

## Introduction

Health Professionals are becoming more aware of the importance of physical activity in order to live a healthier life. There should be no exception for pregnant women, over the years health care providers have struggled with the guidelines on what the precise recommended maternal exercises and activities a women should be doing. Guidelines in Canada, the United Kingdom, the United States, and elsewhere now recommend that physical activity be incorporated during pregnancy as long as no contraindications are presents and that minor modifications are made (Currie, Woolcott, Fell, Armson, Dodds, 2013, p.1823). The American College of Obstetricians and Gynecologists (ACOG) recommend at least 30 minutes of moderate leisure-time physical activity on most days of the week (Mudd, Pivarnik, Holzman, Paneth, Pfeiffer, Chung, 2012, p.1168). These guidelines are set to keep the mother at a healthy gestational weight without factoring in the potential positive exercise could have on their offspring. Approximately 40 % of normal weight women gain more than the recommended amount during pregnancy, increasing the risk of obesity in their offspring (Phelan, hart, Phipps, Abrams, Schaffner, Adams, Wing, 2011, p. 1).

Previous studies have investigated the association between maternal exercise and birthweight, these studies often focused on prepregnancy factors that may lead to birth weight as well. For example, body mass index (BMI) is commonly used to distinguish your body weight category, BMI is often seen as an association for birth weight. The American College of Obstetricians and Gynecologists stated “we assume that prepregnancy BMI, to a certain extent, both determines the degree of recreational physical activity during pregnancy and has a direct association on fetal growth” (Fleten, Stigum, Magnus, Nystad, 2010, p. 331). Multiple studies have overlooked the possible correlation between exercise and its effects when implemented at specific terms in the

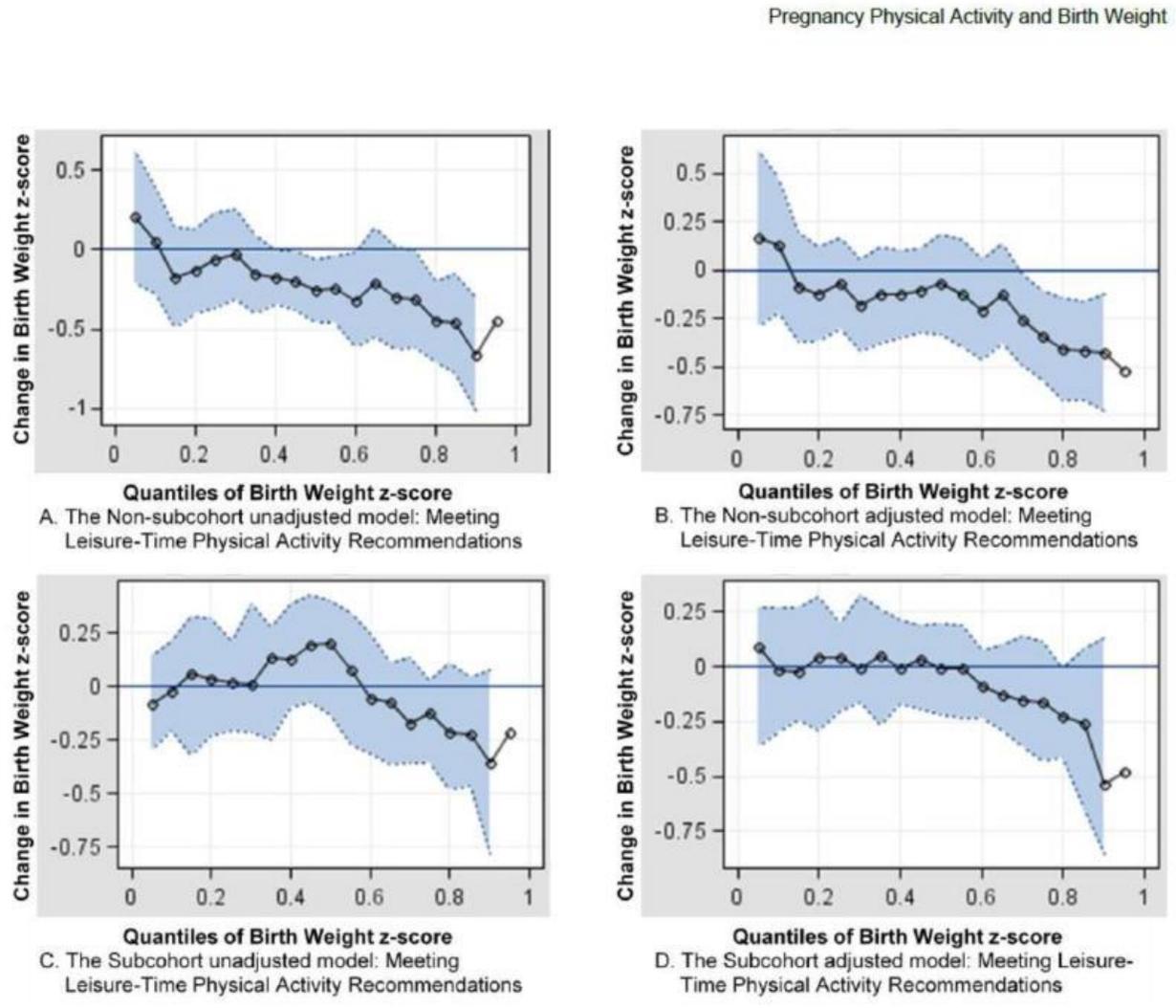
pregnancy. The purpose of our study is to test the effects of exercising in the first half of pregnancy on birthweight. We hypothesize that implementing a moderate level exercise routine for pregnant women to follow most days a week (3-4 days) will have a direct effect on the offspring fetal growth in the first half of gestational growth resulting in a lower birth weight.

### Review of the Literature

When birth weight exceeds 4,000 g, both the mother and the newborn are at greater risk of morbidity (Owe, Nystad, Bo, 2009, p.770). The goal of this study is to find evidence proving that exercise in the early half of pregnancy will reduce macrosomia in newborns. We also hope to show exercise can reduce the risk of multiple birth complications that can cause death such as, caesarean delivery, shoulder dystocia, postpartum hemorrhage, and perineal lacerations.

A study in 2012 studied called the “Pregnancy Outcomes and Community Health (POUCH) that studied the effects of leisure-time physical activity across the entire birth weight distribution (Mudd, et al., 2012, p.1168). The researchers separated their participants into two cohorts the subcohort consisted of women who delivered preterm (<37 weeks), and the non-subcohort consisted of the other women in the study but did not deliver pre term. The graph below shows the associates of meeting leisure-time physical activity (LTPA) recommendations (>150min/wk) during pregnancy and birth weight z-score among nonsubcohort (plots A and B) and subcohort (plots C and D) participants across quantiles. Plot B for the nonsubcohort is adjusted for gestational weight gain, maternal height, parity (nulliparous/parous), maternal occupational level (high/low), maternal age at delivery, smoking during pregnancy (yes/no), and years of recall. Plot D for the subcohort is adjusted for race, gestational weight gain, maternal height, parity, education, smoking during pregnancy, and years of recall. Their results indicated that

participating in LTPA during pregnancy at or above recommended levels may lower the risk for delivering a large at gestational age baby.



Mudd, et al, 2012, p. 1174

A huge limitations this study had was lack of consistency between the two cohorts. The nonsubcohort were sent a single mailing which they were to complete and then there was no further contact with the women, whereas the subcohort were sent the same mailing; however, phone contact and additional mailings were sent. They also did not factor the same factors in the adjusted graph which may have altered results. Information on LTPA was collected by surveys

and recalled 3-9 years by participants thus recall bias may have been a factor in results. With such a large recall period it raises questions on how reliable and truthful the participant's mail in surveys may have been. In order for the new study to have the most success we will mail out surveys as soon as possible to women who have just conceived and are in the earliest stages of pregnancy. By doing so we hope to avoid problems with recall like this study had shown. As well we will follow up with our participants and ask the same questions to all groups or cohorts involved to ensure that all results can be assessed and factored into the results of the entire study.

### Testing

In this study we will recruit women from the age 22-35 in the United States who have been seeking medical care on trying to conceive by postal invitation. It would be most beneficial to the study to have contact with the women while trying to conceive to start implementing exercise as early as possible in the first trimester. We will have these women incorporate exercise into their daily routine most days of the week (3-4 days/week), these exercises include but are not limited to, walking (brisk), running (jogging), bicycling, aerobics classes, dancing fitness classes, swimming, and others.

This study will consist of three groups; group 1, will implement moderate level exercise activities depending on their current physical activity level as soon as 1 week and continue to week 13. Group two, who will begin moderate exercise at week 13 and continue exercise routines until week 30, and Group 3 will be our control they will not be partaking in exercise other than daily living activities.

Questionnaires will be sent by mail to the participating women at 3 weeks, 13 weeks, and 30 weeks gestation. The questionnaires will ask the participants a variety of questions including, lifestyle

factors/behaviors, health aspects, pre-pregnancy BMI, socioeconomic status, previous diseases, and medications both before and during first part of pregnancy. Along with those questions the women are asked to record and rate their exercise on each questionnaire sent, choosing their exercises to be most light, moderate, or intense. Also, recording how frequent they exercise as never, one to three times a month, once a week, twice a week, or three or more times a week along with questions on how the participants feel about the exercises whether they like or dislike the activities. Reminders will be sent out to participants that did not return questionnaires after 2 weeks.

The groups participating in exercise it is possible for women to no longer wish to continue with the study because they dislike the exercises or that they feel they have lack of time as well as, they may feel too much stress from the activities. With doing a study on pregnancy and offspring we must factor in the potential losses and terminations of pregnancy during the study. In order for our study to be successful we would like to see most (75%) of the women in the study stick to a 3 or more times a week exercise program to ensure the results are as accurate as possible.

### Results

We estimate the direct association between exercise in the first half of pregnancy and birthweight. It is expected that group 3, the control group will have no difference in their offspring's birthweight. Because group 3 did not exercise or change their habits in any way, with that being said they should show no correlation in the study relating to birthweight. We expect to see a bigger impact on birthweight from groups 1 and 2, who partook in moderate exercise most days on the week. It is expected that groups 1 and 2 will have lower birthweights. Within groups 1 and 2 who had exercised we expect to see fewer macrosomia and large at gestational age (LGA) babies among the groups exercising. We will compare the result birth weights of

group 1 and group 2 to specify how long the mother should partake in exercise to have the best results.

#### Self- Critique

Any experiment involving human and their offspring is going to be time consuming and highly expensive. When trying to recruit these women we have to spend money getting the information and invitations for the study out and we will have to offer a stipend to the mothers. If the results are to be as expected, we hope to improve maternal health both for the mother and child. In order to receive proper results we have to have the subjects return the questionnaire and trust they were filled in truthfully. We may run into some errors due to recall, filling out a questionnaire on what you have done over several weeks can easily leave gaps of uncertainty. Mail in questionnaires may be lost or misplaced by the subjects. Our subjects will be doing a questionnaire as late as 30 weeks in their pregnancy, with that being said they may not respond due to the stress of the pregnancy. Despite limitations our study adds to existing literature significantly.