

Declarative title: Modify, don't stop! Time to reconsider the 'relative' and 'absolute' contraindications to physical activity in pregnancy: an opinion piece.

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Short title: Modify, don't stop! Active pregnancy for all.

Background

Guidelines for physical activity during pregnancy have existed since 1985. Extensive literature in the subsequent forty years have conclusively demonstrated the safety and benefits of prenatal physical activity for individuals without contraindications. [1, 2] Most global guidelines include specific medical conditions where moderate to vigorous intensity physical activity is not recommended due to the potential for harm to either mother or fetus. However, the list of contraindications varies between guidelines and are primarily based on expert opinion. Re-evaluation of contraindications to prenatal exercise to reflect current evidence is critical to removing barriers to physical activity during pregnancy.

We seek to reinforce the importance of a physically active pregnancy for all, whilst presenting recently published evidence that empirically challenges the traditional contraindications to physical activity in pregnancy. It is hoped that the reader will be empowered to facilitate discussion about physical activity with pregnant individuals, regardless of co-morbidity or complication.

Physical activity in pregnancy

Physical activity is an umbrella term encompassing any physical movement and includes activities and behaviours along a spectrum of intensities: sedentary behaviours (sitting,

lying), and light (walking or activities of daily living) to moderate and vigorous activities (including structured exercise). These activities encompass a range of purposes, from caregiving, occupational, transport, travel and leisure time. Physical activity in pregnancy has a number of clinically important benefits. It decreases the odds of developing major pregnancy complications by approximately 40%, (gestational diabetes mellitus, pre-eclampsia, gestational hypertension, macrosomia) as well as the odds of developing depression by nearly 70%. [3-5] Importantly, physical activity during pregnancy is not associated with increased risk of having a miscarriage, a small baby, or preterm birth related to activity [4,6,7] and these benefits are also evident in pregnant individuals with overweight or obesity.

Current guidelines broadly recommended that pregnant individuals accumulate at least 150 minutes of moderate-intensity aerobic physical activity per week and engage in muscle-strengthening activities twice per week. [1, 2, 8] Yet, despite compelling evidence, cross-sectional population studies estimate that only 3–15% of those who are pregnant meet this guidance compared with 24–26% of non-pregnant individuals.

There are a number of reasons why pregnant individuals may find it difficult to achieve the recommended levels of physical activity during pregnancy. For those experiencing complications or co-morbidity, they may have received clinical or anecdotal advice that precludes them from engaging in physical activity, owing to the potential risk of harm to their own health and/or that of the fetus. This advice often reflects the published lists of ‘relative’ and ‘absolute’ contraindications to physical activity in pregnancy included alongside physical activity guidelines, [1, 8-11] but is also reflective of sociocultural

beliefs. With respect to clinical guidelines, it is worth noting that lists of contraindications are inconsistent *between* guidelines. [12, 13] Further, it has been recently shown that this guidance has not been based on empirical data, begging the question: are we creating additional unnecessary barriers to physical activity participation in pregnancy and doing more harm than good?

Summary: physical activity in healthy pregnancies is safe and strongly protective of developing major pregnancy-related complications. All healthy pregnant individuals should be encouraged to meet the recommended weekly amounts of moderate-intensity aerobic activity (at least 150 minutes) and muscle-strengthening activity (twice per week). If they have not been physically active before pregnancy, they can start by gradually increasing frequency, duration and intensity of activities over time.

Physical activity in complicated pregnancy

Meah *et al.*, (2020) recently published a systematic evidence review in the British Journal of Sports Medicine, [13] which synthesised available literature regarding the safety of physical activity in pregnancies complicated by traditional ‘relative’ and ‘absolute’ contraindication.

There were ten conditions for which engaging in regular moderate to vigorous physical activity did indeed demonstrate a strong potential for adverse effects for the mother and/or fetus (absolute contraindications). There were ten disorders for which the evidence suggested modification of activities (reduction in intensity, duration, or

volume; exercise adaptation) over complete cessation (relative contraindications).

Finally, critical evaluation of available literature identified that eleven of the traditionally listed contraindicated conditions to physical activity in pregnancy should no longer be considered a barrier to being physically active, within the recommended amounts (**table 1**).

Women with absolute contraindications are discouraged from engaging in moderate to vigorous physical activity due to a strong potential for harm to the mother or fetus. However, the latest Canadian guidelines of 2019 advocate for the continuation of activities of daily living (e.g. light walking, light cleaning) due to the known adverse effects of activity restriction (i.e., bed rest).

In contrast, it is clear that relative contraindications require discussion, between a pregnant woman and their obstetric healthcare provider, about the potential risks and benefits of physical activity during pregnancy. Based on available evidence, Meah *et al.*, (2020) recommend supporting pregnant individuals to modify activities (reducing intensity, duration or volume; with exercise or movement adaptation) rather than advising them to avoid physical activity completely. In reality this may require repeated discussion throughout the pregnancy, but regardless, the opportunity should not be missed.

As part of this discussion it is important to consider that even physical activities below the recommended threshold have substantial health benefits for those who are pregnant. Simply going for a brisk 10-minute walk daily reduces the odds of developing

pre-eclampsia by at least 25%, bumping this up another 5 minutes per day also reduces the odds of developing excessive weight gain during pregnancy and gestational diabetes by 25%. [14] Every minute counts!

Summary: the best available evidence supports a physically active pregnancy for all. A recent review of the literature [13] revealed a lack of evidence to support the traditional classification of eleven disorders for which physical activity is a contraindication. The authors also recommend an evidence-based reclassification of the 'relative' and 'absolute' contraindications to physical activity in pregnancy (table 2). It is suggested that pregnant individuals experiencing the listed pregnancy-related complications are counselled as to how to remain as physically active as possible, whilst avoiding unnecessary sedentary behaviour, given the demonstrated benefits of physical activities below the recommended threshold.

A note on bed-rest

Historically, those with absolute contraindications, including pre-eclampsia or intrauterine growth restriction, were prescribed bed rest with the aim of improving maternal and fetal health outcomes. The prophylactic prescription of activity restriction is a common recommendation for individuals at risk of preterm labour and is suggested by up to 93% of obstetricians as a means of risk reduction. [15] Yet, empirical evidence shows that bed rest has negative impacts on maternal health such as anxiety, depression, muscle atrophy, bone loss, venous thromboembolism, and gestational

diabetes and also, that fetal outcomes are not improved. In fact, in developed regions of the world, earlier delivery may occur as a result of bed rest in pregnancy. [16]

Recent research also suggests that pregnant individuals who are hospitalised (but who are not placed on bed rest by their obstetric team), are likely to effectively bed rest themselves; being sedentary for up to 91% of the day. [17] This behaviour is not only seen in hospitalised pregnant individuals, but even in those with uncomplicated pregnancies. This likely reflects the sheer number of perceived reasons as to why pregnant women do not feel able to be physically active.

Summary: it has been shown that the prescription or behaviour of bed rest is associated with physician prescription in certain pregnancy-related complications, and hospitalisation, even in uncomplicated pregnancies. Unfortunately, it has been shown that bed rest is associated with negative physiological and psychological impacts on maternal health, whilst not improving fetal outcomes. It is recommended that should a pregnant individual be required to rest or be admitted to hospital, that they are not simply confined to bed, but have the opportunity to remain ambulatory where appropriate and engage in mobility and muscle-strengthening activities, which can be infinitely modified to suit the individual.

The role of the clinician

Whilst it is not the sole responsibility of obstetric healthcare providers to communicate the benefits of prenatal physical activity, it is understood that pregnant women

consistently report that one of their main sources of physical activity information is healthcare professionals. Unfortunately, a recent study found that as little as 9% of pregnant individuals receive accurate, evidence-based advice on physical activity from their healthcare provider. [18]

It should be noted that the inclusion of physical activity in antenatal clinical care guidelines in the U.K. is limited. The most recent UK guidance for antenatal care of uncomplicated pregnancies (NICE Guideline CG62) was published in 2008 and is under revision in December 2020. Unfortunately, the scope of this revision will not extend to the topic of physical activity. Instead, physical activity will be removed from the revised guideline and will be referenced only in guidance pertaining to weight management (NICE Guideline PH27). This is a missed opportunity given the other numerous benefits of physical activity in pregnancy. Whilst Mills and colleagues (2020), have called for guidelines, policy and practice to be better linked, [19] we would ask that clinicians caring for pregnant individuals – with and without complication/comorbidity – discuss the benefits vs. risks of physical activity as early as possible in the antenatal care pathway. Where clinical interactions occur with greater frequency in medically complicated pregnancies, the opportunity there is ongoing opportunity to engage in discussion as well as modify physical activity prescription.

Clinicians should determine an individual's readiness to be physically active by considering their activity background, their current physical activity status and their intentions for the rest of their pregnancy and beyond. It is important to discuss existing knowledge, beliefs, concerns and barriers to being physically active, alongside any

motivating factors and preferences. These discussions can take place using motivational interviewing techniques alongside an exercise pre-participation screening tool such as the *Get Active Questionnaire for Pregnancy*. [20]

Summary: obstetric healthcare providers and clinicians involved in an individual's antenatal care will be a key and trusted source of evidence-based information relating to physical activity in pregnancy. Whilst antenatal pathway guidelines stop short of recognising the importance of discussion relating to physical activity, particularly in complicated pregnancies, it is vital that clinicians feel confident in discussing the risks vs. benefits of physical activity with all pregnant individuals. Resources such as the Get Active for Pregnancy questionnaire can aid clinicians in determining pre-participation risk, but all pregnant individuals should receive tailored advice on how they can remain as active as possible, regardless of complication.

Conclusion

There is increasing urgency for pregnant individuals to receive evidence-based and timely advice regarding the benefits of being physically active. There are few, if any, risks associated with prenatal physical activity when following current guidelines for those without contraindications. We recommend a shift of focus away from perceived harm to the evidenced benefits of physical activity during pregnancy; including lower intensity activities of daily living, and reduced sedentary time. Now that the safety and benefits of prenatal physical activity in women without contraindications has been

established, we echo the urgent call to action for a concerted effort to examine the role of physical activity in complex pregnancies to improve the health of two generations.

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Disclosure of Interests

None to disclose

Contribution of Authorship

AH and DS conceived the idea for submission of the manuscript. MHD, GD and VM were consulted and gave approval to contribute their expertise. AH and MHD developed the manuscript. MHD, VM, GD and DS contributed comments on revisions of the manuscript, which AH facilitated. All approved the final manuscript.

Details of Ethics Approval

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Table/Figure caption list

Table 1. Proposed revision to relative and absolute contraindications to exercise in pregnancy; adapted from Meah et al. 2020 [6]

1

Not a Contraindication	Relative Contraindication	Absolute Contraindication
Chronic hypertension	Mild respiratory disorders	Severe respiratory diseases (e.g., chronic obstructive pulmonary disease, restrictive lung disease and cystic fibrosis)
Gestational hypertension	Mild congenital or acquired HD	Severe acquired or congenital heart disease with exercise intolerance
Women who are categorised as overweight or obese	Well-controlled type 1 diabetes	Uncontrolled or severe arrhythmia
Recurrent miscarriage	Mild pre-eclampsia	Placental abruption
Short cervix	Preterm premature rupture of membranes	Vasa previa
Twin and high-order pregnancies	Placenta previa after 28 weeks	Uncontrolled type 1 diabetes
Epilepsy	Untreated thyroid disease	Intrauterine growth restriction
Anaemia	Symptomatic, severe eating disorder	Active preterm labour
Orthopaedic limitations	Multiple nutrient deficiencies and/or chronic undernutrition	Severe pre-eclampsia
History of extremely sedentary lifestyle.	Moderate–heavy smoking (>20 cigarettes per day) in the presence of comorbidities	Cervical insufficiency
History of spontaneous preterm labour or fetal growth restriction		

2