An assessment of patient information channels and knowledge of physical activity and nutrition during pregnancy

Zach Ferraro MSc^{*†}, Jane Rutherford MSc^{*}, Erin J Keely MD[†], Lise Dubois PhD[§]
and Kristi B Adamo PhD^{*†**}

^{*}Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario Research Institute; [†]School of Human Kinetics, Faculty of Health Sciences, University of Ottawa; [‡]Departments of Medicine and Obstetrics/Gynecology, University of Ottawa, Ottawa Hospital; [§]Department of Epidemiology and Community Medicine; ^{**}Department of Pediatrics, Faculty of Medicine, University of Ottawa, Ottawa ON, Canada K1H 8L1

Summary

Background: Excessive weight gain during pregnancy increases the risk for obesity in mother and child. Healthy eating and physical activity may help prevent excessive gestational weight gain and minimize offspring risk of developing obesity, diabetes and cardiovascular disease. Our goal was to determine the information channels used by pregnant women to obtain information on nutrition and exercise.

Methods: We collected information about their knowledge of physical activity and nutrition during pregnancy and assessed their satisfaction with this information to identify factors that may be improved upon when designing a behavioural intervention. An anonymous, voluntary questionnaire was completed by 147 pregnant women to identify the proportion who are currently receiving information about exercise from their care provider.

Results: The primarily Caucasian sample (age: 30.9 ± 4.2 , weeks gestation: 21.4 ± 9.4) completed the survey. A total of 86% are willing to participate in a lifestyle intervention trial. Personal health and the health of their child were cited as top reasons for participation. Most women were not informed as to the importance of appropriate pregnancy-specific energy intake or made aware of their own personal healthy gestational weight gain targets. A total of 63% report receiving some form of information on physical activity during pregnancy. Of those who do not, almost all (93%) would like to receive this information from a care provider. Overall, 88% of women consider it safe to exercise when pregnant.

Discussion: Given their responses, nutrition and exercise information offered through a lifestyle intervention during pregnancy may increase healthy behaviours and warrants clinical investigation.

Keywords: obesity, pregnancy, physical activity, nutrition, intervention

INTRODUCTION

In recent years, overweight and obesity in women of reproductive age has emerged as a major public health concern affecting one in every two women.¹ Excessive adiposity during this critical period not only has negative consequences on maternal health, but also poses significant risk to the developing fetus (fetal growth and development).² Obesity at preconception (body mass index [BMI] ≥ 30) is a modifiable risk factor that, if left unattended, may lead to a progressive worsening of the obese state if excessive weight is gained during gestation and retained during the postpartum period.³ Maternal obesity is associated with a myriad of complications including infertility, recurrent miscarriage, spontaneous abortion, gestational diabetes, pre-eclampsia, risk of caesarean section, poor lactation/difficulties

breastfeeding, fetal macrosomia and neonatal death.⁴ Furthermore, obese children are more likely, than their lean counterparts, to remain obese or develop obesity as adults; perpetuating the vicious cycle of body weight dysregulation.^{5,6}

There is now an abundance of evidence available to suggest that maternal energy balance may alter fetal growth and development. Recently, Stuebe *et al.*⁷ reported, for the first time, a link between prepregnancy BMI, gestational weight gain and offspring obesity in adulthood. Their findings, along with those of Oken,² strongly suggest that prepregnancy weight and gestational weight gain if modified may reduce the developing child's risk of obesity.

In an attempt to ameliorate the negative effects of excess adiposity, it is now recommended that all overweight women of reproductive age receive counselling on the beneficial roles of diet and physical activity prior to pregnancy, during gestation and in the interconceptional period.⁸ The Institute of Medicine (IOM) echoed this recommendation by revising the gestational weight gain guidelines. Building on the previous 1990 publication, these new recommendations impose both a

Correspondence to: Kristi Adamo, Children's Hospital of Eastern Ontario Research Institute, 401 Smyth Road, Ottawa, ON, Canada K1H 8L1
Email: kadamo@cheo.on.ca

narrow range and an upper limit (5–9 kg) of weight gain for obese women (BMI ≥ 30).⁹ Furthermore, this report, in addition to others,^{10–12} highlights a need for interventions aimed at promoting a healthy diet and physical activity during pregnancy in an attempt to ensure women optimize gestational weight gain trajectories that balance the risks and benefits of weight change on maternal–fetal health.⁹ The need to encourage maternal weight gain targets that stay within the respective gestational weight gain intervals (based on prepregnancy BMI) through lifestyle interventions may provide an avenue by which maternal–fetal health can be optimized. A joint position statement from the Society of Obstetricians and Gynecologists of Canada and the Canadian Society for Exercise Physiology (SOGC/CSEP) supports this notion. The ‘exercise in pregnancy and the postpartum period’ clinical practice guideline recommends continuation of healthy active living during pregnancy in gravidas without contraindications to exercise.¹³ However, despite the academic literature supporting these behaviours there is a need for a greater understanding from the pregnant women’s perspective that identifies where they receive information, their receptiveness to physical activity and nutrition guidance from care providers and whether this content is considered helpful. Given the need for intervention research in the overweight population, the aim of our study was to assess patient knowledge of and determine the information channels used by women to obtain information on nutrition and exercise during pregnancy. Further, we wanted to evaluate their degree of satisfaction with the information they received in order to identify factors that may be improved upon when designing a behavioural intervention. To our knowledge, this is the first study of its kind designed to concurrently assess physical activity and nutrition information channels and satisfaction with these outlets in a pregnant population.

MATERIALS AND METHODS

All pregnant women, of any gestational age, presenting at clinic for obstetrical reasons were potential candidates for this study; those presenting with solely gynaecological problems were not invited to complete a survey. The clinic is affiliated with an academic medical centre (The Ottawa Hospital/University of Ottawa) and provides primary care to a medium-sized urban area in west Ottawa. The ultrasound clinic receptionist briefly informed patients about the study and asked for their participation. Women who expressed interest were directed to the study coordinator who then explained the consent process, the purpose of the survey and was available to clarify any study-related questions. Approximately 175 questionnaires were distributed to consenting pregnant adult women entering an obstetrics/gynaecology clinic affiliated with The Ottawa Hospital between November and December 2008. Twenty-five questionnaires were not returned to the drop box or were incomplete and voided by the participant. This project was approved by the Children’s Hospital of Eastern Ontario and the Ottawa Hospital research ethics board.

Procedures

Women were encouraged to complete the 31-item (~10 minute) self-administered questionnaire consisting mostly of closed-ended questions where participants could select from

multiple choices. This included, when appropriate, an ‘other’ category where respondents could input an open-ended response not captured within the listed choices. Participants completed the questionnaire while they waited for their appointment with their care provider; those who were unable to finish prior to being seen by their provider had the option to complete the survey following their appointment. This process continued until approximately 150 anonymous questionnaires were completed. To ensure confidentiality, participants returned completed questionnaires to the clinic receptionist or study coordinator who then put them in a closed drop box, kept under lock and key and delivered them to the primary investigator once all data were obtained. A targeted sample size of 150 completed surveys was selected to appropriately identify the proportion of women currently receiving information about exercise during pregnancy from their care provider. With 150 respondents, a proportion of 0.5 could be estimated to within $\pm 8\%$, 19 times out of 20. This describes a 95% confidence interval based on 50% prevalence, which provides a conservative estimate of precision when evaluating the women’s responses.

The questionnaire was designed to be used as a non-validated instrument to collect information about nutrition and exercise information channels and satisfaction with these outlets in a sample of pregnant women. Items were chosen following a review of the literature^{2,8–10} and consensus from our expert group consisting of a clinical methodologist, endocrinologist, clinical psychologist, exercise physiologist, paediatric scientist and dietician knowing that a validated tool for this specific population and purpose does not exist. A final version of the survey is available upon request from the Children’s Hospital of Eastern Ontario Research Institute’s Healthy Active Living and Obesity Research Group. Data were analysed using the SPSS software version 16.0.

RESULTS

The questionnaire was completed by 147 primarily Caucasian women (age: 30.9 ± 4.2 , weeks gestation: 21.4 ± 9.4). All demographic information obtained from consenting women is presented in Table 1. A total of 86.4% of women who completed the survey responded in favour of participating in a lifestyle intervention during pregnancy should a programme of this nature exist. Of those who would elect not to participate, the reasons included already living a healthy lifestyle, lack of time or disinterest. When asked to select from a list of sources from which they could choose more than one option, the 127 women who expressed an interest in a lifestyle intervention reported their motives for participation to include: for the health of their child (87%), their personal health (83%) and to learn more about exercise and nutrition (52%). Use of electronic communication (i.e. email) was reported as the preferential way to receive information about physical activity and nutrition during pregnancy with 56% of respondents choosing this from a list of sources from which they could choose more than one option. Others (40%) stated they would prefer this detailed information to come from an interactive in-person consultation from an exercise or nutrition specialist, while 33% preferred the more traditional avenue of directly receiving all pregnancy-specific advice from their practitioner.

Table 1 Subject demographics

N	147
Age (years) ($\pm$ SD)	30.9 (4.2)
Gestational age (weeks) ($\pm$ SD)	21.4 (9.4)
Number of children living at home (%)	
0	46.3
1	41.5
2	8.2
3 +	4
Parity (%) (n = 147)	
1	70.5
2	24.7
3 +	4.8
Education level (%) (n = 141)	
High school or less	7.1
Some college/university	7.8
Completed college/university	62.4
Obtained a graduate degree	15.6
Completed a professional programme	7.1
Marital status (%) (n = 141)	
Single	2.8
Married/common law	95.7
Other	1.4
Employment status (%) (n = 142)	
Full time	67.6
Part-time	10.6
Unemployed	7
Self-employed	4.2
Leave (sick or early maternity)	9.9
Ethnicity (%) (n = 144)	
White	78.5
Other	21.5
Willingness to participate (%) (n = 147)	
Yes	86.4
No	13.6

Diet and nutrition

Eighty-two per cent of the sample reported receiving information about healthy eating, diet and nutrition during the perinatal period, although nearly 20% of women did not receive any information of this nature during pregnancy. Of the 121 women who received dietary advice, the primary source of this information was from books, magazines and waiting room material, the Internet and their general practitioner (see Table 2). From these sources the prominent topics of discussion include vitamin/mineral requirements, the importance of balanced macronutrient consumption, knowing which foods to avoid, eating for a healthy pregnancy weight gain and appropriate energy (kcal) intake during pregnancy (see Table 2). The majority (43%) of women who received dietary information from any source found it very useful, while only 22% and 26% reported the information to be extremely and somewhat useful, respectively. Taking into account the entire sample of women, 86% reported they would like to receive information about proper nutrition during pregnancy from a health provider or specialist, while 6% and 8% respectively, said they did not want this information or were unsure if they wanted dietary recommendations from a health provider (see Table 2). When asked if receiving pregnancy-specific nutrition information was important to them, 49% responded with 'very important' and 35% 'extremely important'. This specific dietary advice was perceived by the women as important because of its potential to optimize their child's growth and development, to promote long-term child health and to help understand ways in which they can manage their weight during and after pregnancy (see Table 2). When asked which

Table 2 Dietary results

Source of dietary information (%) (n = 121)	
Books	69.4
Internet	53.7
GP	51.2
Other	34.7
OB/GYN	33.9
Family	21.5
RN	9.9
Dietary topics discussed (%) (n = 121)	
Vitamin/minerals	84.3
Food balance	81.8
Foods to avoid	77.7
Healthy GWG	58.7
Calories	43.8
Other	2.5
Do pregnant women want dietary information? (%) (n = 147)	
Yes	86.4
No	6.1
Unsure	7.5
Why is receiving dietary information important? (%) (n = 147)	
Child's growth and development	87.1
Healthy GWG	72.8
Healthy PPWR	74.8
Long-term child health	83.7
Personal long-term health	59.2
What information is the most useful? (%) (n = 147)	
Importance of food for baby's health	72.1
Learn which foods to avoid	70.1
Healthy meal ideas	67.3
Infant feeding advice	60.5
Vitamin/mineral information	57.8
Healthy GWG	57.8
Help with plan to eat healthy	53.7
Appropriate kcal consumption	46.3
Label reading	23.8
Balancing your budget to eat well	21.1
Other	2

GP = general practitioner; OB/GYN = obstetrician/gynaecologist; RN = registered nurse; GWG = gestational weight gain; PPWR = postpartum weight retention; kcal = kilocalorie

type of information would be most helpful, it was reported that being more aware of foods they can eat to improve their baby's health, having an improved understanding of which foods to avoid, learning healthy meal ideas, receiving infant feeding advice, individualized vitamin and mineral information, and having an awareness of healthy gestational weight gain were valuable topics to be addressed in a pregnant population (see Table 2).

Exercise and physical activity

An unexpected 63% of this population of pregnant women reported receiving information about physical activity during pregnancy (see Table 3). From the 93 women who did obtain this type of information, the primary sources of uptake included book/magazines, their general practitioner, the Internet and their obstetrician/gynaecologist (OB/GYN) (see Table 3). Of those presented with pregnancy-specific information from any source, the main topics covered in the material/discussion were intensity of exercise, the type of activity, the frequency of exercise and the optimal duration of exercise. Encouragingly, of the 54 women who did not receive pregnancy-specific exercise recommendations, 93% would like to have access to this type of information from a health educator (see Table 3). Of the 93 women who did receive physical activity information, 19%,

Table 3 Exercise results

Received information about PA during pregnancy? (%) (n = 147)	
Yes	63.3
No	36.7
Primary sources of PA information during pregnancy? (%) (n = 93)	
Books/magazines	62.4
GP	51.6
Internet	43
OB/GYN	33.3
Family	16.1
Friend	16.1
Other	9.7
RN	6.5
Personal trainer	6.5
RD	1.1
Did NOT receive PA info but would like to from a health educator? (%) (n = 54)	
Yes	92.6
No	7.4
Perception of why exercising during pregnancy is important (%) (n = 147)	
Prepares my body for delivery	86.3
Improves overall wellbeing	85.6
Improves the health of my child	76
Helps maintain body weight during and after pregnancy	73.3
Prevents of chronic disease	57.5
Exercise is perceived as safe and beneficial to pregnant women (%) (n = 147)	
My and my child's health	85.4
Feel it is the right thing to do	47.7
Want to stick to routine	26.9
Great time to start new routine	13.9
Other (i.e. stress relief, hope for easier birth, prevent excess weight gain)	3.9
Not sure	1.5

PA = physical activity; GP = general practitioner; OB/GYN = obstetrician/gynaecologist; RN = registered nurse; RD = registered dietitian

31% and 34% of women found the information to be extremely, very or somewhat useful, respectively, and a mere 8% found information of this nature to be only slightly useful. However, when asking the entire cohort if receiving pregnancy-specific information about physical activity is important to them, 31%, 35% and 29% perceived this type of information as extremely, very or somewhat important, respectively. For these women, the most frequently cited reasons why exercise was perceived as important were: to help prepare their body for delivery; has potential to improve their wellbeing; may optimize their child's health; may help them maintain an appropriate body weight; may help defend against chronic diseases such as diabetes, cardiovascular disease and cancer (see Table 3). Similarly, the women's perceived benefits of exercise during pregnancy included optimizing both their and their child's health; they feel it is the 'right thing to do'; they want to maintain their current routine and feel this is an opportune time to initiate a new routine (see Table 3). Given the past belief that was propagated among social networks stating exercise and over-exertion during the delicate and fragile time of gestation may harm the unborn child¹⁴ and that women who are uncertain about exercise safety are more likely to stop activity,¹⁵ we felt it necessary to ask women their beliefs about exercise safety. Of all 147 women surveyed, 88% believe it is safe to exercise during pregnancy while 11% reported 'unsure' because they either did not know what constitutes 'safe' activity or felt that exercise would harm their child. Overall, 53% of the total population surveyed reported that they are currently exercising while pregnant.

DISCUSSION

Despite the consistent plea in the literature for interventions that target excessive weight gain during pregnancy, no study, to our understanding, has concurrently assessed the knowledge, and information channels used to increase awareness, of exercise and nutrition from the pregnant women's perspective. Thus, the purpose of this investigation was to examine a woman's current knowledge of pregnancy-specific exercise and nutrition recommendations, determine the information channels used to obtain these facts and gauge their satisfaction with the information gathered/provided. Our intent was to use these findings to help aid in the evidence-based development of structured lifestyle intervention arm of a randomized controlled trial.

Overall, willingness to participate in a lifestyle intervention during pregnancy was high with more than 86% of the women surveyed favouring participation should a programme of this nature exist. The top cited reasons for participation were for the health of their child, their own personal health and to learn more about exercise and nutrition. Unfortunately, it is hard to draw firm conclusions about the subgroup of women who elected not to participate because of the limited number who selected this option. Another limitation to the current study was that we did not collect information regarding the stage of behaviour change each participant was at and thus do not have a complete understanding of the specific type of lifestyle change patients would consider implementing.

Nonetheless, the overall results suggest that this population of women do have a genuine concern for their and their child's health and are motivated to participate in programmes that offer maternal-fetal benefit during pregnancy. However, we cannot extend these results to support the notion that women are aware of the beneficial longer-term, intergenerational effects that healthy eating and regular exercise during pregnancy may have on subsequent pregnancies or downstream child health. While an awareness of disease risk factors (i.e. obesity) may confer an advantage in obese pregnancies to help optimize weight regulation, women are seldom given proper gestational weight gain guidance tailored to their prepregnancy BMI. Recent evidence suggests that provider-informed patient awareness of their specific gestational weight gain target goal helps to reinforce maintenance of body weight within the IOM guidelines.^{16,17} This finding is also emphasized by Claesson *et al.*,¹⁸ who reported that the pregnant woman herself must be actively involved with goal-setting and be provided with continuous feedback and reinforcement. When intervening during pregnancy, this type of support was deemed beneficial by trial participants to help optimize gestational weight gain trajectories that may incur greater health benefits to the mother and child.¹⁸ Despite this, the vast majority of pregnant women are rarely given gestational weight gain guidance^{16,17} and if given advice, do not necessarily follow the recommendations¹⁹ or are given inaccurate advice that conflicts with the IOM guidelines.¹⁷ A recent report by the IOM⁹ reiterates these findings and further states that despite efforts to publicize these recommendations women are not made aware of the importance of continual weight monitoring during this critical period and fail to adhere to the specific gestational weight gain ranges as outlined in the revised IOM recommendations.⁹

In our study, greater than 70% of respondents expressed that they would prefer detailed, pregnancy-specific diet and

physical activity information from an interactive in-person consultation with an exercise/nutrition specialist and/or their physician when asked to choose from a list of options where they could make more than one selection; while 56% preferred electronic communication through the Internet. This finding supports the belief that interaction with multidisciplinary allied health-care teams may play an advantageous role in mitigating the detrimental effect of obesity,²⁰ especially if follow-up material is available through electronic communications as this counselling strategy has demonstrated success.²¹

Diet and nutrition

With respect to dietary and nutrition recommendations, nearly 20% of women are not receiving pregnancy-specific information from *any* source. This is startling as it was anticipated that every woman would have received some degree of information concerning healthful dietary practices from a medical or allied health professional, a form of popular media (e.g. the Internet or television), or a family member and/or friend. However, few studies have examined the content of prenatal care from the patient's perspective.²² Using data from the National Maternal and Infant Health survey, Kogan *et al.*²³ reported that 93% of women received advice concerning proper food choice during prenatal care from their health provider alone. As far as we are aware the disparity in our study is a novel finding that suggests that the content of prenatal care recommendations are not being met for all women in our population. Moreover, the quality and specificity of the dietary information obtained by patients in our sample must be questioned given that their primary sources were books/magazines and the Internet, two channels which may lack individual relevance, be outdated or not evidence-based.

In our study, 84% of the women who received some form of dietary advice were told about vitamin/mineral requirements, but there was a lack of pertinent guidance provided concerning healthy eating for optimal pregnancy weight gain and an awareness of appropriate caloric intake during gestation. This is of little surprise and in agreement with previous findings by Kogan *et al.*,²³ who showed that vitamin recommendations were received by 97% of patients. The discrepant variation in the type of information patients receive illustrates inconsistencies in knowledge exchange between care provider and patient, especially with respect to physical activity and nutrition – two fundamental lifestyle behaviours that should be fully integrated into prenatal care.²⁴ Although we cannot comment on the specific content and quality, which is a limitation of our study, the majority of women surveyed perceived the information they obtained to be very useful. The women sampled in this study expressed an interest in receiving pregnancy-specific nutrition recommendations from a health provider and believe that learning about healthy eating during pregnancy is important. Perceived benefits of initiating healthy eating behaviours reflect an understanding of both the short- and long-term potential of healthful nutrition during pregnancy. Their responses demonstrate an awareness of the immediate effects that may optimize child growth and development *in utero* as well as the benefits that maternal lifestyle choices have on promoting longer-term child health; albeit to a lesser extent. When the women were asked about helpful information they would like to receive during pregnancy, healthy eating advice aimed at promoting child health

and having a greater awareness of which foods to avoid were top cited, whereas those pertaining to learning about healthy gestational weight gain and appropriate caloric intake during pregnancy were less frequently perceived as helpful. Overall, it is difficult to make comparisons with existing literature given our study, as far as we are aware, is novel with respect to assessing specific prenatal care needs from the patient's perspective. It is therefore important to recognize that women *do* want to improve their overall health and that of their unborn child, but may lack a true understanding of how body weight regulation and caloric intake during gestation may influence maternal–fetal outcomes. Educating pregnant women about appropriate caloric intake, consuming a variety of healthy macronutrients, providing strategies to promote energy expenditure and emphasizing the importance of optimal weight gain in a primary care setting may provide an avenue by which simple and practical nutrition information may become more available to an at-risk overweight population.

Physical activity and exercise

Regular exercise and physical activity play a pivotal role in improving cardio-respiratory fitness; an outcome that is inversely related to all-cause mortality.²⁵ These behaviours effect energy balance and promote optimal regulation of body weight if practised in conjunction with a healthful caloric intake.²⁰ Given the benefits associated with exercise and its potential to optimize weight gain during pregnancy, the SOGC/CSEP joint position statement is geared towards promoting exercise during pregnancy and the postpartum period in women without specific contraindications.¹³ Despite the health benefits associated with regular exercise and the consensus that a pregnant population can also engage in and benefit from regular participation, only 63% of our sample population received information about the physical activity during pregnancy from *any* source (i.e. books, Internet, doctor, etc). Furthermore, the finding that one in every two women is not receiving information about active living from their general practitioner and that only one in every three women is discussing this with their OB/GYN is disheartening given the known health benefits associated with regular activity. Collectively, these results were lower than what we had anticipated finding, given the strong public messages acknowledging the benefits of exercise as well as the clinical practice guidelines endorsing these behaviours from the physicians' own professional society.¹³ Furthermore, our knowledge is far from complete with respect to the quantity and quality of exercise recommendations made during prenatal care delivery from the patient's perspective. Existing research either fails to integrate this information into the assessment tool²³ or acknowledges that the relationship between prenatal care and the adoption of healthy behaviours has received little to no attention.²² Nonetheless, the vast majority (93%) of women surveyed in our study expressed an interest in having access to this type of information from a health educator supporting the need to increase accessibility to and improve outlets designed for knowledge dissemination of this nature.⁹

Encouragingly, there was a common belief among our survey respondents that pregnancy-specific exercise recommendations are important and may help with many of the immediate conditions associated with pregnancy (i.e. improved fitness for labour, increased wellbeing and optimizing child's health

in utero). Although to a lesser extent than the acute advantages associated with active living on maternal–fetal health, we can speculate that pregnant women in our population acknowledge a benefit for the potential use of exercise as preventive medicine when defending against longer-term chronic diseases (i.e. type 2 diabetes, cardiovascular disease and cancer), in both mother and child. Thus, both public initiatives and research interventions targeting excessive weight gain during pregnancy may benefit mothers if there is a greater emphasis on the potential intergenerational effects that exercise during pregnancy may have on their health and that of their child.

Lastly, when delivering an exercise intervention during pregnancy, safety of the participants is a primary concern. Of all the women surveyed in our sample, 88% reported that they believe that exercise during pregnancy is safe while some were unsure as to what constitutes ‘safe’ or felt it may harm their child; a belief that aligns with the past medical paradigm.¹⁴ Collectively, these findings demonstrate that the majority of our sample population places high value on pregnancy-specific exercise behaviours as they deem them both safe and beneficial. These findings are in agreement with those of Duncombe *et al.*²⁶ in which most (61–83%) women in their study believe low-intensity, low-impact exercise to be safe, whereas high-intensity and high-impact activities are not. Moreover, 53% of our sample population reported exercising during pregnancy, which is a slightly greater prevalence compared with other investigations reporting 28%²⁷ and 42%²⁸ participation. The differences in our findings may be attributed to the lack of a nationally representative sample, variation within individual definitions of what one considers ‘exercise’ and/or selection bias by feeling compelled to select the exercise option given the healthy living focus of the questionnaire.

Nonetheless, our study supports the importance of patient education concerning diet and exercise practices during pregnancy as women both need and want current and practical tools during this time to help defend against excessive weight gain.^{18,26} These findings align with Claesson *et al.*, who assessed obese women’s satisfaction with a weight gain intervention during pregnancy and demonstrated that mental coaching in conjunction with weekly discussions about weight maintenance and motivational talk from a midwife, were viewed as positive experiences that were beneficial to them. All women participating in the Claesson intervention would recommend a programme of this nature to a friend and 70% were satisfied with their weight gain supporting a role for interventions in an obese pregnant population.¹⁸

CONCLUSION

While we cannot make population-level inferences from the present study as the women surveyed are predominantly Caucasian, educated and have some form of immediate social support, as demonstrated by 96% married/common-law and over 85% completing some form of college or university, our results lend support to the notion that women are not receiving adequate information with respect to the long-term benefits that regular physical activity and balanced nutrition may have on both maternal and fetal outcomes. We can speculate, however, from our educated sample of women who have an existing support network during pregnancy, that initiatives targeting visible minorities, such as single, uneducated mothers, may be of greater value; a future area of study that remains to be tested.

To date, much of the research on exercise and nutrition has focused on implementing these behaviours and examining their effects on the prevention and management of obesity and diabetes.^{29,30} Our approach was slightly different. We assessed patient knowledge of, and determined the channels used by pregnant women to obtain, exercise and nutrition information. This unique approach has helped identify gaps in the type of content delivered in a prenatal care setting and highlights the necessity for inclusion of this information given the rising obesity rates. Furthermore, knowing what type of information women want and view as beneficial may help inform health promotion initiatives provided to expectant mothers. It is not uncommon for pregnant women to receive recommendations from their care provider about the ill-effects of smoking³¹ and alcohol consumption,³² as well as the benefits of vitamin supplementation (e.g. folic acid)³³ and breastfeeding.³⁴ However, our results suggest a need to incorporate prenatal recommendations on appropriate caloric intake, physical activity and gestational weight gain targets based on prepregnancy BMI.

Similar to women’s perception concerning nutrition recommendations, pregnant women hold the belief that receiving pregnancy-specific exercise recommendations is of utmost importance to them. If care providers capitalize on a mother’s receptiveness to information of this nature and promote an active lifestyle tailored to their individual needs early in gestation (if preconception is not an option), health benefits may become more visible. Additionally, if practitioners believe that providing recommendations about nutrition and exercise is beyond their scope of practice or feel that imparting this type of knowledge is logistically too complex in a office-based setting, referral to the appropriate allied care provider may optimize short- and long-term outcomes. Our intent is not to assign blame, but rather highlight an emerging area of concern in a primary care setting where health-care providers have the opportunity to educate the patient population about the potential health benefits that may result from optimizing their own healthy behaviours before, during and following pregnancy. Whether pregnant women understand the long-term sequelae associated with excessive gestational weight gain remains to be elucidated. It appears as though any behaviour or recommendation that confers an immediate benefit during pregnancy is both expressed by the care provider and viewed as important by the patient. However, these findings suggest that physical activity and nutrition recommendations are underemphasized in primary care, despite the abundance of scientific evidence which supports promotion and monitoring these behaviours during pregnancy.^{8,13,35}

Given the response of the target population, research of this nature demonstrates proof of concept for further testing the efficacy of exercise and dietary initiatives in controlled research settings. The information obtained through this investigation has helped to inform a randomized controlled trial pilot project designed to attenuate maternal gestational weight gain and optimize infant growth trajectory. Overall our findings add support to other investigations^{7,26,36} that highlight an immediate need for effective clinical interventions aimed at preventing excessive weight gain during pregnancy as a way to halt the intergenerational cycle of obesity. Focusing on a life-course perspective acknowledging the acute benefits of healthful nutrition and exercise during pregnancy itself, but also creating an awareness of the positive longer-term intergenerational effects these behaviours may have on growth, development and disease defence, is warranted.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the financial contributions from the Canadian Institutes of Health Research (CIHR), Institute of Nutrition, Metabolism and Diabetes for supporting this project as follow-up from a Research Development and Knowledge Exchange Workshop grant and as part of the larger SOMET team grant (#OTG88590), Dr George Tawagi and the ultrasound staff at the Harmony Health Clinic, Ottawa, ON for their generous assistance with data collection, Dr Mark Walker for his assistance with questionnaire development and Dr Nick Barrowman for his assistance with statistical analysis. This study was funded by the Canadian Institute of Health Research, Sherbrooke, Ottawa, Montreal Emerging Team (SOMET) Grant in Obesity Research. The authors have no competing interests or declarations.

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(Accepted 14 February 2011)