

EXERCISE and PREGNANCY

A summary of the research followed by an exclusive interview of a panel of experts

By Carmen Bott, MSc. CSCS, RKC

This article is dedicated to Dr. James Clapp, a pioneer investigator in the fields of Medicine and Exercise Physiology. Dr. Clapp studied hundreds of women who exercised five or more times per week, performed weight-bearing exercise for 30-90 minutes at 65-90 percent of maximum capacity and compared them to healthy, active controls. Thank-you Dr. Clapp for the tremendous job you have done in uncovering the truths behind exercise and pregnancy, for the fit-mom-to-be!

Pregnancy is a normal biological process characterized by the growth and development of a fetus. In this day and age, all mothers want the best possible health for themselves and their babies, but some women have concerns that regular maternal physical activity during pregnancy may cause miscarriage, premature delivery, poor fetal growth, or musculoskeletal injury. For normal pregnancies, these concerns are unsubstantiated and the physiological effects of combining exercise and pregnancy does not support these concerns (Clapp, 1998). In fact, participation in regular **weight-bearing** exercise has been shown to improve maternal fitness, restrict weight gain without compromising fetal growth, and hasten postpartum recovery. Thus, a healthy woman with a normal pregnancy may either continue her regular exercise regimen, or even begin a new exercise program.

Many of the concerns of exercising while pregnant are centered around theories related to high body temperature, reduced delivery of oxygen and nutrients to the placenta and thus the baby, mechanical stress which may result in damage to the mother or baby and restriction of essential substrates for energy production. The effect of pregnancy on each of these 'theories' are discussed with special attention to the numerous benefits, which result from a **moderate to vigorous, weight bearing exercise program**. These benefits include and are not limited to:

- Maintenance of prenatal aerobic and musculoskeletal fitness levels
- Prevention of excess body fat gain
- Facilitation of labour
- Promotion of good posture
- Prevention of gestational diabetes
- Prevention of low back pain
- A healthy, resilient, and fit baby

There are more reasons than ever now to continue to follow a training program while one is pregnant. Not only does it benefit the mother, but also the baby. Yes, you can train your baby in utero!

MATERNAL BENEFITS OF EXERCISE

The benefits of engaging in a regular, **moderate to vigorous** intensity activities (versus walking and prenatal yoga, which would be considered very low intensity activities) are ten-fold for the mother to be. The research is now clear that the benefits far outweigh any risks, especially when the expectant mother continues her program right to term.

Blood volume expansion

The plasma volumes, red cell volumes and total blood volumes of regularly exercising women during pregnancy are at least 10 to 15 percent higher than those of their less active or sedentary counterparts (Pivarnik et al., 1994). What does this mean? Women who exercise have a greater circulatory reserve, which allows them to better handle stress of exercise and work and also events such as hemorrhage, trauma, anesthesia, and more.

Oxygen uptake

Regular exercise during pregnancy also has some interesting and positive effects on the growth and function of the placenta that helps protect the fetus from oxygen deprivation. Those women who exercise throughout early and mid-pregnancy have a better adapted placenta to deliver more oxygen and nutrients to the baby. There is also an improvement in alveolar ventilation during pregnancy and the muscular effects of regular exercise on ventilation in general which enhances placental gas transfer of both oxygen and carbon dioxide between the mother and the baby (Clapp, 1998).

Thermoregulation

It is also known that exposure to regular sustained exercise increases blood volume, which improves an individual's ability to maintain skin blood flow during exercise and it decreases the core temperature threshold for the initiation of the sweat response, meaning pregnant >>

women who exercise regularly will sweat more readily and have a very efficient cooling mechanism (Roberts et al, 1977; Saltin et al., 1968). Although pregnant women should be cautioned to avoid exercise in extremely hot and humid conditions, they are not at risk of 'overheating' during exercise.

Body composition

A women's basal metabolic rate increases by 10-15 percent during pregnancy (Clapp, 1998). However, her ability to store extra energy (calories) is also improved. Thus, it is not necessary to 'eat for two' even when training during pregnancy. Women need an additional 300 kcal per day when exercising moderately and if they are exercising more vigorously, about an extra 150 kcal per day on top of that. Interestingly enough, women in third-world countries where they must perform hard, physical work and eat a diet rich in whole, natural, unprocessed food gain less body fat, versus those women in industrialized countries— yet, the baby's birthweights are the same (Clapp, 1998). Following a regular moderate to vigorous, weight bearing training program is key to reducing maternal body fat accumulation. Again, the examples of walking and prenatal yoga will not be a sufficient enough stimulus to affect body composition.

Metabolism

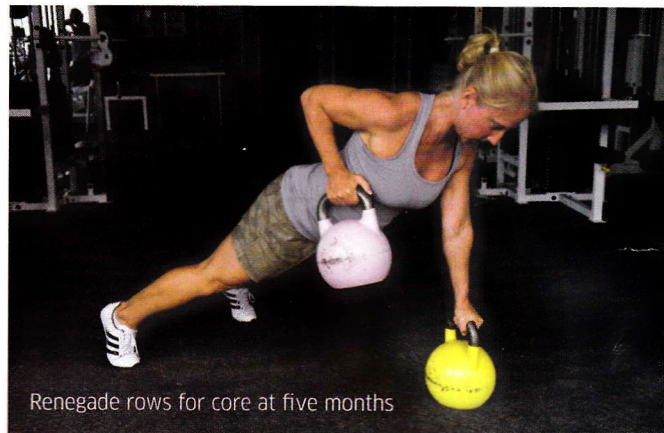
Pregnancy suppresses the normal hormonal responses that encourage the release of stored liver glycogen when blood sugar levels begin to fall, sparing these carbohydrate reserves for the baby and the placenta. It also decreases the transit time for food to travel through the digestive system, which alters the absorption rate of this fuel source in the blood (Clapp, 1998). The two of these effects combined, can cause pregnant women to feel mildly diabetic if they do not replenish fuel stores after training or if they go more than six to eight hours without food. Thus, it is important to have, on hand, a small piece of fruit and a protein source to ingest after exercise, or to keep exercise sessions shorter than normal to keep blood sugar levels from dropping too low. However, those pregnant women who are more highly trained and are used to more vigorous training sessions have an increased reliance on fat for energy, which allows glucose to be more readily available to the baby. Fit, pregnant women maintain more constant blood glucose levels versus unfit, generally active controls.

Less maternal discomfort

When data was reviewed from 100 women, the incidence of low back, pelvic and or leg discomfort in women who exercised during pregnancy was less than 10 percent. In the control group of 100 women who were active, but not trained, the incidence was much greater, at 40 percent (Clapp, 1998). It was not known what types of exercise these active women were doing, however, beyond those that were regular, weight bearing and sustained.

Labour and delivery benefits

In the research, it has been found that continuing weight-bearing exercise at the intensity, duration and frequency *throughout the entire pregnancy* leads to a 35-percent decrease in the need for pain relief, a 75-percent decrease in the incidence of maternal exhaustion, a 50-percent decrease in the need to artificially rupture the membranes, and a 75-percent decrease in the need for operative intervention such as a cesarean section or forceps delivery (Clapp, 1998). What was most interesting is that a whopping 86 percent of the exercise group in Dr. Clapp's study had uncomplicated spontaneous deliveries versus only 53 percent of the control group of the active, but untrained women. Also, among the women who had vaginal births, the length of labour was more than a third shorter in the women who continued to exercise right to term versus the controls (Clapp, 1998).



Effects on the 'Intangibles'

In general, women who continue to train during their pregnancy have a positive attitude and seem ready to take on the challenges of labor. Dr. Clapp describes his fit, research subject's attitudes as "they regard these events as a normal part of life and therefore take them in stride" (Clapp, pg 100, 1998). Simply put, they looked on the bright side of things and used humor as a way to cope with their changing bodies. According to Dr. Clapp, his control group did not share the same upbeat attitude.

FETAL WELL-BEING

It is important to highlight the benefits of exercise on survival value for the baby when unanticipated maternal stresses occur during labour.

Fetal heart rate (FHR) response

The normal and usual fetal heart rate response is an increase in heart rate during exercise, that gradually returns to its pre-exercise level once the exercise session ends (Clapp, 1998). There are some conditions, however, that need to be met for the fetal heart rate increase to occur. First, the exercise must be sustained for more than 10 minutes in duration. Also, the *type* of exercise chosen affects the magnitude of the fetal heart rate response. For example, exercises that use a large fraction of muscle mass and force the woman to move her body weight against gravity such as: aerobics, stair climbing, jogging, sled pushing/pulling result in a greater FHR increase. Both longer and more intense exercise sessions do decrease uterine blood flow and the fetus compensates for this by increasing its heart rate. This of course, poses the question then of how much stress is necessary and how much is too much for the fetus? Is it safe for the FHR to increase 25-35 beats per minute above the pre-exercise level?

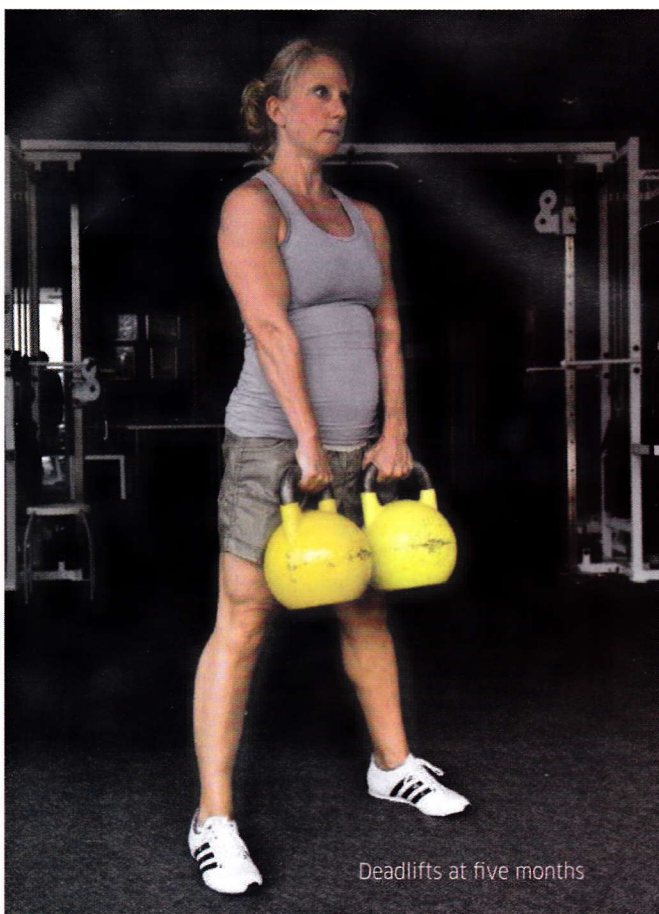
Dr. Clapp and his investigators found there were no changes in fetal breathing or activity patterns, characteristic of a lack of oxygen, with elevated heart rates. Instead, they concluded that heart rate increase was a normal stress response to the exercise, rather than a physiological reaction to insufficient oxygen.

There is also another response the fetal heart rate can undergo with exercise of sufficient magnitude and that is a drop or decreased FHR response. This can happen between 15 and 20 percent of the time in unfit women, exercising close to their maximum, as shown by other investigator's research. In Dr. Clapp's studies of fit women, exercising at above 85 percent of their capacity (not to maximum) it has only happened in two out of 2000 cases, very close to term. In both cases, the baby was perfectly healthy. Dr. Clapp hypothesizes that the fall in FHR response was due pressure on their heads from the mother's pelvic structures, not lack of oxygen.

Dr. Clapp advises monitoring fetal kicks for 30 minutes after exercise. If there are two or more kicks, the baby's condition is fine and there is nothing to worry about.



Single-leg deadlifts at five months



Deadlifts at five months

Guidelines for prescription and monitoring as well as "Do's and Don'ts" can be found in:

- The Canadian Society of Exercise Physiologists
- The Society of Obstetricians and Gynecologists of Canada (SOGC)
- Exercising Through your Pregnancy by Dr. James Clapp

EXERCISE PRESCRIPTION AND MONITORING

There is no replacement for common sense with respect to exercise programming during pregnancy. There are many resources that can be accessed when putting together a plan for oneself, a client, or a patient. It is not necessary to adhere to a set number of exercises, repetitions, or intensity as each and every person is different and will have a different training background. The overall exercise program must be congruent with an individual's goals and their lifestyle. One should cycle rest with training and note that pregnancy is not a time to reach elite levels of performance. It takes energy to develop a healthy baby.

Unfortunately, there is very little research on the effects of resistance training, but Dr. Clapp does encourage it. I recommend you seek a strength and conditioning coach who specializes in technical lifting. He or she will be able to modify exercises and develop a program for you that promotes a strong core, great posture, and muscle balance.

EXPERT INTERVIEWS

The first set of Q&A was provided by Pre and Postnatal fitness expert, Andrea Page, who Founded the FITMOM company.

CARMEN: There are a lot of claims and myths out there regarding exercise and pregnancy. Can you give me your top five and some information on why it is a myth or a gross generalization?

ANDREA: **Myth number 1:** *It is not safe to train during the first trimester.*

For many years, medical experts advised women not to exercise in the first trimester. The concern was related to first trimester miscarriage. A link was made despite no concrete evidence connecting the two. The reality is that one in three pregnancies are lost in the first trimester and are chromosomal in nature. Exercise in the first trimester has no links to pregnancy loss in the first trimester based on current research.

Myth number 2: *Your HR rate should not go above 140 BPM.*

Pregnant women have been told for many years to keep their heart rate below 140 bpm. The truth is heart rate is one area you absolutely cannot give a blanket statement. Without considering the age of the person, previous level of fitness and stage of pregnancy an absolute number is completely inaccurate. The "TALK TEST" is a more applicable guide. From a physiological stand point, a well-trained woman can have a higher heart rate and pass a talk test which means they are not compromising baby. Breaking it down to simple application in this case also creates a more accurate form of monitoring. A person's body will reserve oxygen to support cardiovascular function. Many women can work above 140 BPM without symptoms of breathlessness while some cannot.

Myth number 3: *You cannot train your abdominals during pregnancy.*

Many women are still cautioned by well meaning friends and even uninformed caregivers to avoid abdominals. Core strength is so important for expecting moms and in utero babies live in a cushion of fluid that protects them. Core strength is needed to support the lower back, support the pelvic floor and assist the uterus in the pushing phase of labour.

While core strength is safe for baby and crucial for muscular balance, preparing for labor and postpartum recovery it is also important to find a trained professional to do regular abdominal separation assessments. >>

Myth number 4: *You're eating for two*

Anyone who loves to eat has no investment in knowing the truth here. The reality is pregnancy requires only minimal additional calories. The number quoted is 300 kcals extra per day. However, that may be less or more depending on pre-pregnancy weight and energy expenditures. One can also add an additional 150 kcal to this figure if they are exercising regularly.

Myth number 5: *Lifting your arm above your head*

While lifting your hands above your head does in fact increase your heart rate, this should not be an absolute contraindication as in active women this will be generally insignificant.

Now, some words of advice, from Naturopathic Physician, Dr. Julie Durnan who specializes in women's health.

CARMEN: You have some terrific nutrition and supplement recommendations for women who are pregnant - Can you discuss the importance of iron testing and the necessity for supplementation. Do you also recommend certain foods that are iron-rich during pregnancy?

JULIE: Taking a good prenatal multivitamin is very important in pregnancy and there is very good research showing the importance of a multi in reducing complications in pregnancy. Nutritional requirements go up significantly when we're growing a baby, specifically our body's demands for iron. Iron is needed for proper placenta development and prevention of pre-term and low birth weight babies. A good multivitamin will contain approximately 45mg of iron in the daily dose. I always recommend that women eat a variety of iron-rich foods to keep their stores up. These foods include green leafy veggies, legumes, and occasional red meat if women are inclined. However, many women will require extra iron in addition to what's found in the multivitamin. Iron testing is important during pregnancy and possibly frequently if the mom-to-be is following a vegetarian diet or avoiding iron-rich foods due to nausea and food aversion.

CARMEN: You do not recommend women do Kegel exercises during their pregnancy. Instead you recommend they do their Kegels postpartum. Can you elaborate on this advice?

JULIE: That's correct. I don't recommend doing Kegels for the pelvic floor during pregnancy. Contrary to what many women have been taught, doing Kegels in isolation, will actually tighten the pubococcygeus muscles (PC muscles) and narrow the birth canal. Kegels are fabulous postpartum but in pregnancy, this is actually the worst time to be tightening these muscles. What women need to do is work all of their muscles in concert, that's by doing squats and activating their gluteal muscles (and calves and hamstrings) which will lift the sacrum and widen the birth canal.

CARMEN: You also recommend specific movement patterns during the pregnancy to help turn the baby. What are these patterns and what is the theory behind them?

JULIE: It appears that in the past several years, there are more and more babies presenting and born in a posterior position (also called "back labour", which can be very painful for mom). One theory for this is that women have many more office jobs than we did in previous times. Many years ago, women would be on their hands and knees doing gardening and washing floors. Now women are often in a reclined or upright position for much of the day. Getting on hands and knees as much as possible is not only a great way to lengthen the spine and stretch out sore muscles, but can also encourage baby to get into that desired anterior position.

CARMEN: What types of lifestyle advice do you offer to pregnant clients to make sure they are healthy and ready for child-bearing? Do you recommend exercise? Diet modifications? Certain amounts of sleep or downtime? Stress reduction strategies?

JULIE: I encourage women to remain active in their pregnancies. This generally means keeping up almost the same level of activity as women were previously enjoying prior to becoming pregnant. For women who were not exercising before getting pregnant, I recommend at least walking on a daily basis. There are certainly some foods to be watchful of during pregnancy, most notably raw fish and meat products which can contain Listeriosis (a bacteria which can cause miscarriage). I encourage women to avoid sugar and eat a well balanced whole-foods diet. I also recommend acupuncture during pregnancy to keep stress levels down.

Next, Carmen interviews some of the top coaches and athletes! These women did not follow the conventional guidelines of swimming and walking, but instead combined strength training with the use of kettlebells to stay pregnancy fit and functional!

CARMEN: Yoana, What type of athlete are you? What are the typical training protocols you follows, sports you like, drills you do? How would you describe your pre-pregnancy activity level?

YOANA: At the moment I would say I am primarily a kettlebell athlete with a strong leaning toward anaerobic activities such as sprinting and lower rep strength training. I am an athlete that uses the kettlebell to become strong, powerful and mobile under the hardstyle method of training that I have learned from Pavel Tsatsouline.

Whether I am training for a specific competition or just to be a fit mom, the focus of my exercise is on full body compound lifts such as squats, deadlifts, pull ups, presses, swings, cleans, snatches and more. I have been training in this manner since 2002 and continued to train like this during both of my pregnancies (although at a less intense level).

CARMEN: You are a trained physiotherapist - what is your opinion on joint laxity and ligament changes during pregnancy and how did you change your workouts to accommodate these changes. Did you view these changes as a real 'danger' or just something to keep in mind while working out?

YOANA: As a physiotherapist, I am very aware of the changes that occur to the body during pregnancy. Having been pregnant twice I can tell you that ligament laxity is a definite reality and there is a big increase in joint range of motion especially in the pelvic and hip region. The body is incredibly intelligent and obviously knows how to prepare the woman for the birthing process. I don't view these changes as a huge danger as long as you continue to train for strength and stability throughout your pregnancy. One of the most important things to do is to go into your pregnancy as strong as possible. And by strength I am talking about being able to lift some considerable weight in a safe manner. This will help offset some of the potentially negative effects of ligament laxity.

CARMEN: During your pregnancy, what were your workouts like? What did you do with your volumes and loads? How often did you train and did you worry about keep your heart rate in a lower zone, or did you use more of an RPE to monitor your intensity and fatigue levels?

YOANA: During both pregnancies, I really just listened to my body. If my body told me to rest, I rested. If it had energy, I took advantage of that and trained. Regarding volumes and loads, I gradually reduced both load and volume as the months progressed. Because everyone has a different training background, some people saw me snatching with the 16kg and 12kg kettlebell during my pregnancies and were very alarmed. They told me "how can you lift such heavy weight while pregnant? Isn't that dangerous?" It was not dangerous for me because I routinely snatch the 20kg and 24kg kettlebells so to me, lifting the 16kg and 12kg was actually a perfect step down that felt quite appropriate.

That is why it is so important to have an open line of communication with your medical doctor during the entire 9+ months. Ideally you would find a doctor that is an athlete or fitness is part of their lives so they will understand the importance of exercise and be able to work with you during your entire pregnancy.

I used more of a RPE approach to monitor the intensity of my training. Blood pressure issues are common during pregnancy and it is essential to listen to your body.

Interview with Maya Garcia

CARMEN: Maya, what is your coaching and training background? What type of athlete are you?

MAYA: I am a certified Strength and Conditioning Specialist with the NSCA, a Master Coach with the World Kettlebell Club, and a Club Coach with USA Weightlifting. I also have a Bachelors in Sociology from the University of California at Berkeley so my perspective on health includes emotional and mental fitness as much as physical. I am a Kettlebell Sport (Girevoy Sport) athlete and I compete in traditional kettlebell lifting events originating from Eastern Europe. The winner is determined by the most repetitions lifted non-stop, with one switch of hands, in a ten minute time period. Women competing at the professional level lift 20-24kg kettlebells often for over 100 reps at a time.

CARMEN: How did you change your training during your pregnancy? Did you do different drills, less volume, lighter loads etc. Did you keep your heart rate in a certain zone or use RPE to monitor intensity?

MAYA: I tried my best to use the same movement patterns I would use during my standard training regimen. Of course, I decreased loads and intensities to accommodate the growth of the baby. Other than that, I still moved like an athlete as much as I could. I never wore a heart rate monitor, however I did use RPE to monitor intensity.

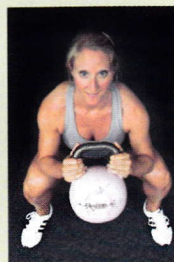
Unfortunately in my second trimester I began to gain a lot of excess weight because I wasn't managing my emotions and the stress of the pregnancy well. My training was extremely challenging once I began carrying an additional fifty pounds! That's when I rediscovered kettlebell training. I found that the low impact movements associated with kettlebell training (i.e. swings and presses) were best suited for my pregnancy as well.

CARMEN: Were you ever 'judged' or advised by the lay person not to exercise so hard during your pregnancy?

MAYA: Fortunately, all of my physicians encouraged me to exercise as I would normally. I was reminded to modify intensities based on how I was feeling that day. Of course, as I fell deeper into my pregnancy, there were many things that I could not do because of limited ROM and weight gain. However, I was always encouraged by medical professionals to continue aerobic and resistance training. Lucky me!

What all the experts interviewed shared with me is that it all boils down to our instincts!

"Always listen to your body. If something doesn't feel quite right, it probably isn't. Avoid pushing through previous boundaries and just take it easy if you need to." □



Carmen Bott

Carmen is a strength and conditioning specialist and certified Kettlebell instructor. She works with performance-driven clients and has been in practice for over 15 years. Carmen also teaches Exercise Physiology at the post-secondary level in Vancouver and she is currently expecting her first baby, to be due in December 2010. Carmen's websites are www.carmenbott.com and www.humanmotion.com.



Andrea Page

Andrea, a mother of three, founded the FITMOM company 10 years ago after a 60 pound weight gain sparked by a doctor's advice to not exercise despite a healthy pregnancy. As a certified personal trainer Andrea has worked extensively with professionals like Physiotherapists & Obstetricians to develop the FITMOM Tm coaching certification. Her website is www.fitmomfitness.com.



Dr. Julie Durnan

Dr. Julie Durnan is a Naturopathic Physician and co-owner of Pacifica Naturopathic Clinic in West Vancouver, BC. After obtaining her degree in Environmental Science from the University of Guelph in Ontario, Dr. Durnan moved to the west coast and gained her Doctorate from the Boucher Institute of Naturopathic Medicine. Dr. Durnan has a family practice with a special focus on women's health and pediatric wellness. Dr. Durnan and her husband enjoy North Shore living and are having a wonderful time raising their 13 month old son named, Jack. www.pacificanaturopath.ca.



Yoana Snideman

Yoana is the co-owner of Revolution Fitness Center (www.revolutionlajolla.com), co-author of the Kettlebell Fat Loss Series DVDs and Book, co-author of the "Kettlebell Mommy" Staying Fit with Kettlebells During Pregnancy (www.kettlebellmommy.com). Yoana lives in San Diego, California with her husband Franz Snideman, RKC Team Leader, her daughter Marianna and son Esteban Andres.



Maya Garcia

Maya is a CSCS, is an accomplished kettlebell sport athlete and co-founder of Ice Chamber, a successful athletic training company in the San Francisco Bay Area. She is a Master of Sport, 9x Gold medalist, and the 1st American to win the Best Lifter Award in the International Union of Kettlebell Lifting. She is mother to Mateo and her websites are www.ickbgirls.com, www.icechamber.com.