



## The influences of sedentary behaviour versus physical activity on cardiovascular health in pregnancy

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### Summary

This article identifies that physical inactivity and excessive sedentary behaviour time are two independent cardiovascular risk factors for women during pregnancy.

Possible mechanisms for hypertensive disorders are explained.

Further exploration of the mechanism are required prior to the development of specific guidelines for women during pregnancy.

### Background

Pregnancy represents an important period during which a woman's lifelong cardiovascular disease risk can be estimated.<sup>1</sup> Dysregulation within the cardiovascular system during pregnancy can result in transient cardiovascular diseases. The hypertensive disorders of pregnancy, in particular, represent the leading cause of maternal-fetal death and disease in North America.<sup>2</sup> However, few strategies exist to prevent the development of these and other cardiovascular disorders during pregnancy.

Exercise decreases cardiovascular disease risk across various populations.<sup>3</sup> A recent meta-analysis suggests that physically active women are less likely to develop transient cardiovascular diseases during pregnancy.<sup>4</sup> However, relatively little attention has been paid to the effect of sedentary behaviour on cardiovascular health during pregnancy. Therefore, the purpose of this article is to review the literature concerning the effects of physical activity and sedentary behaviour on cardiovascular disease risk during pregnancy.

### Physical Activity and Cardiovascular Health

The profound effects of physical activity on cardiovascular health have been well established.<sup>5</sup> Engagement in physical activity throughout pregnancy reduces maternal excessive weight gain and improves fetal outcomes.<sup>6</sup> Alongside data indicating physical activity is effective at preventing cardiovascular complications during pregnancy,<sup>4</sup> this provides strong support for the recommendation of exercise during pregnancy. Indeed, our work has helped to inform national and international guidelines promoting exercise in healthy pregnant women at low risk for developing transient cardiovascular disease.<sup>7,8,9</sup> Unfortunately, despite strong evidence for physical activity during pregnancy, recent data suggest that 85% of pregnant North American women fail to meet physical activity guidelines.<sup>10</sup>

### Sedentary Behaviour vs Physical Activity

Sedentary behaviour, defined as any waking behaviour in a seated or reclined position characterized by an energy expenditure of less than 1.5 METs,<sup>11</sup> has a dose-response relationship with cardiovascular disease mortality.<sup>12</sup> On the other hand, the engagement in physical activity that falls between the classifications of sedentary behaviour and moderate-intensity physical activity (termed "lifestyle activities")

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is associated with a reduced risk of cardiovascular disease, even after adjusting for moderate-to-vigorous physical activity levels.<sup>13,14,15</sup> These data underscore the importance of the separate consideration of sedentary behaviour from physical activity and the personal factors which may lead to it.

## Sedentary Behaviour and Pregnancy

Preliminary reports indicate that pregnancy is associated with an increase in sedentary behaviour with 60% of the day being spent in sedentary behaviour.<sup>10</sup> The amount of time in sedentary behaviour increases over the course of the pregnancy.<sup>16</sup>



Sedentary behaviour during pregnancy, independent of physical activity, has been associated with increases in biological markers of cardiovascular disease risk (e.g., blood lipids, circulating glucose).<sup>17</sup> To justify a prescription to reduce sedentary behaviour time, an understanding of the physiological mechanisms which contribute to cardiovascular disease is needed. Currently, the effects of objectively measured sedentary behaviour on cardiovascular health are largely undescribed.

The impact of sedentary behaviour on vascular health during pregnancy has yet to be examined. Currently, there is a lack of information on this subject in the adult population in general. Therefore, a current hypothesis undergoing investigation in our laboratory is that sedentary behaviour negatively affects blood vessel function in pregnant women. This abnormal function encourages the development of heightened blood pressure and may encourage the development of hypertensive disorders during pregnancy. Indeed, preliminary data collected in our laboratory suggest that sedentary behaviour is associated with a stiffening of arteries in pregnant women, as well as higher blood pressure.

## Next Steps

The separate consideration of sedentary behaviour from physical activity has important practical applications, as interventions designed to reduce sedentary behaviour may have an independent (and potentially additive) influence on chronic disease risk. Our preliminary data suggest that physical activity and sedentary behaviour may independently affect different aspects within the cardiovascular system. The contribution of both sedentary behaviour and physical activity on the maintenance of cardiovascular health merit further investigation.

## Key Terms

**Sedentary behaviour** is any waking behaviour engaged in a sitting or reclined position characterized by an energy expenditure of less than 1.5 METs (Metabolic Equivalent of Task).<sup>11</sup>

**Hypertensive disorders of pregnancy** (gestational hypertension and preeclampsia) are defined by the new onset of high blood pressure (systolic blood pressure  $\geq 140$  mmHg and/or diastolic blood pressure  $\geq 90$  mmHg on two occasions separated at least 4 hours) after 20 weeks' gestation. Preeclampsia is further defined by the presence of proteinuria ( $\geq 0.3$ g/day of protein in a 24-hour urine collection, or protein/creatinine ratio of  $\geq 0.3$  in a random urine sample).

## About the Authors



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