older and I had 12 hours of back labour to start off with so that was no fun but I think you're more, because your older, you're more determined and if you get a fitness background you're used to keeping your body fit too, you manage it better. I think that was what I did; I managed the pain well without any medications, just through the breathing because I had that piece. But afterwards within a week I was running again and I felt great. Like I had Jenna at 1:10 in the morning they let me go at 8:00 that morning.

Kate described how she felt during her pregnancy:

> Well I think it kept, you know gaining weight and you feel heavier and you are not used to feeling heavier and you are so used to being fit and kind of trim and it was, I was happy because I only gained well the 25 pounds and that was the baby and the extra stuff. I was happy with my shape and I felt really good because I was exercising. I think it was a great mental that for me, I always felt well I had my shape and it was just basically the baby and you know and I felt really good. I think that the exercise had a lot to do with that. Mental.

Belief that healthy mother equals healthy baby

A number of the women made the connection between their own health and that of their growing foetus. They saw that their own health was a reflection of the health of their unborn baby. Penny described the significance of exercising throughout her pregnancies as:

> To keep you busy, and for me I was very conscious of having a healthy child, and I thought that my belief, although there is not a lot of research out there, was that if I were to have a strong body and a strong immune system then that would translate to the baby.

Pricilla described a very similar understanding of how she saw exercise impacting on her pregnancy:

> I think, it was to keep myself fit, and I sort of thought healthy mom, healthy baby. And yeah, I mean that was probably the main reason.

Deanne also made the connection between her own health and that of her unborn baby:

> You talk about subconscious stuff right, I think that's the part that I would highly recommend if you want a healthy (baby), I think because I exercised I had a healthy body, a healthy baby, my baby was healthy for it.

Healthier offspring

When asked about their children, all the mothers interviewed described their children as very bright and healthy and within a normal weight range. Pricilla described her two young children as:

> No regrets, I would do it again tomorrow (exercise throughout pregnancy) like wouldn't hesitate and I don't know my husband and I are both so active and whatever that maybe just the environment leads to the kids. I mean it is kind of hard to tell with Alicia (baby) but Adam, from the minute he gets up till the minute he goes to bed, wants to race, run, tag, run the Tely Ten, soccer, football, rugby, you know, whatever. So I don't know, it could have something to do with pregnancy, it could have something to do with the environment now, I mean who knows.

Nadia described her two children this way:

> Well let me say, they have, the both of them have enough power to power the entire island of Newfoundland and Labrador. But I think the kids have a lot of energy. I don't know if that's because I exercised on them but people will often say to me how can you expect those children to stay still when you never stay still?

Belief that exercise was key to managing stress

Being pregnant and being a mother brings with it a number of stressors but for the women interviewed having exercise as a part of their lifestyle helped keep stress in

check and provided a key outlet. Penny talked about the stresses of pregnancy and parenting and the role exercise played for her:

> I really believe that staying active is very important, to control your body fat, which tends to creep up on you a little bit and to control your positive outlook. It is very stressful to be pregnant because I think the whole time you are worried about losing the baby. A lot of times you are wondering if you will be a good mother, if you will be able to handle this, especially on the first one. It's a little bit nerve wrecking and even if you are in a stressful situation where you are on your own and then exercise keeps your sanity and keeps you positive... But for me, I try to manage my life with it because it is a great way to deal with stress and to feel good about yourself. There are so many things that are trying to put you down that you need to have the resilience, and that is why exercise does it for me.

Nadia described the challenges of late pregnancy and how exercise helped her feel "normal again":

> Yeah, like I couldn't even sit for any length of time when I got to reach that, that stage of the pregnancy. But I would say that exercising during pregnancy, especially, when you get into the later months, I think it just kind of, sort of, kept you up, kept your spirits high because you know when you get into the last trimester you're tired of being pregnant and you just want that baby to come. You want; like I remember on Allan, I just want that baby out you know? Its time for that baby to come out and I'll take care of it. You're so uncomfortable and your body is stretched to the limit, and you're so uncomfortable and it's like I want you out, right?

Nadia also felt that exercise played a role in her dealing with post-partum depression:

> I would say that the only thing I think that, you know, people talk about post partum depression and I would say that, you know, I mean after my kids were born, well I was a bit longer returning to exercise after Nicholas, after Andrew, but I do think that probably exercising, you know, does help sort of chase the blues away as they say.

Belief that exercise made them better mothers

Many of the participants credited exercise as that one activity that gave them the ability to be able to accomplish more each day and to be better mothers because of it. These women stated that exercising throughout their pregnancy and as a new mother were

critical to allowing them to hold it all together during the sometimes stressful life of being a mother. Engaging in regular exercise helped them to feel good about the job they were doing as a mother, gave them the wherewithal to be more patient and to have more stamina. Nadia saw exercise as that mental break that allowed her to refuel and return to her children with more energy and patience:

> You know, the only think I would say is that right now being a mother, I find that being able to still continue to exercise, I think, umm, is of benefit. You know, I think it helps me sometimes, you know, if you're with the children a lot, eventually you know you just lose patience. And I find exercising does help you to be more patient because it just relaxes you, umm, so I still find that running has, umm, well I enjoy to run. I must say, I like running on the trails. I, I find it still has, has a major spot in my life. And in terms of being a mother, I think it helps me be more patient.

Jillian described similarly, how exercise helped her to be a better mother:

> It definitely, definitely. Like it gives me, ahh, I think clearer and like managing the kids are so much easier after I exercise. I feel like I got more energy, umm, I don't get tired as much. The adrenaline is flowing and then the adrenaline is gone, then I'm down and back to normal. And the weight thing, the weight issue, so mentally and weight.

Belief that exercise provided a mental health break – Balance for living

The women in this study described exercise as their key to mental health, that it was the one activity that balanced them and allowed them to hold it all together. Jillian described the importance of exercise for her as:

> A big mental thing. I mean, I work all nights and, ahh, just to get out and exercise, I feel, okay, my day is great, after that I can do anything, after I exercise! It, ahh, definitely helped me, you know, makes you feel better about yourself. I mean, I felt that right, no matter how bad I felt before I always felt better after. And of course people say, you know, you have an easier delivery. I'm thinking I don't know about that! When I pushed, it was coming whether I exercise or not, he was coming! So, I don't know about that part of it, but, ahh, it definitely kept my weight down. You know I maintained my weight, you know I only gained, like, you, you, never put any weight on at all either. So with Anna, like 20 pounds she was out, you were back into your own clothes. It wasn't even an issue, the weight gain, plus I was sick too, so I wasn't eating much. So the exercise, you know, helped to keep the weight down. It, umm, it made me feel better.

Nadia saw exercise as essential to her mental health:

> When I feel strong physically, I feel strong mentally. So it's more of a mental thing. It's hard to put into words, but, you know, it just makes you feel refreshed, it energizes you, and gives you more patience.

Belief in exercise as essential in their lives

For these women exercise was an integral part of who they were; it was as essential a part of their life as was eating and sleeping. All participants were very committed to their exercise program before, during and after pregnancy. For most it played a much bigger role than that of staying trim and physically healthy, but the more important role of being the one thing that centered or balanced them and relaxed them in their very busy and hectic lives. It was such an important part of who they were and how they identified themselves that stopping their training during pregnancy would have been a very difficult thing to do in any case. Deanne described the role of exercise for her as: "It clears my head, I've done it for so long I can't separate exercise from me". Nadia stated "I consider it an essential role as my number one source of stress relief."

Penny described the importance of exercise:

> I guess it's like eating, it has the same role. It is necessary for survival. There are so many things that are trying to put you down that you need to have the resilience, and that is why exercise does it for me.

Sarah described exercise as integral to her life:

> For me personally, I consider it (exercise) an essential role as my number one source of stress relief. Like it really is and I find it just wonderful. And for your body physically and mentally, exercise, I don't know what else I could say, it is a very, really integral part of my life that I tend to be quite consistent on. I know some people go all out for a few months and then Christmas time get a wave of exercise machines and then give up, but it's something that I really, I love to do.

Sarah saw the role of exercise as even more important to her during her pregnancies:

> Absolutely the same or maybe even more important because I knew, that you know, that it is not even so much a vanity thing or an image thing you know, I wanted to get back into shape. You just know that it is not part of your life you want to let go so easy when you're pregnant. And you don't want that to make any difference to the role it plays in your life, before and afterwards.

Feelings of pride

All the women interviewed identified that they were very proud of themselves for being able to continue with their vigorous exercise regimes throughout their pregnancies. The women described feeling very energetic throughout pregnancy, many noted that they were proud of their pregnancy physique, enjoyed the experience of pregnancy and were able to maintain their fitness level with most of them maintaining their exercise routines up to delivery day. Having experienced these many benefits strengthened their resolve to maintain their activity levels throughout subsequent pregnancies. Sarah described how she felt about her choice to stay active:

> Well, I feel very privileged and very lucky and very proud, tots were healthy little boys and I do generally feel very lucky that I was able to exercise all my pregnancies. Like I say, I had a miscarriage before my first child but that was very early in the pregnancy and it really didn't have a long term impact on me. As I say, it's good enough to have these four normal babies and I just feel lucky that I have been able (to exercise). I have never been on bed rest or have to go on a certain diet or avoid certain behaviours or whatever. The pregnancies [have] been quite a part of life for me as you said. Just reading the books that lists all of the awful side effects and awful problems that can be associated with pregnancy which should be so normal. I have been lucky to avoid most of them, pretty straight forward.

Deanne described how happy she was that she maintained her training throughout her pregnancy:

> I just felt so connected. I felt so glad that I had listened to myself and I think if there is any message I can give mothers, regardless if you exercise or not listen to your body, you know. And if you don't even exercise start something, do something, even if it just means walking. You don't have to run but if you are a

> runner and you are really connected with that continue it, don't give it up because, and if something goes wrong, it's not because you are running.

Pressures to Stop Exercising

The second category of themes identified in the data covered the range of pressures these exercising women had to deal with because they chose to maintain a high level of physical activity throughout their pregnancies. These pressures came in the form of comments, insults, reactions, and stares from people around them, with all interview participants describing having had negative encounters with others regarding their choice to stay highly active throughout their pregnancy. These negative comments or confrontations occurred with healthcare professionals, family, co-workers and strangers. No matter who made these comments the women seemed to recall them very vividly, with these comments often planting a momentary seed of doubt in their minds.

Physicians offer vague advice

Many of the women interviewed recounted negative experiences with their healthcare providers regarding their decision to continue vigorous exercise during pregnancy. Many of the study participants felt that their physicians were not well informed on the topic of exercise and pregnancy. Their doctors were often vague in their advice or neither encouraging nor discouraging, leaving the women feeling confused and having to do their own research and make decisions on their activity levels on their own. Lauren, in describing her conversation with her doctor noted "I find with her she will never tell you one way or the other, just do what you can do; she never said much about it to tell you the truth."

Jillian described her encounter with her doctor when she was seeking advice on exercise and pregnancy:

> So my doctor was like, ahh, she's not into physical fitness, so she could not relate to me exercising. Like, she didn't know what to tell me. She had no idea. I was kind of thinking, okay your supposed to be advising me and then at first I was taken back by it cause she, but then again, I was thinking I know more about this than you. That's what I was thinking. So I was thinking I know my limits I know how far I can go. But with regards to her knowledge of fitness and pregnancy, I didn't find she knew a lot...Yeah, I don't feel she, she didn't encourage me but she didn't discourage me either. It was kinda like okay, you know, you do what you feel comfortable with and we kind of left it at that. I don't remember us in any deep discussion.

Megan's doctor advised her to downgrade her activity level during her pregnancy:

> Well, I will start with my G.P. I remember her saying, she was going by the book you know, walking is good, quick walking, brisk walking is good she said, like swimming or aquatic things because it is non impact, is good. And she also mentioned that she thought the Y has a program or a fitness class...She was a little bit like she wasn't negative in saying don't do that but she wasn't really recommending that I continue either. She was suggesting that you would probably want to go pre-natal low impact, aquatic, walking.

Discouraging healthcare providers

Many physicians encouraged the women to downgrade their activity levels to more moderate levels during pregnancy. Pricilla recounted the conversation she had with her family doctor when she learned she was pregnant:

> Well, initially, from my family doctor, right off the bat, I remember when I went in and she informed me that I was eight and a half to nine weeks pregnant that I never even realized. So right off the bat my first question was can I play basketball, can I run the Tely Ten, and something else. She was like 'Whoa whoa....lets step it back, you're pregnant like get that through your head first before', but that was my initial concerns, was what can I, you know. So initially my health care provider was not so gung ho about any, her recommendation was try swift walking, and that's probably, don't run, don't play basketball, don't run the Tely Ten.

Some participants described attending available educational seminars on exercise and pregnancy in order to become as informed on the topic as possible. In one such presentation Megan described an incident where the presenter, a physiotherapist, was

quite an alarmist in her view. Megan described how upset she felt after hearing the presentation on exercise and pregnancy and then talking with the presenter:

> But I didn't see the connection in [a physiotherapist] advising pregnant women on what they can and can't do while they are pregnant and she obviously wasn't really fit herself and she said that exercise 15 minutes no longer and you should not bring your heart rate up above and I can't remember what the heart rate is. She said that if you feel flushed or if your face is red at all you should stop and that you shouldn't get to that level. So I was talking to her, she was very, she scared me because I was exercising, I was at aerobics that night and it was getting to the time of year because it was getting into spring when the gym was getting hot and so I always get red anyway when I exercise, that is just me. It doesn't necessarily mean that I am getting ready to pass out. I am saying 'So my face is a little bit red tonight so am I doing damage to this baby?' I mean she had scared me to death. I really thought 'Oh my god what have I done?' She said oh yeah you really shouldn't, you shouldn't if your face is getting red...Your face is red therefore your heart rate is up so high that it is at a dangerous rate that you could be doing damage to the foetus. Yeah, and like I could see at one point you advising people who have never exercised before and like some people who and some people who think that they get pregnant and then all of a sudden they want to get fit which is not a time to start an exercise regime. But if you are already exercising and you are at a level of fitness I don't see the problem maintaining that. But she was you know and I could see why she would be trying to deter people from that but at the same time she was deterring people who were already fit and there was no reason to scare, like I was scared.

Deanne recalled feeling very frustrated after speaking with her physician about her plans to maintain running during pregnancy:

> My doctor had no research on it, and at the time it was a female doctor and she basically didn't know what to say, she just said take it (easy), don't run too hard. And I didn't know what that meant anyway, like don't run too hard, it was like watch it you could fall, it was like, so there was a guarded, it wasn't just like just go and do it.

Discouraging mothers

Discouragement from the participant's own mothers seemed to be a very common thread throughout the interviews. Many of the women talked about their own mother's reactions to their choice to stay highly active throughout pregnancy with most of the women describing their mothers as being unsupportive of their decision to exercise throughout their pregnancy. These mothers seemed to be quite concerned that their

daughters were engaging in "risky" behaviour at a time when they should be more cautious.

Deanne talked about conversations she had with her mother around exercising throughout her pregnancies:

> My mother, who had had 9 children, and I am sure she had me when she was 17 so my mother was like in her 50's then, she would say stuff like 'Are you sure you should be running? I don't think that is good for the baby'. Now and I said to her 'I remember when you had me you used to have to carry water all day and go off, so you were very physical, so what's the difference? I am just running'. She couldn't understand the running. I think they figured if you are running you are going to fall and hit your head. Even if you fell the baby is protected, I mean you know. You're just more conscious and it's something that you are connected with. It's not like I was doing something I had never done before, I was a runner. So that really concerned me and most of my family, like they were very traditional, they didn't believe that like you said, it's like you shouldn't be doing that because it is hurting the baby.

Nadia talked about her mother's reaction to her as she continued to run throughout her first pregnancy. While her mother was very fearful of her daughter's activity levels during her first pregnancy she seemed to become more accepting of her behaviour with her second pregnancy:

> I think that when I was pregnant on Jack my first, I think my mom was, you know, she just wasn't in tune with running during pregnancy... She never really said anything. But you'd, she, oh, what she didn't say, yah. You could tell she wasn't really impressed. But when I was pregnant on Adam, she was more used to it. She knew that, you know, there were no problems with Jack. That it was in fact, when I was pregnant on Adam she came up to Ottawa to help us and she, because I went early on Jack she came up, ahh, a bit early and she was there one week and she was only there for two weeks. And when I was 39 weeks pregnant on Jack, I got up one Sunday morning to go swimming and right then my mom said no, go for a run! So she gave me the cell phone and said no, just go for a run. Cause my mother said, 'I don't want to go back to St. John's and you not have this baby, so go for a run. I want you in labor so I can see this baby'.

Megan knew her mother, with whom she was very close, did not approve:

> My immediate family like my mom didn't really say much but I think she was a little bit you know, she wasn't sure but I think she trusted me enough to know. And she knew about you (researcher) cause I said Julie is down there exercising and she is doing fine.

Discouraging co-workers

Considering the amount of time people spend on the job it was not surprising that a significant number of comments and feedback would come from co-workers toward these exercising women. For some reason this was the group from which came a lot of harsh feedback. Nadia described an incident at work with a female co-worker after she saw Nadia run in a five kilometer road race on a hot summer's day:

> But I remember there was someone at my work who lived in Kanata and saw me running the Canada Day event when I was pregnant on Jack. And they just went back to work floored and telling everyone how I had run a 5k on this warm day and so I just got all these comments back when I went back to work and it, it made me feel like I've done something really wrong and it actually really upset me.

Megan described the reactions and comments she received from her co-workers through out her pregnancies:

> You know, some people were impressed that I was still working out. Certainly at work, and funny at work, one of the guys at work, and he is as sweet as anything and of course wouldn't let me lift anything and I would look at him saying 'I'm fine I'm fine', but he's like that anyway whether I was pregnant or not. But you know, I think that he kind of looked at me warily like 'Oh, you sure you should be doing that?' But he wouldn't say anything because he knew better than to say anything, but I think he thought that was a bit much. And actually it was another guy at work, like I think it was my boss at the time and he had two kids and his wife is pretty active, quite active, but she didn't do anything while she was pregnant. He made a couple of comments actually, and said 'No, I don't think you should be doing that.'

Kate talked about how she felt her co-workers, who were school teachers, were not impressed with her continuing to teach fitness classes late into her pregnancy:

> I had a few people who I work with who said 'Oh, you're not still teaching classes? You're not still doing a lot of exercise?', and I say 'Yeah you know, I feel fine'. So I had a few comments later on, probably about the fact that I was still teaching classes, probably more female than male. Well, I think from their own experience that they felt that it's not something you should be doing this far along, you know? You know it's crazy!

Discouraging work-out partners

Several of the study participants recalled comments they received from their training or work-out partners and noted that it was more often the males than the females who provided the negative comments. Deanne talked about comments she often heard from her male running team members:

> Now from my running group, the guys thought, 'Well are you supposed to be?' I can remember guys, you know, passing me on the road and stopping and saying at about 5 or 6 months (pregnant), 'Are you supposed to be doing that? Is that ok for the baby?' Then I would feel really guilty.

Deanne also recalled an incident when she was overdue to have her baby and decided to run a road race:

> I was due December 23rd, and I was to have a December 25th baby, so we got through December 25th and there was a Boxing Day run, and I ran it, a 5K, and I said to the guys cause the guys all thought, that's the other thing, the women were kind of like not sure because none of them had ever ran and exercised like that, like they were all saying 'Are you ok?' But the men were like 'Are you sure you should be doing that?' Like the men were more protective than the women. And all I used to say is that I am listening to my body. So men made me feel guilty, women didn't, women were really interested.

Penny described a situation where her male squash partner stopped playing with her because he feared that he would injure her:

> Men were a little suspicious, and I don't know why that would be. There is two or three men, and I have a lot of male friends, who would be a little bit cautious. I do remember though at five months, I was playing squash and I played at an intense level where people say you shouldn't do anaerobic exercise but I still did. It wasn't my choice to give it up it was my partner's choice. He didn't want to play me anymore because he had banged into me once or twice. I was always fully

> confident that the baby would not be hurt and I thought most of that was just old wives tales. The baby is protected in a sac of water. I did not have any of the ligament tightness or any worries that the ligament problems would cause any injuries. I did stop the squash; I think it was after five and a half months.

Discouraging family and friends

Jillian described how family members would question her choice to stay active, especially people who were inactive themselves:

> Most people where surprised. Like if you were around people that are not, ahh, as active as you are, and then when you get pregnant, they think you should do nothing. So I found a lot of people were surprised at that I am still doing this and still doing that. Especially like your parents, older people, you know? And they're like, you know, oh my goodness, oh, you're not still doing that? It's like breastfeeding. It's like, you know, when are you going to stop? It's going to go on forever?

Pricilla recalls people who questioned her need to stay active during her pregnancies:

> 50/50 you know, like some of them were very supportive and some of them were like I know you, I know that you are smart enough to know what you are doing, great, keep it up! And the others, and the others probably the other 50% were like who, 'Do you really know what you are doing? Can't you give up your exercise for a little bit?' You know? And even athletic friends of mine, who were pregnant at the same time were like no, and these are people that are better runners than me, better you know, that were just like, no.

Discouraging acquaintances

All the women interviewed had a story or two to tell about negative comments they received from people they barely knew. Sarah described a very discouraging conversation she had with a close friend's parent, who happened to be a physician, which left her doubting herself and her choice to exercise through her pregnancy:

> I think I have ran up the Hill, I think it was the last pregnancy and my best friend's parents were disgusted. I mean they said I should just be walking or even if I am gonna walk I should walk flat surfaces, I shouldn't be running up the Hill. He (friend's father) is a physician too, a very old school physician. I mean he said it in a laughing way but he was really quite disgusted that I was running up the Hill. And maybe he is right, that is the thing I am not certain, maybe it was

> irresponsible, I don't know. You know I really took care not to take giant steps so I would fall or anything like that, I wouldn't even call it running.

Pricilla went on to describe the response she received from the mother of a close friend when she tells her of her plan to run the Tely Ten road race while pregnant. This experience left Pricilla feeling doubtful that you could even trust those people who did appear to offer support to her:

> One of my best friends lives away, and I visited with her mom who is sixty, active, running, whatever. So I go in and oh great, she says how good you are to be running the Tely Ten, oh this is excellent! I wasn't out the door five minutes she called her daughter in Boston who later relayed the message to me her mother called her 'I can't believe that Pricilla would dare to run the Tely 10', blah, blah, blah, you know? So I thought, even then some people who are supportive...

Discouraging strangers

Many women described experiences where strangers would stop them on the street and make negative comments towards them that left them feeling guilty and upset. Deanne described an encounter with a person yelling at her out a car window as she ran down a street:

> So I was in this big rain storm going by the Square and I am not far from the house right, like 8 minutes, maybe 15 with that much weight on, 26 pounds at 7 months, and this car stops and volunteers to drive me home. 'Maybe you shouldn't be running you know you're getting really wet', and I was like I'm fine I'm fine you know I haven't got that far to go, and they must have thought that I didn't have that far to go to deliver!

Sarah described an encounter with a fitness instructor who was conducting a fitness class she was attending:

> I remember Brad (fitness instructor) actually making a comment, when I was running (in a fitness class) that maybe I better cut it down to a, I think he just ran along side of me he just quietly said 'I think at this stage in your pregnancy it be, research suggests that you should generally just stick to low impact'. So again I felt kind of miffed but I said all well enough, I said ok, you're right. I say again I am quite curious to read any research about that because you know maybe it is

> at that stage, it is unwise to keep at the high impact stuff. Like believe me I could take it, and quite... I thought 'Well he's right, yeah he probably is right'. By that stage I was huge, now this was my last pregnancy and I had been overdue, nine months plus and still bouncing up and down in the gym upstairs.

Internal Conflict

The third major thematic area found in the data deals with the depth and range of the internal conflict experienced by the women interviewed for this study. These women possessed a strong drive and desire to continue their activity levels during pregnancy yet had to cope with a myriad of conflicting emotions and beliefs. The conflict ranged from feeling very healthy and strong, feeling that exercise was a good thing and feeling pride in being able to maintain fitness activities, to feelings of guilt and frustration when dealing with negative reactions from others.

All the women interviewed described moments throughout their pregnancies where they felt tormented about their choice to maintain their exercise routines. For some the feelings of fear were fleeting but for others they stayed at the back of their minds. However, over riding these doubts were their strong convictions that what they were doing was appropriate for them. I will cover the negative emotions and concerns these women had to cope with followed by the conflicting positive feelings and beliefs they had which helped give them the courage to continue with their activity levels.

Feelings of fear

When confronted with negative comments many of the women interviewed described feelings of fear that they may be doing something harmful to their unborn baby, that their behaviour was in fact dangerous for their baby. Megan described feeling very fearful that

she may have caused her unborn baby harm after being frightened during a presentation on exercise and pregnancy she and her husband attended:

> I thought 'Oh my God what am I doing?' And I felt, I thought, 'Oh my god, I am going to have a disabled child! I am going to have like a Down syndrome child, or a vegetable or something and this is going to be all my fault because I spent one night exercising!' That is how I felt. I thought 'Oh my god, what have I done?' you know and 'I am going to spend the next 30 years looking after this child and it is going to be all my fault!' But then when you do the research you realize well, no, it is not just about me it is about the baby too'.

Nadia described her feelings of doubt and fear after being confronted by a negative co-worker who saw her running in a five kilometer road race:

> I would think to myself, 'Well God, I hope that, you know, I hope this is okay, I feel okay, everyone tells me it's okay', you know? And my doctor, umm, she had done, well you do that 16-week ultrasound and all the measurements and every time you have the check-up everything had seemed fine. So there was no issue that way. But still, you know, just someone always planting doubt in your, in your head. So I found her comments to be upsetting you know? They would be, she would make some comment about something she read or something like that, then that would sort of be, be in the back of my mind the whole day.

Feelings of guilt

Even though these healthy exercising women felt that they were well informed, were experiencing a normal, healthy pregnancy and that their exercise programs were not harming their unborn babies, many still described deep feelings of guilt about their behaviour. The interviews exposed many moments when the study participants truly felt the guilt and pressure to conform to what society thought was a more appropriate way to behave when pregnant. Although they all described similar incidents, their strong conviction to stay active and fit throughout pregnancy did not wane. Deanne described her feelings of guilt and the 'not really knowing' if she may have harmed her unborn baby until the day that she was born:

> I listened to my body but I always felt a little bit guilty about that like 'Oh my god, I'll only know when Jenna is born', and that is hard because you had to wait until

she was born. And it felt good, I had no problems, but I felt a little bit guilty. Some people made me feel a little bit guilty.

Sarah described an incident with a stranger yelling out of a car window as she was out for a run:

> I do remember felling quite uncomfortable sometimes, I remember running with my running partner, and I was just like two blocks or something, a very short run and it was downhill, but very slowly, and I am huge, I mean I am past my due date and I know somebody yelled a comment out of their car window, it was in by the mall there. Anyway, it was a man who said you should be at home or something like that you know? But again instead of just laughing or thinking ok that's his problem again you do question yourself, and I mean if I did fall I would never forgive myself if something happened to the baby. But then I have been running for fifteen years and only fell the last few months ago, you don't usually fall, but if you did fall.

Sarah went on to describe how tortured she felt when she had feelings of doubt about her exercise routine during her pregnancies and how this all led to the naming her first born:

> I didn't change (stop exercising) but again you didn't flatter yourself then, you think that maybe you're doing this for selfish reasons and I am putting the baby at risk, you know, hurt the placenta or damaging blood vessels to the baby jumping up and down in your body. The way I always justified it to myself when I started to worry about that was when babies love to be rocked, and they love movement and always say, well the pregnancy books described it's good to keep sexually active and it is good to keep physically active in you pregnancy because the baby bobs around like a cork in a bottle. I remember that impression well, I, when I am doing aerobics the baby is bobbing around happily. I still in fact, this is an aside, that is why we called my first child Bob because we used to laugh all the way through my pregnancy about me exercising and the baby bobbing around in there. So our first child is called Bob. So, yeah it is quite funny. But anyway as I say, I used to have these pangs of like guilt, thinking well maybe I am doing too much, especially at that high impact stuff, I thought maybe that is wrong.

Feelings of frustration regarding the medicalization of pregnancy

Several of the study participants viewed the position of women in society, when pregnant, as very frustrating. Some saw that the medicalization of pregnancy was placing women in a powerless position during their pregnancy and that pregnancy

should instead be viewed as a normal part of being a woman. Deanne described how her doctor wanted to book a caesarean section and she was having no part of it:

> I find that we medicalize pregnancy as if it is a sickness and it's not, it's natural, it's healthy and if you take care of yourself, eat properly. Now you might have some complications, now that's normal, but most of it can be managed, it really can. It's not a sickness, it really isn't, and until we, if we give away all our power to the doctors they will do whatever is convenient, that's the irony of it all. They're not going to look at, I can remember sitting in the office with the second doctor who was male for Liam (unborn baby) and John (partner) was there and the 2 males against the 1 woman well, that's a great date! We'll pick it November the 3rd (caesarean date), and I am there saying like hell you're gonna have November the 3rd! I'll let them think they are, and that was October the 22nd. So I went home and said now kid you better move because I do not want a section. Called my midwife and did all these little manoeuvres for a breech birth and he moved that night; It was like a whale moving in my stomach. Went back the next day and he (doctor) says he moved, yeah I know. He said, he said so your not breeched any more, so no I am not I said, so you can cut out the section.

Sarah described her frustration around being put on a list for inducing pregnancy because she was overdue on her delivery:

> I know that this is, there is one point that I would like to make about the pregnancy and delivery, I say that because I was healthy and active and luckily had normal pregnancies. I really didn't like the fact that as I went past my due date, which I think only five percent are actually born in their due date anyway, I think once you go past your due date the medicalization comes in and you get put on a waiting list for induction and then you feel like a cow going off to milking. That's what I found, like I had taken so much control over my body and my pregnancy and you know I feel so lucky that the foetus was also growing normally and everything going fine and then suddenly you feel like the control is taken away from you, even when you are put on the waiting list and get the phone call, right? You can come in now there is a bed free, you know?

Deanne described feelings of vulnerability and how she took charge of her own hospital delivery:

> I am not a controller but I needed to have some power over my own body and my own life. I had to have a midwife; I had to have someone I really trusted, who understood what it was really like to have a baby. She had, had four (children); she had delivered thousands of babies. I gave a lot of my trust to her because I really trusted her and I needed that. I really didn't trust a lot of the doctors because they are all waiting to cut you open and you know and anaesthetize you and give you a section. Wouldn't you like to have a due date that you can plan, a

> convenient date? I could never understand that. When would be a convenient date? They're going to cut me open and I am going to have all these incisions. It didn't make any sense to me. Like if you had to go that route, that's ok, if through delivery and that happens but you don't plan it!
> When you're pregnant you're vulnerable, very vulnerable, and when you get all these negative things, like you know these horror stories about going in and you don't even get to see your doctor, whoever is on, you know? They hook you up and do all this stuff and they have all these interns coming. So I had heard enough and had enough clients that had gone through that. I was really adamant; I had it all written on my form. I am sure they must have been frightened to death when they looked at my form, like no intervention unless [her midwife] approves it. So they had that.

Frustration with the position of pregnant women in our society

Several of the participants described feeling frustrated with how women are viewed in our society when pregnant. Penny viewed the position of a pregnant woman today as being portrayed as super-delicate in the mass media:

> That is a 21st century belief. I believe we are all pampered to death in the 21st century, and it is perpetuated by the media and soap operas, where people are losing babies for the sake of a storyline for the simplest and stupidest of stuff. I don't think that great grand-parents did that, they had to survive and they, it was a totally different philosophy back then. That is what I believe.

Sarah described her bewilderment at why women in general are not taking responsibility for their own bodies:

> I don't know where that has come from but I find women seem to be much more prone to think that way you know, say that I can't do this because I am pregnant or I shouldn't do that because I am pregnant. Now whether that's coming from other people telling them that or whether it the lack of motivation and education... How far it's been changed from a female taking responsibility for her own body... and the lack of control you feel.

Overcoming the Conflict

The final overriding theme found in the interview data was the ability all these women had to overcome the conflict they had to cope with because of their choice to maintain their activity levels during pregnancy. Even though many of the women had to cope with

negativity from people around then and had to deal with feelings of guilt and doubt about their choices from time to time, none of them stopped exercising or gave in to the pressures.

The women interviewed portrayed a very strong sense of belief in self that appeared to stem from a combination of several very important sources of support. These supports boosted their confidence in themselves and in their choices and gave them the courage to continue with their vigorous exercise routine throughout pregnancy. The key external sources of support came from their spouses, some physicians, other active women who wanted to follow in their footsteps and the encouraging research gathered on the topic. Added to these was a powerful internal source of support all these women possessed which was a very strong belief in themselves and a determination to follow their own choices.

Encouraging spouses

The belief these women had in themselves and that what they were doing was appropriate received a great boost in support from their husbands, with all the study participants describing having very supportive husbands who stood by them and supported their decision to continue vigorous physical activity during their pregnancies. The husbands seemed to understand their wives and the importance they placed on exercise in their lives; they helped in gathering the research, some worked out with their wives and all trusted in their wife's decision to maintain their exercise routines during pregnancy. Megan talked about the role her husband played in supporting her in her choice to stay active:

> Well I think like, obviously George was with me in these early pre-natal classes and he kind of thought the same things as what I thought and of course was very supportive. He just said you know go and do the research or whatever but he wasn't concerned at all.

Pricilla's husband stood completely behind her as she continued her competitive running throughout her pregnancies:

> Spouse 100% supportive! He as well was all over this let's go research and see because he was into me again knowing. It was so much of my lifestyle, thought if I take that away you know, the stress and all of that, so he was very supportive.

Jenna described how her husband felt about her staying very active throughout her pregnancy:

> My husband was a little bit dubious at first but once he'd seen that I was being responsible about it and looking after myself he didn't have a problem. He was afraid that I was gonna fall or gonna overexert myself or something like that, right?

Supportive physicians

Some of the women interviewed had physicians who were very encouraging and supportive. This support was important in giving these women the freedom to continue exercising and to feel good about their decision to do so. Many of these women researched to find out which local physicians were experienced with dealing with and supportive of highly active pregnant women. Sarah described how supported she felt by her family doctor:

> My family doctor, Dr. Smith, if you know her, she was wonderful. Like, she was really supportive throughout the pregnancy, a real advocate for keeping active and eating well. She really, she thought it was wonderful that I was doing exercise right up to and past the due date, and so was my husband I guess.

Megan's doctor was very supportive of her desires to stay highly active:

> I will tell you that my obstetrician was great. I asked her about exercise and I said look you know I am trying to get everyone's [opinion]. She said I got women who are running marathon's, doing it all, and you know if you continue to do it then and this was your lifestyle before, I wouldn't recommend you starting an exercise regime but you continue to do your own.

Deanne felt validated by her new doctor after her original doctor went on maternity leave:

> I had initially, like I had one doctor and then I got transferred because she was going on maternity leave, but (she) didn't really encourage me to run. But I got another doctor who was really good, she said, run with how you feel and she validated me and for the last 3 or 4 months. It was really connecting.

Nadia felt supported by her obstetrician while living in Ottawa:

> In Ottawa, yeah. So [obstetrician's] impression was that you can continue to do what your doing just keep in mind that you are pregnant. And you know that wasn't really an issue because I found that when you're pregnant, your body only lets you do so much, you have no choice. Your body just doesn't let you do full out sprints so it's no point in even trying, you know. Umm, the, ahh, the obstetrician that I had, as far as she was concerned, whatever you did before you can do now, just be comfortable, just stay hydrated. Umm, so they all supported physical activity during exercising.

Encouraging research on exercise and pregnancy

All the study participants took on the task of researching the topic of exercise and pregnancy and self-informing on the topic. These women were very resourceful in doing their research and gathering as much information as possible on exercise and pregnancy, they sought out physicians who were informed and supportive, they used the internet, and they purchased books on the topic and some went to the library. The information gathered gave these women a sense of comfort and empowerment and the knowledge that they were not subjecting their growing foetus to any dangers.

Pricilla described the lengths she and her husband went through to become as informed as possible after meeting with her physician who was very discouraging about vigorous physical activity during pregnancy:

> Yes, and so after that I left there (doctor's office) and I sort of thought I am not sure about this like, and I knew quite a bit about my health care provider and I thought she is not really a super active person. I think she is a walker but I don't think she that aside from that. So I thought, first of all, I went and did, myself and my husband, did some research, went on the internet, went to the library. Then I sought out three other medical doctors for their opinions and then one who I knew was a runner and had had two kids and the other one I knew, the second one was active and the third one just at random you know. And three of them

> said absolutely, you can maintain what you were doing prior, or not totally, not total consensus, but generally speaking from the research. And then they said what you were doing prior you could do after, avoid contact sports which was fair and but trust your body.

Megan and her husband felt it was very important to gather as much information as they could on the topic of exercise and pregnancy:

> I remember I talked to you (researcher) of course and then you gave me some literature on, you referred me. So then I felt a little bit better because I thought there is lots of advice out there saying that it's ok. And I picked up this really good book, I think I was telling you about it's called Expecting Fitness and I remember the name of the author, I gave it to a friend of mine actually but the author is Brigitta Gallo and she was very positive and what I got out of that was you know, she said there is no reason basically, I really liked what she was saying, and there is no reason to stop, there is only benefits, lots of great benefits for you and the baby in terms of your labour and your recovery. Babies who are born not so big but healthier, brighter kids, they do end up being brighter kids!

Jillian described how she went about becoming as informed as possible about exercise and pregnancy:

> I read, mostly what I did was read magazines. Ahh, you know if I saw something on pregnancy and fitness then I read it. I've found I didn't find a lot of people, umm, that I encountered knowledgeable when it came to pregnancy and fitness. It was either something I saw on TV or something that I picked up and read. And if I had a question, then I, the doctor who delivered, I'd ask him cause he seemed to know what he was into. Other than that, and some little bit of training (fitness instructor training) we got.

Encouragement from other exercising women

Other exercising women proved to be a great source of support for the women interviewed in this study. In some ways these study participants helped to pave the way for other women to consider maintaining their fitness program during their own pregnancies. The study participants behaved as rebels in some ways with other active women seeing them as role models for behaviours that they themselves may follow someday. These women would often praise the study participants for their abilities and

fitness levels throughout their pregnancies and often admired them. Deanne saw the other active women around her as very interested in her fitness activities:

> Women were different, and women that were very supportive were people that were in the fitness field that I knew for a long time, that were all fit, who were doing aerobic classes, who were runners, who were swimmers. In fact what they were doing, they were interested, they were curious. They were saying 'God that's wonderful, maybe I can get pregnant and do that!' It was like, I had people, women, stop me on the trail and say I am going to do exactly what you did. Like, they couldn't wait to see the end result; if it was really a baby...A few of my friends would say to me, you're like an example now of what we are going to do when we have babies. They were fascinated so I was like, I said I feel really good and they said, one woman finally said to me 'I'm gonna, when I get pregnant, I am going do the exact same thing you are.

Nadia described how other women would observe her running and be excited to see a pregnant woman staying highly active:

> I think most of the, the people that I ran with they were sorta, kinda excited about seeing someone in the group running who was pregnant and they wanted to see how it was going to work out for me...They liked seeing me pregnant and running because I guess a lot of them, at some point they where going to be pregnant and I guess for them it was like, you know, you can be pregnant and, and run at the same time.

Belief in self and the choice to exercise during pregnancy

While the participants in this study received mixed advice when it came to exercise and pregnancy, these women chose to continue with their work-out programs because they believed in themselves and that what they were doing was safe, regardless of the negative comments they had to cope with. They had collected the research and knew that what they were doing in the way of exercise was not harming their unborn baby. Penny believed in herself and in what she was doing: "I think that I, I can remember thinking that I was a good mother for doing this, that I was staying healthy."

Jillian described her own sense of resolve to stick with her exercise routine even though others were discouraging her:

> I felt great. I felt I didn't care what other people said. I felt quite confident in what I was doing. The only thing I was worried about was that...remember the abs (abdominal muscles)? Whatyamacallit when your abs split? Remember that? That was the only little problem, that this was going to happen and I didn't want that to happen.

Megan described how frustrated yet determined she felt after she attended a discouraging seminar on exercise and pregnancy given by a physiotherapist:

> Obviously priority was the health of the baby and me but, so it didn't make any sense to me, and it also didn't make any sense to me that exercise could be bad. It was completely against my whole judgment and my whole belief in what exercise is all about. Like, how can exercise be bad? I know that to a certain level that if you are really, really pushing yourself but that is not where I was. So that is why instinctively I thought it can't be right but she still scared me enough that I had to go and do research. It really upset me that she was there and advising and I thought that they were ill advising people.

Lauren talked about having no regrets about her decision to maintain her activity level during her pregnancy:

> No regrets, I would do it again tomorrow, like wouldn't hesitate and I don't know my husband and I are both so active and whatever that maybe just the environment leads to the kids.

Determination to stay active

These women showed a very strong commitment to staying active throughout their pregnancy; it was as though their sense of determination was innate or in their blood. Although they felt as though they had to justify their actions at times and were often on the defensive this did not stop them. Penny pointed out that a negative doctor was not about to discourage her from her goals:

> I would never have had a doctor that did not support it. If I was in and had a negative doctor who didn't encourage me to be active, I am sure I would have found another doctor. Because we are like that, we will find one who says what we want to hear. One doctor says, yeah sure go on, whatever, and my other doctor Dr. Black, he was excellent. He always thought I was pretty cool anyway, whatever I wanted to do he was totally supportive.

Though Pricilla felt defensive on many occasions it did not slow her down:

> I just felt, I ended up being very defensive all the time. With the first doctor nothing cause I was so not in the know anyway so that was fine. But afterwards with friends and friend's parents I found a lot of older people, I found were more kind of against you, you know? So I found I was always having to justify. Oh I have talked to my doctors, I have done the research you know, it's really nobody else's business.

While the negative reactions from others would make her feel badly about herself

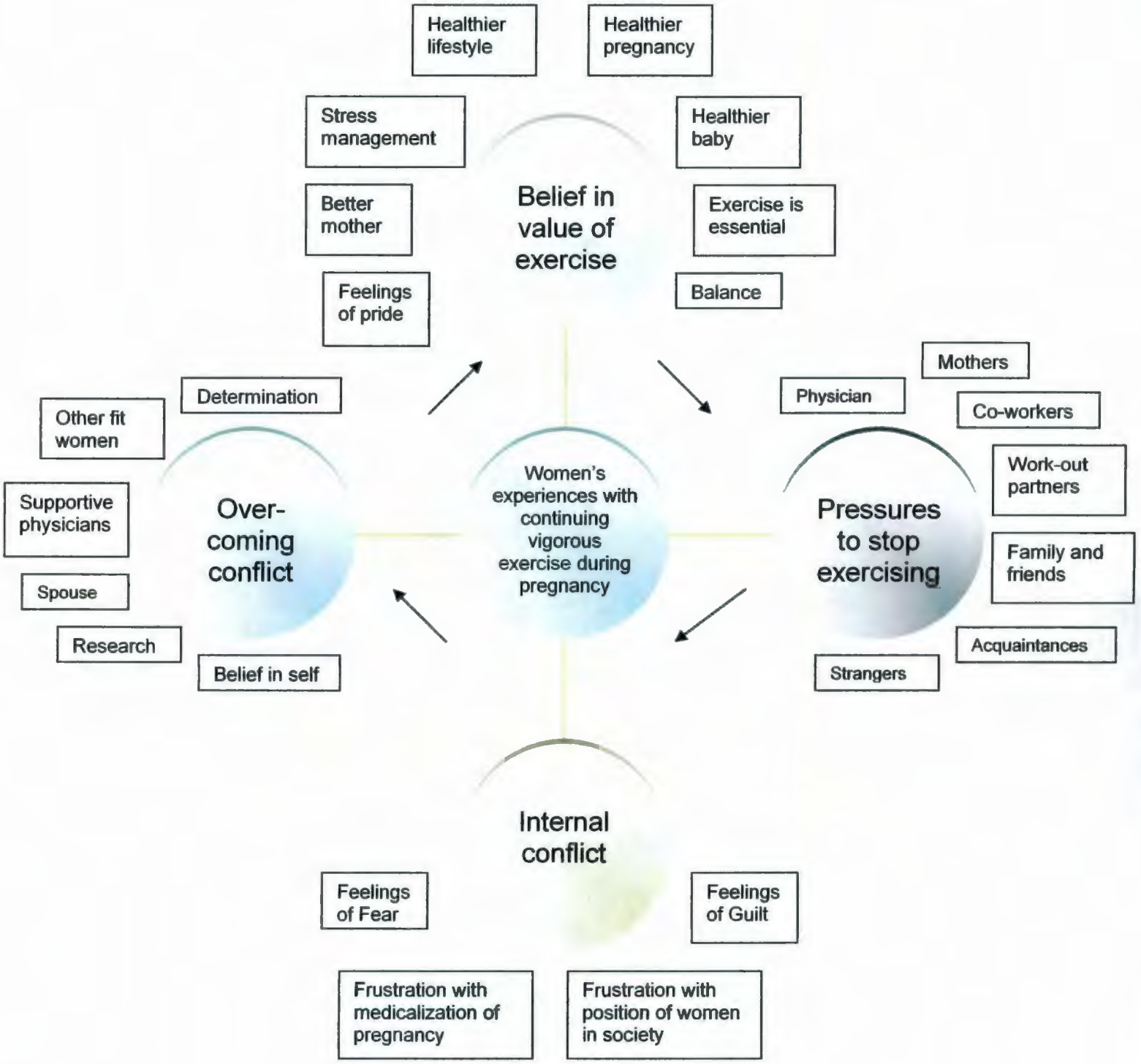
Deanne was able to turn the negative around and point the finger back at them:

> I'd go back and feel really bad for a while and then I'd say who the, they don't know, he's never had a baby so what's he know?

Overview of Women's Experiences

Fig 1 provides an overview of the themes identified organized in a Hurricane Diagram. At the centre of the diagram is placed the research question and branching from that the four primary theme categories that emerged from the analysis of the interview data. Each of the four thematic areas are connected in a cyclical manner.

Figure 1: Hurricane diagram presenting the study findings or themes as they surround the "eye of the hurricane" which represents the research question.



In summary, the participants, all of whom continued vigorous physical activity during their pregnancies, were all committed to their exercise regime, all had to cope with criticism from a variety of sources, all experienced varying degrees of distress because of this criticism, and all were able to maintain their exercise regime throughout pregnancy in spite of the criticism, with the help of key supports around them and their determined personalities.

CHAPTER 5

DISCUSSION

The aim of this study was to explore the experiences of highly active women who continued with vigorous physical activity during their pregnancies, to clarify the reactions of and the advice they received from people around them and how they responded to those reactions. The idea for this thesis project developed from my own experience of being fit and pregnant and wanting to continue with my own exercise routine. I had experienced many negative reactions from various people around me and decided to explore how widespread this experience was.

Through a series of in-depth, one-on-one interviews the sample of ten women told of their experiences with maintaining vigorous exercise throughout the course of their pregnancies. This chapter will discuss the findings of the interviews beginning with the importance exercise held in the lives of the study participants as seen through their exercise identity, the inequality in exercise opportunities experienced by these women throughout their pregnancies, and finally the journey towards equality in exercise opportunity they pursued.

Exercise Identity

All participants followed in this study demonstrated a very strong exercise identity as defined by Anderson, Cychosz, and Franke, (2001) where physical activity was viewed as a central piece in how they defined themselves. The participants demonstrated a very strong commitment to a physically active lifestyle before, during, and after their pregnancies.

Healthy lifestyle and healthy pregnancy

The women interviewed for this study were a very healthy, high energy group. They all lead very healthy lifestyles in general, subscribing too many if not all the key health practices, with physical activity being the central piece. All were physically fit with a healthy body weight, consumed a healthy diet, were non smokers and exercised regularly. They all described having a very healthy and highly active lifestyle before, during and after pregnancy, with their expanding waistline not holding them back. All participants reported that they were able to maintain, for the most part, vigorous activity levels throughout their pregnancies, most up to delivery day, and resumed physical activity within days of delivery.

The women saw their exercise program as key to making their pregnancy experience as enjoyable and as healthy as possible because of the many benefits they experienced: it helped make their pregnancy experience more enjoyable and improved their mood; it assisted in controlling some of the symptoms of pregnancy; it provided them with a mental break and stress relief allowing then to get back to life and mothering more refreshed and energized; and the most significant benefit reported by far was that exercise centered or balanced them within their lives.

The women described their pregnancy experiences as having few of the commonly seen "symptoms" of pregnancy such as nausea, heartburn, leg cramps, varicose veins, insomnia. The few symptoms that were noted in this exercising group were some nausea, food cravings and sleeplessness at the very late stages of pregnancy.

The reports of very healthy pregnancy experiences by the women studied are supported by other research. Clapp (2000) and Stevenson (1997) have reported that exercise

helped in relieving many of the symptoms of pregnancy. Clapp found that regular exercise reduced musculoskeletal complaints associated with pregnancy, enhanced feelings of well being, improved body image, and decreased maternal weight gain and fat deposition in late pregnancy. Stevenson also reported that active women experience fewer physical symptoms of pregnancy, and that moderate regular exercise during a healthy pregnancy is likely to improve well-being when compared with a sedentary lifestyle.

The women also reported giving birth to very healthy babies who were developing normally, who were in healthy weight ranges and who were bright and energetic. Clapp (1996,1999) who followed the growth and development of the offspring of women who maintained highly active pregnancies produced findings in line with what was found in this current study. Clapp (1996) reported that when compared with matched controls at one year of age, the exercise offspring exhibited slightly better motor skills but had identical mental skills and morphometry. However, at age five years they were much leaner than control offspring and performed much better on standardized tests of intelligence, particularly in the area of oral language skills. As Clapp (1999) has hypothesised, it is possible that some factor associated with exercise, e.g., motion vibration, intermittent stress, may alter neurodevelopment *in utero* in a beneficial way resulting in newborns that have a healthier start in life.

The importance of exercise in the lives of the research participants

The importance and value exercise held in the lives of the women interviewed was a fundamental part of how they viewed themselves. Examples of terms these women used to describe the importance of exercise for them included: "I guess it's like eating", "It is necessary for survival", "an essential piece", "can't separate exercise from me", and "its

integral". All the women saw exercise as much more important than just keeping them healthy or lean or attractive; they perceived exercise as an integral part of who they were and there was no separating it from their lives or giving it up during pregnancy.

This level of commitment to physical activity among pregnant women has also been reported by Clapp (1995). He identified that over the past two decades physical activity has become increasingly important to women of child bearing age and that an ever increasing number of these women now want to include exercise as an integral part of their lives and have every intention of continuing it during pregnancy. All the women interviewed for this current study showed a very strong commitment to maintaining their exercise routines during pregnancy and saw exercise as an essential part of their daily lives that was even more critical during pregnancy.

Exercise identity

The findings of this study would suggest that many highly active women and athletes will continue with vigorous exercise during their pregnancies regardless of the negative reactions they will encounter from others. This theory is supported by Anderson, Cychosz, and Franke, (2001) in their research on exercise identity and adherence. They explain that patterns of behaviour are important to the establishment of role identities and as one performs the rituals associated with role identities one, through social interaction, has the identity reinforced and validated. Once behaviours associated with the role identity, in this case exercise identity, have been mobilized and are reinforced by others, they are poised to become important to one's concept of self. It is at this point that these behaviours appear to become primary salient beliefs. The participants in this current research project all saw exercise as a critical piece of their own identity or as a primary salient belief. All the research participants continued to maintain their vigorous

exercise routines in spite of the, in some cases, overwhelming negativity from various sources. Their exercise identity was such a critical part in how they defined themselves that even the discouraging comments from their mothers, physicians, and others did not deter them.

Anderson et al (2001) explains that once the role identity of exerciser becomes a valued aspect of one's concept of self and a primary salient belief it may also become important in directing future exercise behaviour. When the research participants became pregnant their exercise identities were so deeply imbedded in who they were and how they and others saw themselves that it was very difficult to put exercise aside and adopt a more socially acceptable behaviour during pregnancy. Based on this current study it can be assumed that there are many more women who do not consider it an option to forego exercise for the duration at their pregnancy and are being needlessly subjected to criticism from those around them because of their desire to maintain their exercise routines.

Inequality in Exercise Opportunities for Pregnant Women

Overwhelmingly the participants in this study perceived that they were not free to choose and pursue the exercise activities that they wanted without having to face criticism along with it. They experienced negative reactions from a wide group of sources from family members to their physicians; however, all participants were able to stay committed to their exercise regime.

External pressures to change exercise behavior

The study findings demonstrated that all the participants experienced, in varying degrees, criticism for their decision to maintain vigorous physical activity levels

throughout pregnancy. Many of the women reported having to deal with strong pressure from sources to conform to a more "appropriate" behavior, identifying their healthcare providers, family members, friends, co-workers and even strangers as sources of criticism. This societal disapproval often came in the form of lack of advice or support from health care professionals, questions from family and friends such as "Should you be doing that?" gossip in the workplace, rude comments from strangers, and glances and stares of disapproval from people.

For the participants in this study mothers and co-workers proved to be very out-spoken, having strong opinions to offer these women. Mothers were very much against their daughters engaging in any high intensity exercise during pregnancy and co-workers of the participants also tended to have very negative attitudes toward the exercising women. These negative experiences were recalled vividly by the study participants and did have an impact on them but did not result in them changing their exercise behavior.

These findings are supported by Clarke and Gross (2004) who looked at women's beliefs, behavior, and information sources about physical exercise and pregnancy. According to Clarke and Gross the strongest sources of advice offered to women exercising throughout their pregnancy came from family, friends and colleagues. Clarke and Gross found that at 25 weeks of gestation 59% of women who reported receiving advice from family members indicated that they had mostly been discouraged from being active; at 34 and 38 weeks this number had risen to 85%. They reported that this advice from family members promoted negative views of exercise and pregnancy with the general consensus being that pregnant women should limit their exercise.

The women followed in this study would not be the norm for how you would expect most pregnant women to behave. Most active women, when they become pregnant, do scale down their activity levels to a much more moderate level. Clarke and Gross (2004) found that many active women turned away from exercise when pregnant with over two-fifths of regular exercisers ceasing to engage in recreational physical activity completely. The women in this current study reported that they felt very comfortable and capable with regards to their exercise choices, that they were experiencing normal and healthy pregnancies, and that they believed their exercise programs were not harming their unborn babies.

Many of the participants described how they became quite accustomed to having to explain themselves and how they took the opportunity to inform curious onlookers about their exercise activities during pregnancy. The study participants viewed themselves and may have been seen by society as rebels in some ways, raising eyebrows as they went about their exercising routine. Some of the study participants saw themselves as role models for other exercising women who were very intrigued with them and hoped that they would also be able to do the same and maintain their exercise routine when they became pregnant. However, many still described feelings of guilt about their behaviour. For some it was the momentary fear of the possibility that they could in fact be causing harm to their unborn babies and would not know the outcome until after the delivery and for others it was the constant sense that they had to explain themselves and their choices.

It can be expected that fit and healthy women planning an active pregnancy will face similar circumstances as did the women in this study. They will have to deal with the dilemma of having to decide what approach to continuing exercise they are willing to

pursue, to continue with their vigorous activity levels or take the line of least resistance and choose to downgrade their activity level or stop all together. Like the women followed in this study, unless they possess a strong exercise identity, have a supportive physician and family, have current research on the topic, and have positive role models they may not know of the many benefits available to them and their developing fetus and that they can and should continue with their physical pursuits.

Societal limitations placed on exercising women

The women interviewed saw many people in society as not accepting of pregnant women engaging in vigorous exercise during pregnancy. Much of the criticism they received such as "should you be doing that?" seemed to imply that pregnant women may be too fragile to be engaging in such activities and that pregnancy is a time in a woman's life when she needs to be cautious, not a time to be exercising. This belief that women, particularly pregnant women, are weak and should not be engaging in "risky" behavior is a common expectation in western society.

These pressures on women to downgrade or stop exercising altogether when they become pregnant are not a new phenomenon but one that has evolved over the past century. According to Vertinsky (1997) female behavior has been constrained by physicians and physical educators who have promoted a restricted range and scope of physical activity for girls and women. Most of this advice concerned the perceived risks of physical reproductive harm and nervous strain. This advice appeared to have not been based on any empirical evidence but on cultural assumptions about women and femininity that had a particular use in ordering social and power relationships.

While in most aspects of life women have made strides towards social equality the field of women's health continues to be an area where many old standards still hold true. Ussher (2000) writes that women's lives have historically been marginalized, ignored, or dealt with in a detrimental way by the mainstream health professions and that "woman" has been constructed in quite specific ways by phallocentric health professions who have not always or ever had women's interests at heart.

Throughout history many limitations have been placed on women's involvement in physical activity and more particularly when a woman was pregnant. Today women as a group continue to be defined and limited in their physical aspirations by their reproductive potential (Vertinsky, 1997). As women quest for control over their own bodies much of the professional discourse on female health and exercise is still contaminated, in subtle ways, by deterministic views which focus on the reproductive role of the female. Vertinsky writes:

> "It is the invidious consequences of the medical lexicon about women's bodies and their capacity for exercise which are of concern and the ways in which they permeate popular as well as professional attitudes toward female health and exercise".

It would perhaps be expected that the past 30 years of increased public participation in physical activity would have moderated the medical profession's view of the risks and benefits of female exercise. It appears that this is not the case with much of the current medical literature on women and exercise still perpetuating these traditional views. For example an editorial entitled "Exercise for women: How much pain for optimal gain?" in the New England Journal of Medicine (Anonymous, 1996) reiterates this perspective. It emphasizes the physicians' role in supporting limitations upon physical activity among women in the name of reproductive health. In the first paragraph of the editorial it states: "safety is particularly relevant to women since exercise of high intensity and long

duration may lead to menstrual and reproductive dysfunction" (p. 1325). The editorial concludes "we would not dissuade those who wish to exercise more but we do believe that physical activity at moderate intensity has fewer health risks than vigorous activity" (p. 1327).

This preoccupation with the potential for reproductive harm for women engaging in physical activity seems to be at the forefront in exercise prescription for women. Vertinsky (1997) identified that where women's physical health activity is concerned the themes of risk of reproductive impairment rarely go unmentioned and always seem to be at the centre of medical discussions. This is not the case for men. Health hazards of excessive activity, overtraining, or risky sports can be very real for males as they are for females. However, for males it is the risk to the male lifestyle or their sporting careers that becomes the focus rather than their ability to father children.

The Canadian Academy of Sports Medicine and the American College of Obstetrics and Gynecology are the central bodies that provide information and guidance on exercise during pregnancy (Artal & O'Toole, 2003; Davies, Wolfe, Mottola, MacKinnon, 2003). The current recommendations put forward by these bodies can be viewed in appendices D and E. Their literature, though it has improved somewhat over the past twenty years is still quite moderate in nature, contains many deterrents and information on possible risks, and still places the power of the decision to exercise in the hands of the physician. Both sets of guidelines clearly outline the requirement that women seek approval for their exercise program from their physician, again placing the power into the hands of the medical system For athletes and the very active, who may be the healthiest and strongest, these reports on exercise prescription recommend even closer obstetric

supervision than the routine prenatal care with additional testing and intervention as indicated due to their greater "risk" for reproductive impairment.

The medicalization of pregnancy

The women interviewed for this current study all reported that they initially looked to their physician for advice about exercise and pregnancy with the expectation that their physician would be a primary source for expert information. However, many of the participants reported that they were offered no advice from their physician and on some occasions met with discouragement. These findings regarding the limited amounts and kinds of exercise-related advice offered to the study participants by their physicians were supported in the literature. Clarke and Gross (2004) found that only 18% of women reported receiving advice regarding exercise and pregnancy directly from their health professionals with 22% reporting that they had often received confusing and contradictory recommendations.

Clark and Gross (2004) did not provide any explanation for or speculation as to why so many physicians were unwilling to provide advice or encouragement to exercising women. However, Reich (1987) described the environment for exercising women as un-supportive when it comes to physicians making recommendations for more liberal activity for pregnant women. Reich suggested that this can be explained by the medico-legal environment these women find themselves in, health-care professionals' lack of participation in research on exercise and pregnancy, and the physician's desire to "protect" and keep women in a dependent role.

It has been well documented that historically much health research has excluded women with many major clinical trials on heart disease, cancer, alcohol use, and AIDS using

only male subjects. Attention is now being paid to how these diseases effect the female population (Ussher, 2000). This lack of research on female health issues may partly explain the lag in changing attitudes towards female health but the most compelling of the reasons reported by Reich (1987) concerns the power relationship between the physician and the patient. Ussher writes that through the course of history the nature of the relationship between the physician and the female patient has been nurtured into one where the physician holds tremendous power over those under his (and now increasingly her) care with women's health in particular having evolved into an area where women have become passive recipients of care.

Many of the participants in this study reported experiencing the power differential between themselves and their physician during their pregnancies. Several study participants reported that they experienced the pressure to defer to and give in to their healthcare providers in order to ensure a safe outcome to their pregnancy. However, some of the women reported that they wanted to maintain control over their bodies and to have a say in the decisions dealing with their pregnancy and delivery. These findings are supported by other research on the medicalization of women's health and more specifically, the medicalization of pregnancy where pregnancy is viewed as a "health" condition which is inherently problematic (Gross, 2000).

Medicine today continues to maintain control during pregnancy with fetuses and mothers being subjected to monitoring from the moment of conception and undergoing regular invasive testing. Flamm, Berwick, Kabcenell (1998) identified that close to one million babies are delivered by cesarean operations each year in the United States making it the most frequently performed major operation. The view that pregnancy and delivery must be managed by the physician and is a technological accomplishment on behalf of

the physician is commonplace for many women today (Gross, 2000). Given this environment it is understandable the power that physicians have over women and pregnancy and why many women today still follow the same patterns and see themselves as fragile when pregnant and in turn stop or reduce their exercise routines. However, many women, like those followed in this study, adopt a more resistant stance and challenge the more medical view about women's health and exercise capabilities during pregnancy.

On the Road Towards Equality in Exercise Opportunity for Women

In many ways the journey towards the physical emancipation of women through (and in) sport and exercise has just begun. However, gains are being made every day by women like those interviewed for this study. With more and more encouraging research into this area, with the growing support for women's quest for power over their own bodies and with the personal power which comes from being physically strong active women are making strides towards exercise equality.

The social, political, economic and cultural manifestations of gender inequality

It is apparent in the reports of the women interviewed for this study that they felt the pressures to conform to more "acceptable" physical activity behaviours during their pregnancy(s), with their female bodies having limitations placed on it in the name of reproductive health. These limitations are reflected in the writings of Vertinsky (1997) who identified the many challenges and obstacles to achieving gender equity for women in opportunities for physical health activities. She sees these challenges as being closely linked to social, political, economic and cultural manifestations of gender inequality, much as they were a century ago. Vertinsky reports that recent discourses of population health strategies and the U.S. Surgeon General's Report on Physical Activity and Health

demonstrate a continued preoccupation with individual lifestyle change and cautious medical prescription for exercise as recipes for better female health. This preoccupation serves to address only the symptoms of the problem rather than dealing directly with the central issue of social inequality in exercise opportunities for women.

Clark and Gross (2004), in their study which looks at women's information sources about physical activity in pregnancy, have also shown that women's level of physical activity during pregnancy may decline both as a result of the physical changes of pregnancy and from a combination of the strong social, cultural and medical discourses that continue to discourage physical activity in pregnancy. They reported, interestingly, that their study respondents did not refer to the benefits that physical activity may confer on the symptoms of pregnancy, but rather that physical exertion was frequently believed to present inherent risks. When asked why they changed their physical activity behaviour during pregnancy almost a third of all the respondents referred to fear of potential danger associated with their former exercise programs.

Exercising women today continue to be confronted with the same paternalistic beliefs and attitudes as they persevere in continuing their exercise regime during pregnancy. Choi (2000) argued that in order to encourage more women to exercise health promotion has to change from an androcentric approach within a patriarchal framework to a more woman–centered approach with the emphasis on true physical and psychological health as opposed to beauty. Vertinsky (1997) goes further to say that a male dominated society is a threat to public health.

Exercise and power

For the participants followed in this study physical activity was a central part of their lives, they felt strong and healthy and they had the confidence to maintain their activity levels throughout pregnancy. It is possible that the women's perceptions of themselves as very fit and physically strong individuals may have played some role in their sense of strength as a woman, their desire for control over their bodies, and their sense of independence. All the study participants were able to cope with the frustrations of dealing with people who were unsupportive and stayed committed to their physical activity choices. They saw exercise not as something they did for beautification or for purely physical health reasons but as something that was essential and integral in their lives and something which empowered them. For the participants in this study exercise was about being in tune with their bodies, maintaining balance in their lives, and being fit and strong.

This finding is supported by Choi (2000) who argued that increased participation in sport and physical exercise has allowed women access to success and expression of bodily strength and skill. Choi explained that through physical activity many women can be and are empowered from their physical abilities and that involvement in physical activity may assist women's access to success in other domains. Markula's (1995) research on exercise and body image in women also supports this theory. She reported that the active women followed in her study did not exercise for beauty reasons but to be strong and independent. Lensky (1995) warns that that for women with low participation rates in regular physical activity there are negative implications for overall health and well-being, for body image and self esteem, and ultimately for individual and collective empowerment. Many girls and women who do not participate, as Lensky explains, miss out on the opportunity for empowerment that physical activity offers: feelings of being at

ease with one's body, confidence in one's physical abilities, and the ability to view one's body as an asset rather than a liability.

It is possible that for the research participants in this study that the expression of bodily strength and skill through physical activity may have promoted positive attitudes towards their bodies and a sense of power from their physical abilities that may have translated into a sense of confidence and empowerment during pregnancy. Because they were physically strong the study participants may have felt more in control of their bodies and more confident in pursuing their physical activity choices when pregnant.

The involvement of women in sport has improved dramatically over the years (Hargreaves, 1994). Women having exploded the myths surrounding female biology with the differences between male and female performances in sport being less marked. Although most 19th century feminists disregarded sport in their efforts to improve the status of women, Hargreaves sees that because sport is intimately connected with the body – the most conspicuous symbol of the differences between the sexes – their development represented a new and important form of freedom for women. Unfortunately, it is mainly middle class women who are participating more than their working class counterparts, and are reaping these benefits (Hargreaves, 1994).

Patient centered care for pregnant women

While for many pregnant women being passive recipients of healthcare is the standard, for the participants followed in this study a more balanced relationship between them and their physician was desired. Several participants reported that they were unhappy with their interactions with their physician during pregnancy. Many of the participants reported that they desired more of a say in their medical care and the freedom and

support to pursue exercise during pregnancy, with several participants actively seeking out physicians known for supporting active pregnancies.

It appears that the issues of power and control in the physician-patient relationship are reflected in many other aspects of health care beyond the field of obstetric care. The physician-patient relationship seems to be undergoing a transition from an asymmetrical one between a patient seeking care and a medical expert whose diagnostic evaluations were more or less indisputable and whose decisions should silently be complied with by the patient. Falkum & Forde (2001) explain that in this paternalistic model the physician uses his skills to choose the interventions and treatments most likely to restore the patient's health or ameliorate her pain and if information is presented it is selected to encourage her to consent to the doctor's decisions.

This power imbalance in the interaction between doctor and patient has been challenged during the past 20 years leaving this paternalistic model no longer suitable for many of the encounters that today's women have with their physicians. Falhum and Forde (2001) reported that an expression of the cultural shift towards greater patient autonomy in the patient-physician relationship has taken place in both the US and in Europe. The field of obstetric care would seem to be a very natural fit for embracing the patient-centered care model since there is both the time and opportunity for both patient and physician to come together and the wide range of choices for perinatal care that must be considered. The women interviewed in this current study reported that they sought out physicians who had the reputation of providing this approach to care.

Encouragement and support for exercise during pregnancy

All the participants for this project identified supports around them that were critical in allowing them to persevere with their exercise regime and feel confident doing so. The encouragement and support these women received from significant people in their lives such as their spouses, other exercising women, supportive healthcare providers and the encouraging research available to them gave them the courage to follow their choices rather than give in to the pressures to behave "appropriately". It appeared that having these supports helped to buffer the negativity they came into contact with and helped to boost their self confidence and empower them.

Social equality for exercising women

It is the position of this researcher that we can only expect women to have a supportive and healthy environment in which to make decisions about their bodies, to make decisions about how they want their pregnancy and delivery to unfold, and to make decisions about how they wish to exercise during their pregnancy when we acknowledge that social inequalities exist and make the commitment to critically evaluate the challenges inherent in achieving social equality for women, and in this case specifically social equality in opportunities for healthy physical activity for all women. The factors that influence healthy lifestyle practices such as physical activity are multiple and interactive, deeply embedded within the social, economic and physical environment, and they are engendered (Vertinsky, 1997). Health gains can be achieved for women by reducing social inequality rather than providing more medical care resources.

Ussher (2000) sees that today we have emerging a rich and vibrant body of work on women's health, with women's issues now firmly on the agenda of the World Health Organization. She sees researchers, theorists and social activists moving knowledge

and practice forwards, improving service provision for women, at the same time as developing a greater understanding of "what women want" regarding their health. However, she urges that there is no room for complacency if we are not to lose hard won gains in a world where resources are increasingly scarce.

Strengths and Limitations of this Research

This research project had a number of key strengths. First, very limited research addressing this particular topic was identified in the literature making this a novel project. While much research has investigated the physiological aspects of exercise and pregnancy there were no identified qualitative articles published that asked similar questions to those outlined in this project. With the growing number of fit and healthy women who hope to continue with their exercise programs when pregnant this project may help increase awareness of the current attitudes held by society towards women exercising throughout pregnancy.

A second area of strength of this project was the enthusiasm and interest the research participants brought to the interviews, their excitement about getting involved and their desire to share their personal experiences. The participants, as did the researcher, felt that this was a very important project. The participants wanted to tell the stories of their experiences and hopefully initiate some change for future exercising women.

A number of limitations must also be noted regarding this research project. In particular, we need to be cautious in generalizing the study findings to a broader population of pregnant women due to a number of factors:

1. This study consisted of gathering retrospective data on the experiences of women regarding their active pregnancies. In some cases the women interviewed were required to recall experiences and emotions that occurred several years previously. While these women appeared to remember vividly the events around their pregnancies the years since those experiences may have impacted on their recollection of events.

2. The study participants were selected from a restricted geographical environment. All participants lived in St. John's which is an isolated and small urban environment. The limited pool resulted in limited demographic characteristics of the study participants, i.e.: all women were Caucasian, middle class and well educated. These women may have a more active orientation to their health than less educated women.

3. The results of this study focused only on the women's own perceptions of their experiences with exercising throughout their pregnancy(s). Interviews with mothers, spouses and physicians, etc., would provide a more comprehensive understanding of exercise during pregnancy.

Although these limitations were inherent in the study the researcher was able to develop an understanding of the experiences of the women who participated in this study and from that we can get a glimpse of what it may be like for other women with similar circumstances.

Implications of Study for Research and Practice

This study clarified the frequently negative experiences of pregnant women who choose to exercise during pregnancy and the strategies they used to resist the message to desist from exercise. Interpretation of the findings clarified the role of social, political and cultural factors in shaping public attitudes towards exercise during pregnancy and women's reproductive health in general. We know that these factors play a role in influencing the behaviours and choices of pregnant women who wish to exercise. This study has shown that fit and healthy women experience pressure to discontinue vigorous exercise during pregnancy and some, like those interviewed for this study, were able to overcome these pressures and continue their exercise regimen. However, these women did have to cope with negative reactions from others.

The study participants demonstrated a strong exercise identity that did not change when they became pregnant, and may have in fact, became stronger because of the many benefits from exercising experienced by the participants. This strong exercise identity coupled with their sense of empowerment from being fit and strong seemed to contribute to helping the participants withstand the public criticism.

It is important for the women followed in this study to acknowledge that the position in which they find themselves can be understood if we acknowledge the context in which exercise and pregnancy and women's reproductive health in general is imbedded. Women are discouraged from exercise during pregnancy not because of scientific evidence regarding any ill-effects of such exercise but rather because of the expected role of women in our society, and especially pregnant women, as being passive. The medicalization of women's health and society's attitudes regarding what is appropriate behavior for women when pregnant are both at odds with what many woman feel they

can and want to do with regards to exercise when pregnant. This study has demonstrated that there are fit and healthy women who want to maintain exercise during their pregnancies, these women want information and support from their healthcare providers, and they desire a more patient-centered approach to their health-care during pregnancy.

Preliminary answers were found to the research question presented in this present study. This topic is relatively new and therefore leaves many areas open to further exploration. In considering the limitations of the current study one can see the possibilities for expanding this research topic and for deepening our understanding of the experiences and perceptions of highly active pregnant women. Further research could include:

1. Through surveys or interviews, gather data on the information and advice healthcare workers provide in advising highly active pregnant women;
2. To determine, through in-depth interviews, the position or viewpoint of mothers, spouses, and other family members of women who continue with vigorous exercise throughout pregnancy;
3. In-depth interviews to determine the experiences of those highly active women who choose to down grade of stop completely their physical activities during pregnancy;
4. A systematic review and evaluation of the current educational materials that is available to exercising women and healthcare providers regarding exercising throughout pregnancy.

This study is of importance to healthcare providers who encounter female athletes or highly active women who plan to continue with their vigorous exercise routines

throughout pregnancy. As more healthcare providers encounter such women it is critical that they are informed regarding the physical capabilities of healthy women during a normal pregnancy, that they are aware of their own personal attitudes, and that they are aware of the pressures society places on highly active women. This knowledge and awareness will hopefully help lead to healthcare providers offering more supportive and informed advice on exercise and pregnancy and a more patient-centered approach to the care of highly active pregnant women.

With inactivity being a critical health issue today and women being the lesser active of the sexes we need to consider societal attitudes towards physical activity for women and girls that perpetuate this social inequality. Health promotion programming for women and girls needs to start with acknowledging that social inequality in physical activity choices exist. There has to be an improved climate for women considering choices in physical activity in general and when pregnant. Though this may be one small step in improving the opportunities for social equality for women it is literally at the heart of the issue. When women have the freedom to choose what physical activities they want to pursue based on their fitness level and capabilities without having to fear criticism, when physical activity is promoted and viewed by women as a health activity not for the purposes of beautification and sex appeal, and only when all women are free to make their own choices we will likely see a more active and healthier female population.

Conclusions

Considering the current situation regarding exercise during pregnancy and women's choices it is apparent that a number of factors have contributed to the position women find themselves in today when they become pregnant and wish to continue with vigorous physical activity. Historically we live in a patriarchal society where women have been

viewed as weaker and irrational and have been excluded from an equal place alongside men; we have a medical system that has historically focused on performing health research only on the male population and medicalizing women's health; we live in a society that perpetuates the myths and fallacies that being female is a weakness; and a societal attitude toward women and exercise that sees vigorous exercise during pregnancy as unsafe and irresponsible. These issues have all culminated into the current environment where social inequality in physical health activity choices for women is the norm.

This gender inequality in exercise opportunities is perpetuated by public attitudes towards women's participation in physical activity. There needs to be an improved climate for women considering choices in physical activity in general and when pregnant. Women need to have the freedom to choose what physical activities they want to pursue based on their fitness level and capabilities.

We know that physical inactivity is a critical health issue for both men and women and that women in general participate less in physical activity. We also know that it is not inherently risky for fit and healthy women experiencing a normal pregnancy to continue to exercise with few restrictions (Stevenson, 1997, Wolfe, 2003, Hatch et all, 1998, Pivarnik, 2003) and we know that more active women are planning to continue vigorous activity during pregnancy (Clapp, 1998). However, based on this current study we now know that many of these women may be subjected to criticism for their exercise choices and may find varying degrees of support from those around them.

While the current position many exercising women find themselves in when planning to maintain exercise during pregnancy is often un-supportive, there is a slow and steady

change underway and it is women like those interviewed in this study who are helping to break down the barriers for other women coming behind them; by being role models to other active women, by demonstrating through their own healthy and successful pregnancies that not only do they have much to gain but their offspring may be healthier as well. As we saw in this study those close to the exercising women such as their mothers often had a change of heart during subsequent pregnancies, once they saw that the outcome was a healthy and vibrant baby and mother.

Coda

Now that this project is completed I feel as though I have accomplished something of importance. It is my hope that research such as this will help move the position of girls and women forward, if only in some small way, with regards to physical health activity choices. It is my hope that my daughter, who is now five, will live in a world where she is free and encouraged to pursue physical activity purely to suit her desires and capabilities, where she is encouraged to chose activities to improve her health, not her figure, and where her choices are her own.

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APPENDIX A

HUMAN INVESTIGATION COMMITTEE CLEARANCE LETTER

May 13, 2004

Reference #04.29

Ms. J. Downey
C/o Dr. M. Murray
Community Medicine
Faculty of Medicine
2nd Floor, Health Sciences Centre

Dear Ms. Downey:

RE: "**A qualitative study of the experiences and perceptions of women who continue vigorous physical activity during pregnancy**"

Your correspondence dated March 30, 2004 was reviewed by the Human Investigation Committee at the meeting held on **May 6, 2004**. The Committee commented that the response satisfactorily addressed their concerns and granted ***full approval*** of the study.

With respect to the consent form, the Committee requested the following modifications:

- Section 3, Description of the study procedures and tests should include a statement informing participants that the interview will be audio taped be inserted.
- The signature page should include a statement allowing the participant to agree or not agree to the audio taping.
- Section 6, Benefits, should be deleted, as there are no benefits by taking part in this study.
- Assent of minor participants (if appropriate) should be deleted from the signature page.

A copy of the revised consent form is requested for our file.

We look forward to hearing further from you regarding the above outlined issues.

Sincerely,

John D. Harnett, MD, FRCPC
Co-Chair
Human Investigation Committee

Richard S. Neuman, PhD
Co-Chair
Human Investigation Committee

JDH;RSN\jjm

APPENDIX B

RESEARCH STUDY INTERVIEW GUIDE

RESEARCH STUDY INTERVIEW GUIDE

TITLE: A qualitative study of the perceptions and experiences of women who continue vigorous exercise throughout pregnancy

1. Provide an overview of your exercise program

    - Before pregnancy
    - During pregnancy
    - After pregnancy

2. What do you see as the role of exercise

    - In your life in general?
    - During pregnancy?

3. What are the key heath practices that you feel you must adhere to in order to have a

    - Healthy lifestyle in general?
    - Healthy pregnancy?

4. Provide details on the advise and guidance you received from healthcare professionals, from family, from friends, regarding your decision to remain highly active throughout your pregnancy(s).

5. Describe the type(s) and give examples of the positive or negative reactions you received regarding your decision to exercise throughout your pregnancy (from healthcare providers, family, friends, etc.).

6. What was your reaction to the advice you received?

7. How does the reactions/feedback from these groups impact on how you see yourself as a mother to be?

APPENDIX C

PARTICIPANT INFORMATION AND CONSENT PACKAGE

February 4, 2004

Dear New Mother:

We are writing to invite you to participate in a graduate research study about exercise and pregnancy. We are interested in talking to women who chose to maintain a level of physical activity throughout their normal, healthy pregnancy.

We would like to talk to you about your experiences with maintaining your exercise program throughout pregnancy, advice and guidance you received from healthcare professionals, and reactions from others to your choice to continue your exercise program.

If you agree to participate in the study you will be contacted by a graduate student from Memorial University of Newfoundland and asked to attend a one hour interview to be conducted at your convenience. We ask that you would permit us to audiotape the interview with the assurance that your identity will remain confidential.

If you are interested in becoming a participant in this study we ask that you complete the ***Contact Reply Form*** below. Completed forms can be submitted to the front desk receptionist who will forward your reply on to the fitness director. After receiving your response, the graduate student will contact you to arrange the time and place for the interview.

Thank you in advance for your consideration of this request.

CONTACT REPLY FORM

Project Title: Exercise and Pregnancy Study

I, _____, am interested in and give consent to participate in this study.

NAME: _____

TELEPHONE NUMBER: _____

E-MAIL ADDRESS [not required]: _____

MAILING ADDRESS: _____

_____

_____

October 2003

Faculty of Medicine, Schools of Nursing and Pharmacy of Memorial University of Newfoundland; Health Care Corporation, St. John's; Newfoundland Cancer Treatment and Research Foundation

Consent to Take Part in Health Research

TITLE: **A qualitative study of the experiences and perceptions of women who continue vigorous physical activity during pregnancy**

INVESTIGATOR(S): **Julia A. Downey**

You have been asked to take part in a research study. It is up to you to decide whether to be in the study or not. Before you decide, you need to understand what the study is for, what risks you might take and what benefits you might receive. This consent form explains the study.

The researcher will:

- **discuss the study with you**
- **answer your questions**
- **keep confidential any information which could identify you personally**
- **be available during the study to deal with problems and answer questions**

If you decide not to take part or to leave the study you are free to do so.

1. Introduction/Background: Over the past 20 years we have seen a dramatic increase in the amount of research completed regarding the physiological aspects of exercise and pregnancy. Numerous studies have indicated the safety in healthy, fit women continuing their exercise programs throughout pregnancy. In fact, many studies have shown that there are many important benefits for the mother to be and the outcome of her pregnancy, and to the developing foetus. Active women who are experiencing a normal pregnancy are encouraged to continue with their exercise programs, using common sense. These women can take advantage of many benefits including: reduced musculoskeletal complaints, enhanced feelings of wellbeing, improved body image, decreased maternal weight gain, fewer symptoms of insomnia, heartburn and leg cramps, etc. The foetus, as well, stands to benefit by an increased tolerance to the physiologic stresses of late pregnancy, labour and delivery, one year later the offspring exhibit better motor skills, are leaner, etc.

While much data has been developed looking at these physiologic responses, no data was found which addressed, in any way, the areas outlined in this study: personal experiences of women who choose to continue vigorous exercise throughout pregnancy.

2. Purpose of study: To gather information on the experiences of women who have chosen to continue vigorous exercise throughout the course of their normal and healthy pregnancy(s).

3. Description of the study procedures and tests: Participants will be interviewed in an informal style regarding their personal experiences with exercising throughout their normal and healthy pregnancy: what exercise they engaged in, information/support received from healthcare providers, reactions from family and friends to your decision to continue your exercise program, etc. Interviews will be audio taped and later transcribed into print data.

4. Length of time: Participants will be interviewed for a one hour time period. Interviews will be conducted at a time and place that is convenient for the participant.

5. Possible risks and discomforts: Only women who have/are experiencing a normal and healthy pregnancy, where continuing their physical activity levels would be appropriate, are requested to participate in this study.

7. Liability statement:

Signing this form gives us your consent to be in this study. It tells us that you understand the information about the research study. When you sign this form, you do not give up your legal rights. Researchers or agencies involved in this research study still have their legal and professional responsibilities.

8. Questions:

If you have any questions about taking part in this study, you can meet with the investigator who is in charge of the study at this institution. That person is:

Julie Downey at 709-737-8038

Or you can talk to someone who is not involved with the study at all, but can advise you on your rights as a participant in a research study. This person can be reached through:

Office of the Human Investigation Committee (HIC) at 709-777-6974

Email: hic@mun.ca

Signature Page

Study title: **A qualitative study of the experiences and perceptions of women who continue vigorous physical activity during pregnancy**

Name of principal investigator: **Julia A. Downey**

To be filled out and signed by the participant:

	Please check as appropriate:
I have read the consent [and information sheet].	Yes { } No { }
I have had the opportunity to ask questions/to discuss this study.	Yes { } No { }
I have received satisfactory answers to all of my questions.	Yes { } No { }

I have received enough information about the study.
Yes { } No { }

I understand that I am free to withdraw from the study Yes { } No { }

- at any time
- without having to give a reason

I understand that it is my choice to be in the study and that I may not benefit. Yes { } No { }
I agree to be audio taped during the interview Yes { } No { }
I agree to take part in this study. Yes { } No { }

_____ _____
Signature of participant Date

_____ _____
Signature of witness Date

To be signed by the investigator:

I have explained this study to the best of my ability. I invited questions and gave answers. I believe that the participant fully understands what is involved in being in the study, any potential risks of the study and that he or she has freely chosen to be in the study.

_____ _____
Signature of investigator Date

Telephone number: _____

APPENDIX D

Canadian guidelines for exercise in pregnancy. *Wolfe, L.A., Davies, G.A., (2003). Clinical Obstetrics and Gynecology*, 46 (2): 488-495.

CLINICAL OBSTETRICS AND GYNECOLOGY
Volume 46, Number 2, 488–495

Canadian Guidelines for Exercise in Pregnancy

LARRY A. WOLFE, PhD *and* GREGORY A. L. DAVIES, MD
School of Physical and Health Education, Departments of Obstetrics and Gynaecology and Physiology, Queen's University, Kingston, Ontario, Canada

The need for guidelines for exercise during pregnancy and the postpartum period was stimulated during the early 1980s when active women of the "baby boom" generation became interested in whether it was safe to continue their active lifestyles during pregnancy. As a result of the strong demand for information, important questions were raised concerning the risk/benefit ratio of such exercise.[1] Postulated risks included the possibility that the fetus may be forced to compete with contracting maternal skeletal muscle for oxygenated blood flow (leading to fetal hypoxia and distress), essential substrates (leading to fetal growth restriction), and heat dissipation (leading to fetal hyperthermia and potential teratogenic effects).[2–4] Concern was also expressed that exercise may increase the chance of early miscarriage, spontaneous abortion, and premature labor, as well as chronic fatigue and musculoskeletal injury.[4] Putative benefits included maintenance of prenatal aerobic and musculoskeletal fitness levels, prevention of excessive maternal weight gain, facilitation of labor and recovery from labor, promotion of good posture, prevention of gestational glucose intolerance and low back pain, and improved psychological adjustment to the changes of pregnancy.[4]

As a result of the conflict between these 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[4–7] (Fig. 1). The concept that exercise is safe for some pregnant women but not others also led to the need for absolute and relative medical contraindications to exercise and the need for medical screening by a qualified health care provider before engaging in fitness training after becoming pregnant.[8]

As a result of a lack of scientific information, early guidelines for exercise during pregnancy were necessarily conservative and based primarily on common sense and

Note: A copy of the Physical Activity Readiness Medical Examination for Pregnancy can be obtained from the Internet at: www.csep.ca/forms.asp
Correspondence: Larry A. Wolfe, PhD, School of Physical and Health Education, Queen's University, Kingston, Ontario K7L 3N6, Canada. E-mail: wolfel@post.queensu.ca

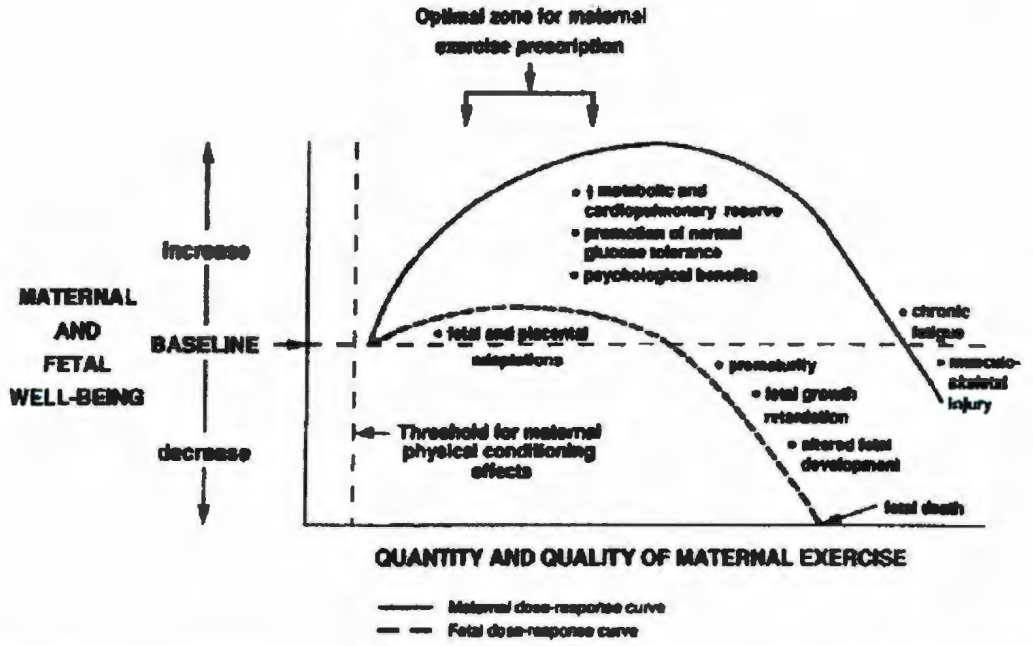

FIG. 1. Postulated dose-response relationship between quantity and quality of prenatal exercise with maternal and fetal well-being. Solid line, maternal dose-response curve; broken line, fetal dose-response curve. (Wolfe LA, Brenner IKM, Mottola MF. Maternal exercise, pregnancy outcome and fetal well-being. Exerc Sport Sci Rev. 1994;22:145–194, with permission)

the best guesses of medical authorities and exercise physiologists. In the United States, the original guidelines, "Exercise During Pregnancy and the Postpartum Period," were published in 1985.[8] These guidelines were the subject of much controversy because they placed conservative limits on the maximum pulse rate that could be achieved (140 bpm) and the duration of exercise (maximum of 15 minutes) and did not accommodate the idea that previously inactive women could begin an exercise program after becoming pregnant. Subsequent revisions published in 1994[9] and 2002[10] have become progressively more evidence-based and less restrictive and are widely accepted.

Pre- and postnatal exercise guidelines followed a parallel but different development path in Canada as a result of promotion by national and provincial health/fitness ministries. The first of these, a booklet entitled "Fitness and Pregnancy," was published by Fitness Canada (a federal government ministry) and was made available to the general public in 1982. This publication promoted the idea that pregnancy is a good time to develop healthy lifestyle habits (including regular exercise, good nutrition, smoking cessation, and abstinence from alcohol consumption). Guidelines for aerobic exercise included the idea that pregnant women should exercise 3 to 5 days per week for at least 15 minutes per session using the lower end of conventional pulse rate target zones for apparently healthy adults. The "talk test" was also introduced as a check to avoid overexertion. Muscular conditioning exercises, including calisthenics for general muscular conditioning and improvement of posture, abdominal exercises, Kegel exercises to strengthen the pelvic floor, and warm-up/cool-down exercises, were de-

scribed in detail. Finally, a postnatal exercise routine was also provided. This publication was followed by guidelines for the training of pre- and postnatal fitness instructors published by the Fitness Ontario Leadership Program and the National Fitness Leadership Advisory Committee.

More recently, the Physical Activity Readiness Examination (PARmed-X for Pregnancy)[11] was made available for use by physicians and midwives to provide medical clearance for their pregnant patients to initiate prenatal exercise programs. A summary of guidelines for the prescription of aerobic exercise and muscle conditioning was also included to assist health care providers in advising their pregnant patients on safe and effective types, intensities, and durations of exercise and suggested rates of progression. Safety precautions and reasons to stop exercise and consult a physician were also incorporated, along with advice for active living, healthy eating, and maintenance of a positive self-image.

A companion booklet, "Active Living During Pregnancy: Physical Activity Guidelines for Mother and Baby," was also made available to provide more detailed information to pregnant women on the guidelines outlined in the PARmed-X for Pregnancy.[12] The PARmed-X for Pregnancy was first made available to the public in 1996 and revised in 2002. The companion booklet was published in 1999. These materials are co-published by Health Canada and the Canadian Society for Exercise Physiology (CSEP) and are available from CSEP.

Research Background for PARmed-X for Pregnancy

The original prototype version of the PARmed-X for Pregnancy was formulated for use in a series of research studies conducted in the Clinical Exercise Physiology Laboratory at Queen's University in Kingston, Ontario, Canada (L. A. Wolfe, coordinator). These were controlled prospective studies that involved previously sedentary women. Subjects in the experimental group entered the physical conditioning program at the start of the second trimester and continued until term. Procedures for aerobic exercise prescription and muscle conditioning were those described in the current version of the PARmed-X for Pregnancy. All subjects were tested at the start of the second trimester (preconditioning), at the end of both the second and third trimesters (post-conditioning), and 3 to 4 months postpartum. Measurements during both steady-state and progressive testing protocols included a wide array of maternal metabolic, cardiovascular, and respiratory variables as well as fetal responses, pregnancy outcome, and labor and delivery data.[13–20] These studies confirmed that the physical conditioning methods used were safe for the mother and fetus and effective to improve maternal fitness.

In 1990, the format of the prototype PARmed-X for Pregnancy was refined after input from the Ontario Fitness Safety Standards Committee (N. L. Gledhill, chairperson) and an Expert Advisory Committee of the Canadian Society for Exercise Physiology and Health Canada. Safety precautions for muscle conditioning were also added in accordance with advice from Michelle F. Mottola, PhD (School of Kinesiology, University of Western Ontario). After an exhaustive review of available literature,[21,22] use of the PARmed-X for Pregnancy was endorsed by the Canadian Academy of Sports Medicine in their "Position Statement on Pregnancy and Exercise."[23]

Finally and most recently, CSEP and the Society of Obstetricians and Gynecologists of Canada (SOGC) have collaborated to formulate Canadian National Guidelines for exercise during pregnancy and postpartum.[24] These guidelines endorse the current version of the PARmed-X for pregnancy[11] and will be published in the June 2003 issues of the Journals of both societies.[24]

Medical Screening and Monitoring

An important goal in the design of the PARmed-X for Pregnancy was to establish communication between the pregnant woman, the health care provider monitoring her pregnancy, and her prenatal fitness instructor. To accomplish this, the pregnant woman completes Part A (her own basic contact information and telephone number of her prenatal fitness instructor) and Part B (questions on her general health status, presence or absence of symptoms in her current pregnancy, her current physical activity habits and intentions).

After completion of Parts A and B, the form is given by the pregnant woman to her health care provider, who completes Part C to approve or withhold medical clearance as appropriate. This section consists of a convenient checklist regarding the presence or absence of well-accepted absolute and relative contraindications to exercise in pregnancy, followed by a recommendation that exercise is either approved or contraindicated, based on current information.

A tear-away form is provided to be completed by the health care provider monitoring the woman's pregnancy to inform the individual's prenatal fitness instructor that the screening process had been completed. Finally, both "Safety Considerations" and "Reasons to Consult a Physician" were incorporated to ensure that the pregnant women exercises safely and seeks medical advice if signs appear that her pregnancy is not proceeding normally.

General Advice

The PARmed-X for Pregnancy guidelines carry forward the original philosophy of Fitness Canada that pregnancy is a good time to establish healthy lifestyle habits and that previously inactive women are encouraged to begin exercise programs while pregnant. In view of the discomforts in early pregnancy (nausea, fatigue, etc.), the high general rate of early miscarriage, and concerns about possible teratogenic effects of overheating during closure of the fetal neural tube, the start of the second trimester was identified as the best time to begin such a program.

Since the potential for competition between contracting maternal skeletal muscle and the fetus for oxygenated blood flow, glucose availability from the maternal blood glucose pool, and heat dissipation is highest in late gestation, the third trimester was also identified as a poor time to increase the quantity and quality of physical activity. This leaves the second trimester as the best time to progressively increase the amount of physical activity.

Aerobic Exercise

PRESCRIPTION AND MONITORING OF EXERCISE INTENSITY

Historically, the safest and most accurate way to prescribe and monitor the intensity of aerobic exercise in pregnancy has been a subject of considerable controversy. This is based on the fact that resting heart rate increases abruptly during the first trimester, followed by further moderate increases with advancing gestational age. Maximal heart rate has also been reported to be attenuated during maximal exercise testing,[25] resulting in a significant reduction in maximal heart rate reserve[26] (Fig. 2). Recent studies from this laboratory indicate that the higher resting heart rate and blunted heart rate response to heavy exercise are the result of reduced parasympathetic/vagal and sympathoadrenal modulation, respectively.[27]

As a result of the reduced maximal heart rate reserve, use of conventional heart rate target ranges for aerobic exercise is less dependable and precise during pregnancy compared with the nonpregnant state. To adjust for this, the modified heart rate target zones were provided as part of the PARmed-X for Pregnancy guidelines. This involved reduction in the heart rate target

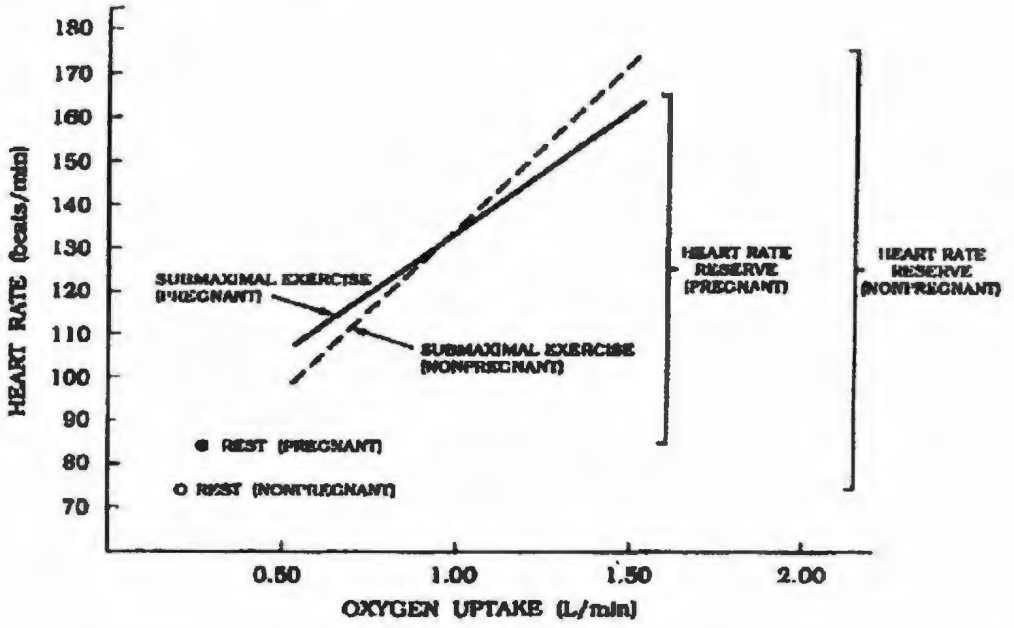

FIG. 2. Pregnancy-induced changes in resting heart rate, heart rate responses to exercise, and maximal heart rate reserve. (Wolfe LA, Mottola MF. Aerobic exercise in pregnancy: an update. Can J Appl Physiol. 1993;18:117–147, with permission)

zone for each age decade from approximately 20 to 15 bpm. This was done by lowering the upper end of the zone by 5 bpm. In both the pregnant and nonpregnant states, the heart rate target range represents approximately 60–80% of aerobic capacity.

Since the heart rate method of prescribing exercise intensity is less precise during pregnancy, ratings of perceived exertion (RPE) were recommended for use in addition to heart rate. RPE ratings at any given external work rate are not significantly altered by pregnancy or advancing gestational age.[13,17] Therefore, Borg's conventional 15-point scale[6–20] was recommended for this purpose, with 12 to 14 (a rating of 13 corresponds to a subjective rating of "somewhat hard") identified as the RPE range to use in pregnancy.

As suggested originally by Fitness Canada, the "talk test" was also retained as a final check to avoid overexertion. This is based on the idea that the exercising pregnant woman should be able to carry on a verbal conversation; if she cannot, the exercise intensity is too high. Since respiratory chemosensitivity is increased throughout pregnancy,[28] this test is more conservative during pregnancy than in the nonpregnant state.

EXERCISE DURATION AND FREQUENCY

Pregnant women should perform aerobic exercise regularly for at least 15 minutes, 3 days per week at the target intensity. Previously inactive women can gradually increase the duration of exercise from 15 to approximately 30 minutes per session over the course of the second trimester. The frequency of aerobic exercise can also be increased from a minimum of 3 days per week to 4 or 5 days per week. Exercise durations of 25 to 30 minutes per session at the target intensity have been shown to be safe and effective to increase maternal physical fitness.[13–20]

The recent case-control study by Camp-

bell and Mottola[29] indicated that women who participated in structured exercise five or more times per week had an increased chance of delivering a low-birth weight infant compared with women who exercised three or four times per week. Women who exercised 2 days per week or less were also at increased risk for low birth weight.

Muscle Conditioning

TYPES OF EXERCISES

A detailed review of procedures for muscle conditioning and specific exercises appear in the CSEP booklet "Active Living During Pregnancy: Activity Guidelines for Mother and Baby."[12]

As summarized in the PARmed-X for Pregnancy, muscular strengthening exercises should be included for the upper and lower back (to promote good posture), the abdomen (to promote good posture, prevent low back pain, prevent diastasis recti, and strengthen the muscles of labor), upper body (to support the breasts), and buttocks/lower limbs (to facilitate weight bearing and prevent varicose veins). Pelvic floor exercises (Kegels) should also be included to strengthen the pelvic floor muscles and prevent urinary incontinence.[30] Warm-up and cool-down exercises should also be incorporated and should include range of motion exercises and static stretching exercises for all major joints and muscle groups, respectively.

SAFETY PRECAUTIONS

Safety precautions for muscle conditioning are included in both the PARmed-X for Pregnancy and its companion booklet.[11,12] Briefly, these include the following: the need to avoid exercise in the supine position after the fourth month of gestation (to avoid the supine hypotension reaction); maintenance of good posture during daily activities; emphasis on controlled, static exercises versus ballistic movements during stretching; the need to discontinue abdominal exercises if diastasis recti develops; and avoidance of the Valsalva maneuver during resistance exercises.

To examine the safety of maternal strength conditioning, a recent study from this laboratory examined fetal heart rate responses to strength conditioning exercises in late gestation.[31] Healthy pregnant women ($n = 12$) performed three sets of different exercises involving different muscle masses (handgrip, single leg extension, double leg extension) at 50%, 70%, and 90% of their 10 repetition maximum in both the supine (30° tilt) and sitting postures. The order of the exercises for each subject was randomized. With the exception of occasional mild, transient bradycardic responses to exercise in the supine posture, fetal responses to exercise were unremarkable and supported the safety of moderate resistance training in late gestation, provided that the supine posture is avoided.

Nutritional Guidelines

The PARmed-X for Pregnancy and its companion booklet[11,12] also include basic advice for healthy eating. This includes the need to choose healthy foods from the four major food groups in accordance with Canada's Food Guide to Healthy Eating, along with adequate fluid intake. The need to gradually increase caloric intake to accommodate the increased energy requirements of pregnancy and to replace additional calories used for exercise was also emphasized; dieting to lose weight is discouraged. Finally, advice was given to avoid alcohol intake and cigarette smoking completely and to limit caffeine intake. Detailed nutritional guidelines for pregnancy and postpartum were published by Health Canada in 1999[32] and are available in the Internet (www.hc-sc.gc.ca).

Postpartum Exercise

The CSEP's "Active Living in Pregnancy" booklet[12] advises that women who have had

a healthy, uncomplicated pregnancy can resume mild activities such as walking, pelvic floor exercises, and moderate stretching immediately after delivery. Women with caesarean sections or other complications should consult their pre/postnatal health care provider before resuming activity. With their health care provider's approval, most women can resume their normal exercise programs after their postnatal checkup at approximately 6 to 8 weeks postpartum.

The CSEP booklet also includes recommendations for aerobic and muscle conditioning. Aerobic exercise should be done using conventional heart rate target and RPE targets for at least 15 minutes, 3 to 5 days per week. A series of postnatal exercises involving the mother and baby are also provided and include walking with a stroller, pliés, toe raises, modified pushups, and strengthening exercises for the abdominal and inner/outer thigh muscles.

Summary

Evidence-based guidelines for exercise in pregnancy have been developed in Canada as a result of cooperation between exercise scientists, the CSEP, Health Canada and the SOGC. After medical screening using the PARmed-X for Pregnancy, previously inactive women are encouraged to begin prenatal exercise programs involving both aerobic and muscle conditioning. Aerobic exercise should be performed regularly (at least 2 days per week), and exercise duration can be gradually and progressively increased from 15 to approximately 30 minutes per day over the course of the second trimester. Exercise intensity should be prescribed and monitored using modified heart rate target zones combined with the RPE method. The "talk test" can be used as a final check to prevent overexertion. Muscle conditioning exercises are also suggested to promote general conditioning and good posture, to facilitate labor, and to prevent gestational low back pain, urinary incontinence, diastasis recti, and varicose veins.

Women should avoid exercise in the supine posture after the fourth month as well as performance of the Valsalva maneuver during resistance exercise. Static stretching should be used and ballistic movements should be avoided. Advice for postnatal exercise and good nutrition was also provided.

Acknowledgment

The Exercise/Pregnancy Research Program at Queen's University has been supported by the U.S. Army Medical Research and Materiel Command (Contract #DAMD17–96-C-6112), the Canadian Forces Personnel Support Agency, the Ontario Thoracic Society, Ontario Thoracic Society Block Term Grant Funding, William H. Spear Foundation (Queen's University), Health Canada (NHRDP), the Canadian Fitness and Lifestyle Research Institute and NSERC (Canada).

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APPENDIX E

Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period. *Artal, R., O'Toole, M., White, S. (2003). British Journal of Sports Medicine, 37: 6-12.*

Br J Sports Med 2003;37:6-12

LEADER

Exercise in pregnancy

Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period

R Artal[1] and M O'Toole

[1] Saint Louis University, St Louis, MO, USA

New guidelines for exercise in pregnancy and postpartum have been published by the American College of Obstetricians and Gynecologists

Keywords: exercise; pregnancy; post partum

In January 2002 the American College of Obstetricians and Gynecologists (ACOG) published new recommendations and guidelines for exercise during pregnancy and the postpartum period.[1] Regular exercise is promoted for its overall health benefits. Pregnancy is recognised as a unique time for behaviour modification and is no longer considered a condition for confinement. It is currently recognised that habits adopted during pregnancy could affect a woman's health for the rest of her life. For the first time the recommendation suggests a possible role for exercise in the prevention and management of gestational diabetes.

The recommendations also promote exercise for sedentary women and those with medical or obstetric complications, but only after medical evaluation and clearance.

Box 1⊞ lists the absolute contraindications to aerobic exercise during pregnancy, and box 2⊞ the relative contraindications. As with any form of exercise prescription, these recommendations also include the warning signs to terminate exercise while pregnant (box 3⊞). The recommendations also offer guidelines for sports and recreational activities. It cautions against participation in contact sports and recommends avoidance of scuba

diving.

As for postpartum resumption of activities, the recommendations note that rapid resumption has no adverse effects, but gradual return to former activities is advised. This review includes background and comments to the above recommendations.

The health benefits of physical activity are well recognised, and conversely sedentary habits and low levels of cardiorespiratory fitness are leading risk factors for subsequent development of cardiovascular disease.[2,3]

The Centers for Disease Control and Prevention and the American College of Sports Medicine (CDC-ACSM) have recommended the accumulation of 30 minutes or more of moderate intensity physical activity on most, and preferably all, days of the week.[4] Moderate intensity physical activity is defined as activity with an energy requirement of 3–5 metabolic equivalents (METS). For most healthy adults, this is equivalent to brisk walking at 3–4 mph. The CDC-ACSM statement also recognises that more intense exercise performed in 20–60 minute sessions on three to five days a week will result in higher levels of physical fitness.

Despite the fact that pregnancy is associated with profound anatomical and physiological changes, there are few instances that should preclude otherwise healthy, pregnant women from following the same recommendations.

MUSCULOSKELETAL ADAPTATIONS

Anatomical and physiological changes during pregnancy have the potential to affect the musculoskeletal system at rest and during exercise. The most obvious of these is weight gain. The increased weight in pregnancy may significantly increase the forces across joints such as the hips and knees by as much as 100%[5] during weight bearing exercise such as running. Such large forces may cause discomfort to normal joints and increase damage to arthritic or previously unstable joints.

"Despite a lack of clear evidence that musculoskeletal injuries are increased during pregnancy, these possibilities should nevertheless be considered when prescribing exercise in pregnancy."

Data on the effects of increased weight of pregnancy on joint injury and pathology are lacking. Because of anatomical changes, pregnant women typically develop lumbar lordosis, which contributes to the very high prevalence (50%) of low back pain in pregnant women. Balance may be affected by changes in posture, predisposing pregnant women to loss of balance and increased risk of falling. However, increased incidence of falling during pregnancy has not been reported. Another musculoskeletal change during pregnancy is increased ligamentous laxity thought to be secondary to the influence of the increased levels of oestrogen and relaxin. Theoretically, this would predispose pregnant women to increased incidence of strains and sprains. This hypothesis has been substantiated by objective data on the metacarpophalangeal joints.[6] Despite a lack of clear evidence that musculoskeletal injuries are increased during pregnancy, these possibilities should nevertheless be considered when prescribing exercise in pregnancy.

Box 1 Absolute contraindications to aerobic exercise during pregnancy (with permission from ACOG[1])

- Haemodynamically significant heart disease
- Restrictive lung disease
- Incompetent cervix/cerclage
- Multiple gestation at risk for premature labour
- Persistent second or third trimester bleeding
- Placenta praevia after 26 weeks gestation
- Premature labour during the current pregnancy
- Ruptured membranes
- Pregnancy induced hypertension

Box 2 Relative contraindications to aerobic exercise during pregnancy (with permission from ACOG[1])

- Severe anaemia
- Unevaluated maternal cardiac arrhythmia
- Chronic bronchitis
- Poorly controlled type I diabetes
- Extreme morbid obesity
- Extreme underweight (body mass index <12)
- History of extremely sedentary lifestyle
- Intrauterine growth restriction in current pregnancy
- Poorly controlled hypertension/pre-eclampsia
- Orthopaedic limitations
- Poorly controlled seizure disorder
- Poorly controlled thyroid disease
- Heavy smoker

Box 3 Warning signs to terminate exercise while pregnant

- Vaginal bleeding
- Dyspnoea before exertion
- Dizziness
- Headache
- Chest pain
- Muscle weakness
- Calf pain or swelling (need to rule out thrombophlebitis)
- Preterm labour
- Decreased fetal movement

- Amniotic fluid leakage

Uterine activity has been measured in exercising pregnant women,[7,8] and minimal or no changes were reported during the last eight weeks of pregnancy. In some reports, physical activity has been associated with an increase in uterine contractions.[9] The magnitude of uterine contractions reported is usually low. There are only anecdotal reports that strenuous training may cause preterm labour. Nonetheless, until there is unequivocal evidence that strenuous exercise has no impact, a physically active woman with a history of, or who is at risk of, preterm labour should be advised to reduce her activity in the second and third trimesters.[10]

NUTRITIONAL REQUIREMENTS

After the 13th week of pregnancy, about 1.2 extra MJ (300 kcal) per day are required to meet the metabolic needs of pregnancy.[11–13] This energy requirement is increased further when daily energy expenditure is increased through exercise. In weight bearing exercise, such as walking, the energy requirement progressively increases with the increase in weight during the course of the pregnancy. A related consideration to nutrition and exercise during pregnancy is adequate carbohydrate intake. Pregnant women use carbohydrates at a greater rate both at rest and during exercise than do non-pregnant women.[15,16] It also appears that, during non-weight bearing exercise in pregnancy, there is preferential use of carbohydrates, possibly the result of the anaerobic component of this type of activity.[17]

CARDIOVASCULAR ADAPTATIONS

Pregnancy induces profound alterations in maternal haemodynamics. Such changes include an increase in blood volume, heart rate, and stroke volume as well as cardiac output, and a decrease in systemic vascular resistance.[13,18,19] By midpregnancy, cardiac outputs are 30–50% greater than before pregnancy.[20] Most studies show that maternal stroke volume increases by 10% by the end of the first trimester and is followed by a 20% increase in heart rate during the second and third trimesters.[21,22] Mean arterial pressure decreases 5–10 mm Hg by the middle of the second trimester and then gradually increases back to prepregnancy levels. The decreased mean arterial pressure is the result of increased uterine vasculature, uteroplacental circulation, and the decrease in vascular resistance of predominantly the skin and kidney.[21] These haemodynamic changes appear to establish a circulatory reserve necessary to provide nutrients and oxygen to both mother and fetus at rest and during moderate but not strenuous physical activity.

The cardiovascular changes associated with body posture is an important consideration for pregnant women both at rest and during exercise. After the first trimester, the supine position results in relative obstruction of venous return and therefore decreased cardiac output. For this reason, supine positions should be avoided as much as possible during rest and exercise. In addition, motionless standing is associated with a significant decrease in cardiac output, thus this position should be avoided.[23] Conflicting evidence exists on maternal heart rate response to steady state submaximal exercise during pregnancy.[24,25] Both blunted and normal responses to weight bearing and non-weight bearing exercise have been reported,[24,25] making use of heart rate monitoring to guide exercise intensity during pregnancy difficult.

RESPIRATORY ADAPTATIONS

Pregnancy is associated with profound respiratory changes: minute ventilation increases by almost 50%, largely as a result of increased tidal volume.[26,27] This results in an increase in arterial oxygen tension to 106–108 mm Hg in the first trimester, decreasing to a mean of 101–106 mm Hg by the third trimester.[28] There is an associated increase in oxygen uptake, and a 10–20% increase in baseline oxygen consumption. Physiological dead space during pregnancy remains unchanged.[26,29,30] During treadmill exercise in pregnancy, arteriovenous oxygen difference is decreased.[24] Because of the increased resting oxygen requirements and the increased work of breathing caused by pressure of the enlarged uterus on the diaphragm, there is decreased oxygen availability for the performance of aerobic exercise during pregnancy. Thus both subjective workload and maximum exercise performance are decreased.[12,27] However, in some fit women, there appear to be no associated changes in maximum aerobic power or acid-base balance during exercise in pregnancy compared with non-pregnant controls.[13,29,31]

THERMOREGULATORY CONTROL

The cardiovascular system is affected the most by the increased metabolic demands of exercise, and therefore a major factor is the dissipation of the excess heat generated by exercise. During pregnancy, basal metabolic rate, and therefore heat production, is increased above non-pregnant levels. The increase in body temperature during exercise is directly related to the intensity of the exercise. During moderate intensity, aerobic exercise in thermoneutral conditions, the core temperature of non-pregnant women rises an average of 1.5°C during the first 30 minutes of exercise and then reaches a plateau if exercise is continued for an additional 30 minutes.[16] A steady state of heat production versus heat dissipation is accomplished by increased conductance of heat from the core to the periphery through the cardiovascular system as well as through evaporative cooling through sweat. If heat production exceeds heat dissipation capacity, for example during exercise in hot, humid conditions or during very high intensity exercise, the core temperature will continue to rise. During prolonged exercise, loss of fluid as sweat may compromise heat dissipation. Maintenance of euhydration, and therefore blood volume, is critical to heat balance.

> " . . .an increase in maternal core temperature of more than 1.5°C during embryogenesis has been observed to cause major congenital malformations."

Data on the effects of exercise on core temperature during pregnancy are limited.[12,13,16] Fetal body core temperatures are about 1°C higher than maternal temperatures. In animal studies, an increase in maternal core temperature of more than 1.5°C during embryogenesis has been observed to cause major congenital malformations.[32] These data coupled with the results of human studies suggest that hyperthermia in excess of 39°C during the first 45–60 days of gestation may also be teratogenic in humans.[32,33] However, there have been no reports that hyperthermia associated with exercise is teratogenic in humans.

FETAL RESPONSES TO MATERNAL EXERCISE

In the past, the main concerns of exercise in pregnancy were focused on the fetus, and any potential maternal benefit was thought to be offset by potential risks to the fetus. In the uncomplicated pregnancy, fetal injuries are highly unlikely. Most of the potential fetal risks are hypothetical.

The principal question that remains to be answered is does the selective redistribution of blood flow during

regular or prolonged exercise in pregnancy interfere with the transplacental transport of oxygen, carbon dioxide, and nutrients, and, if it does, what are the lasting effects, if any? The indirect evidence is that there are no lasting effects. Given this concern, water exercise may be an excellent choice of exercise during pregnancy because, during immersion, a centripetal shift in blood volume occurs.

It is well recognised that, during obstetric events, transient hypoxia could result initially in fetal tachycardia and an increase in fetal blood pressure. These fetal responses are protective mechanisms allowing the fetus to facilitate transfer of oxygen and decrease the carbon dioxide tension across the placenta. Any acute alterations could result in fetal heart rate changes, whereas chronic effects may result in intrauterine growth restriction. There are no reports to link such adverse events with maternal exercise.

Responses of fetal heart rate to maternal exercise have been the focus of numerous studies.[27,34–38] Most of the studies show a minimum or moderate increase in fetal heart rate by 10–30 beats/min over baseline during or after maternal exercise. Fetal heart rate decelerations and bradycardia have been reported to occur with a frequency of 8.9%.[36] The mechanism leading to fetal bradycardia during maternal exercise can only be speculated on: probably a vagal reflex, cord compression, or fetal head malposition. No associated lasting effects of the fetus have been reported.

Several studies[8,39,40] have attempted to assess umbilical blood flow during maternal exercise with Doppler velocimetry. These studies are technically difficult to conduct during exercise, so most measurements are taken before and after exercise, by which time any changes could have returned to normal.

Epidemiological studies have suggested for a long time that a link exists between strenuous physical activity, deficient diet, and the development of intrauterine growth restriction. This association appears to be particularly true for mothers engaged in physical work. It has also been reported that mothers whose occupation requires standing or repetitive, strenuous, physical work such as lifting have a tendency to deliver earlier and have small for gestational age infants.[41–43] However, other reports have failed to confirm these associations,[44,45] suggesting that other factors or conditions, such as inefficient nutrition, have to be present for strenuous activities to affect fetal growth.

"It appears that birth weight is not affected by exercise in women who have adequate energy intake."

In another study it was concluded that mean birth weight is substantially lower when women exercised at or above 50% of preconception levels compared with non-exercisers.[46] Another study[47] found no difference between birth weight of offspring of vigorous exercisers and those of sedentary women, whereas others even found an increase in birth weight.[48] It appears, however, that birth weight is not affected by exercise in women who have adequate energy intake. Reports on continuous physical training during pregnancy in athletes indicate that such activities carry very little risk.[49]

Although the reported birth weights are lower than expected by an average of 500 g, these facts may be a partial explanation of some anecdotal reports of shorter duration of labour in some of these subjects.

The information available in the literature is too limited to allow risk assignment for either premature labour or fetal growth restriction in recreational or professional athlete exercising mothers, and the link to deficient

diets has not been sufficiently addressed. Clinical observations indicate that patients at risk of premature labour may have labour triggered by exercise. Women who are diet conscious often do not receive the minimum required nutrients. The combined energy requirements of pregnancy and exercise coupled with poor weight gain may lead to fetal growth restriction.

CLINICAL EVALUATION

Exercise prescription requires knowledge of the potential risks and assessment of the physical ability to engage in various activities. Given the potential risks, albeit rare, thorough clinical evaluation of each pregnant woman should be conducted before an exercise programme is recommended. Routine prenatal care, as advocated in ACOG publications, is sufficient for monitoring the exercise programme.

MEDICAL SCREENING BEFORE EXERCISE

The overall health, obstetric, and medical risks should be reviewed before a pregnant woman is prescribed an exercise programme. In the absence of contraindications, a pregnant woman should be encouraged to engage in regular, moderate intensity physical activity to continue to derive the same associated health benefits during pregnancy as before pregnancy. However, there are contraindications to exercise because of pre-existing or developing medical conditions, and pregnancy is not different. In addition, certain obstetric complications may develop in pregnant women regardless of the previous level of fitness, which could preclude them from continuing to exercise safely during pregnancy. The contraindications to exercise listed are suggested only as guides to determining the appropriateness of exercise during pregnancy for individual women. Box 3 highlights the warning signs of complications.

EXERCISE PRESCRIPTION

The elements of exercise prescription should be considered in every physical activity framework regardless of its purpose—that is, basic health, recreational pursuits, or competitive activities. Consideration should be given to the type and intensity of exercise as well as to the duration and frequency of exercise sessions to carefully balance between potential benefits and potential harmful effects. Additional attention should be given to progression in intensity over time.

Basic exercise prescription for overall health and wellbeing

Type of exercise

Exercise prescription for the development and maintenance of fitness in non-pregnant women consists of activities to improve cardiorespiratory (aerobic exercise) and musculoskeletal (resistive exercise) status.[50] Exercise prescription in pregnancy should include the same elements. Aerobic exercise can consist of any activities that use large muscle groups in a continuous rhythmic manner—for example, activities such as walking, hiking, jogging/running, aerobic dance, swimming, cycling, rowing, cross country skiing, skating, dancing, and rope skipping. Because control of exercise intensity (see below) within rather precise limits is often desirable at the beginning of an exercise programme, the most easily quantified activities, such as walking or stationary cycling, are particularly useful. There are no data to support the restriction of pregnant women from participating in these activities, although some activities carry more risk than others. There are several activities that pose increased risks in pregnancy such as scuba diving and exertion in the supine position. Swimming, however, has not been associated with adverse effects and has the advantage of creating a buoyant condition that is well tolerated. Activities that increase the risk of falls, such as skiing, or those that

may result in excessive joint stress, such as jogging and tennis, should include cautionary advice for most pregnant women, but evaluated on an individual basis with consideration for individual abilities. Certainly, the risk of related injuries is difficult to predict.

In addition to aerobic activities, activities that promote musculoskeletal fitness are part of an overall exercise prescription. Typically, these include both resistance training (weightlifting) and flexibility exercises. Limited information exists on strength training during pregnancy. In one study,[51] individually prescribed strength training (one set of up to 12 repetitions) of multiple muscle groups was used as part of an overall conditioning programme for pregnant women. Fetal heart rates were monitored during training at 28 and 38 weeks gestation, and they remained unchanged. It was concluded that relatively low weights with multiple repetitions lifted through a dynamic range of motion appear to be a safe and effective type of resistance exercise during pregnancy. Although supporting data are lacking, it would be prudent to limit repetitive isometric or heavy resistance weightlifting and any exercises that result in a large pressor effect during pregnancy. Because of the increased relaxation of ligaments during pregnancy, flexibility exercise should be individualised for the same reason. Maintenance of normal joint range of motion, however, should not interfere with a moderate exercise routine in pregnant women.[51]

Intensity of exercise

Intensity is the most difficult component of an exercise regimen to prescribe for pregnant women. To derive health benefits, non-pregnant women are advised to participate in at least moderate intensity exercise. In the combined CDC-ACSM recommendations for physical activity and health, moderate exercise is defined as exercise of 3–4 METS or any activity that is equivalent in difficulty to brisk walking.[4] There is no reason to alter this recommendation for pregnant women with no medical or obstetric complications. The recommended intensity of physical activity for developing and maintaining physical fitness is somewhat higher. The ACSM recommends that intensity should be 60–90% of maximal heart rate or 50–85% of either maximal oxygen uptake or heart rate reserve. The lower end of these ranges (60–70% of maximal heart rate or 50–60% of maximal oxygen uptake) appears to be appropriate for most pregnant women who did not engage in regular exercise before pregnancy, and the upper part of these ranges should be considered for those who wish to continue to maintain fitness during pregnancy. In a meta-analysis study of exercise and pregnancy, it was reported that, with exercise intensities of 81% of heart rate maximum, no significant adverse effects were found.[52]

Given the variability in maternal heart rate responses to exercise, target heart rates cannot be used to monitor exercise intensity in pregnancy.

Ratings of perceived exertion have been found to be useful during pregnancy as an alternative to heart rate monitoring of exercise intensity.[54] For moderate exercise, ratings of perceived exertion should be 12–14 (somewhat hard) on the 6–20 scale. Evidence of the efficacy of this approach is that, when exercise is self paced, most pregnant women will voluntarily reduce their exercise intensity as pregnancy progresses.[55] Although an upper level of safe exercise intensity has not been established, women who were regular exercisers before pregnancy and who have uncomplicated, healthy pregnancies should be able to engage in high intensity exercise programmes, such as jogging and aerobics, with no adverse effects. The nutritional, cardiovascular, and musculoskeletal condition of the subject as well as fetal wellbeing should be periodically assessed during the prenatal office visits in pregnant women undertaking high intensity exercise programmes. Additional testing should be considered as clinically indicated—for example, non-stress fetal heart testing and

ultrasound to assess fetal growth. Dietary modifications and changes in exercise routines should also be considered if clinically indicated.

Duration of exercise

Two concerns should be addressed before prescribing prolonged exercise (in excess of 45 minutes of continuous exercise) regimens for pregnant women. The first is thermoregulation. Exercise preferably should be performed in a thermoneutral environment or in controlled environmental conditions (air conditioning). Attention to proper hydration and subjective feelings of heat stress are essential. The second concern is energy balance. Energy costs of fitness exercise should be estimated and balanced by appropriate energy intakes. Setting of limits to exercise durations is not possible because of the reciprocal relation between exercise intensity and duration. It should be noted that, in studies in which exercise was self paced, in a controlled environment, core temperatures rose less than 1.5°C over 30 minutes and stayed within safe limits.[16] Accumulating the activity in shorter exercise periods, such as 15 minute periods, may obviate concerns related to thermoregulation and energy balance during exercise sessions. ACSM recommends that non-pregnant women exercising to increase or maintain fitness may exercise for up to 60 minutes per exercise session.[52]

Frequency of exercise

In the current CDC-ACSM recommendations for exercise aimed at health and wellbeing, the recommendation for non-pregnant women is that an accumulation of 30 minutes a day of exercise occur on most if not all days of the week. In the absence of either medical or obstetric complications, pregnant women could adopt the same recommendation.

Progression

Pregnant women who have been sedentary before pregnancy should follow a gradual progression of up to 30 minutes a day. This recommendation is not different from that for non-pregnant sedentary women who begin an exercise programme. Pregnancy is not a time for greatly improving physical fitness. Therefore, women who have attained a high level of fitness through regular exercise before pregnancy should exercise caution in engaging in higher levels of fitness activities during pregnancy. Further, they should expect overall activity and fitness levels to decline somewhat as pregnancy progresses.[55]

Recreational activities

Most reports of participation in active recreational activities during pregnancy are anecdotal in nature. In general, participation in a wide range of recreational activities appears to be safe. The safety of each sport is largely determined by the specific movements required by that sport. Activities with a high risk of falling or those with a high risk of abdominal trauma should be considered undesirable.[56] Participation in recreational sports with a high potential for contact, such as ice hockey, soccer, and basketball, could result in serious trauma to both mother and fetus. Similarly, recreational activities with increased risk of falling, such as gymnastics, horseback riding, downhill skiing, and vigorous racquet sports, have inherent high risk of trauma in pregnant and non-pregnant women. Scuba diving should be avoided throughout pregnancy because the fetus is at increased risk of decompression sickness secondary to the inability of the fetal pulmonary circulation to filter bubble formation.[57] As for exertion at altitude, reports are available for activities at less than 2500 m (6000 feet). In one study conducted at 2500 m, it was concluded that pregnant women may engage in periods of exercise and/or moderate physical tasks, but are limited in performing high intensity physical activities. No adverse fetal responses were recorded during this study.[58] Other studies confirm the lack of adverse effects on the fetus at altitudes typically used for mountain sports such as hiking or skiing (less

than 2500 m).[59] All women who are recreationally active should be aware of signs of altitude sickness for which they should stop exercise, descend from altitude, and seek medical attention (box 3).

Water exercise

The major effect of immersion is a redistribution of extravascular fluid into vascular space, resulting in an increase in blood volume.[60,61] This effect occurs very rapidly and is proportional to the depth of immersion, leading to a decrease in systemic blood pressure (both systolic and diastolic). These changes are accompanied by a decrease in antidiuretic hormone, aldosterone, and plasma renin activity while the atrial natriuretic factor decreases.

The shift in blood volume leads to ventilatory changes with a decline in vital capacity, ventilation capacity, and expiratory reserve volume.[62] Immersion is ideal for dissipating exercise induced increased temperature during exercise in pregnancy.[55]

"No adverse effects on the fetus have been reported to occur during water exercise in pregnancy."

In longitudinal studies of immersion exercise in pregnancy at 60% maximal oxygen consumption, it was found to be a safe activity, with advantageous effects on oedema, thermal regulation, and buoyancy, thus minimising the risk of joint injuries.[63] Furthermore, no adverse effects on the fetus have been reported to occur during water exercise in pregnancy.

COMPETITIVE ATHLETICS

Competitive athletes are likely to encounter the same limitations as faced by recreational athletes during pregnancy. The competitors tend to maintain a more strenuous training schedule throughout pregnancy and to resume high intensity postpartum training sooner. The concerns of the pregnant, competitive athlete fall into two general categories: (*a*) the effects of pregnancy on competitive ability; (*b*) the effects of strenuous training and competition on pregnancy, particularly the fetus. Such athletes would certainly require closer obstetric supervision than the routine prenatal care. Additional testing and intervention should occur as clinically indicated.

As pregnancy progresses, several changes occur that will prevent the athlete from attaining the same performance levels as before pregnancy. Weight gain, by itself and in the presence of laxity of joints and ligaments and change in the centre of gravity, will cause unavoidable limitations in most sporting activities. The ability to stop and start or to change direction will progressively decrease. Any attempts to substitute compensatory movements for finely tuned skill movements result in inefficient movement, decrease in competitive ability, and increase in the risk of injury. Performance in sports in which endurance is important may be adversely affected by the physiological anaemia commonly associated with the increased blood volume of pregnancy.

Despite the fact that pregnancy adversely affects performance in the competitive athlete, most elite athletes prefer to continue to train during pregnancy. The relatively high intensity, long duration, and frequent workout schedules of most competitive athletes may place them at greater risk of thermoregulatory complications during pregnancy.[10] Particular attention should be paid to maintaining proper hydration during

and between these exercise sessions. Fluid balance during an exercise session can be monitored by weighing before and after the session. Any loss of weight is fluid loss that should be made up before the next exercise session (1 lb weight loss ≈ 1 pint of fluid).

Because of the type (high intensity, prolonged, and frequent) of training done by elite athletes, it is likely that weight gain will be less for both mother and fetus than for sedentary women. This lower birth weight has been attributed to decreased neonatal fat mass.[46]

SPECIAL POPULATIONS

Pregnant women with diabetes, morbid obesity, or chronic hypertension should have individualised exercise prescription. The information available in the literature is limited with regard to the role of physical activity for these women. Two randomised trials of exercise training in women with gestational diabetes have been published.[64–66] In one study, arm ergometry exercise three times a week for about 20 minutes a session at 50% maximal oxygen consumption resulted in normalisation of glycaemic control after four weeks in contrast with diet alone.[67] A second study included 41 women at 28–33 weeks gestation who, despite dietary treatment, had persistent fasting hyperglycaemia of 105–140 mg/dl. Study control subjects were treated with insulin. The exercise patients performed moderate cycle exercise three times a week and maintained an active lifestyle for the duration of pregnancy. Through this regimen, the exercising patients maintained euglycaemia and did not require insulin. In a study of women with type I diabetes mellitus, a postprandial walking programme did not achieve the desirable glycaemic control.[68] Epidemiological data suggest that exercise may even be beneficial in the primary prevention of gestational diabetes particularly in morbidly obese women (body mass index >33), but not in women of normal weight.[69] The American Diabetes Association has endorsed exercise as "a helpful adjunctive therapy" for gestational diabetes when euglycaemia is not achieved by diet alone.[70] There is currently no information available on the effect of exercise on women with chronic hypertension. The standard of care for women with pregnancy induced hypertension is to limit physical activity.

EXERCISE IN THE POSTPARTUM PERIOD

Many of the physiological and morphological changes of pregnancy persist for four to six weeks post partum. Thus, exercise routines may be resumed only gradually after pregnancy and should be individualised. Physical activity can thus be resumed as soon as physically and medically safe. This will certainly vary from one woman to another, with some being capable of engaging in an exercise routine within days of delivery. There are no published studies to indicate that, in the absence of medical complications, rapid resumption of activities will result in adverse effects. Undoubtedly, having undergone detraining, resumption of activities should be gradual. No known maternal complications are associated with resumption of training.[10] Moderate weight reduction while nursing is safe and does not compromise neonatal weight gain.[71] Failure to gain weight is associated with decreased milk production, which may be secondary to inadequate fluid or nutritional intake to balance training induced outputs. Nursing women should consider feeding their infants before exercising in order to avoid the discomfort of engorged breasts.[72,73] In addition, nursing before exercise avoids the potential problems associated with increased acidity of milk secondary to any build up of lactic acid. Finally, a return to physical activity after pregnancy has been associated with decreased postpartum depression, but only if the exercise is stress relieving and not stress provoking.[74]

SUMMARY

Pregnancy should not be a state of confinement, and pregnant women with uncomplicated pregnancies should be encouraged to continue and engage in physical activities. Recreational and competitive athletes with uncomplicated pregnancies may remain active during pregnancy, and modify their usual exercise routines as indicated in this review. All active pregnant women should be examined periodically to assess the effects of their exercise programmes on the developing fetus, so that adjustments can be made if necessary. Women with medical or obstetric complications should be carefully evaluated before recommendations on physical activity participation during pregnancy are made. Despite the fact that pregnancy is associated with profound anatomical and physiological changes, exercise has minimal risks and confirmed benefits for most women.

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Commentary

S White[2]

[2] Olympic Park Sports Medicine Centre, Swan Street, Melbourne, Victoria 3000, Australia; susanwhite@optusnet.com.au

Correspondence to:
Dr Artal, 6420 Clayton Road, Ste 290 St Louis, MO 63117, USA;
artalr@slucare1.sluh.edu

In March 2002, Sports Medicine Australia (SMA) also released a consensus statement on exercise in pregnancy,[1] independently of the American College of Obstetricians and Gynecologists (ACOG). Not surprisingly most of the recommendations are similar, with an emphasis on encouraging activity during pregnancy because of its short and long term benefits. The latest guidelines also acknowledge that an exercise programme can be started or increased in a normal, healthy pregnancy.

After extensive review of the literature, both guidelines concede that there are no reported adverse pregnancy outcomes related to exercise during pregnancy and most of the potential risks such as reduced transplacental oxygen and nutrients, and hypothermia related teratogenesis are hypothetical. The ACOG (and SMA) no longer recommend heart rate targets to assess intensity of exercise but prefer self regulation and scales of perceived exertion. The ACOG guidelines only briefly comment on contact sports, advising that there may be a risk of trauma and therefore they should be avoided.

SMA's statement was initiated after a ban was placed on pregnant women participating in the moderate contact sport of netball. These guidelines therefore describe in more detail related research into abdominal trauma and sports injuries. This discussion suggests that many contact sports may in fact pose no serious risk to the mother or fetus.

The ACOG's guidelines for the first time provide helpful comment on competitive athletes and special groups (diabetic, obese, and hypertensive) of pregnant women. Overall, the latest ACOG guidelines are more comprehensive and generous in their advice to pregnant women. Like SMA, they encourage women to exercise before, during, and after pregnancy after appropriate medical assessment and advice.

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