

# Canadian Journal of Diabetes

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ABSTRACT BOOK

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# The 2<sup>nd</sup> National Obesity Summit

Montreal, Quebec  
April 28<sup>th</sup> – May 1<sup>st</sup>, 2011



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## POSTER PRESENTATIONS

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**Influence of a high birth weight on physical activity, sedentary behaviour, and obesity in six- to 15-year-olds**V. Carson<sup>1</sup> and I. Janssen<sup>1,2</sup><sup>1</sup>School of Kinesiology and Health Studies, Queen's University, Kingston, Ontario, Canada; <sup>2</sup>Department of Community Health and Epidemiology, Queen's University, Kingston, Ontario, Canada

**Introduction:** Compared to babies with a healthy birth weight, babies with a high birth weight tend to have lower lean body mass as a percent of body weight. The reduced lean body mass may negatively impact physical activity levels, increasing the risk for obesity later in life. Our objective was to examine whether birth weight predicted moderate-to-vigorous physical activity (MVPA), sedentary behaviour, and obesity in childhood.

**Methods:** Results are based on 1,889 children aged six to 15 years from the 2003-06 U.S. National Health and Nutrition Examination Survey. Birth weight was obtained by parental recall and 500 g birth weight categories ranging from  $\leq 2500$  to  $\geq 4000$  g were created. MVPA and sedentary behaviour were measured using accelerometers. Height and weight were measured and body mass index (BMI) z-scores were calculated based on Centers for Disease Control and Prevention (CDC) growth charts. A series of linear regression models were used to examine associations while adjusting for demographic and lifestyle variables.

**Results:** Birth weight was not significantly associated with MVPA or sedentary behaviour at age six to 15 ( $p > 0.05$ ). Children in the 3500-3999 g and  $\geq 4000$  g birth weight groups had a significantly higher BMI z-score ( $P < 0.01$ ) at age six to 15, compared to children with a healthy birth weight (3000-3499 g). MVPA and sedentary behaviour did not attenuate the relationship between birth weight and obesity.

**Conclusion:** These findings suggest that the relationship between high birth weight and childhood obesity is not mediated by MVPA or sedentary behaviour.

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**Lifestyle-based management of obesity-related and familial hyperlipidemias in children and adolescents enhanced by peer education**

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**Introduction:** Traditionally, new patients referred to the Lipid Clinic were expected to attend a didactic heart health class after their initial clinic assessment. This approach faced challenges of low attendance along with minimal success regarding lifestyle and lipid profile changes.

**Objective:** To evaluate a collaborative program at the time of initial assessment; combining hyperlipidemia education, assessment, and peer education together to promote healthy lifestyle, foster weight loss, and improve lipid profiles.

**Method:** We sought to compare the traditional didactic versus the collaborative approach regarding changes in anthropometric measurements, blood pressure, screen time, physical activity, and nutritional assessment between initial and the follow-up assessment.

**Results:** Seventy-five patients enrolled (37 collaborative/38 didactic). No differences between groups at baseline were noted other than physical activity level (median 3.6 hours/week didactic vs. 2.3 hours/week collaborative,  $p = 0.06$ ). For the group overall, significant decreases in total cholesterol (baseline average  $5.79 \pm 1.65$  mmol/L vs. follow-up  $5.52 \pm 1.39$  mmol/L,  $p = 0.02$ ) and LDL-C (baseline  $3.96 \pm 1.63$  mmol/L vs. follow-up  $3.58 \pm 1.38$  mmol/L,  $p = 0.01$ ) were noted, with no significant difference in the change between the two groups. Patients

in the collaborative group had greater reduction in weight percentile ( $+1.8\%$  didactic vs.  $-8.9\%$  collaborative,  $p = 0.03$ ), reduction in screen time ( $+1.3$  hours/week didactic vs.  $-7.0$  hours/week collaborative,  $p = 0.05$ ), increase in physical activity ( $+2.0$  hours/week didactic vs.  $+4.0$  hours/week collaborative,  $p = 0.05$ ), and improvement in nutrition scores ( $+1.0/10$  didactic vs.  $+1.7/10$  collaborative,  $p = 0.12$ ).

**Conclusions:** A collaborative approach incorporating interactive peer education results in greater lifestyle change for children and adolescents with obesity-related and familial hyperlipidemias.

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**Are children who have had early complete repair of congenital heart disease at increased risk of obesity?**

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**Background:** As a group, patients with congenital heart disease (CHD) have been shown to have an increased risk of obesity, although the risk specific to those with early complete repair versus those with complex palliations is unknown.

**Methods:** Anthropomorphic growth in patients with transposition of the great arteries (TGA) who had complete neonatal repair was compared to a cohort of single ventricle patients (complex chronic heart disease).

**Results:** Two hundred and seven patients with TGA who underwent arterial switch operation at a median of eight days of life were included. Despite having lower-than-expected weight percentile in the neonatal period, median weight percentile increased on average by  $3.0\% \pm 0.3\%$ /year ( $p < 0.001$ ). Proportion with weight percentile  $> 85\%$  percentile increased over time (5%-surgery, 11%-2 years, 14%-5 years and 25%-10 years) at a rate of  $2.0\% \pm 0.04\%$ /year ( $p < 0.001$ ), which is a similar pattern to that for children without CHD. In a separate cohort of 126 single ventricle patients followed for up to 16 years after Fontan palliation, we found that 10 years after Fontan, average weight percentile was only 38% with an average increase of 1.8%/year ( $p < 0.001$  vs. normal and vs. TGA). Percentage of overweight children in this group remained marginal at  $< 5\%$ .

**Conclusions:** Patients with CHD deemed repaired may be at increased risk of obesity, despite expected normal exercise tolerance and functional capacity. Rehabilitation strategies aimed at healthy lifestyle and activity promotion for children with chronic disease is required, regardless of the severity of that chronic disease.

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**Exercise with nutrition reduces weight retention regardless of intensity in the postpartum period**M.H. Davenport, I. Giroux, M. Sopper, and M.F. Mottola  
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**Introduction:** Fourteen per cent of pregnant women retain at least 5.0 kg one year after delivery. Women who are unable to return to a healthy weight by six months postpartum are at increased risk for chronic disease (CD; including obesity, metabolic syndrome, and cardiovascular disease). In a prospective, randomized intervention study, we examined the impact of exercise intensity on CD risk factors in postpartum. We hypothesized that women receiving an intervention targeting healthy weight loss would have improved CD risk factors compared to women not receiving the intervention. Further, we hypothesized that nutrition control and moderate-intensity exercise would have the greatest improvement in CD risk factors versus low-intensity exercise.

**Methods:** Women were randomly assigned to a controlled nutrition

health promotion interventions aimed at preschool-aged children, as well as the influence of several moderator variables, will be presented and discussed.

**Keywords:** meta-analysis, health promotion intervention, obesity, physical activity, preschooler.

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### School-based obesity and related cardiovascular disease prevention intervention effect on weight and academic performance: Three-year results

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**Introduction:** Childhood obesity and related health consequences continue to be major clinical and public health issues. Healthier Options for Public Schoolchildren was an elementary school-based obesity intervention with nutrition and physical activity components. The goal was to improve weight, blood pressure, and academic achievement using replicable strategies.

**Methods:** The study was implemented in August 2004, and included approximately 3,200 children (48% Hispanic) attending four schools in Florida. Demographic, anthropometric (height, weight, body mass index), and academic (Florida Comprehensive Assessment Test [FCAT]) were collected. The intervention included modified dietary offerings, nutrition/lifestyle educational curricula, school gardens, and other wellness projects. We hypothesized that the intervention would improve weight and FCAT scores in intervention participants.

**Results:** Repeated measures analysis showed over a three-year period intervention Z-weight scores decreased significantly among boys (0.81 to 0.71,  $p < 0.001$ ), with a trend among girls (0.56 to 0.51,  $p < 0.07$ ). Within ethnicity, a significant decrease in Z-weight score for Hispanics (0.66 to 0.59  $p < 0.01$ ) and whites (0.62 to 0.54,  $p < 0.02$ ) was shown. FCAT math scores improved significantly among girls (308 to 319,  $p < 0.001$ ), and reading scores improved significantly among boys (299 to 307,  $p < 0.01$ ). Within ethnicity, Hispanics significantly improved both their FCAT math (298 to 309,  $p < 0.001$ ) and reading (286 to 301,  $p < 0.0001$ ) scores.

**Conclusions:** School-based obesity interventions using both nutrition and physical activity components show promise in improving health and academic performance in elementary-aged children, among Hispanics in particular.

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### Fun innovative time breaks: Attitudes of elementary school students toward physical activity in the classroom

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**Introduction:** Fun Innovation Time Breaks (F.I.T. Breaks) is a classroom-based fitness program that was introduced into 22 elementary schools in a large, Western Canadian city.

**Methods:** This study examined student attitudes toward physical activity and the F.I.T. Breaks program. Additionally, the effect of teacher training and student gender on those attitudes was evaluated. Teachers were divided into two F.I.T. Breaks training groups: written/electronic resources only and written/electronic resources plus group training. Teachers administered attitude questionnaires to their students ( $n=639$ ) both before and after the four-week program.

**Results:** Students reported that they thought F.I.T. Breaks were fun (76%) and that they liked doing F.I.T. Breaks in class (74%). Statistical analyses showed that girls and boys scored differently on three of four factors generated from the questionnaires. Students whose teachers received group training showed higher scores on one of these factors and were more positive about F.I.T. Breaks, compared with students whose teachers did not receive training.

**Conclusions:** When teachers plan and train in groups, student enthusiasm may be increased. Moreover, evidence suggests that attitude changes can influence behaviour. It is hoped that introducing physical activity within traditional classroom environments can lead to healthier lifestyle choices.

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### Healthy Buddies Manitoba: A cluster randomized controlled effectiveness trial of a peer-led healthy living lesson plan on unhealthy weight gain and physical activity in early years students

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**Purpose and hypothesis:** The purpose of this study was to assess the effectiveness of a novel peer-led lesson plan called Healthy Buddies™ ([www.healthybuddies.ca](http://www.healthybuddies.ca)) on unhealthy weight gain and its determinants in early years students. We hypothesized that the Healthy Buddies™ lesson plans would attenuate weight gain and increase physical activity in youth participating in the program, compared to standard curriculum.

**Study design and methods:** This was a cluster, randomized, controlled effectiveness trial of Healthy Buddies™ in 20 early years schools in the province of Manitoba. The intervention schools received instruction and materials required to deliver 21 healthy living lesson plans over 24 weeks.

**Outcome measures:** The primary outcome measures were the change in body mass index (BMI) z-score and waist circumference. Secondary outcome measures were daily step counts, self-efficacy, healthy living knowledge, and self-reported dietary intake.

**Results:** A total of 584 students (8.6 ± 1.8 yrs, 48% girls) completed the study. Among the completers, 36% were overweight or obese and 11% achieved the recommended 13,500 steps/day. In comparison to students in control schools, students in the intervention schools displayed a significant decline in waist circumference (-0.38 ± 3.9 cm vs. +1.2 ± 4.0 cm;  $p < 0.001$ ), and a non-statistically significant decline in BMI Z score (-0.02 vs. +0.13,  $p = 0.2$ ). No differences were observed in daily step counts or fitness, however, knowledge of healthy living, self-efficacy and self-reported dietary intake were all significantly improved in those who received the intervention ( $p < 0.001$ ). Subgroup analyses revealed that the intervention was effective at reducing waist circumference in rural schools and First Nations communities ( $p < 0.05$ ).

**Conclusions:** The data suggest that the Healthy Buddies™ lesson plan is an effective method for attenuating weight gain—in particular central weight gain—among early years students, secondary to improvements in diet quality, self efficacy, and knowledge of healthy living.

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medium (between -4.8 and 2.5 kg), and small (between -2.4 and 3.4 kg) weight losers, respectively vary of - 14.47, - 17.24, and 0.8 kcal for a 24-hour period after the weight lost. The Doucet's equation predicted a change of - 58.66, -29.84, and 0.74 kcal per 24 hours.

**Conclusions:** These results suggest that the apparent resistance to lose fat in small losers is not explained by changes in thermogenic activity. In addition, the magnitude of weight lost in medium and large losers does not seem to be sufficient to observe a substantial adaptive thermogenic effect.

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### Characterisation of angiotensin II type II receptor implication during adipogenesis

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Excess body fat is associated with abnormalities of the adipose tissue metabolism, and is also associated with many comorbidities such as inappropriate cytokine secretion and cardiovascular diseases. Several studies documented the role of the renin-angiotensin system (RAS) in adipocyte physiology. Angiotensin II (Ang II) mediates its action through two types of receptors, the type 1 (AT1R) and type 2 (AT2R), which are characterized by their opposite actions. RAS modulates adipocyte differentiation, and treatment with AT1R blockers (ARBs) is known to improve insulin sensitivity. However, this effect could be indirectly attributable to the activation of the AT2R by Ang II. We thus hypothesize that AT2R is important to modulate adipogenesis. Therefore, we studied the effect of M24, a new selective agonist of AT2R, as well as AT2R knockdown, by shRNA lentiviral particles, on 3T3-L1 adipocyte differentiation. Our preliminary results (RT-PCR and Western blotting) indicate that AT1R and AT2R are both present in the 3T3-L1 cells, and that both receptors protein and mRNA levels decrease and increase, respectively, with time. Also, the protein levels of aP2 and PPAR $\gamma$ , two adipocyte-differentiation markers, are increased during adipogenesis, and M24 treatment increases AT2R expression. Moreover, cells infected with shRNAs against AT2R are unable to differentiate: they exhibit a spindle-like morphology instead of polygonal round-up appearance, and cannot accumulate lipids or express mature adipocyte markers. These results suggest that AT2R has an important role in adipocytes differentiation. Additional work is needed to determine the role of AT2R activation on lipid accumulation and in preserving insulin sensitivity. Work funded by Canadian Diabetes Association.

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### Preventive Weight Management: Evidence-informed program principles

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**Introduction:** Obesity is a significant contributor to many chronic diseases, which can be a financial drain on the health care system. Primary care, which is often the first point of contact into the health care system, could make an impact on obesity by actively promoting a healthy lifestyle approach for its patients.

**Methods:** A two-fold assessment of how the clinics participating in the Chinook Primary Care Network were dealing with patients who are overweight or obese was conducted. 1) A qualitative evaluation of the current weight-management programs (survey data) was performed throughout the clinics; 2) A clinical indicator was developed to assess if the body mass index (BMI) and waist circumference were measured on all patients on the physician's panel (over the age of 18 years).

**Results:** The survey data revealed a variety of weight-loss programs throughout the primary care network, ranging from no established

program to one very comprehensive measurement-based curriculum, which is supported by a multi-disciplinary team. In contrast, the weight-loss clinic indicator results were less encouraging; a small proportion of the physician's patients over the age of 18 had their BMI and waist circumference measured.

**Conclusion:** The Chinook Primary Care Network has started assessing the programs available for weight loss and determining how many patients on a physician's panel have their BMI and waist circumference measured. The future direction of the primary care network will be discussed.

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### The pursuit of physical literacy: Can exergaming develop fundamental movement skills like balance?

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**Introduction:** Given the popularity of video games among young people, the concept of blending technology and physical activity will likely continue to build momentum. Exergaming is a fun, social, and inclusive way for children to be active. It also holds promise as a tool for the development of fundamental movement skills in the pursuit of physical literacy. The construct of balance is an important foundational ability that children can build upon for their success and confidence in progressively more difficult physical skills.

**Methods:** A multi-factor, multi-variable repeated measures design with convenience sampling was chosen for this research. Public education students (n=130) in the third and fourth grade participated in two parallel research studies as part of their regularly scheduled daily physical education classes. The six-week intervention used the HUR BT4 balance platform to measure the pre/post-test variance in centre of pressure of each subject. All research was conducted with the approval of the University of Calgary's Office of Medical Bioethics.

**Results:** Subjects who participated in the exergaming intervention using only the Wii Fit Plus three days/week, improved their postural stability by 25% (sig. <.001). Daily exergaming with a variety of games such as iDance, XR Board, and Lightspace for six weeks resulted in a 29% improvement (sig. <.001) in postural stability. The control group had no significant difference in their postural stability.

**Conclusions:** Certain exergames require a player to utilize fundamental movement skills and may be used as a tool to develop balance in pre-adolescent children.

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### Promising weight-management strategies for program development in interprofessional primary care: An augmented scoping review

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**Introduction:** Interdisciplinary services are emerging as the preferred model for primary care (PC) in Canada, offering new opportunities to improve prevention services including obesity management. The present study was undertaken as part of a larger project, to inform the development of an obesity-services planning framework. A scoping review was conducted to identify promising new approaches in inter-professional primary care (IP-PC) settings.

**Methods:** We searched PubMed, CINAHL, CENTRAL, and SCI-Expanded. Search strings used terms from three concepts: obesity/overweight, non-drug treatments, and PC setting. We included primary

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hour, for five hours. Data from the remaining in-laboratory and out-of-laboratory sessions, where foods were chosen from the menu at the start of the day and packed into containers for the subjects to bring home, are currently being collected.

**Results:** As expected, there were no significant differences in total energy (1546.0±843.6, 1760.6±688.7, 1751.5±715.2; p=NS), carbohydrate (991.5±480.2, 1111.1±495.7, 1101.5±502.7; p=NS), lipid (383.1±319.5, 453.2±209.5, 442.3±211.0; p=NS), and protein (216.4±119.9, 230.5±99.5, 241.7±100.5; p=NS) intake between the three in-laboratory sessions (n=9). There were significant intraclass correlations (r) for total energy (r=0.83, p<0.001), carbohydrate (r=0.86, p<0.001), lipid (r=0.52, p<0.01), and protein (r=0.82, p<0.01) intake. The average within-subject coefficient of variation (CVws) was measured at 17.6% for total energy intake.

**Conclusions:** Results from the preliminary study demonstrate a good reproducibility of energy and macronutrient intake inside of the laboratory, given the small number of subjects. These results suggest that this food menu is a promising tool for experimental assessment of energy and macronutrient intake.

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### Using virtual reality technology and biometric interfaces in obesity reduction

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There has been much said in the literature relating to video games, computer use, and obesity in people generally. There are two sides to this work: one tells a story of kinetic interfaces (those involving motion), and computer games that involve physical activity encouraging general fitness and obesity reduction. There is a degree of motivation associated with game play and basic competition that results in subjects spending more time doing the activity. This results in higher fitness levels in the long term. Many students dread formal physical education as they lack the skills, have poor physical fitness, and/or are just not interested. Alternatively, students are enthusiastic about video games, which tend to require skills that they can improve as the game is played. There are games that exist now that demand a high degree of aerobic activity, and that are played using the multimedia facilities found on a Playstation 2. The best-studied computer game of this kind is Dance, Dance Revolution, in which participants attempt to dance according to a set of predefined steps and are graded for conformity to those steps. This has been assessed for use in weight loss and fitness improvement, for which it was not originally designed. We present a new dance game that attempts to maintain the player's heart rate in a given range by using heart rate monitors to control the tempo of the music in real time. This improves the effectiveness of the game in obesity reduction and fitness promotion.

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### The next generation birth cohort: Childhood outcomes of offspring of parents with early onset type 2 diabetes

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**Introduction:** The incidence of type 2 diabetes (T2D) in Manitoba First Nations children is 8.4-fold higher than the Canadian incidence. This population demonstrates multiple risk factors in prenatal and postnatal life. The Next Generation birth cohort includes children born to parents with T2D diagnosed before age 18. The risk of T2D and the relative contribution of risk factors are unknown.

**Methods:** Annual measurements of height and weight age 1-18 years. Annual fasting blood glucose (FBG) at age ≥7 years. HNF-1α G319S genotype at age seven.

**Results:** On December 1, 2010, 100/111 (90%) eligible offspring have been assessed. 13/100 (13%) are the offspring of fathers and 87/100 (87%) are offspring of mothers. Of those age ≥7 years, 40/52 (76%) have had a FBG, 11/40 (27%) have T2D, and 3/40 (7%) have impaired glucose tolerance (IGT). All 14 children were offspring of mothers. The average age of diagnosis of IGT or T2D was 11.1 years (range 6.7-20.1 years) with 7/14 (50%) diagnosed before age 10 years. All offspring with T2D have at least one copy of G319S. Of those children with at least one copy of G319S, 12/26 have T2D/IGT. The average BMI of children with T2D/IGT is 24.2 kg/m<sup>2</sup> (mean Z-score = 1.65), while the average BMI of the remaining cohort is 23.1 kg/m<sup>2</sup> (1.92). Offspring of fathers had an average BMI of 21.7 kg/m<sup>2</sup> (2.07) and offspring of mothers had an average BMI of 23.3 kg/m<sup>2</sup> (1.89).

**Conclusions:** The risk of T2D by age 20 years in this birth cohort is at least 27%. Overweight and obesity are modifiable risk factors for age of onset of diabetes. The high-risk genotype and exposure to pre-pregnancy T2D are non-modifiable risk factors. The detailed observation studies in this birth cohort will inform intervention and mechanistic studies.

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### Three-quarters of overweight and obese women are planning on exceeding the gestational weight gain recommendations

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**Introduction:** Despite the current obesity epidemic, studies show that the majority of pregnant women are gaining above the Institute of Medicine recommendations. Our objectives were to determine what pregnant women know and are being counselled about gestational weight gain (GWG), and risks of inappropriate gain.

**Methods:** This cross-sectional survey was performed using a piloted, self-administered questionnaire that was distributed at urban obstetric, midwifery, and family practice clinics providing prenatal care at academic centres. The study population included women attending prenatal care clinics with singletons, who had had at least one previous prenatal visit, and could read English.

**Results:** Three hundred and ten (310) women completed the survey, a 93% response rate at a median of 33 weeks. The mean age of respondents was 32.1 years and 44% were primiparous. Although 28% reported that their health care provider had made a recommendation about weight gain, only 11% reported that they were counselled to gain the correct amount of weight, while only 16% were counselled about the maternal risks of excess GWG. Many women were inadvertently planning to gain more than recommended by the IOM guidelines including 74% of overweight and obese women.

**Conclusions:** Three-quarters of overweight and obese women are planning on exceeding recommended GWG. A large majority of women are not receiving the counselling regarding weight gain and nutrition during pregnancy. The results of this study suggest that patient education can be improved especially for overweight and obese women.