



FOCUS AWARDS

**Level 3 Award in Supporting Pre and Postnatal Clients
with Exercise and Nutrition
(RQF)**

Contents:

Qualification Overview

Introduction to Pre and Postnatal Exercise

Unit 1 Physical activity, health and nutritional considerations for pre and postnatal clients

Benefits of physical activity for pre and postnatal clients	6
Concerns	8
The Value of Physical Activity	9
Key Guidelines	9
Barriers to Activity Participation	9-10
Physiological and Biomechanical Changes during Pregnancy	11
The Stages of Pregnancy	11-15
Cardiovascular changes	16 -17
Conditions to be Aware of	18-19
Exercise Considerations	20
Respiratory Changes	21
Musculoskeletal System	22-25
Pubis Symphysis Disorder (SPD) or Pregnancy-related Pelvic Girdle Pain	26
Changes to the metabolic and hormonal systems	27-29
Considerations for Exercise Participation	30
Contraindications to Exercise during Pregnancy	31
Health and Safety	32
Collecting information to ensure health and safety when working with pre and postnatal clients	33
Considerations when Developing an Effective Working Relationship with Clients	34
Sources of Information	35
Testing Pre and Postnatal	36 -42
Nutritional Requirements	43
Important Sources of Food during Pregnancy	44
Vitamins and Minerals	45
Foods to be limited and avoided	46
Importance of Hydration	47

Unit 2: Design and Implement Exercise Programmes for the Pre and Post Natal Client

Designing an Individualised Exercise Programme	49– 50
Applying the FITT Principles	51-52
Prenatal Resistance Training and Muscular Fitness	53-54
Exercise Modifications for Physiological and Biomechanical Changes	55
Core and Functional Training	56– 58
Managing Risk	59-60

Qualification Overview

Aim

The purpose of this qualification is to provide learners with the knowledge and skills needed to be able to programme safe and effective exercise for both pre and postnatal clients, taking into account the physiological and biomechanical changes associated with pregnancy and the key health and safety considerations for pre and postnatal clients taking part in physical activity.

Learning Outcomes

1. Understand the benefits of physical activity for pre and post natal clients
2. Know the physiological and biomechanical changes that take place during pregnancy
3. Understand the key considerations for pre and post natal clients participating in physical activity
4. Know the nutritional requirements for pre and post natal clients

Purpose

Evidenced-based messages and recommendations advocated by the UK Chief Medical Officers on physical activity during pregnancy.

- Myths and history of guidance
- Current context
- Evidenced-based messages and recommendations advocated by the UK Chief Medical Officers on physical activity during pregnancy.
- What do we know about current levels of activity within this pregnant community
- Sharing recent research regarding the barriers and attitudes surrounding this behaviour
- Possible solutions and projects to address physical activity levels for pregnant women and their transition to becoming mothers
- Allow more confidence and better provision of assistance to support physical activity behaviour during pregnancy for mothers and families
- Postnatal evidence check

Qualification Structure and Unit Content

The following 2 units must be successfully achieved for the full qualification:

1. Physical activity and health considerations for pre and post-natal clients (worksheet)
2. Programming safe and effective exercise programmes for pre and post-natal clients (case study)

Introduction to Pre & Postnatal Exercise

History and Progress

Since the early 1970's the interest in regular physical activity in women has grown. Recreational exercise has become an integral part of a healthy lifestyle. Interest and concern about exercising during and after pregnancy has also grown, as has the search for definitive guidelines.

Two schools of thought have emerged:

Those who shared the more conservative, no-risk approach (guidelines for exercise in pregnancy published by ACOG, 1985)

Those who preferred the more liberal approach, as highlighted by many physically active women who have maintained intensive exercise throughout pregnancy

The understanding of the effects of exercise is relatively straight forward. In **most** cases, exercise is safe for both mother and baby during pregnancy, and supports recommendations to begin or continue to exercise in **most** pregnancies to gain the health benefits associated with such activities.

The earliest advice largely reflected the cultural and social norms of the time rather than evidence (Mittelmark & Gardin, 1991). In 1949, the US Children's Bureau issued for prenatal physical activity (PA): 'in the absence of maternal complications, pregnant women can continue housework, gardening, daily walks (up to 1-mile in several short bouts), and even swim occasionally but should avoid sports participation'.

In 1985, ACOG issued the first guidelines for prenatal PA. Based on the consensus opinion of a panel of obstetricians, recognised the safety of most aerobic PA, but advised caution with high impact activities such as running and included restrictions for duration (no longer than 15 minutes for strenuous PA), heart rate (no greater than 140 bpm), and core body temperature (no greater than 38degrees centigrade).

Around 67-75% of people who hire a coach or trainer are women, and 85% of women will have a baby at some point in their life. That means there's a good chance that over 50% of your clients are pre- or postnatal women (your female clients will either become pregnant, are pregnant, or are postpartum). In other words, most of your female clients will go through these life stages, and most coaches and trainers have little or no training on how to effectively support them.

This qualification will provide current knowledge, skills and confidence to be able to support pre and postnatal clients with safe, appropriate, effective and adaptive exercise and nutritional advice.

Unit 1 Physical activity, health and nutritional considerations for pre and postnatal clients

Aim

To provide learners with a thorough understanding of the physiological and biomechanical changes that take place during pregnancy, the nutritional requirements for pregnant clients, and guidelines for exercise participation

Learning Outcomes

Understand the benefits of physical activity for pre and post natal clients

Know the physiological and biomechanical changes that take place during pregnancy

Understand the key considerations for pre and post natal clients participating in physical activity

Know the nutritional requirements for pre and post natal clients

Unit Content

Benefits and barriers

Physiological and biomechanical changes

Contraindications

Health and Safety

Nutritional Requirements



Benefits of Physical Activity

Overview

Those who exercise regularly pre pregnancy naturally may want to continue, whilst for others it is the first step to a healthy body for the wellbeing of their baby.

For many women the changing body shape is a concern and exercise helps to gain a sense of control and achievement.

For many women pregnancy motivates them to make sweeping lifestyle choices for the health and wellbeing of their developing baby including exercise, healthy eating, stopping smoking etc.

Benefits of physical activity for pre and postnatal clients

The Royal College of Obstetrics and Gynaecology (2017) and the American College of Sports Medicine (2017) list a host of benefits to be gained from exercise during pregnancy and into the postnatal period.

Benefits can be categorised into both physical and physiological.

Benefits during Pregnancy

- Maintains general fitness levels and improves CV fitness
- helps to promote a healthy lifestyle
- lowers gestational weight gain
- may reduce the risk of gestational diabetes and preeclampsia
- alleviates many symptoms of pregnancy e.g. back ache, varicose veins
- enhanced self-esteem and positive feelings
- more oxygen rich blood via the placenta
- increased endurance levels for labour
- less likely to need obstetric intervention (forceps', caesarean)
- increased ability to cope with labour anxiety and pain
- faster recovery from labour
- better posture and less back pain
- improved sleep patterns
- less likely to suffer stress incontinence, constipation and prolapse
- quicker return to pre pregnancy weight, stamina, strength and flexibility
- enhanced body image and confidence
- reduces risk of hypertension



Benefits of Postnatal Exercise

- Quicker post-natal recovery
- Improved posture
- Increased local muscular endurance
- Increased stamina
- Increased energy
- Increased metabolic rate
- Increased weight loss to return to normal weight, improved body image
- Increased self-confidence
- Reduced anxiety
- Relieves stress
- Improves sleep
- Helps to strengthen and tone abdominal muscles and slow bone loss during lactation
- Provides functional fitness for the role of motherhood



Evidence of Other Benefits

Other benefits associated with being active during and following pregnancy (low-moderate quality evidence):

- Increased likelihood of vaginal delivery
- May help decrease the time in active labour
- Positive effect on depression during and post pregnancy

The evidence base is growing – there is lots of interest and research in this area. One study with pigs showed that aerobic exercise during pregnancy improves vascular function which may have long term health implications for offspring (Bahls, Sheldon, Taheripour, Clifford, Faust, Breslin, Marchant-Forde, Cabot, Laughlin, Bidwell & Newcomer, 2014). Another found that children born to mothers who had exercised whilst pregnant had significantly lower BP at 8-10 years old (Pivarnik et al 2014)

Concerns

Although women are aware of the benefits of exercise, they do not always alleviate or outweigh the concerns they may have regarding physical activity whilst pregnant:

- fear of miscarriage
- fear of harming the baby
- fear of injury (muscular, abdominal etc)
- lack of knowledge about what exercises are safe
- physical barriers (feeling tired, sick, back pain)
- lack of information available (gym instructors, midwives, doctors)
- peer pressure from parents and friends

The Value of Physical Activity

The Role of Exercise

- Significant reduction in fatigue, varicose veins and joint swelling/ oedema.
- Weight bearing exercise throughout pregnancy can reduce the length of labour
- Decreased delivery complications
- Women who exercise during pregnancy are more likely to continue to exercise postpartum
- Improvement in glycaemic control in those with gestational diabetes – and may play a vital role for primary prevention of developing gestational diabetes mellitus.
- Protective effect of exercise on CHD, osteoporosis and hypertension
- Reduced risk of colon cancer, breast cancer and reduced body fat.

UK Chief Medical Officer's Guidelines for Physical Activity

Evidence-based recommendations for physical activity and pregnancy and physical activity and postpartum have been produced, infographics included in this section have been co-produced with the CMO and tested with health professionals and women.



Key Guidelines

(ACOG and RCOG)

- All women should be encouraged to take part in aerobic and strength-conditioning exercise as part of a healthy lifestyle during pregnancy
- Reasonable goals of aerobic conditioning in pregnancy should be to maintain a good fitness level throughout pregnancy without trying to reach peak fitness level or train for athletic competition
- Women should choose activities that will minimise the risk of loss of balance and foetal trauma
- Women should be advised that adverse pregnancy or neonatal outcomes are not increased for exercising women
- Initiation of pelvic floor exercises in the immediate postpartum period may reduce the risk of future urinary incontinence
- Women should be advised that moderate exercise during lactation does not affect the quantity or composition of breast milk or impact on foetal growth

2019 Canadian Guideline for Physical Activity throughout Pregnancy

- All women without contraindications should be active throughout pregnancy
- Also emphasised pelvic floor exercises
-

Barriers to Activity Participation

On condition that health and safety is observed sufficiently and exercises are selected and adapted accordingly, there are no identifiable risks associated with prenatal exercise. The pre and post-natal period can have a host of potential barriers or concerns and it is important to be able to recognise them and respond in order to move forward appropriately.

The natural response is to try and overcome them, however barriers to participation are likely to be different to those of usual clients. During pregnancy it must be determined whether the barrier can and should be overcome.

As long as the client is healthy and the pregnancy and delivery was normal they should be given the 'OK' to participate by their GP or Midwife.

Examples of barriers and ways to respond could include:

Barrier/ concern	How to respond
Fear of miscarriage	Effectively communicate the benefits of exercise during the prenatal period and refer to ACOG and RCOG guidelines and sources of information Provide reassurance with professional qualifications and the ability to adapt exercise during each trimester
Fear of harming the baby	
A lack of knowledge about safe exercises	
Peer pressure from friends and family	
Fatigue	Reduce intensity and allow more rest periods. Reschedule exercise for another day when energy levels are higher, if necessary
Sickness	Reduce intensity and increase rest periods. Reschedule for another day when the sickness has reduced. Avoid decline, prone or kneeling prone positions e.g. down dog, 4 point box Choose standing, seated or inclined positions If symptoms persist or are uncomfortable, seek medical advice
Heartburn or reflux	
Child care issues	Provide a home based exercise service
Lack of time	Design shorter sessions and mini workouts to target different areas of the body and components of fitness Walk with the buggy

Research - This mum moves

This mum moves is a Sport England funded project led by UKActive. Its aim was to establish the capabilities, opportunities and motivation available to mothers and mothers-to-be in relation to physical activity.

Capability



- ☐ Lack of information and specific advice from HCP
- ☐ Reliance on other sources of information
- ☐ During pregnancy, perceived focus on being healthy but with no link to physical activity
- ☐ Following pregnancy, perceived focus on breastfeeding and mental health but no link to physical activity
- ☐ Continuity of care/career an issue
- ☐ Health and safety restrictions at the workplace
- ☐ Helpful information from other professionals

Opportunity



- ☐ Time
- ☐ Travel and Cost
- ☐ Social Support
- ☐ Social Stigma

Motivation



- ☐ Benefits for mum and baby
- ☐ Mental Health
- ☐ Staying fit and being in shape
- ☐ Having own time and space




Physiological and Biomechanical Changes during Pregnancy

During pregnancy several physiological and biomechanical changes occur in pregnancy in order to nurture the developing foetus and prepare the mother for labour and delivery. All pregnancies are different, therefore the degree that these adaptations occur will be different from one pregnancy to another, even in the same mother.

It is important for fitness professionals to understand these changes and the implications they have when planning physical activity.

The Stages of Pregnancy

The stages of pregnancy are measured using points of reference that include the day of last menstruation, ovulation, fertilization, implantation and chemical detection. The course of the pregnancy consists of 3 periods known as trimesters and each trimester has a new set of physiological and biomechanical changes and challenges for the mother and unborn child - the boundaries between these trimesters are not distinct and every pregnancy is individual. Following proper programming guidelines during each trimester will ensure a safe and effective exercise programme

Trimester	Months pregnant*	Weeks pregnant
 1st trimester	0	0-4
	1	5-8
	2	9-12
	3	13
 2nd trimester	3	14-17
	4	18-21
	5	22-25
	6	26-27
 3rd trimester	6	28-30
	7	31-34
	8	35-38
	9	39-42

Calculating the Expected Delivery Date

EDD is calculated as 40 weeks from the date of the first day of the last monthly period (LMP) or as 9 calendar months plus 1 week from the first day of the LMP

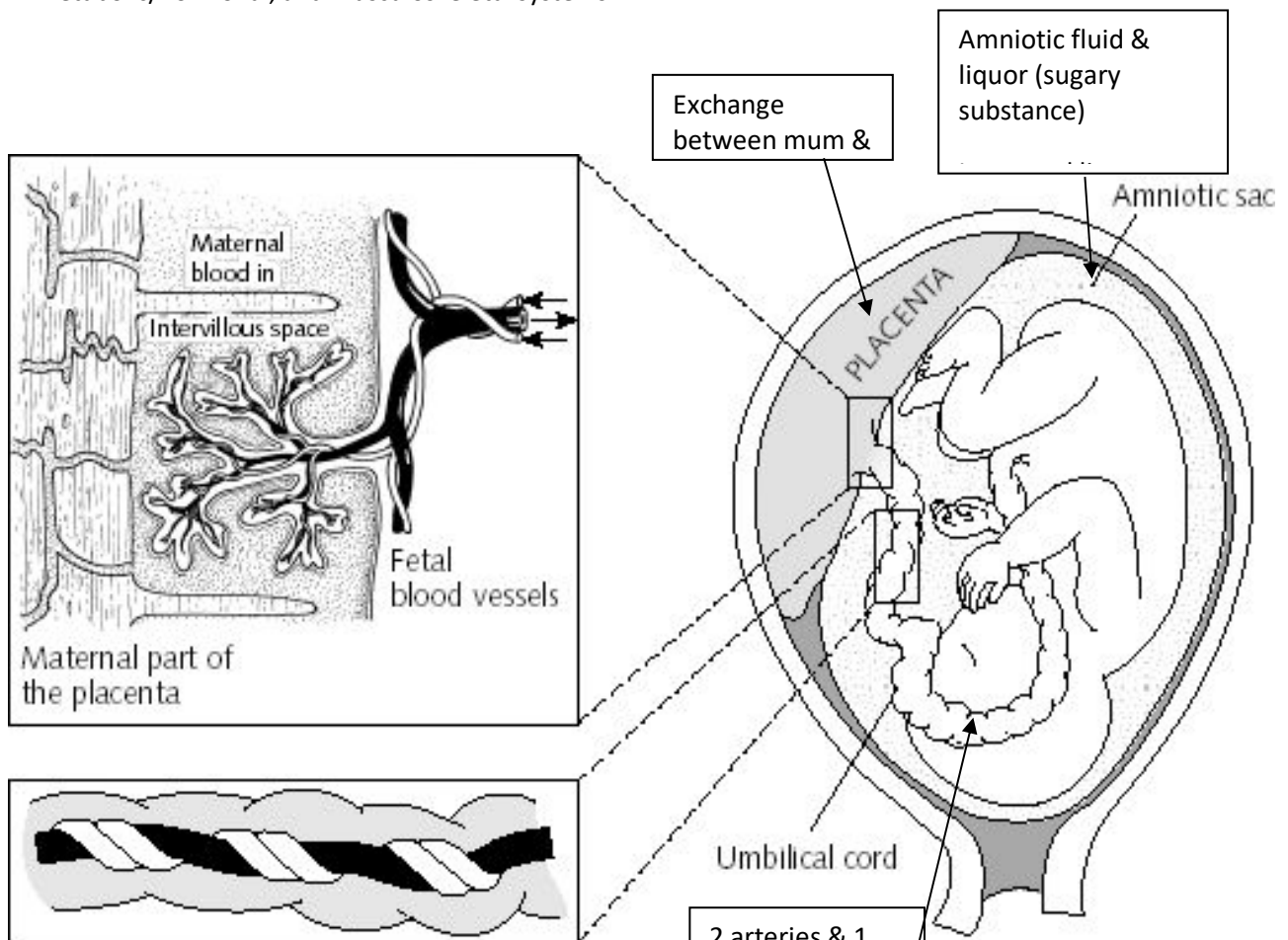
- LMP = January 1st. Add 7 days = January 8th
- Add 9 calendar months = 8th October.
- EDD = 8th October

Premature Babies

Normal gestation of pregnancy is generally between 38-42 weeks however the onset of labour can occur before this time. Any baby born before 36 weeks of pregnancy is termed premature. There is obviously greater risk to the well-being and health of premature babies due to a less developed respiratory system.

Changes during each trimester and implications for physical activity

The physiological and biomechanical changes that occur during pregnancy are well documented. Fitness professionals prescribing exercise should be aware of changes to the circulatory, respiratory, metabolic/hormonal, and musculoskeletal systems.



Changes During Each Trimester

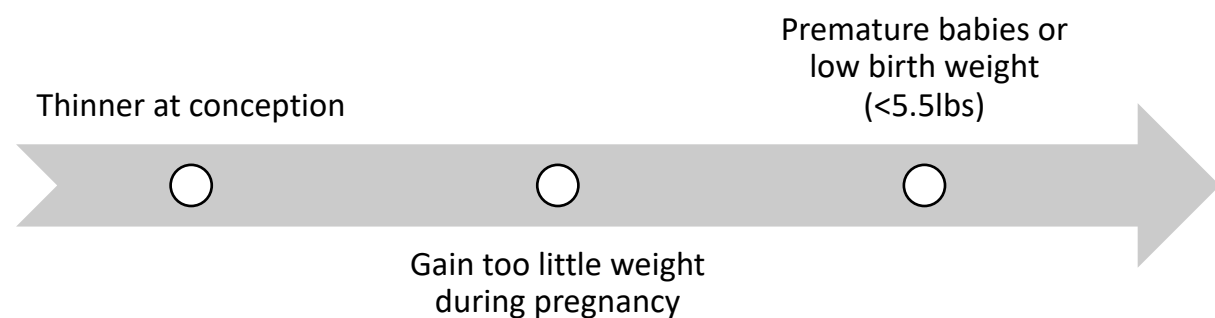
Physiological and biomechanical changes		
1 st Trimester 0-12 weeks	2 nd Trimester 13-26 weeks	3 rd Trimester 27-40 weeks
<ul style="list-style-type: none"> • Early signs of pregnancy may include: <ul style="list-style-type: none"> • missed period • nausea and sickness (may not just be in the morning!) • breast tenderness • severe tiredness • emotional and tearful • Vascular under fill, causing fatigue, nausea, pallor • Decreased blood pressure • Increased heart rate by 10-15bpm • Elevated cardiac output • Increased breathing rate • Higher metabolic rate • Large hormonal changes • Increased insulin resistance leading to greater maternal fat storage • Relaxin is released from the ovaries affecting connective tissue (mild) • Breasts and uterus enlarged 	<ul style="list-style-type: none"> • The placenta takes over the role of maintain the pregnancy • Correction of vascular under fill • Heart rate normalises • Increased energy • hormone influence effects joint stability and cardio respiratory systems • the uterus rises out of the pelvis and begins to show • increased risk of supine hypotension • Increased anterior pelvic tilt - change in centre of gravity & posture • Increased thoracic kyphosis and breast size • hormones stabilise • relaxin is now released from the placenta • intestinal tract relaxes • colostrum secretion • linea nigra may develop • bleeding gums due to progesterone (nosebleeds) • Heartburn • Improved body temperature regulation • Weight gain (7-11lbs – mostly maternal body fat) • Increasing pressure on pelvic floor muscles 	<ul style="list-style-type: none"> • Blood volume continues to increase • Heart rate may drop slightly lower than normal • Rapid weight gain – as much as 1lb per week due to foetal growth • Increased fatigue • Increased shortness of breath • Postural changes that began in the 2nd trimester become more exaggerated leading to increased back pain • Relaxin output and insulin resistance continue • Increasing pressure on the pelvic floor muscles • Increased change to the centre of gravity and balance – accidents and falls more likely • fluid retention (oedema) • pressure on bladder causes increased frequency of micturation • Fatigue/ insomnia • hypertension risk • metabolic changes in the brain • Braxton Hicks contractions • emotional and psychological concerns over labour and motherhood • change in daily living pattern (stopping work)

Weight Gain

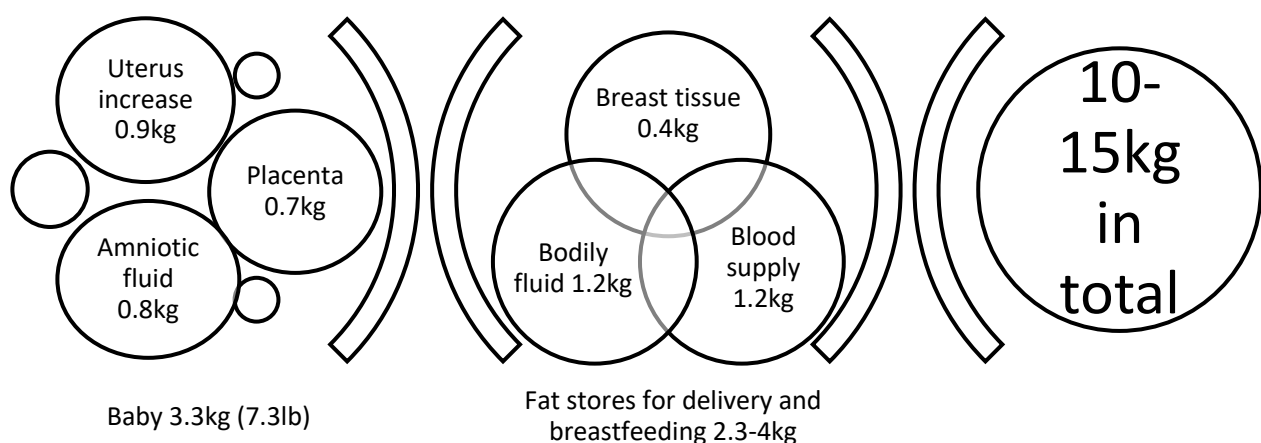
- During early to mid-pregnancy the weight gain is normally 7-11lbs, most of which is maternal fat. During late pregnancy, weight gain is normally 7-11lbs.
- Most of the weight gain at this stage is due to the growth of the foetus and placenta.
- The additional fluid retention and blood volume expansion of pregnancy account for an additional 9-15 lbs.
- Total pregnancy –related weight gain in western society is ~24-33lbs (10-15kg)
- The support system will account for 7-12kg (14-24lb)- the placenta, amniotic fluid, extra blood fluid, fat and breast tissue.
- Weight gain can be irregular from week to week

The worries of weight gain

Although a worry, it is important that women see the weight gain is for a good reason and that the alternative can have serious adverse consequences



Summary of weight gain



Stria Gravidarum



Better known as 'stretch marks', these are narrow white lines that appear on the surface of the skin. When they appear in pregnancy they are referred to as Stria Gravidarum. They normally appear due to the skin being stretched suddenly when the baby is growing rapidly. At the start they can appear as red or purple they are likely to fade with time. There is no guaranteed method to prevent stretch marks, however managing weight gain to ensure it is not excessive during pregnancy will help to manage them and prevent the amount forming. Keeping well hydrated will help to keep skin supple and also help to minimise stretch marks.

Cardiovascular changes

(additive effect from being pregnant and exercising)

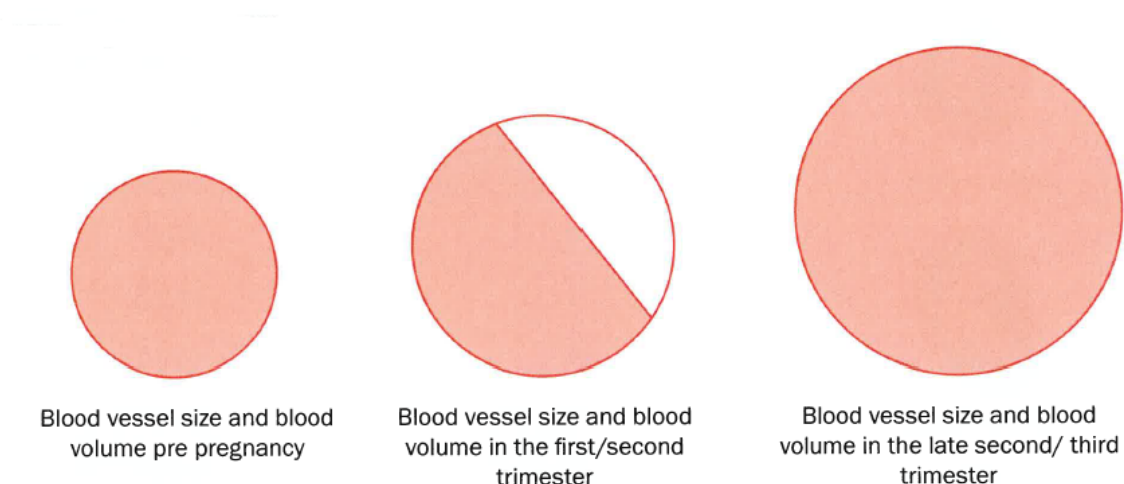
Blood Vessels

The blood vessel walls dilate due to the relaxing effect of progesterone on smooth muscle and therefore vascular resistance decreases. This effect is necessary in order to prevent extreme vascular resistance due to the increased blood volume and ultimately raised blood pressure. The dilated blood vessel walls can result in an increased risk of varicose veins and haemorrhoids. Also the small non return valves which help venous return from the lower extremities are less effective due to progesterone, therefore blood can pool in the legs and feet. Prolonged periods of standing in one position should be avoided. Mobility exercises promote venous return by the muscular action effectively 'squeezing' the veins. The extra weight of the baby pressing on the blood vessels in the pelvic area can also cause swollen ankles and legs (known as gravitational oedema).

Blood Volume

During pregnancy maternal blood volume increases to 30-40% (12-13 pints). Initially the water (plasma) content of the blood increases and the blood becomes more dilute resulting in less oxygen being carried around the body. This is called anaemia and can cause mothers to feel especially tired and exhausted in the first trimester pregnancy. However the red blood cell mass does increase by 20-30% after this period to enable more oxygen to the developing baby. A shortfall in blood volume is referred to as vascular underfill.

Vascular Underfill



Symptoms of Vascular Underfill

This is the process by which the blood vessels dilate earlier than the blood volume increases. This can result in dizziness and the risk of fainting. However, the effects of this vascular underfill is generally short lived and confined to the first trimester.

Symptoms include:

- Waves of sudden fatigue
- A racing pulse
- Nausea
- Pallor
- Sweating
- Dizziness, especially when getting up quickly or quietly standing

Stroke Volume and Cardiac Output

The hormone oestrogen encourages extra muscle tissue within the left ventricle to develop by 20%. This increases the heart's strength and ability to pump more blood volume with each stroke, however blood to the mother's muscles decreases. The body is working harder to supply adequate oxygen and nutrients so this can result in greater maternal fatigue (especially during high intensity exercise), so it is important to monitor intensity and avoid reaching exhaustion.

After giving birth it can take up to 6-12 weeks for cardiac output to return to normal so it is advised that women return to exercise gradually after their 6 week postnatal medical check. Exercise intensity and frequency should be progressed slowly as the circulatory system begins to return to its normal state.

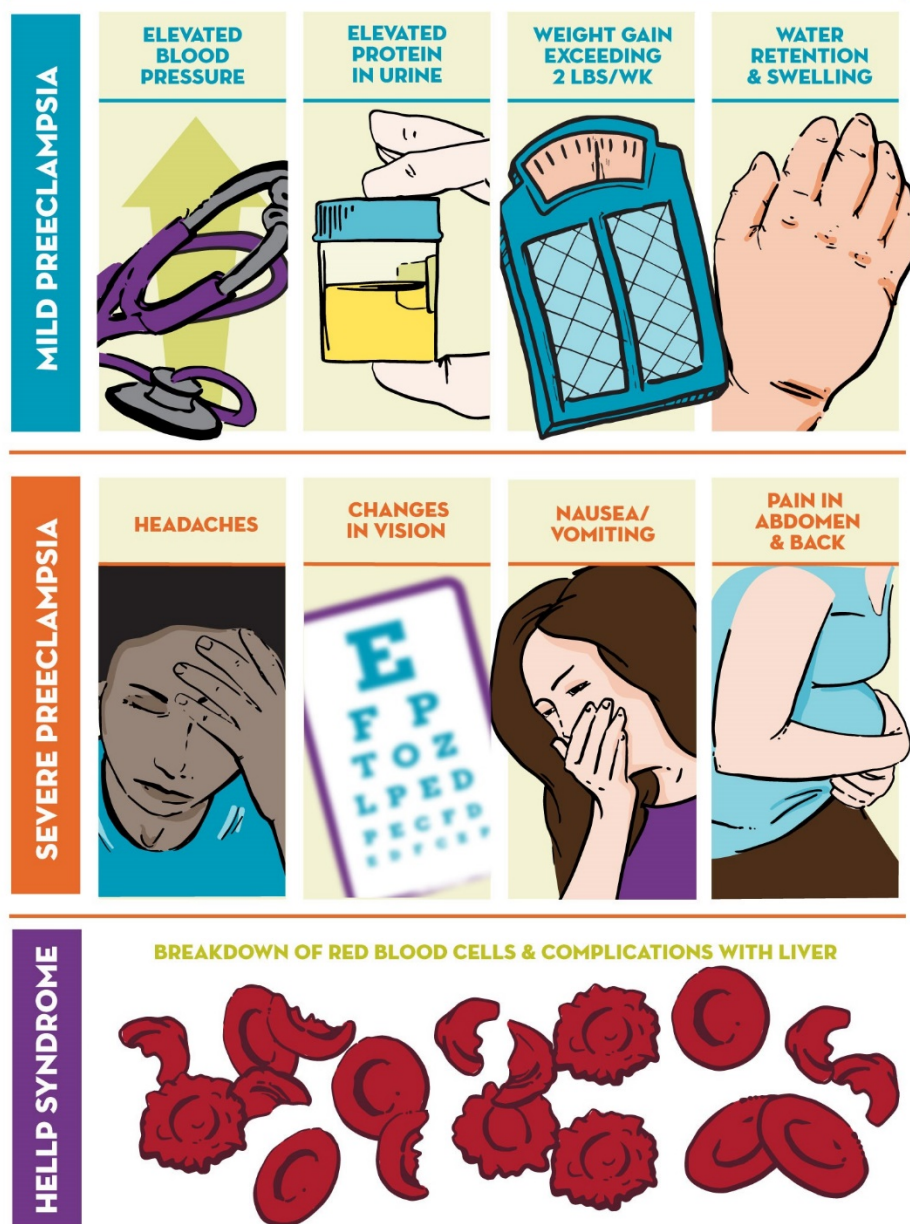
Blood Pressure

Generally the increase in blood volume does not lead to a rise in blood pressure because of progesterone's dilating effect on the blood vessel walls. Prolonged periods spent lying supine then quickly standing up can result in postural hypotension, therefore care should be taken to slowly mobilise to sitting then standing position. High blood pressure may be an indication of a serious medical condition known as pre-eclampsia or pregnancy-induced hypertension. This can manifest with swelling of the hands, face and feet along with visual disturbances. It is a potentially fatal condition and therefore any concerns with blood pressure MUST be referred to a midwife/ doctor for checking.

Conditions to be Aware of:

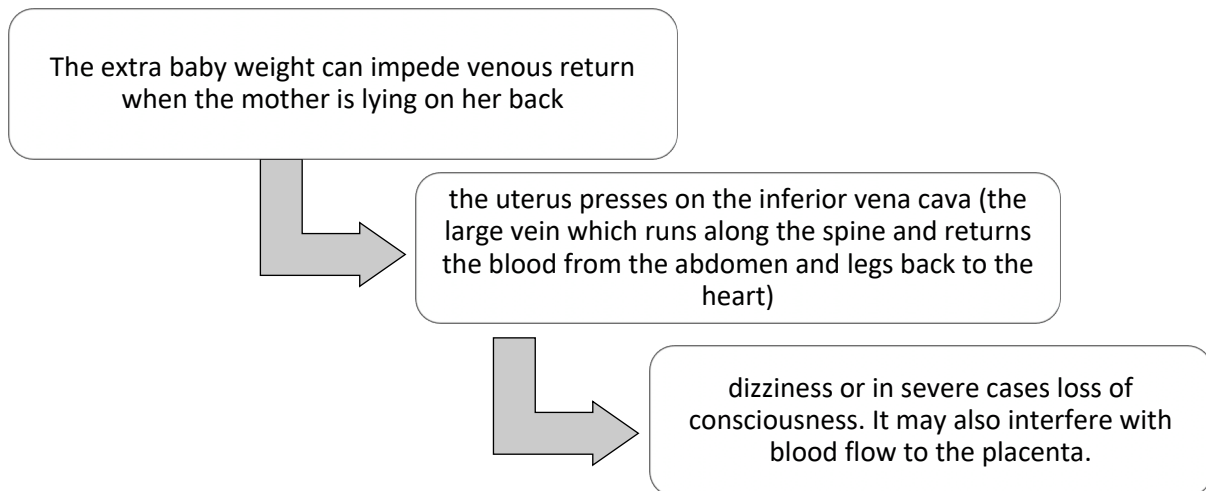
Pre-Eclampsia

SIGNS & SYMPTOMS OF PREECLAMPSIA



Source: Baptist Health

Supine Hypotensive Syndrome



Therefore pregnant women are advised to avoid exercises which involve lying flat on their back (supine) for prolonged period of time from approx 16-20 weeks of pregnancy.

Blood Flow Response to Exercise and Pregnancy

During exercise the blood flow response is:



☐ Increased blood flow to the heart, working muscles, skin & adrenal glands

☐ Decreased blood flow to the kidneys, digestive & reproductive systems

During pregnancy the blood flow response is:



☐ Increased blood flow to the heart, reproductive system, skin & kidneys

☐ Decreased blood flow to the working muscles

Body Temperature and Sweating

In pregnancy the mother's core temperature is raised by 0.6°C (1.1°F) so overheating of mother and baby may be a common concern during exercise. During pregnancy the body becomes more effective at thermoregulation in order to prevent hyperthermia (overheating). The maternal set point for sweating lowers, therefore the body is able to sweat sooner, there is an increase in blood flow to the skin which causes a more efficient cooling via evaporation, pregnancy glow is caused by dissipating heat (2-6°C higher) and the slight elevation in breathing rate also increases heat loss through expiration. The risk of overheating is low due to the above adaptations however prolonged high intensity exercise in hot and humid conditions could result in dehydration and heat exhaustion

Exercise Considerations



Wearing layers of clothing which can be removed as the body temperature increases



Exercise with moderate intensity and duration with regular 'cool down' break



A well ventilated environment with access to water.

ACOG Guidelines

Several reviews have determined that there is no credible evidence to prescribe bed rest in pregnancy, which is most commonly prescribed for the prevention of preterm labour. Bed rest poses a risk to venous thromboembolism, bone demineralization and deconditioning

Summary

- The cardiovascular adaptations to a woman who is pregnant are similar to a non-pregnant person who is exercising. The efficiency of the cardiovascular system is actually enhanced naturally through pregnancy.
- Therefore a pregnant woman who is also exercising can doubly benefit from the additive effect of both pregnancy and exercise.
- Any cardiovascular exercise prescription should take into account the duration and intensity with regards to uterine placental blood flow.

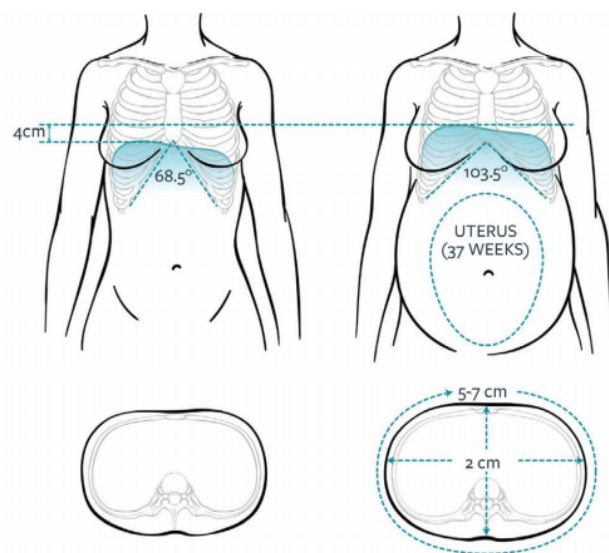
Respiratory Changes

To ensure adequate oxygen supply to mother and baby there are a number of adaptations to respiratory function during pregnancy.

Oxygen Uptake

Progesterone alters the smooth muscle tone of the airways causing a dilating effect and although the expanding uterus presses on the diaphragm there is also an increase in the depth of each breathe so as not to compromise lung function. 'Faulty' breathing may be noted as a consequence of this and therefore clients should be encouraged to practice diaphragmatic breathing in the postnatal period to prevent the inhibition of the pelvic floor and diastasis rehabilitation. Chest or belly breathing can put pressure on the core and weaken the systems causing incontinence or prolapse

Oxygen consumption gradually rises by 16-32% to meet the needs of the mother and growing baby.



Lung Volume

To facilitate the increased oxygen there is an increase in tidal volume (40-50%) and a decrease in residual volume i.e. more of each lung is used for each breath leaving less reserve space.

The rib cage widens and elevates to accommodate the extra volume and in the third trimester the increased size of the uterus forces the diaphragm up by 4cm. The intercostal muscles allow for this expansion under the influence of relaxin

Carbon Dioxide

Progesterone also affects the respiratory centre in the brain and it becomes more sensitive to levels of carbon dioxide. Since carbon dioxide influences the respiratory centre, the set point which stimulates respiratory rate and depth is lowered to encourage more oxygen consumption.

This is one of the reasons many women experience breathlessness on exertion from early on in their pregnancy onwards. Hyperventilation (over breathing) is common at 12 weeks due to progesterone

Summary

The risk of Oxygen deprivation is unlikely due to an increased maternal blood volume and preferential distribution to placenta. Foetal haemoglobin carries more oxygen and the chemical environment within foetal blood maximises gaseous exchange. Maximal aerobic capacity increases by 5-10%

Musculoskeletal System

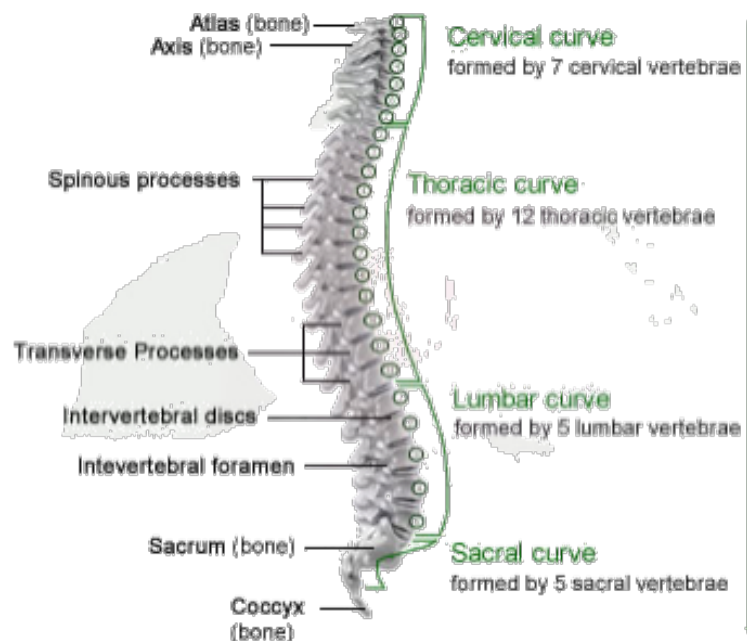
Structure and Alignment

During pregnancy there are a number of postural adaptations that take place which could have the potential to cause pain. Abdominal muscles can become strained and stretched, the lower back muscles become tighter. There is an increase in mechanical stress in the lumbo-pelvic-hip complex and the CoG shifts up and out.



The Spine

The stability of the spine is greatly at risk during pregnancy due to the effect of relaxin on the ligaments. The frontward pull and pressure as the uterus grows out of the pelvic cavity causing the sacrum to tilt forwards and the lack of support from the separated abdominal muscles. The increased weight and gravity of the breasts also affect alignment and there is an increased thoracic kyphosis and lumbar lordosis.



Posture (poor postural adaptation)

Posture relates to the alignment of the body both in static and moving positions and maintenance of posture is controlled by our own kinaesthetic awareness and postural reflex. Good posture can be influenced by exercise which can improve the suppleness and strength of specific muscles and lead to an improved body awareness. A number of muscles become either weak and underactive or tight and overactive which can impact the exercise selection when designing pre and postnatal programmes. Aims of the session should be to maintain strength in the muscles that become weak and maintain length in those that become tight.

Poor posture means the body has to work harder to maintain an upright stance so muscles which are not designed to support the body are recruited to help out. This causes strain and stress on both the muscles and joints. Plus overly lax muscles tire easily in their effort to counterbalance misalignment in the body.

Correct posture depends on:

Flexibility in:



☐ Hip flexors

☐ Hamstrings

☐ Pectorals

☐ Lower back

Strength in:

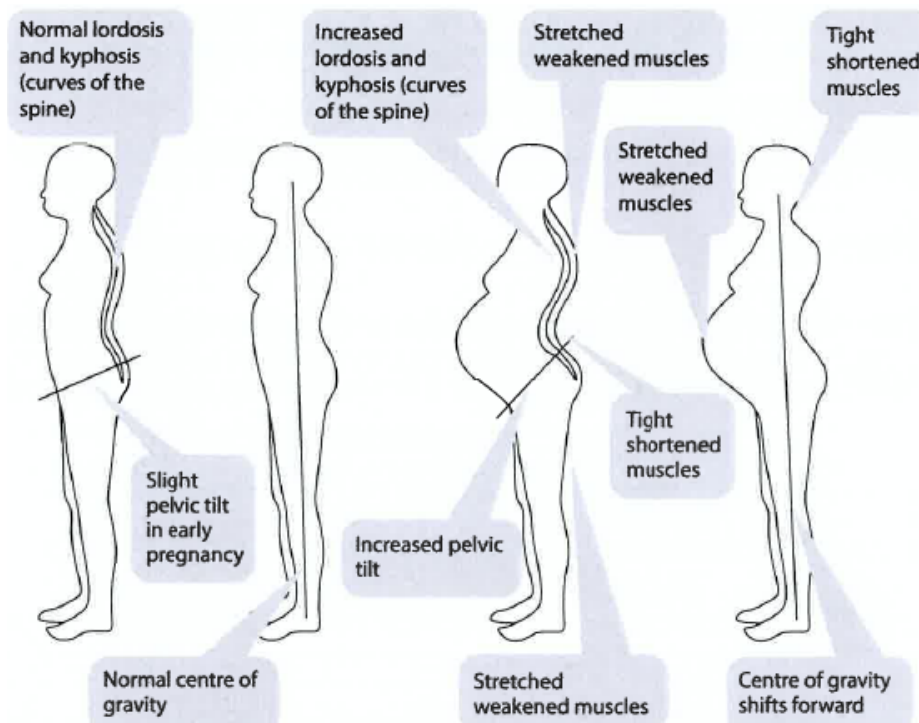


☐ Gluteals

☐ Abdominals

☐ Upper back

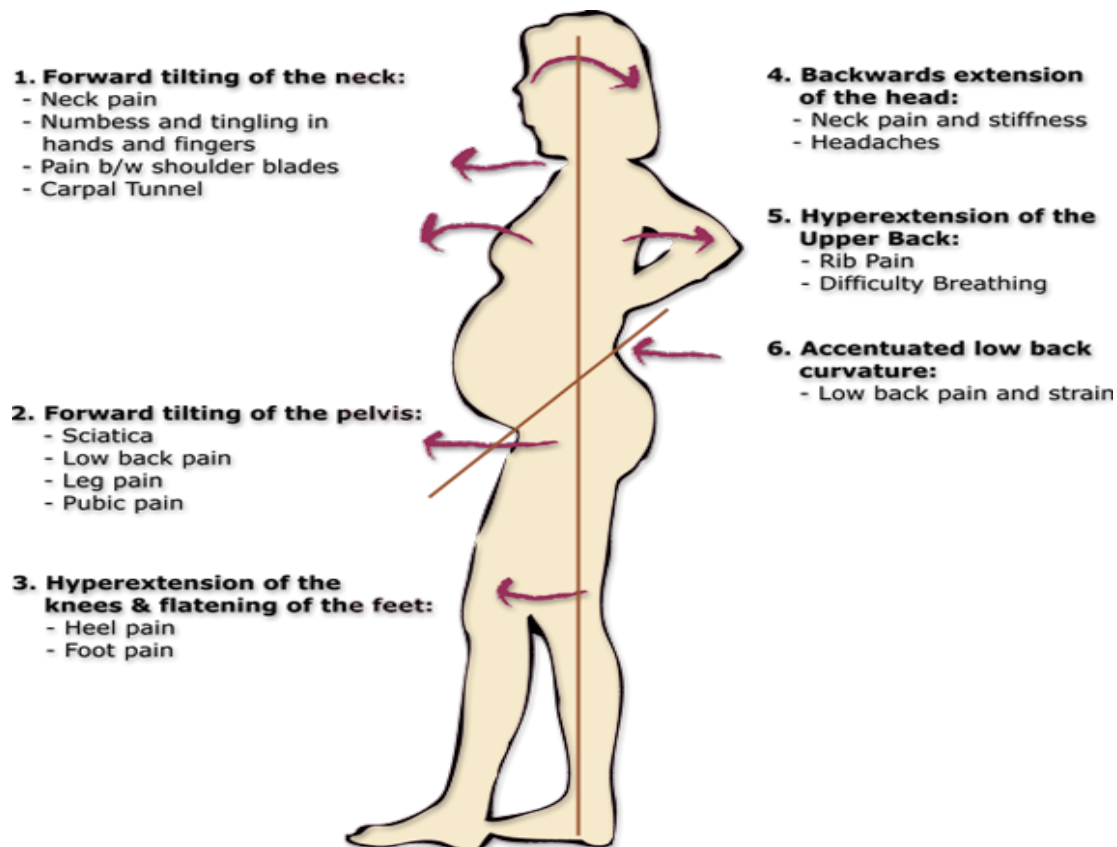
The development of poor posture during pregnancy



During pregnancy the growing baby is carried at the front of the body, which throws the body weight forwards and alters the centre of gravity therefore affecting balance. The abdominal muscles stretch, weaken and separate and the back adopts an exaggerated forward tilt of the sacrum and increased lumbar curve. Pressure is put upon the vertebrae and intervertebral discs which may experience a decreased flow. The pregnant woman may push her chin forward to compensate for the change in her centre of gravity, but this only increases the thoracic and lumbar curve further. This altered posture in pregnancy can lead to stress and strain throughout the whole body; therefore teaching about correct posture control is a vital part of exercise techniques to achieve:

- a foundation of good body alignment
- increased core stability
- to balance opposing muscle groups through strength/ stretch

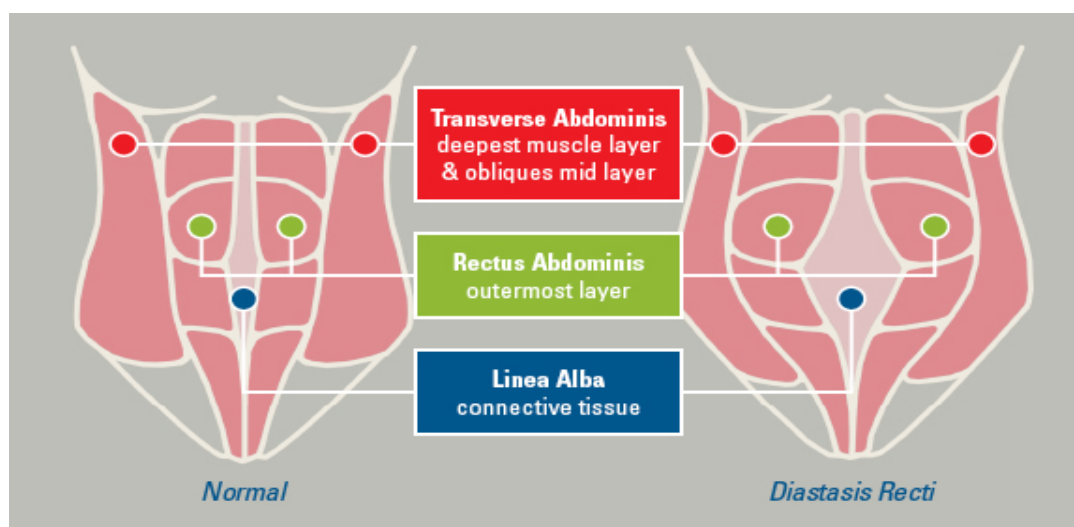
The effects of pregnancy



Abdominal Muscles

During pregnancy the abdominal muscles stretch in width and length and the linea alba (connective tissue) expands to accommodate the growing uterus. This is known as Diastasis Recti and the degree of separation is different in every pregnancy based on factors such as the size of the baby and strength of the core muscles.

Although the separation is not usually painful it can weaken the core and cause back pain. This can become chronic with the support mechanisms in the spine compromised during this time.



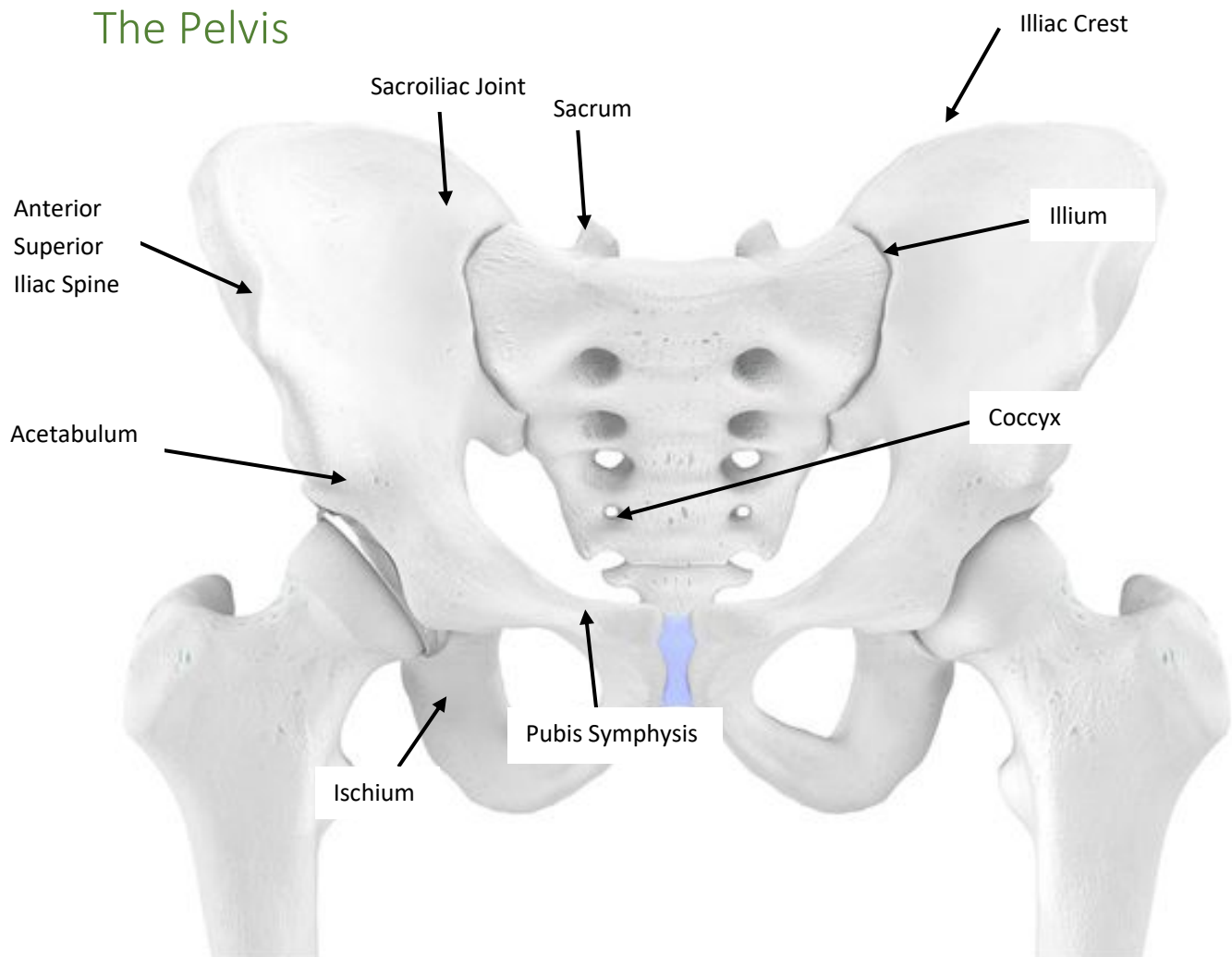
Source: EMH Physical Therapy

Function of the Abdominals

1. to stabilise and support the lumbar spine
2. to support the abdominal and pelvic organs
3. to produce controlled flexion of the trunk
4. to maintain correct pelvic alignment
5. to brace the body under stress e.g. lifting, coughing
6. to aid expulsive movements e.g. vomiting, excretion, childbirth

Contrary to popular belief the abdominal muscles are not cut during a 'normal' c/s delivery. An incision is made across the lower abdomen just above the symphysis pubis. This incision cuts through the skin and upper layer of the sheath covering RA. However, in this lower quarter of the abdomen, the sheath aponeurosis only covers the top of the RA therefore producing a space once the linea alba is pulled apart through which the baby can be delivered.

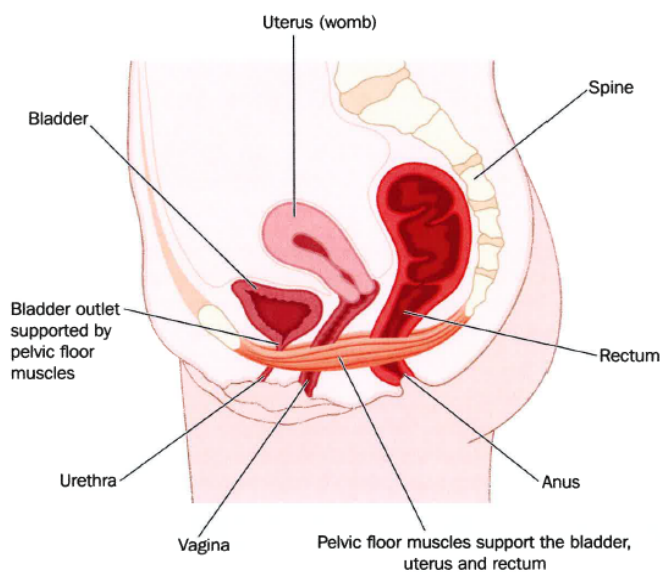
The Pelvis



Pubis Symphysis Disorder (SPD) or Pregnancy-related Pelvic Girdle Pain

Increased levels of relaxin and pressure from the extra baby weight can cause the symphysis pubis joint (SPJ) to widen excessively. This can cause debilitating pain and affect mobility. With SPD and PPGP often the sacro iliac joint is also affected which makes the pelvis very unstable and painful. Clients with this condition should be referred to seek medical advice and a 'pain free range of movement' should be determined to guide exercise selection, especially for abduction and external hip rotation.

Anatomy of the Pelvic Floor



Due to the weight of the uterus bearing down on the pelvic floor and bladder there is often a feeling of needing to urinate more frequently. Consider this when planning sessions so that there is easy access to a toilet.

Sometimes during delivery an episiotomy may be required. This is when an incision is made in the perineum to avoid excessive tearing of the vaginal/anal opening. This can help to speed up delivery and avoids severe injury to the anal muscle.

This is generally only used if the baby is in

Changes to the metabolic and hormonal systems

The Menstrual Cycle and Hormonal Changes

A precise balance of hormones is required for the menstrual cycle to take place effectively. The purpose of the menstrual cycle, is to prepare the uterine wall ready for implantation, to prepare for the release of the egg from the ovary and then to shed the endometrium if the egg is not fertilised. This produces the monthly period

If the egg is fertilised the hormone balance changes. The egg implants itself in the well prepared lining of the uterus so that the pregnancy is maintained.

Hormone levels rise significantly to sustain the pregnancy and many body changes occur as a result. The main 3 hormones are relaxin, oestrogen and progesterone.

Relaxin

Initially relaxin is released from the ovaries. From 12 weeks onwards it is released from the placenta. It relaxes the ligaments of the pelvis to allow separation of the joint surfaces to provide more space within the pelvis to accommodate the growing baby, and a wider diameter for the baby to be born. There can be significant movement between the joint surfaces which can cause pain and discomfort. The resulting instability has major implications for exercise choices. Relaxin stays within the body and can take up to 6 months to return to normal levels. However as long as a woman is breast feeding, relaxin will continue to be produced (although in smaller amounts) and therefore post-natal exercise advice should include this factor.

Precautions

Relaxin is not able to contain the relaxing effect on just the pelvic area. It can cause joint laxity on ligaments and fibrous tissue ANYWHERE in the body. It will also affect the pelvic floor and intercostal muscles in the rib cage. The back is particularly at risk during pregnancy - there is an increase in weight and forward shift of the centre of gravity and also because of the laxity of the intervertebral ligaments in the spinal column and weak abdominals which are no longer able to provide core support.

Correct technique in all activities is particularly important, especially those that stress the back such as lifting and carrying. Pregnant women may find that they have greater range of movement during pregnancy due to relaxin. Extra care needs to be taken with exercise movement and stretching.

Oestrogen

The hormone oestrogen remains at high levels throughout pregnancy as it helps to maintain the pregnant state, its main function being to promote growth. It helps to promote foetal growth, the growth of the uterus, breast enlargement and the production of colostrum (the first stage of eventual breast milk production). It also promotes the growth of the heart muscle (left ventricle) and affects the metabolic rate to increase by approximately 20% and contributes to fluid retention (oedema).

Progesterone

Smooth muscles such as the oesophagus, blood vessels, intestinal tract, rectal mucosa etc. are all affected by progesterone. It is responsible for the action of making all smooth muscle more elastic and relaxed.

Progesterone stabilises blood pressure due to its elastic effect on blood vessels as less vascular resistance. This also affects the venous return of blood which is reduced and the reason for some of the 'minor' symptoms of pregnancy such as heart burn, varicose veins and haemorrhoids, linea nigra, develops, bleeding gums, stimulation of colostrum. Progesterone is also responsible for increasing the body's sensitivity to carbon dioxide (thus increasing oxygen levels in respiration).

Oxytocin

Also known as the love hormone is released from the pituitary gland and stimulates labour. Levels rise throughout pregnancy and more dramatically at the onset of labour as it is responsible for aiding the contraction of the womb. It is not unusual for women to experience 'Braxton Hicks' which are 'practice contractions'. The muscles of the uterus tighten for approximately 30-60seconds, sometimes longer, and cause the bump to go hard. This is partly caused by the rise in oxytocin. It prepares and 'ripens' the pelvic region for delivery through relaxation and dilation of the cervix. Oxytocin is also the hormone responsible for aiding contraction of the milk ducts, and mother and baby bonding once the baby has been delivered.

Insulin

Insulin resistance increases during pregnancy. This makes the pregnant woman's pattern of energy utilisation similar to that of a mild diabetic. One in 300 women develop gestational diabetes (diabetes that lasts for the duration of the pregnancy only). The increased insulin resistance helps ensure that the maternal blood glucose circulates for longer to enable adequate glucose absorption by the placenta and baby. Think of insulin as a lock and key – glucose circulates in the blood looking for doors in muscles and fat cells to 'unlock'. Cell receptors act as a keyhole and if it is blocked or the key won't turn properly the door can't open. This means that the glucose cannot enter so it stays circulating in the bloodstream. The hormones released in pregnancy block the keyhole to some degree and in severe cases can cause gestational diabetes.

Exercise considerations for insulin

In terms of exercise the concern is that training encourages increased insulin sensitivity, this could result in a drop of glucose being available for the baby during exercise. It is important for the mother to eat at regular intervals throughout the day to top up glucose levels - consideration should also be given to food intake intervals. Exercise should not be advised within 1-2 hours of eating and ideally a snack (of protein and carbohydrate) eaten within 30 min to 1 hour post exercise.

Gestational Diabetes

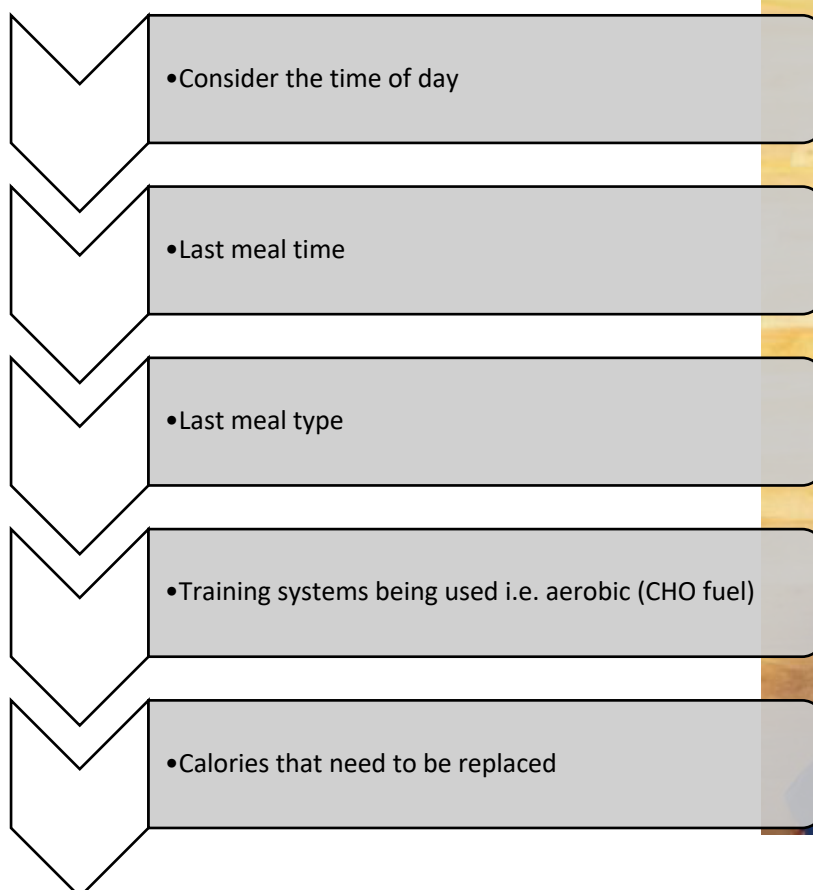
Gestational diabetes is diagnosed when circulating blood sugar levels are higher than normal, this can develop during pregnancy and usually goes after giving birth (NHS, 2017). In those who have a BMI >30 pre pregnancy the risk is higher and symptoms include increased thirst, increased need to urinate, dry mouth and tiredness (all also symptoms of a normal pregnancy). Women who are active in the prenatal phase of pregnancy are less likely to develop gestational diabetes.

Metabolic Changes

During pregnancy the resting metabolic rate increases by approximately 15-20% therefore the mother needs more calories. The pattern of energy utilisation in pregnancy is similar to those of a mild diabetic. Some women may develop 'pregnancy induced diabetes' (gestational diabetes) and require insulin medication. Normally the diabetes resolves following giving birth.

Pregnant women burn up more carbohydrates; which is the preferred energy supply for the baby. As pregnancy progresses there is an increased maternal reliance on fat store for energy.

Training Considerations



Considerations for Exercise Participation

Contraindications to Exercise during Pregnancy

Careful screening should be completed of every expectant mother. If there is any doubt of the appropriateness of exercise a referral to the GP should be made. Regular check-ups from the GP or midwife will monitor blood pressure and answer any other health concerns.

There are 4 main contraindications that need evaluation prior to beginning or resuming exercise during pregnancy

1. Significant physical injury
2. An acute bout of illness or chronic underlying disease
3. The onset of persistent or recurrent localised pain
4. Abnormal or heavy vaginal bleeding

Absolute and Relative Contraindications

An absolute contraindication refers to aspects that pose a significant or life threatening risk to mother or baby. If any of the signs/symptoms/ conditions apply exercise should not be carried out.

A relative contraindication may pose a risk if it is not accounted for i.e. the exercise mode/frequency/intensity etc adapted to prevent harm.

Absolute Contraindications	Relative Contraindications
<ul style="list-style-type: none">• Haemodynamically significant heart disease• Restrictive lung disease• Incompetent cervix/ cerclage• Multiple gestation at risk for premature labour• Persistent 2nd or 3rd trimester bleed• Placenta praevia after 26 weeks gestation (placenta is lying partially or completely over the cervix)• Premature labour during the current pregnancy• Ruptured membranes• Pregnancy induced hypertension	<ul style="list-style-type: none">• Severe anaemia• Unelevated maternal cardiac arrhythmia• Chronic bronchitis• Poorly controlled type 1 diabetes• Extreme morbid obesity• Extreme underweight (BMI<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

Key Research

Too much exercise during pregnancy can be associated with pre-eclampsia. Women who exercise for more than 270mins/week are at an increased risk of severe pre-eclampsia. Moderate to low exercise levels (<270mins/week) showed no association

Warning Signs

If any of these signs become apparent you must handle the situation in a professional and sensitive manner. The client must stop exercising until the cause is ascertained. Ensure any explanation of this to the client doesn't cause them any undue worry about her or the baby's health and well-being

- Vaginal bleeding
- Dyspnoea before exertion
- Headache
- Chest pain
- Muscle weakness
- Calf pain or swelling
- Preterm labour
- Decreased foetal movement
- Amniotic fluid leakage

If a pregnant client has any of the above it is vital that they discuss it with their midwife or GP.

The fitness professional must also be aware of the signs of overtraining:

Fatigue, pain, loss of motivation, susceptibility to injury, common infections.

Overtraining may result in little or no movement after the exercise session of the baby, and a reduced growth rate over time.

Health and Safety

Collecting information to ensure health and safety when working with pre and postnatal clients

It has already been established that exercise is beneficial both pre and post-natal. Certain medical conditions and health and safety issues must be considered to protect the wellbeing of mother and baby. You have a legal and ethical responsibility to screen clients before they begin exercise. Assess their readiness to exercise, their health status and current activity and fitness levels. Clients must also give their informed consent to take part in exercise. Holding appropriate qualifications and screening clients shows a duty of care has been provided should an unlikely accident occur. The Canadian Society of Exercise Physiology (CSEP, 2006) provides a Physical Activity Readiness Medical Examination (PARMedX) form that can be downloaded and used by GPs to refer clients.

Pre and Postnatal Physical Activity Readiness Questionnaire (PPARQ)	Informed Consent
<ul style="list-style-type: none">• Governs the advice and guidance offered to clients• Influences the design of a programme of physical activity, including the frequency, intensity, time and type• Maximises the benefit of exercise in relation to the client's goals• Identifies any need to delay exercise or refer to a medical professional	<ul style="list-style-type: none">• What is being proposed and the rationale for the exercise programme• The benefits of the proposed exercise programme• The risks of the potential exercise programme• The responsibilities of everyone involved

Considerations when Developing an Effective Working Relationship with Clients

You need to establish rapport before expecting anyone to work with you. It's the foundation that successful communication is built on and sets you apart as an industry professional – you only ever truly realise you have a problem when you haven't got enough.

How do you know if you have built rapport?

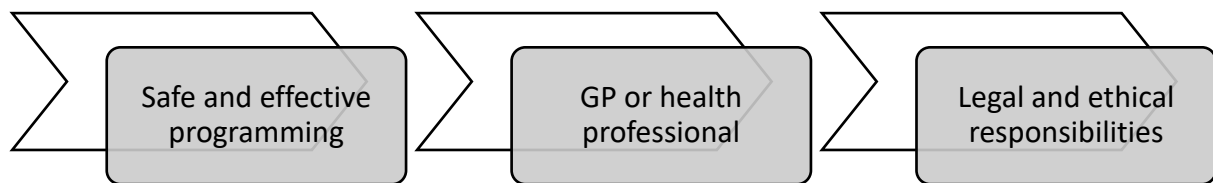
- Communication is comfortable
- You've established mutual respect and trust
- You are listening and being listened to

A true rapport is based on an instinctive sense of trust and integrity and is an essential ingredient for a working relationship. Think about someone you have met that you 'got on with' straight away. What was it about the situation, environment, them or you that created that level of rapport so quickly?

Whether a male or female instructor, who has or has not experienced pregnancy, it is important to have empathy with the symptoms and concerns of pregnancy. Knowledge of the physiological and biomechanical changes that take place will help to become sensitive to this.

Collecting Information

It is important to collect information for a number of reasons. Identifying contraindications, signs and symptoms of pregnancy ensures safe and effective programming. It means that the GP or health professional can be kept up to date should circumstances change. It also has legal and ethical responsibilities for factors such as insurance.



The Referral Process

All referrals should be discussed with the client and consent should be obtained for making the referral and disclosing information that accompanies the referral. If the health professional wishes to maintain overall responsibility for the client then they should be provided with a progress report.

Clients with medical conditions need supervised exercise sessions with a suitably qualified level 3 exercise referral instructor or level 4 specialist.

Guidelines for Referral

The consultation is a key time to identify if there is a need to postpone exercise or refer to a medical professional before the exercise begins. When any of the previously identified contraindications are identified or if in any doubt about safety to mother or baby a referral should be made.

Legal and Ethical Responsibilities and Confidentiality

Fitness professionals must have adequate and appropriate qualifications, public liability insurance and data stored in accordance with the Data Protection act of 2018 and General Data Protection act (GDPR – whilst the UK remain in the EU).

All information should only be shared with a third part on a 'need to know' basis and only with specific permission granted by the client.

When working with a client, moral responsibility should lead the way to ensure that they are dealt with in a respectful, dignified and sensitive manner whilst maintaining safe and effective physical activity.

Sources of Information

In the current climate there are many different sources of information available to expectant and new mothers surrounding exercise and nutrition. Although helpful, this also poses multiple problems with the rise of Instagram influences and Youtube channels posting incorrect, false or misleading guidance. It is important that clients are directed to credible sources of information to ensure that they are receiving safe, appropriate and effective advice. Wikipedia for example can never be considered a credible source of information as anyone has access to edit it (non-credible website). Clients and fitness professionals should accept nothing and question everything until it has been researched properly. It is important to separate fact from fiction and be aware of online and magazine articles that do not correctly cite their references as they are often journalistic opinion and can be inaccurate.

Fitness professionals

Material published within the last 10 years
Research published by government or educational establishments
Material from Google Scholar
Medical Journals
Academic Databases
American College of Obstetrics and Gynaecology (ACOG)
Royal College of Obstetrics and Gynaecology (RCOG)

User friendly

- Babycentre.co.uk
- NCT.org.uk
- Fit pregnancy for dummies
- The complete guide to pregnancy and fitness
- The complete guide to postnatal fitness

Support Services

There are also a number of support services available to parents and families across the UK. It is useful to have a general awareness of these in your local area to direct or refer clients where necessary and appropriate.

Services available

NHS choices publish 'Your pregnancy and baby guide' which provides a range of medical and nutritional advice throughout pregnancy, along with expert videos, parent tips and interactive tools
PANDAS Foundation UK - support for pre or post natal mental illness
BLISS - support for families whose babies are born premature or sick
SANDS - stillbirth and neonatal death charity
Kicks Count - online information for parents emphasizing the importance of tracking baby's movement patterns
Children's centres - support to children and families in the local community and funded by the local council

The register of exercise professionals (REPs, 2001) have published a 'Code of Ethical Conduct' which identifies good practice by outlining the core values of rights, relationships, personal responsibilities, professional standards and safe working practices

Pre and Postnatal Care

Care	Summary of Care
Antenatal appointments with a healthcare professional	Up to 10 appointments for the first child and approximately 7 for subsequent pregnancies. A schedule of appointments are provided by a GP or Midwife early on in pregnancy
Scans	Two pregnancy ultrasound scans are provided at 8 to 14 weeks and again at 18 to 21 weeks. Ultrasound scans are used to build a picture of a baby in the womb and are totally painless. Scans are a happy opportunity to see the baby but it can also show up abnormalities so it is important to be sensitive to this when speaking to a client about the outcome of their scan
Urine tests, blood tests and blood pressure checks	A urine test is requested at antenatal appointments to check for several things, including proteins which can be a sign of preeclampsia Blood tests are also offered to check that the pregnancy and baby are safe. They can highlight anaemia, gestational diabetes, blood group and rhesus status as well as infectious diseases such as HIV, syphilis and hepatitis B. Blood pressure is checked at every antenatal visit and high blood pressure can indicate signs of preeclampsia
Weight, height and circumference checks	Weight and height are measured at the first antenatal appointment and Body Mass Index (BMI) is calculated to assess the risk of problems during pregnancy due to being overweight or obese. After this women are generally not weighed during pregnancy. The circumference of the womb is measured to check the baby's growth patterns.
Screening (optional)	Screening for Down's, Edwards' and Patau's Syndromes is offered between 10 and 14 weeks of pregnancy. The tests are optional and are not 100% accurate. Screening for Sickle Cell (at risk groups) and thalassaemia are offered before the 10 th week of pregnancy.
Postnatal and new baby checks	A postnatal check-up should take place 6 weeks after delivery to ensure that the mother is recovering well. This includes checking blood pressure, vaginal discharge and the healing of scars and stitches. If a new mother's BMI was >30 pre pregnancy she may be weight. A check will also be made to see if breastfeeding is going ok, however Diastasis Recti tests are not commonly performed so it is important that the fitness professional carries this out. Around 1 in 4 births in the UK are via C-section. It is common for there to be a lack of sensation for up to 12 months and there is a subsequent lack of connection to the pelvic floor and abdominals - even if birth was via c-section the pelvic floor will still be weakened. Assisted deliveries can result in a tear or incision which will often affect healing, pain, bleeding and damage to the pelvic floor A physical examination of the baby occurs within 72 hours of birth to check eyes, heart, hips and in boys, testicles to test for any signs of abnormality or disease. In 2009 the Department of Health (DoH) issues the 'Healthy Child Programme' which outlines advice for health and social care throughout a child's life. It outlines the checks at the 6-8 week postnatal period for babies to check their development in the first few weeks of life.

Testing Pre and Postnatal

Diastasis Recti

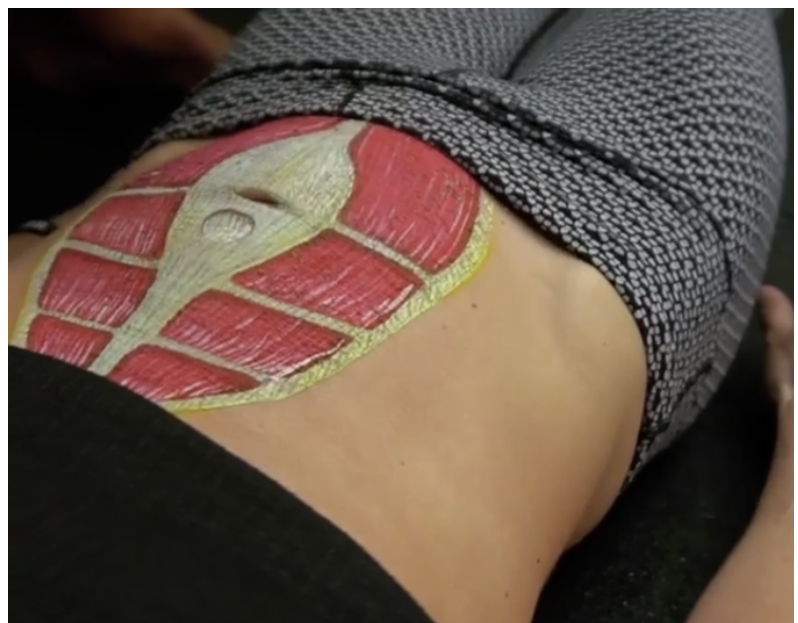
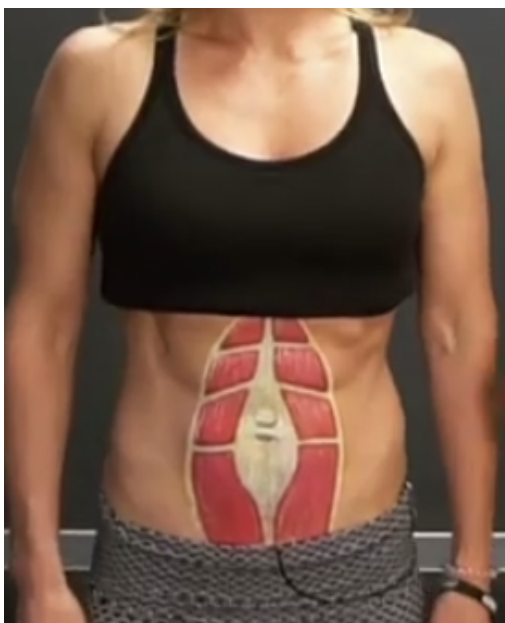
What is Diastasis Recti

Diastasis recti is the separation of the rectus abdominals, specifically widening of the connective tissue, the linea alba. Pregnancy creates tremendous stretch on both the skin and fascia of the abdomen, and women over the age of 45 appear more likely to experience more severe diastasis recti (Lee, 2011).

It is the separating or spreading of the linea alba, the midline that runs down your abdomen. If you can visualize the six pack muscles, it is the space between those six pack muscles, also known as the rectus abdominis, which spread apart and widen. Typically, it's due to the fascia in the abdominal wall being too weak or tight in the wrong places.

Who is affected by Diastasis Recti

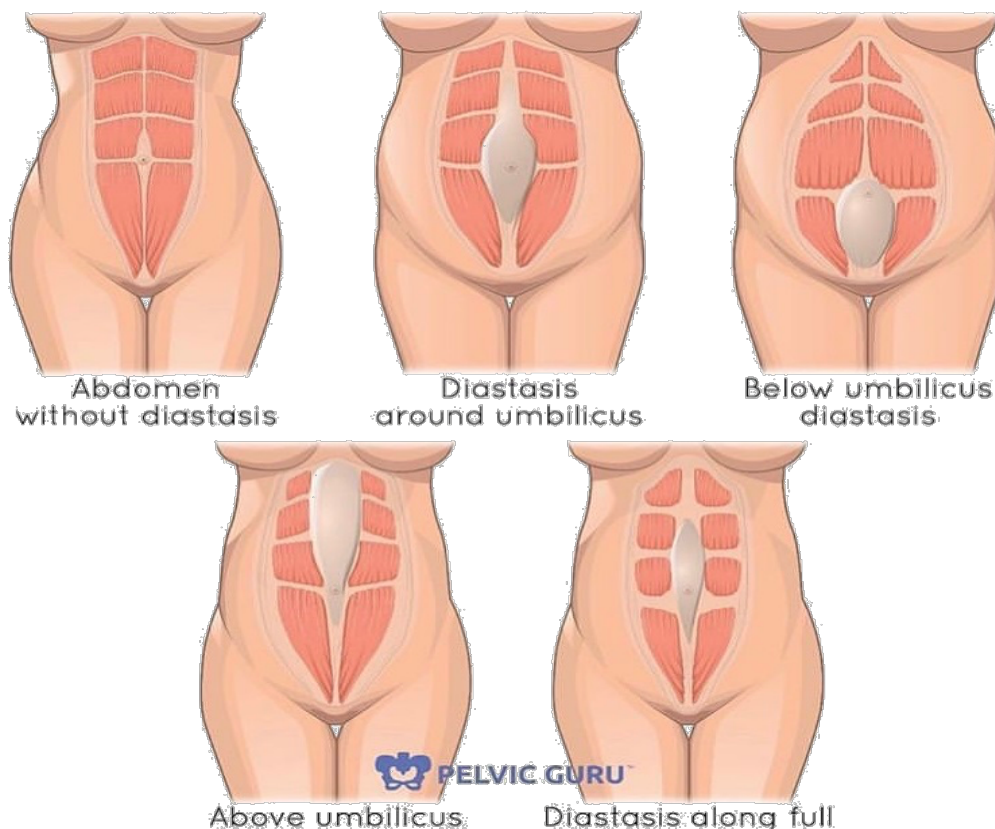
It does not just affect pre and postnatal women. It also affects women who have never had babies and it can affect *men* too. It can be brought on by doing a lot of crunches, doing inappropriate core or ab exercises, by just not having the good fascial tensegrity and connection through the body, specifically in the abdomen. Pre and postnatal women may experience an umbilical hernia while men can tend to experience hernias a little bit lower in their abdomen. This can be caused by the fascia not being connected or tight in the body as well as misalignment.



Always check to see if a client has a DR postnatal – usually diagnosed from 26 weeks pregnant

Diastasis occurs naturally during pregnancy and can be managed through good posture, doing the right exercise, avoiding excessive weight gain and allowing separations to heal.

Variations of Diastasis Recti



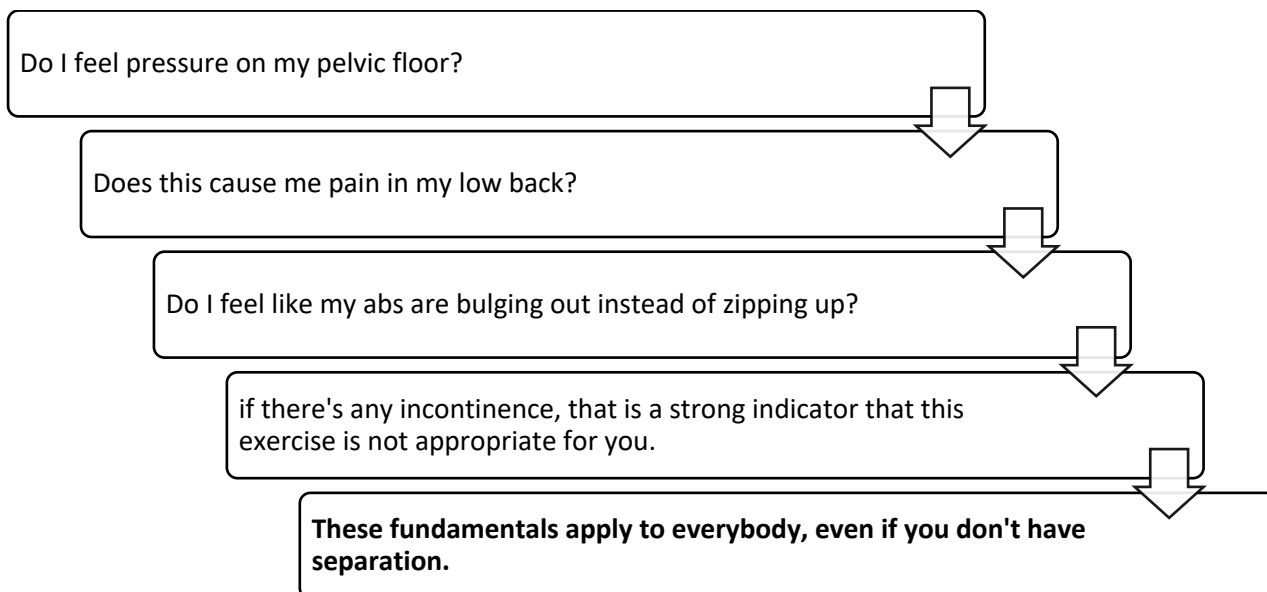
As an instructor it's important to address and care

It's not just for vanity! Having diastasis recti (or a deep core that does not function optimally) can lead to aches and pains and issues within the body that you don't need to be experiencing.

1. Umbilical hernias – occurs when part of the intestine protrudes through an opening in the abdominal muscles
2. Back & core discomfort/injury reduction – low back pain, poor posture, sciatic issues, hip issues, etc.
3. Pelvic Organ Prolapse – strengthening leads to long and short term pelvic floor support.

All 3 of these topics can be minimized or prevented by improving her fascial networking (or connections), throughout the entire body, but specifically addressing the deep core

Questions to Ask



Testing for Diastasis Recti

1. Ask the client to lay on their back with their knees bent, and the soles of their feet on the floor. They should place their hands behind their head
2. With your fingertips place them across their midline, parallel with the waistline, at the level of the belly button whilst the abdominal wall is relaxed, gently press your fingertips into their abdomen.
3. When they are ready ask them to inhale. As they exhale they should draw their belly button inwards and lift the shoulders off the pillow.
4. Working quickly pass your index finger and middle fingers horizontally across the linea alba and the rectus abdominis muscles. Apply firm pressure, starting at the top of the rectus abdominis and working down the midline toward the pubic bone

Things to feel for:

- When you are palpating down the midline, take notice of how much space you have. One finger-width space is normal.
- There are three fascial sheets that run through our abdominal wall. There is also the visceral fascia, which runs around our organs and our intestines. Note how that fascia feels as it is palpating down the midline. This is the most important thing when it comes to testing for abdominal separation.
- If you feel as though you can't really feel any feedback, that's an indication that the fascia is weak. Don't worry - you can make that fascia *better, stronger, more connected*.

Remember:

- Space is not the most important thing
- It's all connected!

Can Diastasis Recti be prevented?

The answer is most likely yes. Everybody's bodies are different. During pregnancy and postpartum, it is not 100% preventable, BUT you can work to prevent the severity of diastasis recti. If you do nothing, the severity of the abdominal separation from having babies could be really severe. The tissue could become extremely weak and recovery could be much more challenging. Learn how to properly activate the deep core, and also how to release/relax (especially during pregnancy). Pregnancy is the best time to learn about your core and to feel your core. It is the absolute best time to learn about your body.

Prevention Strategies

Back off on the high intensity ab exercises. There are lots of great core exercises out there that don't involve the drastic intra-abdominal pressure. Some of these exercises, such as pelvic tilts, are super simple yet extremely effective. It's really about core function and how your whole body is moving and functioning together. The fundamentals are key!

Healing Diastasis Recti

Healing diastasis recti is not just bringing the abs back together. It's about releasing the other areas that are restricting proper core function and may be preventing or making it harder for the abdominal separation to heal. Feeling that deep core connection from the base of the pelvis and pelvic floor that draws up through the middle of the body and spine. This helps to activate and zip up the fascia through the core, around the ribcage, all the way up through the top of the head.

Things to avoid when healing DR include:

Breathe holding

- Can add pressure on a weak core system
- Push the belly outwards when lifting heavy objects to prevent this

Waist trainers

Sitting straight up out of bed, off the floor and when playing with baby

Constipation

- Increased pushing adds pressure

Poor posture

- Will increase DR and prevent healing

Pelvic Floor Dysfunction (PFD)

It is important for women to know how to find their pelvic floor. There are many methods, some of which include:

- Stopping the flow (not recommended due to risk of UTIs and preventing the emptying of the bladder)
- Visualisation
- With a partner
- Accidentally leaking urine when exercising, laughing, coughing or sneezing
- Urgency to go to the toilet
- Difficulty in emptying the bladder or bowel
- Accidentally passing wind

The Importance of the Pelvic Floor (PF)

It's important to have a well-connected and functioning pelvic floor. In one aspect you could say 'strong pelvic floor' – but not too strong of pelvic floor muscles. It is possible to have a pelvic floor that is too strong - 'gripping in her pelvic floor'. Sometimes that may occur more in those that tend to do heavier lifting and higher intensity exercises.

The Importance of Pelvic Floor Exercises

Also known as 'Kegel' exercises, they help to control urinary and faecal control (incontinence common in late pregnancy). The pelvic floor supports pelvic organs and around the 5th month, as the uterus grows, there is an increased pressure around the pelvic area. Many women are unable to do isolated pelvic floor contractions with verbal instruction and mistake it for a Valsalva manoeuvre. Proper guidance is invaluable. Fast and slow contractions – 6-10 reps per set throughout the day are recommended but women should also learn how to relax the pelvic floor to enable easier labour.

Resuming pelvic floor exercises as soon as possible after giving birth can reduce swelling and speed up the healing process. Some women who have had stitches find it easier toing these lying down at first and working up to doing them whilst sitting.

How to lessen the PF disorders linked to childbirth

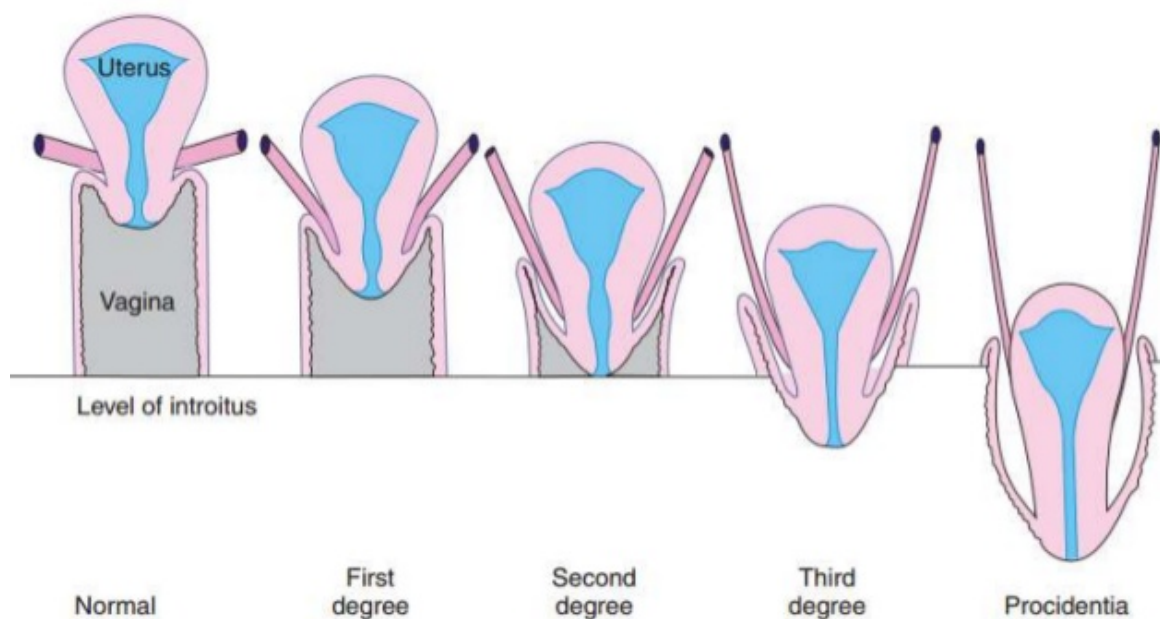
- STOP performing jumping exercises post T1 (or once the belly starts to grow)
- Make diaphragmatic breathing the norm – it helps to provide balance to the PF muscles & prevent disorders ante/ post-natal
- STOP performing traditional ab exercises (even planks)
- STOP isolating & activating the TA without leading with the PF. If the PF doesn't lead the TA engagement there will be downward pressure on the PF

- Insert a finger into the vagina and feel what happens when you activate and release the PF (know your body)
- Soften the PF following any lifting or holding of the PF. BALANCE is key!
- Use diaphragmatic breathing during birth and PUSH correctly by recruiting the TA but also softening the PF instead of activating it while pushing (also during bowel movements)
- POST BIRTH, the first PF and core exercises should be diaphragmatic breathing. When the core is engaged make sure the PF comes along for the ride and softens with every exhale

Prolapse

When the supporting muscles and ligament of the pelvis supporting her organs weaken and the pelvic organs slip out of place causing a bulge of the vagina (Prolapse) (Mayo Clinic, 2011). There are many variables of pelvic organ prolapse, when the bladder, uterus, or intestines protrude down through an opening in the pelvic floor. Incontinence and pelvic organ prolapse do not necessarily come hand in hand.

This topic of pelvic organ prolapse or any pelvic floor dysfunction is all too real, and NOT talked about, especially in the fitness industry.



Different types of Uterine Prolapse that may occur

As most Postpartum women are asymptomatic there are at a real risk of prolapse which can be increased with exercise choice. Pelvic organ prolapse affects 3 in 4 women during their lifetime and is the leading cause of incontinence (70% of pelvic floor dysfunction). Just because there is no problem at the time does not mean they are in the clear.

Heavy Weight Training should only be completed if:

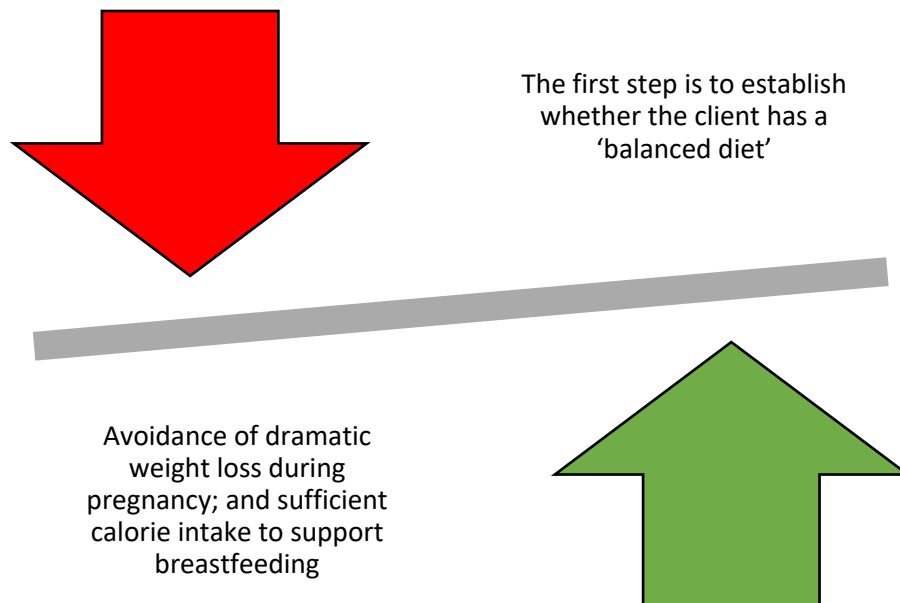
- There is a strong, functional core
- No diastasis
- The mother is hormonally balanced
- Perfect posture and optimum technique are adopted and maintained

Important: Don't think just because she had her baby a year ago that she is 'healed'. She is only 'healed' if she did the correct exercises to actually re-strengthen her deep core the correct way.



Nutritional Requirements

Importance of a Balanced Diet



There is little evidence of harm in the 1st ½ of pregnancy with calorie restricted diets, but there are concerns in the 2nd. Calorie restriction can lead to lipolysis and ketonaemia which can affect mental development. This can be prevented in late pregnancy by adopting a high carb low GI diet. Lipolysis is suppressed by enhanced sensitivity induced by this eating pattern and can be safely recommended to pregnant women who are overweight and obese whilst preventing gestational diabetes.

Sufficient nutrients are required to support proper growth and development, as well as for the support of the physiological changes.

BMR generally increases by up to 25%, representing a total energy cost of 80,000 calories to fuel the growth and development of maternal and foetal tissues and growing foetus. This equates to an extra 150-300kcal per day, however during the 2nd and 3rd trimesters, slightly more calories may be needed for women who are exercising during pregnancy.

Important Sources of Food during Pregnancy

Advice is often varied and opinionated:

- Ensure a good supply of vitamins and minerals
- A broad spectrum of fruits and vegetables of different colours
- Starchy carbs to provide energy during fatigue – limit refined carbs such as white bread/ rice and confectionary to help stabilise insulin levels
- Small frequent servings of unrefined carbs rather than one large serving to maintain a constant supply of energy rather than peaks and troughs
- Good quality protein is vital as the baby is growing all the time.
- Calorie intake should be increased by up to 500kcal per day during breast feeding



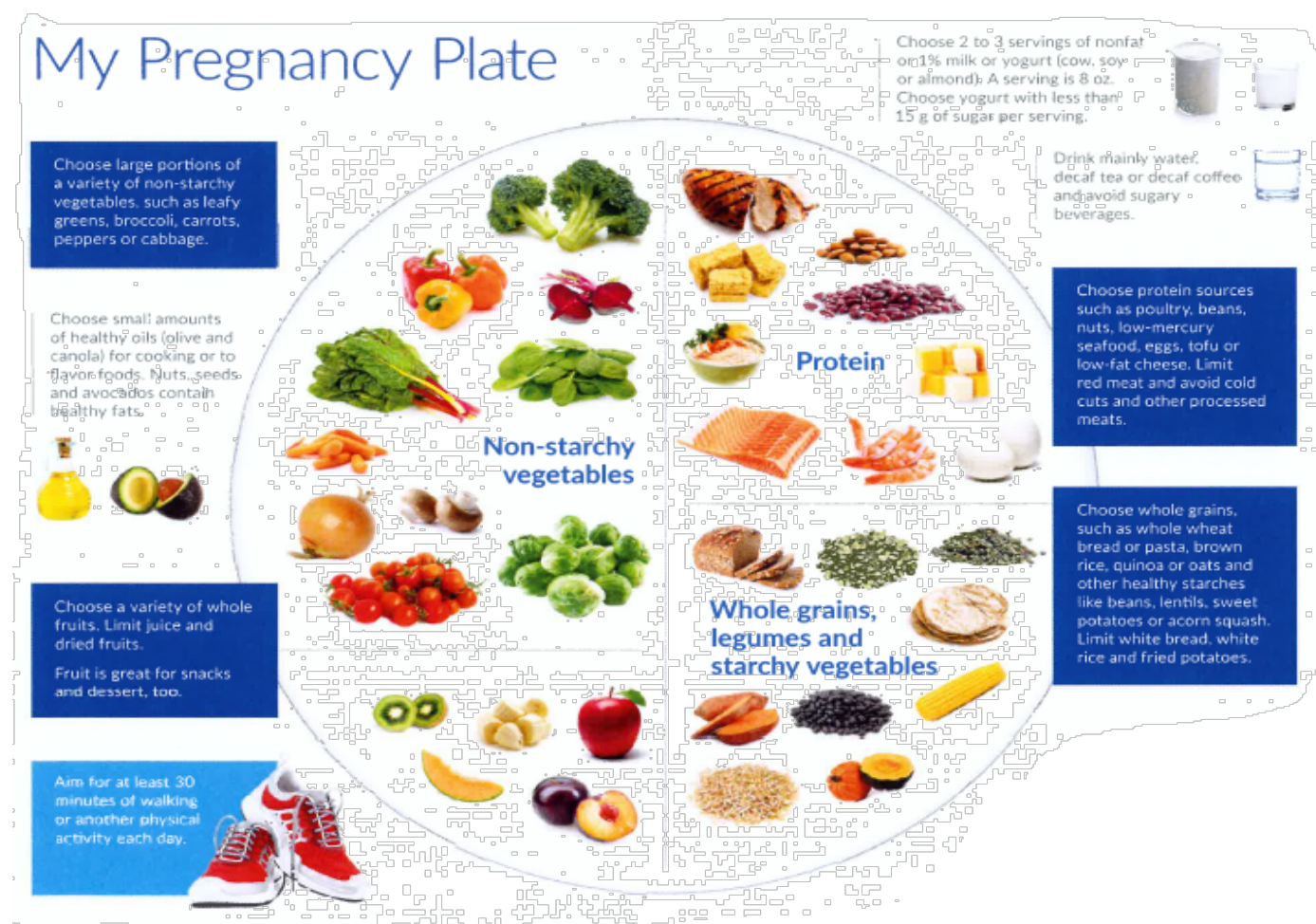
Eating while you are pregnant from the FSA, 2008 can be recommended to pregnant women. The eatwell plate can also be recommended and modified where necessary



The Eatwell Guide recommends:

- Drink 6-8 glasses of fluid per day – more if taking part in physical activity
- Limit smoothies and fruit juice to no more than 150ml per day
- Limit salt to no more than 6g per day
- Check the traffic light labels on packed foods and choose low salt, sugar and fat items

Nutritional Requirements



Foods to consume	Rationale
Fruits and vegetables (at least 5 a day)	Provide a varied range of vitamins and minerals. Contain fibre to help with digestion and prevent constipation
Starchy Carbohydrates (1/3). Unrefined are best. Small and frequent servings.	Provide some vitamins and fibre. A good source of energy during periods of tiredness and fatigue. Can be used as a pre and post exercise snack as well
Protein (beans, pulses, fish, eggs, poultry, nuts and meat). Ensure meat is cooked well and avoid processed meats	Contains amino acids which are the building blocks of life. Especially important in 2 nd and 3 rd trimester when the baby is growing fast
Dairy foods (milk, yoghurt, fromage frais, cream and cheese) Non-dairy options (soya) should be fortified	Important source of calcium and other essential nutrients for bones and teeth
Foods that are high in fats and sugar	Often high in calories and contribute to weight gain, diabetes, high cholesterol and the chances of developing heart disease and some cancers

Vitamins and Minerals

Vitamin/ Mineral	Function	Sources
Folic Acid	Safe development of the foetal spinal cord up until 12/52	Green vegetables, brown rice, fortified bread/ cereals, can be supplemented
Vitamin B12	Makes new cells (especially blood cells), helps build a healthy NS	Meat, fish, eggs, milk, hard cheeses, fortified breakfast cereals, soya
Vitamin C	Helps absorb iron from food and keeps cells healthy	Citrus fruit, tomatoes, broccoli, peppers, blackcurrants, potatoes
Vitamin D	Helps maintain proper levels of calcium and phosphorus during pregnancy	Milk, oily fish, 15-30 minutes exposure to sunlight each day
Calcium	Strong teeth and bones	Dairy, fish with edible bones, breakfast cereals, dried fruit, bread, almonds, tofu, green leafy vegetables
Iron	Helps produce haemoglobin. A shortfall can cause tiredness and possible anaemia	Lean meat, leafy vegetables, dried fruit and nuts

Foods to be limited and avoided

Foods to avoid	Rationale
Supplements and foods containing high concentrations of pre-formed Vit A (retinol), including liver and liver products.	High levels of Vitamin A in pregnancy can cause congenital birth defects. Harmful bacteria can grow in these environments such as listeria. In rare cases it can lead to miscarriage, stillborn or severe illness in a new born baby or mother
Certain cheeses that are mould-ripened (blue veined) unless they are cooked, those with a white rind (brie and camembert)	
Raw, unpasteurised or non UHT dairy such as milk, cream and cheese	
Raw or partly cooked eggs UNLESS they are British Lion Code eggs. Non Lion Code hen, duck and goose eggs are safe to eat as long as they are cooked thoroughly	British Lion Brand eggs are considered a very low risk of salmonella and are safe for pregnant women. Salmonella can result in severe diarrhoea or vomiting
Raw or undercooked fresh or processed meat. It is important there is no trace of pink or blood. Cold meats such as salami and chorizo should be checked to see if it has been cooked and should be avoided if it has just been cured or fermented. Haggis should also be avoided	There is a potential risk of toxoplasmosis if it is not thoroughly cooked (an infection caused by a parasite found in raw or uncooked meat, unpasteurised goats milk, cat poo and untreated water. Although very rare it can cause harm to the baby)
Game shot with led pellets	Lead can cause developmental problems with the baby
Shark, Swordfish and Marlin should be avoided when pregnant or trying to conceive. Tuna should be limited to no more than 2 (140-170g) steaks or 4 medium tins per week. No more than 2 portions of oily fish per week such as salmon, sardines and mackerel	High levels of mercury can cause developmental issues and potentially brain damage
Raw shellfish such as mussels, clams, prawns and scallops. Raw fish in sushi is okay as long as it has been frozen first to kill off harmful bacteria	Can contain bacteria and viruses that are harmful and causes food poisoning
No more than 200mg of caffeine per day	High levels are associated with low birth weight babies
Alcohol	Keeps risk to the unborn baby to a minimum as their liver is unable to process the alcohol

Restricted Diets

Varied and balanced diets can come from plants as well as animal products, however some, for example vegetarians and vegans, may find it difficult to get enough iron and vitamin B12. Food intolerances such as coeliac disease or religious diets may also restrict the variety of nutrients available in the diet. In these cases the client should consult with their health professional for advice on nutrition and supplementation during the pre and postnatal period

Importance of Hydration

Water flushes waste products from the cells and aids in liver and kidney function for both mother and baby. It is needed for the expansion of blood volume and adequate breast milk production and flow. Insufficient intake can contribute to constipation, preterm labour and possibly miscarriage, fatigue



Tip

- One mug of instant coffee is 100mg caffeine
- One mug of filter coffee is 140mg caffeine
- One mug of tea is 75mg caffeine
- One can of cola is 40mg caffeine
- One 250ml energy drink is 80mg caffeine
- One 50g bar of plain, dark chocolate is 25mg caffeine
- One 50g bar of milk chocolate is less than 10mg caffeine

Staying Hydrated

General Advice

- 8-12 glasses per day
- Stay proactive, if you are feeling thirsty you are probably already dehydrated
- Avoid caffeinated and high sugar beverages
- Drink small amounts frequently



Pica

This is when non-food substances are craved and consumed in pregnancy. It can include things such as soap, charcoal, and chalk. There is no known evidence as to why this exists

Unit 2: Design and Implement Exercise Programmes for the Pre and Post Natal Client

Aim

To provide learners with an understanding and application of collecting information and designing safe, effective programmes for pre and post natal clients

Learning Outcomes

Be able to collect information and select appropriate activities with the pre or post natal client

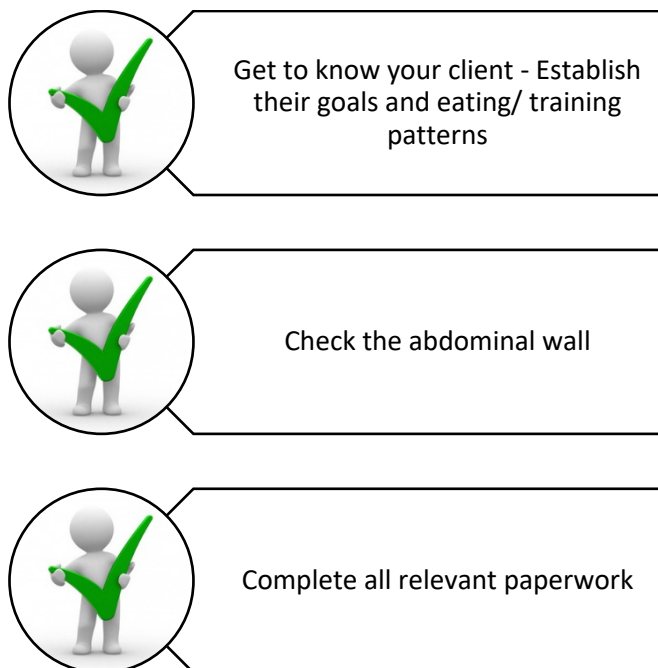
Be able to design an individualised, safe and effective exercise programme for pre or post natal clients

Be able to record the individualised exercise programme for the pre or post natal client

Be able to identify and manage specific risks to the pre or post natal client when participating in physical activity

Meeting your Client

The First Meeting with your Client



Designing an Individualised Exercise Programme

Considerations

The stage of pregnancy the client is in will affect how they are feeling, the main risks and the benefits of exercise. Consider how experienced the client is and what her exercise capabilities are. Regular exercise prior to pregnancy can be maintained to some degree during pregnancy but beginners must start with suitable progressions from a low intensity

Regular exercisers



- ☐ Can continue training without major modifications
- ☐ Modifications to F.I.T.T principles in line with levels of comfort & maternal symptoms

Non exercisers



- ☐ Advised to seek medical approval
- ☐ Begin with low intensity & low impact activities

General Principles of Exercise Prescription

DO:	Don't:
<ul style="list-style-type: none"> • Have an open mind, focus on development of wellbeing, physical capability and productivity • Make sure that total volume enhances sense of wellbeing – 20mins at a moderately hard RPE • If it feels good it is probably ok – use common sense • Always monitor and review progress • Pay attention to little things – hydration, rest, nutrition • Give as much attention to the process of pregnancy as you do to the exercise 	<ul style="list-style-type: none"> • Do anything without thinking it through • Continue if exercise produces pain • Ignore fatigue or signs of noticeable tiredness • Exercise to exhaustion • Exercise in the supine position after the 1st trimester • Exercise in hot or humid conditions

Practical Considerations for Exercise Prescription

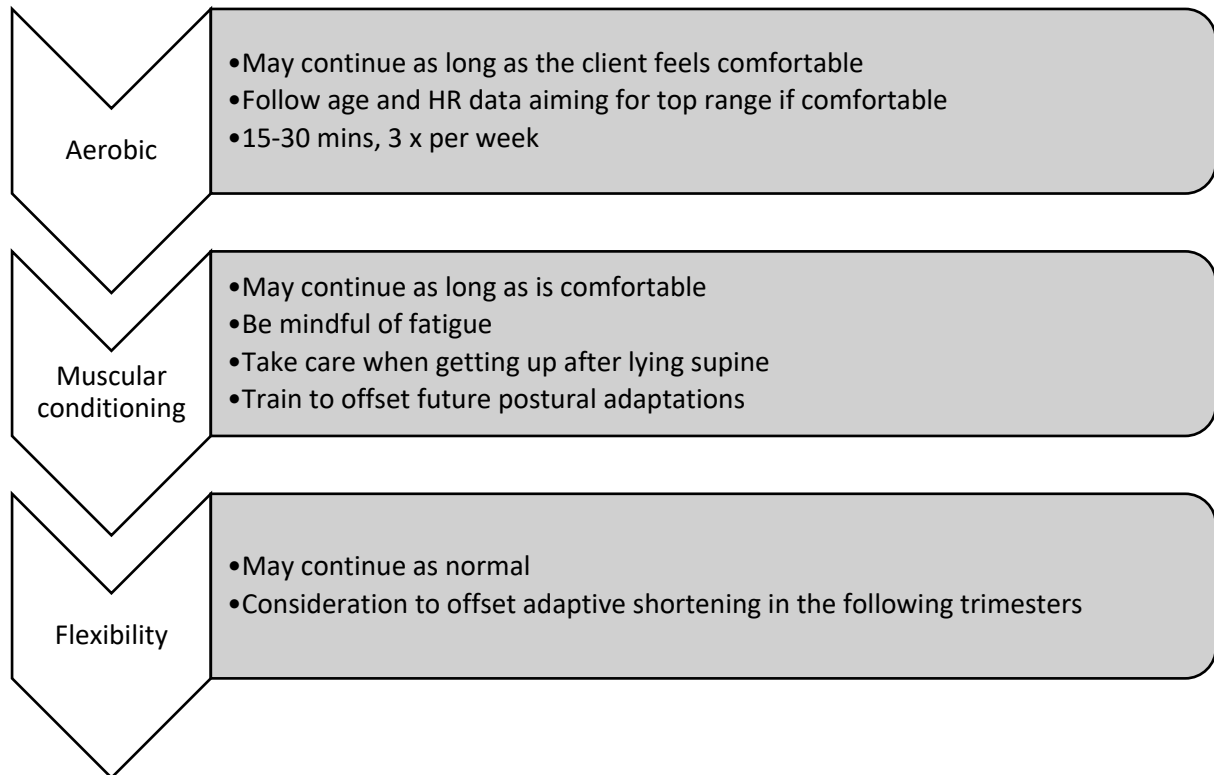
Variable	Effects of pregnancy	Exercise Modification
Body position	Decreased blood flow in the supine position	Past 4 months of gestation, alter to side lying or standing
Joint laxity	Ligaments become relaxed – joints may be prone to injury	Avoid rapid changes in direction and bouncing Stretching should be done with control
Abdominal muscles	Presence of rippling of connective tissue along the midline (diastasis recti)	Not recommended if diastasis recti develops
Posture	Shift in centre of gravity – increased arch in lower back, shoulders slumped forward	Emphasis on correct posture and neutral pelvic alignment
Resistance training	Emphasis on continuous breathing Avoid valsalva manoeuvre Avoid supine exercises past 4 months gestation	

Changes throughout the Trimesters

Each trimester brings about physiological and biomechanical changes. Different signs and symptoms are experienced along with these changes and therefore exercise should be adapted appropriately. A number of modifications will need to be applied throughout each trimester and into the postnatal period.

Applying the FITT Principles

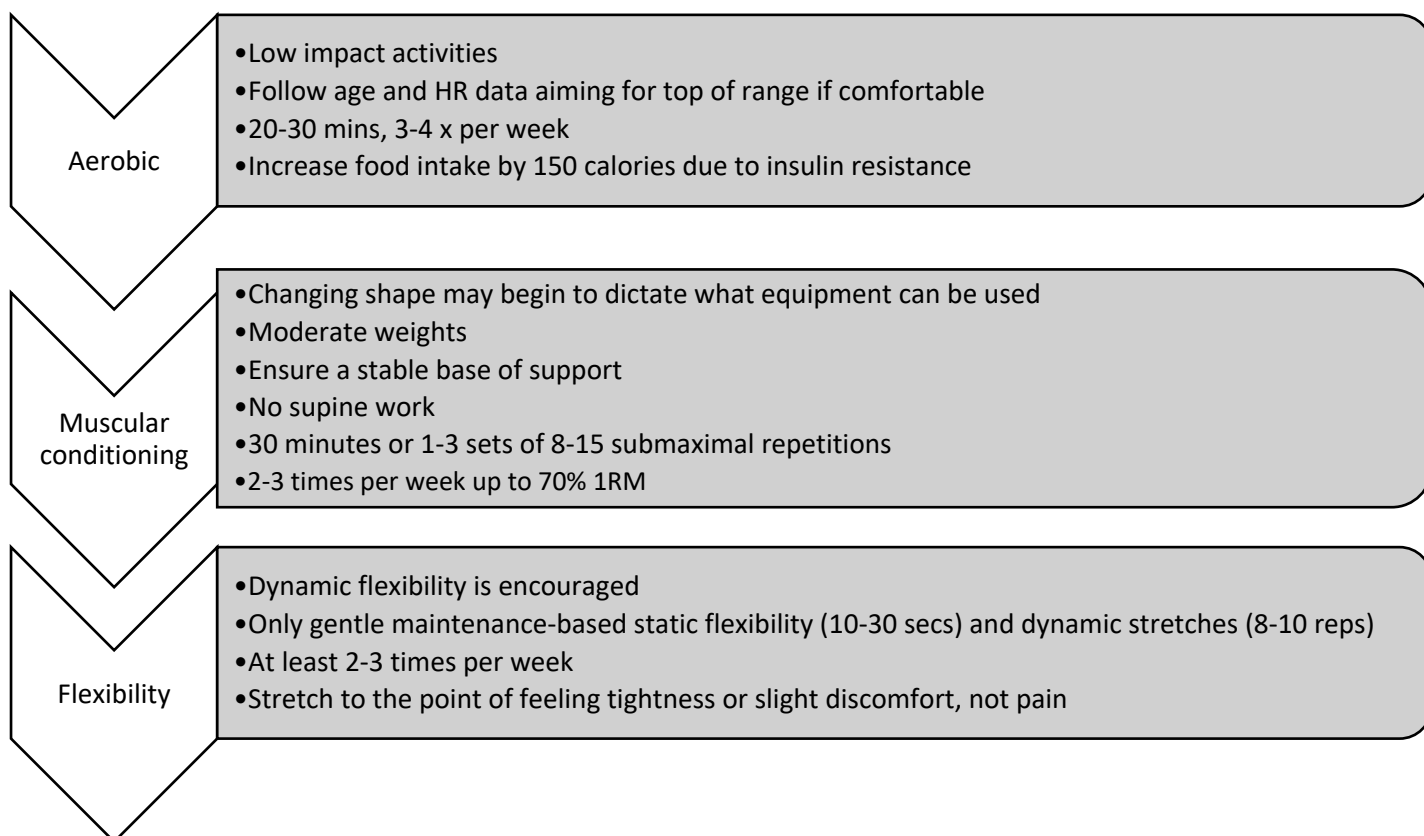
First Trimester



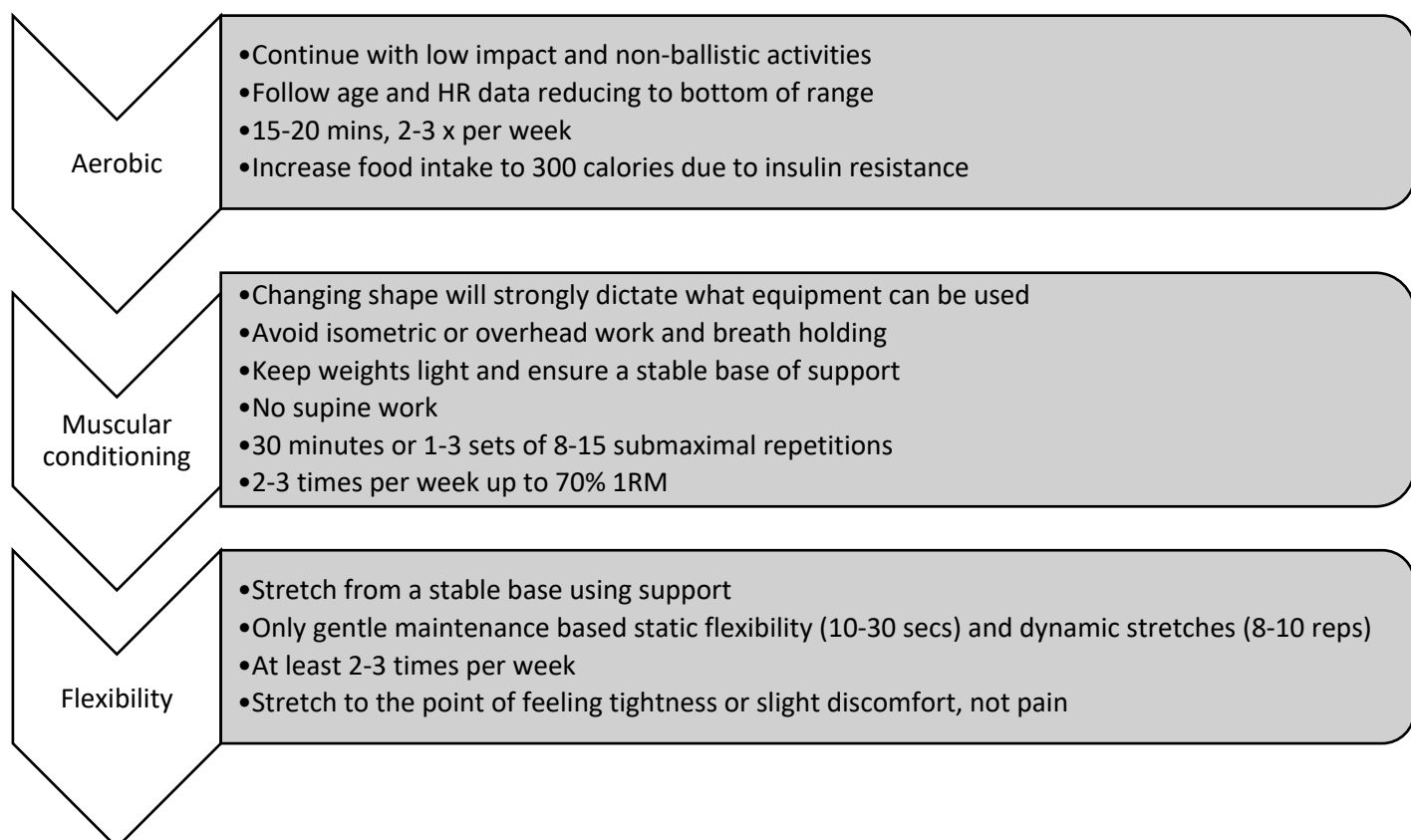
Top Tips

- Reduce the duration by approx. 10% during the first trimester if you are tired. The body is automatically working harder so a 40min run pregnant is the equivalent to almost 60 non pregnant
- Women want to feel they are working out so sweating is ok. Just make sure they do not feel exhausted. They should always feel they could do another 10-15mins if they had to!
- If it doesn't feel right then it is not right!
- Encourage them to listen to their body, this is a key message. Everyone is different and has different strength and fitness levels. One person's easy is another's hard
- They don't HAVE to monitor their heart rate, this is an old guideline which is no longer recommended as there are too many variables
- For each hour they exercise, clients should rest for the equivalent to ensure they gain the most benefit from the exercise and recover optimally

Second Trimester



Third Trimester



Guidelines for Warming up and Cooling down

- Start with correct posture
- Promote exercises that gradually promote circulation
- Work on body awareness and control
- Gradually warm up/ cool down (10-15 mins)
- Caution when side bending – protect the back
- Use mobility exercises to lubricate joints, no sudden changes in direction
- Avoid rotating the trunk while the hips or spine are flexed, no excessive flexion
- Avoid sitting with legs straight
- Maintenance based stretches only – major muscle groups
- No supine exercise after 20 weeks or when showing

Rate of Progression

Gradual progression should be applied to those who did not exercise before becoming pregnant. This is not a time to be considering improving physical fitness so those who have engaged regularly in high intensity activities prior to pregnancy should apply caution. Overall activity and fitness levels will decline.

Prenatal Resistance Training and Muscular Fitness

Due to the biomechanical changes taking place in each trimester, particular care should be taken when selecting activities to ensure they help to maintain strength in the areas that could become weak (core musculature), and improving functional movements to support activities of daily life (ADL).

Progressions

As pregnancy progresses:

- Decrease weight
- Decrease sets
- Increase recovery between sets
- Increase recovery between sessions
- Avoid maximal lifts
- Beware of overhead lifts (lordosis, blood pressure)

How to Activate the Core Safely

When you contract the core muscles for support it should feel like a gentle hug, not a tight squeeze. Gently lift up your pelvic floor and reduce the distance between your hip bones by 1mm to help contact your Transversus Abdominus as you exhale.

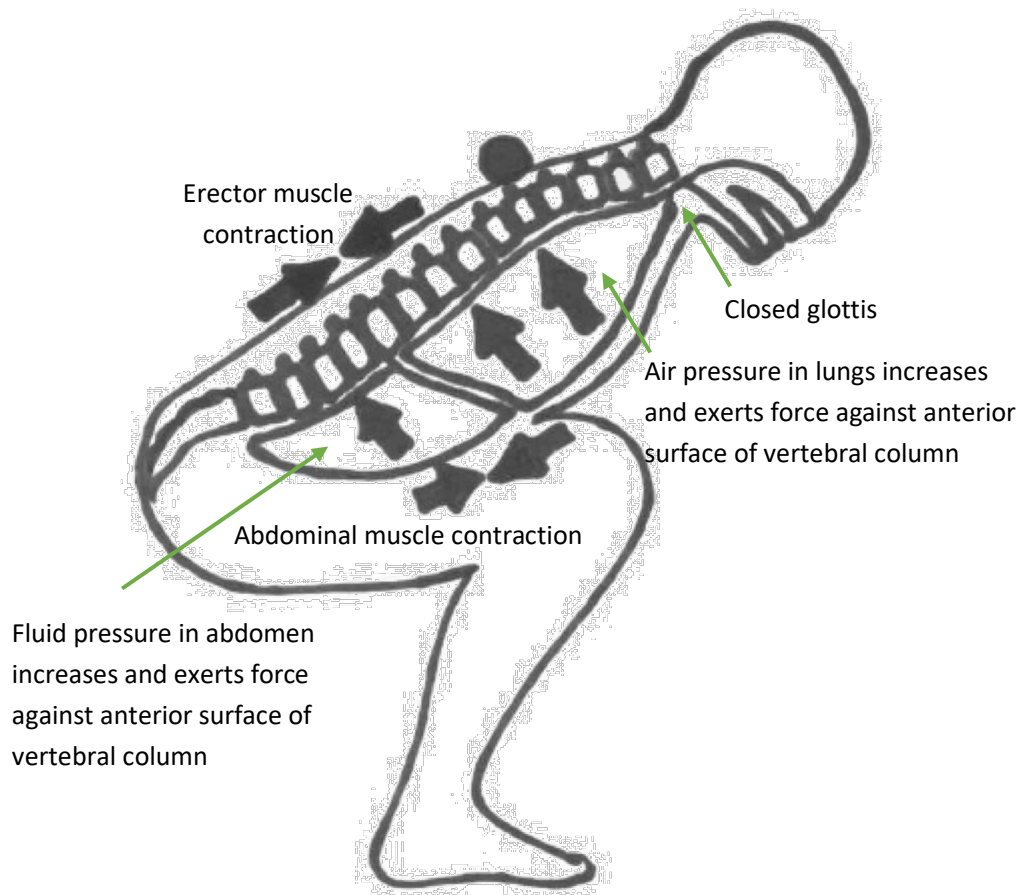
Try to imagine holding an egg in your hand...squeeze too hard and the egg will break, hold subtly and it won't. It is very common to over squeeze and contract the muscles. Over recruiting often triggers other muscles not associated with the inner core.

This should not be mistaken for the Valsalva Manoeuvre.

The Valsalva Manoeuvre

Definition: Excessively holding one's breathe with a closed glottis during performance of a resistance training exercise.

It creates a "balloon" of relatively incompressible gas in the thorax, and, via the diaphragm, a corresponding pressure increase in the abdomen.



Exercise Modifications for Physiological and Biomechanical Changes

Physiological changes and potential symptoms	Exercise Modifications	Trimester(s)
Fatigue, dizziness, racing pulse and nausea as a result of vascular underfill and the increase in progesterone and oestrogen	Moderate intensity and duration. Avoid decline and prone positions. Postpone exercise for another day	1,2
Heartburn and reflux	Avoid decline, prone lying/kneeling positions	1,2,3
Circulatory and respiratory changes causing postural hypotension, breathlessness without hypoxia and breathlessness on exertion	Avoid rapid changes in position, long isometric contraction, and heavy weight training overhead and long periods of standing motionless. Moderate intensity and duration	1,2,3
Release of relaxin	Monitor range of movement (ROM) to avoid hyperextension of joints and overstretching which can cause soft tissue damage. Avoid developmental and advanced PNF or ballistic stretching	1,2,3
Haemorrhoids, constipation or prolapse. Episiotomy/ healing stitches	Avoid hard seats (spin/upright bike). Use a Swiss ball or pillow to make seated exercises more comfortable	1,2,3 and postnatal
Maternal insulin resistance	Monitor intensity carefully and ensure they client has a small meal or snack before and after physical activity. Advise on maternal caloric needs and prenatal nutrition guidelines	1,2,3
Carpal tunnel syndrome (potential numbness, tingling in hands and thumb)	Assess ability to grip weights or handles and adapt where necessary. Opt for machine based exercises as opposed to free weights. Avoid weight bearing on the hands	2,3
Breastfeeding – can often encourage hyperkyphosis and there are increased calorie needs	Avoid vigorous arm movements and prone positions. Support exercises in an inclined position and use Swiss balls and pillows as support if back pain is present. Refer to adaptations for kyphosis. Advise on breastfeeding nutrition and hydration	postnatal
Lack of sleep, tiredness, low energy levels	Moderate intensity and duration. Postpone exercise for another day if necessary. Discuss adequate nutrition and hydration	3 and postnatal
Circulatory and respiratory system returns to normal slowly postnatal	Moderate intensity and duration and progress gradually	Postnatal
Growth of uterus – centre of gravity shifts forwards and upwards	Avoid supine and prone positions. Counterbalance and stabilise standing exercises. Avoid high steps ups and single leg balance without support. Avoid standing forwards flexion if balance is an issue	2,3
Weakened pelvic floor muscles and symphysis pubis dysfunction (SPD)	Avoid impact, especially with hip abduction i.e. star jumps. Avoid wide ranging abduction such as grapevines, side steps and lateral lunges. Avoid high step ups and single leg balance exercises without support. Programme pelvic floor strengthening exercises. Ensure there is access to a toilet	2,3 and postnatal

Physiological changes and potential symptoms	Exercise Modifications	Trimester(s)
Weakened abdominal muscles or diastasis recti	Plan strength training for the core muscles and avoid spinal flexion or uncontrolled rotation against gravity such as crunches and sit ups. Avoid the 'doming' effect which will further weaken the linea alba and abdominal wall	2,3 and postnatal
Hyperkyphosis	Programme strength training for the mid trapezius, rhomboids and posterior deltoids with exercises such as one arm row and TRX inverted row. Use maintenance stretches for the pectorals and anterior deltoids	2,3 and postnatal
Hyperlordosis	Include strength training for the rectus abdominis, gluteals and hamstrings. Include maintenance stretches for the hip flexors and erector spinae	2,3 and postnatal
Back pain	Programme strength training for the core muscles and stretch the lower back muscles. Use support such as a bench, swiss ball and pillow to provide back support	2,3 and postnatal

Activities during Pregnancy

Any potential risk of trauma to the 'bump' should be avoided during pregnancy so some gym based exercises such as rowing and the stationary bike should be assessed to avoid abdominal trauma. Seated row machines may also become uncomfortable or impossible due to the placement of the chest pad. Contact sports and high risk sports such as horse riding are not advised. Scuba diving is also deemed as unsafe as the baby has no protection against decompression sickness and gas embolism (bubbles in the bloodstream). Activities that can induce altitude sickness should be avoided and it may also be prudent to avoid high impact activities and very heavy plyometric weight training. Joint laxity and sudden increases in heart rate and blood pressure and biomechanical loading provide a relative contraindication to power and Olympic lifting. Conventional yoga and Pilates should be modified if being delivered to a pre and postnatal client

Not sure if an exercise is appropriate for a client just ask these questions:

- Can you feel pain or pressure pushing down on the pelvic floor?
- Are you experiencing any incontinence with that movement/exercise?
- If the answer is "YES" to either or both of those questions then it's time to rethink that movement/exercise.

Core and Functional Training

To prevent lower back pain as a result of weakened abdominals programmes should include muscular strength and endurance exercises for both pre and postnatal clients. It is not unusual for women to want to regain their abdominal musculature and physique during and after childbirth. The Journal of Strength and Conditioning (2012) provides guidance for providing appropriate core training exercises during pregnancy and postnatal (following clearance from a health professional)

Core Training Exercise Selection

The below exercises meet all of the ACOG and ACSM guidelines for training during pregnancy

Exercise	Trimester	Description	Target Muscles
Kneeling rope ab crunch	1,2	<ol style="list-style-type: none"> 1. Upper arms perpendicular to the floor 2. Crunch down until elbows are close to the knees 3. Bring back to starting position and repeat 	Rectus abdominus
Standing crunch	1,2	Same as kneeling but standing	Rectus abdominus
Kegels	1,2,3	Squeeze the pubococcygeus muscle for 5sec. Relax and repeat	Pubococcygeus muscles of the pelvic floor
Opposite arm/ leg raise	1,2,3	<ol style="list-style-type: none"> 1. Begin on all fours 2. Engage the core 3. Raise the right arm and left leg until they are in line with the body 4. Hold for 5s and return to starting position 5. Alternate sides 	Erector spinae, entire core musculature
Can-Can	1,2,3	<ol style="list-style-type: none"> 1. Sit upward on the mat with the knees held in toward the chest 2. Keeping the waist lifted, twist legs to the right 3. Bring legs back to neutral then twist to the left 	Obliques, rectus abdominus, erector spinae
Seated Bicycle	1,2,3	<ol style="list-style-type: none"> 1. Seated in a chair, raise the knees to 45 degrees 2. Hold the spine in neutral position 3. Bring on knee at a time to the chest 4. Alternate knees and repeat 	Rectus abdominus, iliopsoas, rectus femoris
Seated side bends	1,2,3	<ol style="list-style-type: none"> 1. Seated in a chair 2. Spine in neutral position 3. Lean to the right side and return to neutral 	Obliques, quadratus lumborum
Seated stability ball pelvic tilts	1,2,3	<ol style="list-style-type: none"> 1. Sit on stability ball with knees bent, feet spread for stability 2. With core muscles engaged slowly, tilt the pelvis forward as far as feels comfortable 3. Pause briefly and tilt the pelvis backward as far as feels comfortable 	Abdominals, transverse abdominals
Standing pelvic tilts	1,2,3	<ol style="list-style-type: none"> 1. Stand with back against the wall 2. Heels 14 inches from the wall 3. Feet shoulder width apart and knees slightly bent 4. Rotate the pelvis so that the lower back touches the wall 5. Contract abdominal muscles and hold for 10s 	Abdominals, transverse abdominals

Doing 8-12 repetitions while avoiding the Valsalva manoeuvre is recommended. 1-3 sets

If any pain presents itself in an activity the technique should be checked. If required modify the activity to an alternative.

The table below represents some examples of exercises to replicate movement patterns required in daily life and motherhood

Activities for Daily Life (ADL)	Exercise selection
Squatting down to play or take care of the baby	TRX squat, swiss ball wall squat, DB squats, sit to stand
Picking the child, bags and seat up from the floor	Hex bar deadlifts, DB or KB deadlift, sumo deadlift in later stages
Carrying the child	KB racked walk, DB bicep curl variations
Carrying the car seat and bags	DB farmers walk, single arm carry DB, KB or powerbag
Pushing the buggy	Prowler/sled push, TRX chest press
Twisting to check the child is ok in the back car seat	Medicine ball controlled wood chop, resistance band horizontal wood chop (later stages of pregnancy)
Placing the child in and out of the car seat – push/pull	Kneeling push up and one-arm row, bent over row (early stages of pregnancy)

Engage the Core

The core should fire prior to any movement that recruits the core, during all core specific exercises, as you cough/ laugh/ sneeze

Deep Core Strengthening

When exercising, if the core is not correctly engaged, injury and even **worsening** of existing abdominal separations can occur. This is why it is so important to learn in pregnancy how to accommodate the changing body. It might seem a little strange to think about ‘training the abs’ in pregnancy, but it’s actually the best time to connect with the ‘belly’ and really feel the best when exercising and throughout your day!

Belly Pumping

This exercise combines diaphragmatic breathing with deep core engagement. Let your breath be the guide and include the PF, TVA and multifidus – the belly should expand with an inhale and with the exhale the pelvic floor and TVA should be activated, drawing the hip bones in towards one another. It is important to practice engaging and releasing the muscles of the inner unit – feel into the sensational differences between a full engagement and lengthening vs a 5% engagement and lengthening.

Managing Risk

Identifying any specific potential risks when working with pre and postnatal clients

As with all clients, exercise can pose risks, however additional risks and hazard exist with pre and postnatal clients which must be assessed and addressed. It is therefore advisable to carry out a risk assessment when working with this specific population in any fitness environment.

Identifying and managing specific risks for the pre and postnatal client

There are no reports for regular exercise in healthy women with a normal pregnancy. Exercising incorrectly or in an unsafe manner may cause premature labour, abortion or congenital deformities. Fitness professionals must inform each woman of the potential risks and warn of any associated problems – educated decisions can then be made

Risks for the mother and the foetus can be categorised into different headings.

Risks for the foetus:

Occupational:

Physically demanding jobs should be considered. Avoid strenuous lifting, long hours of standing, and exposure to noise or vigorous vibrations.

Hypoxia:

Exercise can cause a decreased utero-placental blood flow which can cause foetal hypoxemia and/or hypoglycaemia. This is extremely rare and only occurs in women who were unfit and engaged in episodic, intensive exercise during pregnancy.

Hyperthermia:

The greatest threat to foetal defects is high temperature during T1. Intensive exercise in hot, humid conditions will elevate core temperature and is correlated with neural tube development defects.

Hormonal Stress:

Exercise causes a surge in catecholamines and prolactin which can causes premature increases in uterine contractility. There is no correlation between vigorous exercise and early spontaneous abortion or premature labour.

Foetal Growth:

Exercise may cause a decreased birth size and body weight, especially with those who maintain vigorous activity throughout. These infants tend to be leaner but no less healthy. There is no correlation between exercise and reduction in birth weight or neo-natal health

Trauma:

Blunt or penetrating trauma to the abdomen could result in foetal damage. This is more likely to occur later in pregnancy when the foetus is anterior to the pelvis and less protected. Contact sports cause a higher risk and may be prone to falls due to balance alterations

Risk for the mother:

Strains and Sprains:

Care should be taken with ballistic movements. Hormonal changes increase relaxin and progesterone which cause laxity.

Hypoglycaemia:

Hypoglycaemia can occur due to low-intensity, long distance exercise which gets worse as pregnancy progresses. Women utilize carbohydrates more readily during exercise. If the woman feels dizzy, faint or tired it could be due to low blood glucose. Consumption of carbohydrate during exercise can help eliminate the problem

Below are some examples of hazards to consider with their associated risks and control measures:

Hazard	Risk (low, medium or high)	Impact of Risk (low, medium or high)	Control Measure
First trimester: High temperature during the session	Moderate: Risk of overheating	High: Risk of causing heat distress and harming the baby	Ensure adequate hydration, ventilation and light clothing
Second trimester: Supine exercises	Moderate: Risk of occluding the inferior vena cava and therefore reducing the oxygen flow to the baby and mother – hypotensive syndrome	High: Risk of causing loss of consciousness and foetal death	Incline exercise and avoid supine exercise position
Third trimester: Release of the hormone relaxin	Low: Risk of overstretching due to joint laxity	Moderate: Risk of injury to soft tissue due to range of movement	Choose maintenance based stretches and avoid ballistic and PNF techniques
Postnatal: Abdominal curl in the presence of diastasis recti	Low: Risk that incorrect exercise choice or technique can worsen diastasis recti	Moderate: Risk that exercise could further weaken the abdominal wall	Avoid spinal flexion and uncontrolled rotation until diastasis has healed



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