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## STUDENTS' CORNER

### Resistance Training and Pregnancy

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#### Abstract

Resistance training has received growing attention as an important health and wellness recommendation for pregnant women. Resistance training focuses on increasing musculoskeletal fitness, which can improve functional capacity and psychological state to manage the day-to-day demands and discomforts of pregnancy as well as facilitating an easier labour and delivery process. The purpose of this commentary is to overview the benefits and implications that resistance training can elicit for pregnant women. Through this work, we establish the potential benefits of regular resistance training in pregnant women. An increasing body of research supports resistance training mediated changes in musculoskeletal fitness, functional status, and wellbeing. Further research is required to fully elucidate the risks associated with resistance training; however, the preponderance of information suggests that the benefits outweigh the risks of resistance training in pregnant women when appropriate safety measures are implemented.

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#### Introduction

Exercise recommendations during pregnancy have evolved significantly over the last several decades. Having been heavily discouraged in the past due to fear of adverse outcomes and pregnancy complications, research has more recently demonstrated that exercise actually provides a range of benefits to the mother, the fetus, and the future child (Mottola et al., 2018). Exercise has been shown to improve both physical and mental aspects of the mother's health and wellbeing in addition to reducing the risk of a multitude of pregnancy-related diseases and complications (Mottola et al., 2018). Gestational diabetes, hypertension,

obesity, preeclampsia, perinatal depression, excess gestational weight gain, and postpartum weight retention can all be reduced through the incorporation of regular exercise during pregnancy (Mottola et al., 2018; Nascimento, Surita, & Cecatti, 2012; Wolfe & Davies, 2003). Improved fitness as a result of exercise during pregnancy helps to facilitate a healthy pregnancy and smoother labour and delivery process, as well as an easier recovery (Wolfe & Davies, 2003). The benefits seen with exercise during pregnancy has made exercise an important recommendation for pregnant women.

While exercise recommendations for pregnant women continue to evolve based

on emerging research, much of this research has largely focused on aerobic exercise (Mottola et al., 2018). The role of resistance training (RT) during pregnancy has received comparatively little investigation. However, recent research has started to realize that RT can actually be quite promising for pregnant women (Nascimento et al., 2012). Recently, Mottola and colleagues (2018) released recommendations that incorporate RT as a for pregnant women based on evidence that a combination of aerobic and conditioning exercises appears to be more effective compared to just aerobic exercise alone. RT has strong implications for complementing the benefits acquired from aerobic activity and further enhancing health and wellbeing, particularly its potential to strengthen the musculoskeletal system to provide the mother with increased strength during pregnancy (Schoenfeld, 2011). Through this process, RT further augments the improvements in health and fitness in pregnant women in ways that aerobic activity is unable to (Schoenfeld, 2011), allowing the woman to achieve a more holistic improvement in health and wellbeing during pregnancy. Together, the combination of RT with aerobic exercise can maximize the benefits from exercise during pregnancy. Accordingly, the primary purpose of this student driven commentary is to outline the benefits and implications of RT on pregnancy.

### **Pregnancy Demands**

Pregnancy involves a number of dynamic changes to the body, many of which can be quite uncomfortable and even painful. It can become increasingly challenging to complete even day-to-day activities as pregnancy progresses (Pujol, Barnes, & Elder, 2007). RT works to build

strength and musculoskeletal fitness in the individual, which can be immensely beneficial during pregnancy (Wolfe & Davies, 2003). Improving musculoskeletal fitness can enhance functional capacity in the pregnant woman (Schoenfeld, 2011), providing her with increased capability to better manage the changes, demands, and daily activities of pregnancy as well as attenuating pain (Nascimento et al., 2012; Pujol et al., 2007). By increasing muscular capacity through RT, pregnant women not only have increased capacity to manage loads, but the cardiovascular stress response to these loads is also lowered (Barakat et al., 2009b). As a result, women experience less exertion for these same tasks potentially reducing overall fatigue. The implications of this improved functional capacity extend beyond solely improved physical competence; the effects on mental health are equally (if not more) substantial. In a study by Barakat et al. (2011), light RT throughout pregnancy was found to increase maternal perception of functional health status and wellbeing, demonstrating that improved functional capacity from RT can improve self-concept. These mental wellbeing benefits that result from the strength-based approach of RT further help to manage emotional distress from pregnancy-related changes and improve psychological state surrounding them, positively affecting mood and coping mechanisms throughout pregnancy (Barakat et al., 2011).

Low back pain is one of the most common symptoms that pregnant women suffer as a result of the weight of the growing fetus (Artal & O'Toole, 2003; Wolfe & Davies, 2003). Strengthening the muscles involved in supporting the weight of the fetus and stabilizing the spine can help combat this low back pain (O'Connor et al., 2011; Wolfe & Davies, 2003). Even in

women with increased risk of back pain, lumbar muscle endurance and strength across abdominal, back, and leg exercises are shown to improve with RT (O'Connor et al., 2011). By targeting all major muscle groups with RT to improve full body strength, the cumulative strength in the core, back, and leg muscles make carrying the weight of the fetus more manageable (O'Connor et al., 2011; Wolfe & Davies, 2003). Additionally, joint laxity is also increased during pregnancy as a result of elevated levels of relaxin (Artal & O'Toole, 2003; Schoenfeld, 2011). Pregnant women have an increased predisposition for falling and consequent musculoskeletal injuries as a result of this joint instability in addition to their displaced centre of gravity, although this theory requires more evidence (Artal & O'Toole, 2003; Schoenfeld, 2011). It has been feared that RT would increase joint stress and the heavy weights would overload the joints, consequently increasing risk of injury (Artal & O'Toole, 2003). However, with low-to-moderate intensity RT aimed safely for pregnant women, RT can strengthen connective tissue, including muscles, bones, and ligaments, in turn increasing joint stability, which can elicit a protective mechanism against risk of injury during pregnancy (Fleck & Falkel, 1986).

Collectively, increased functional capacity and better management of pregnancy-related pains through improved physical strength and psychological state wholistically facilitates a healthier pregnancy and can significantly improve a woman's quality of life during pregnancy (Barakat et al., 2011).

### **Labour and Delivery**

Labour and delivery require a great deal of strength and endurance, and poor health and fitness can lead to a difficult labour

and/or various complications with delivery (Perales et al., 2016). A long labour puts increased strain on the cardiovascular system, heightening the risk for cardiovascular complications (Perales et al., 2016). The strength achieved from RT during pregnancy can facilitate and shorten the labour process and allow for an easier recovery afterwards (Wolfe & Davies, 2003). For instance, a study by Hall and Kaufmann (1987) demonstrated that RT has significant effects on multiple measures of labour, particularly reduced incidence of a caesarean section and shorter hospitalizations as a result of less complications. Similarly, a more recent randomized controlled trial found that light RT throughout pregnancy is correlated with a lower percentage of both caesarean section and instrumental deliveries (Barakat et al., 2012). RT can also be particularly promising for overweight women with gestational diabetes mellitus. Often maternal overweight and gestational diabetes mellitus can cause macrosomia in the newborn (Barakat, Lucia, & Ruiz, 2009a; Brankston et al., 2004). However, in a study by Barakat et al. (2009a), RT was shown to not only attenuate this correlation, but also reduce the need for insulin therapy in the mother; this latter observation replicated earlier findings from both Brankston et al. (2004) and de Barros et al. (2010). However, research on this area is still quite limited. Many of the studies on this topic so far have focused on disproving the theory that RT can adversely affect pregnancy outcomes. While it has been shown that light to moderate RT does not cause adverse outcomes (Olson et al., 2009), more research is needed to fully explore the effects that RT has on pregnancy and the labour process.

### **Adherence and RT Prescription**

Adherence is crucial for any exercise program to be effective. For pregnant women who may be unmotivated to exercise due to lack of time, resources, or energy, RT can be a promising option (Gaston & Cramp, 2011). Compared to aerobic exercise, RT typically involves less vigorous movement and caloric expenditure (Barakat, Lucia, & Ruiz, 2009a). The higher level of movement in aerobic exercise may be uncomfortable during pregnancy with the weight of the fetus and the displaced centre of gravity, so RT may be a more appealing option for many (Brankston et al., 2004). For a light-to-medium intensity RT session, an individual can often easily complete their workout at home by using bodyweight or bands/tubes (Pujol et al., 2007), significantly improving convenience and accessibility which may increase exercise adherence. Furthermore, RT exercises have been observed to be the third most popular type of leisure activity (after walking and swimming) among pregnant women (Evenson et al., 2004), and so further research is undoubtedly warranted to create the most effective and safe RT program catered to pregnant women. The safety of RT in pregnant women has often been of concern among health care providers, with fear that high loads, improper breathing techniques, and various positions may pose danger to the mother and/or the fetus (Wolfe & Davies, 2003; O'Connor et al., 2011). However, in pregnant women the ultimate goal should not be maximal strength but rather building strength slowly and safely (Pujol et al., 2007; Schoenfeld, 2011). RT should be adjusted accordingly for this special population group, focusing on light weights and high reps (Schoenfeld, 2011). A

carefully supervised program with proper instruction of technique and special considerations is key, and can significantly reduce the incidence of injury (O'Connor et al., 2011). Future research on RT should focus on how pregnant women can safely engage in RT to maximize benefits.

### **Conclusions**

The increased musculoskeletal fitness, improved functional capacity, and mental wellbeing, and appeal makes RT very promising for pregnant women if done safely. Unfortunately, debates about RT during pregnancy still exist. This controversy may relate to discrepancies in exercise design and methodology, making it difficult to draw valid comparisons and conclusions leaving many gaps and ambiguities still to be addressed (Barakat et al., 2009a). Accordingly, more research is needed to thoroughly explore the promising benefits RT can impart for pregnant women as well as its efficacy and safety to establish detailed RT guidelines for pregnant women. Further research is required that focus on how exercise can make pregnancy flourish rather than focusing on how exercise can only prevent complications.

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### **Authors' Qualifications**

The authors' qualifications are as follows: Jasmine Deol, BSc, MSc candidate,

Darren E. R. Warburton MSc, PhD, HFFC-CEP.

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