DOI: 10.1097/JPN.0000000000000792

Nursing Continuing Professional Development

J Perinat Neonat Nurs • Volume 38 Number 1, 25–36 • Copyright © 2024 Wolters Kluwer Health, Inc. All rights reserved.

Pairing Evidence-Based Strategies With Motivational Interviewing to Support Optimal Nutrition and Weight Gain in Pregnancy

Cecilia M. Jevitt, PhD, CNM; Kiley Ketchum, BSc, RD

ABSTRACT

Objective: Because eating, nutrition, and weight management patterns adopted during pregnancy may persist beyond the postpartum period, pregnancy provides an opportunity for health education that affects the future health of the pregnant person, the fetus, and the family. This systematic review aimed to find nutrition and weight management behaviors that could be used safely during pregnancy to optimize gestational weight gain. **Methods:** PubMed, MEDLINE, and Web of Science were searched for research or systematic reviews published in English from 2018 to 2023 using terms including gestational weight gain maintenance, weight, management, pregnancy, behavior, strategy, and strategies. Excluded research used pediatric or adolescent populations, restrictive diets such as no carbohydrate or no fat diets, fasting, bariatric surgery, weight loss medications, private industry, or profit-earning programs using food brands or specific diet programs. **Results:** The abstracts reviewed in these areas: excessive gestational weight gain (1019), low-glycemic index diet (640), Mediterranean diet (220), MyPlate diet (2), the Dietary Approaches to Stop Hypertension (DASH) diet (50), portion control (6), home meal preparation (6), mindful eating (13), intuitive eating (10), self-weighing (10), and motivational interviewing during pregnancy (107), were reduced to 102 studies. Studies in those 10 areas were reviewed for nutrition and eating behaviors that are safe to use during pregnancy and could be used along with motivational interviewing. **Conclusion:** Clinicians can discuss these behaviors using motivational interviewing techniques to assist clients in optimizing gestational weight gain. Dialogue examples pairing these strategies with motivational interviewing principles are included.

Key Words: antenatal nutrition, Dietary Approaches to Stop Hypertension (DASH diet), gestational weight gain, intentional eating, low-glycemic index diet, meal planning, meal portions, mindful eating, motivational interviewing, prenatal care, weight maintenance

The human body is designed for growth and cell replacement. The metabolic needs and the milieu of growth hormones during pregnancy further stimulate the body toward growth. In some countries, balancing abundant food supplies with baseline energy needs and the slightly increased energy needs of pregnancy for a healthy weight gain is challenging. Because eating and activity patterns adopted during pregnancy may persist beyond the postpartum period,[1] pregnancy provides an opportunity for health education that affects not only the pregnancy but the future health of the pregnant person, the fetus, and the family. Dietary changes were made by 78% of pregnant individuals in 1 study from Alberta, Canada.[2] Most people (81%) increased their intake of fruits, vegetables, meat, and milk, while 60% of people

Author Affiliation: Midwifery Program, Faculty of Medicine, University of British Columbia, Vancouver, Canada.

Disclosure: The authors have disclosed that they have no significant relationships with, or financial interest in, any commercial companies pertaining to this article.

Each author has indicated that he or she has met the journal's requirements for Authorship.

Corresponding Author: Cecilia M. Jevitt, PhD, CNM, Midwifery Program, Faculty of Medicine, University of British Columbia, Vancouver, BC V6T 1Z3, Canada (cecilia.jevitt@ubc.ca).

Submitted for publication: September 30, 2023; accepted for publication: October 31, 2023.

avoided foods and beverages known to be harmful during pregnancy.[2] Pregnant people want knowledgeable guidance by those providing prenatal care, and clinicians want to provide support toward optimal gestational weight gain, but often lack the evidence to share.[3,4]

In North America, more than one-third of pregnant people are overweight or obese,[5–7] and 40% of individuals in the United States exceed recommended gestational weight gain targets.[8] Excessive gestational weight gain is linked with many poor health outcomes including gestational diabetes, fetal macrosomia, hypertensive disorders of pregnancy, and increased risk of cesarean birth.[7,9,10] Additionally, individuals with excessive gestational weight gain are more likely to have postpartum weight retention and future obesity.[9–11] Following excessive gestational weight gain, the newborn also faces lifelong increased risk for overweight, obesity, and metabolic diseases including diabetes, hypertension, and heart disease.[9,11] This article summarizes evidence-based nutrition strategies and behaviors to optimize excessive gestational weight gain that can be shared with patients using a motivational interviewing approach.

REVIEW METHODS

This review used a subset of research gathered in a 2023 scoping review. Articles of research or systematic reviews published in English from 2013 to 2023 were searched using terms including gestational weight gain maintenance, weight, manage, pregnancy, behavior, strategy, and strategies. Studies were not limited to pregnant individuals because weight management research is done more often outside of pregnancy. The initial search used PubMed, MEDLINE, and Web of Science with 103 full-text studies reviewed. Those databases were further searched for additional terms specific to pregnancy for this review, including excessive gestational weight gain (1019 abstracts), low-glycemic index (GI) diet (640 abstracts), Mediterranean diet (220 abstracts), MyPlate diet (2 abstracts), the Dietary Approaches to Stop Hypertension (DASH) diet (50 abstracts), portion control (6 abstracts), home meal preparation (6 abstracts), mindful eating (13 abstracts), intuitive eating (10 abstracts), self-weighing (10 abstracts), and motivational interviewing during pregnancy (107 abstracts) (see Figure 1). For this secondary review, articles reviewed were limited to 2018-2023 due the tremendous volume of research and review articles published in these areas in the last decade. International guidelines for gestational weight gain and antenatal nutrition were reviewed. Excluded research included those using pediatric and adolescent population, restrictive diets such as no carbohydrate or no fat diets, fasting, bariatric surgery, weight loss medications, herbs, private industry, or profit-earning programs using food brands or specific diet program. The 102 studies reviewed ultimately yielded healthy diets, eating patterns, and behaviors that could be paired with motivational interviewing to assist pregnant individuals in managing prenatal weight gain.

MOTIVATIONAL INTERVIEWING IN GESTATIONAL NUTRTION AND WEIGHT GAIN COUNSELING

Motivational interviewing (MI) is a counseling approach that has been used extensively outside of pregnancy to assist clients to reduce tobacco and illegal substance use and to reduce weight and increase physical activity.[12] MI has been employed successfully in programs to optimize gestational weight gain and is recommended for gestational weight gain counseling by the American College of Obstetricians and Gynecologists (ACOG).[8] MI is a patient-centered approach that urges clinicians to avoid handing down rigid guidelines as accepted advice, while encouraging patients to explore their own goals and experiences.[13] MI has 4 core skills that healthcare providers are likely to have practiced in other settings: open-ended questions, affirmations, reflections, and summaries.[8,14] Open-ended questions are those that cannot be answered using a yes or no answer. Closed-ended questions limit conversation and reduce the client's ability to convey their own experiences and plans. Affirmations are statements that support an action that a patient has done that supports the patient's own health goals. Reflections are restatements of what the client has said. Reflections allow the care provider to restate what was heard from the client, giving the client an opportunity to correct misconceptions. Reflections also enable clients to think further on what they have just said. Summaries are often used at the end of a healthcare visit. A summary is normally several questions and statements that again check that the care provider has correctly heard what the client is planning. These core MI skills are demonstrated in Table 1, which has phrases for routine visits, visits where weight gain has been higher than expected, and visits where weight gain is lower than expected. Some phrases are very similar demonstrating that for many situations, only small changes in wording are need to use MI concepts.

Discussion of gestational nutrition and weight gain is recommended for the first prenatal visit.[7,8,14] MI starts with asking the client permission to discuss an issue. Following a complete health history that rules out prior eating disorders, the healthcare provider can say, for example, "Weight gain is a necessary part of pregnancy. Would it be all right for us to talk about what you are

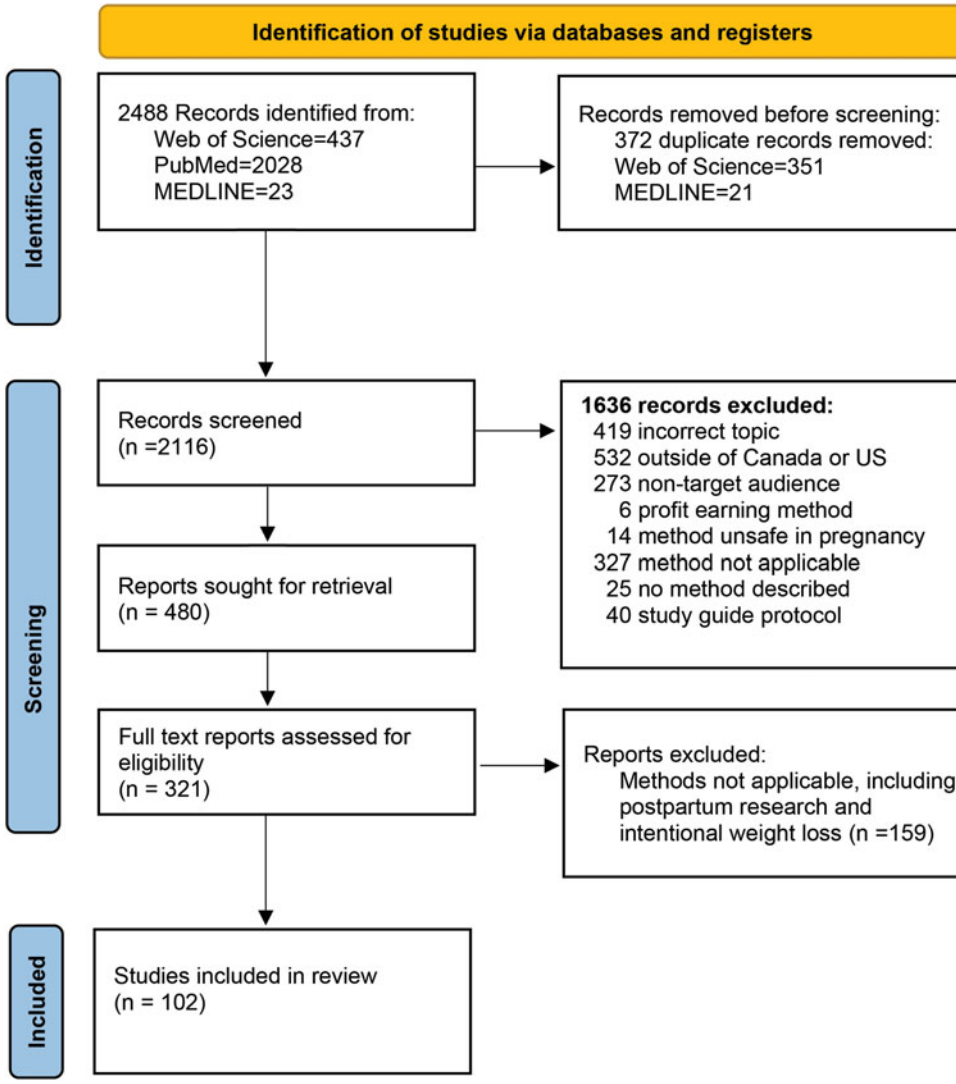

Figure 1. PRISMA diagram evidence-based behavior changes to optimize gestational nutrition and weight gain. This figure is available in color online (www.jpnnjournal.com).

thinking for weight gain in this pregnancy?" or, "Do you have questions or concerns about gaining weight during this pregnancy?" These permission-asking questions are not open ended. If the client is willing to discuss weight gain, the provider can follow with open-ended prompts such as, "What are your thoughts about weight gain during pregnancy?" or for someone who has been pregnant before, "Can you describe what weight gain was like in your last pregnancy?"

Many individuals have experience attempting to manage their own weight.[14,15] Whether the strategies have been successful in the past or not, having experience with weight management can be viewed as an advantage during pregnancy. A list of evidence-based weight management advantages and how to deploy MI for discussing application of those strategies to optimize gestational weight gain were first described by Jevitt in 2016.[14] Emerging evidence and changes in social routines have changed the acceptability of some weight management strategies formerly used during prenatal care. For example, low-fat diets are not recommended during pregnancy and some countries stopped routine weighing during prenatal care. This scoping review enabled the 2016 advantageous weight management behavior list to be updated into Table 2.[14] How MI principles can be used in antenatal conversations to discuss nutrition and weight management strategies are described in Table 1. MI counseling integrated into routine antenatal care can be a successful method of client support in optimizing gestational weight gain.

Table 1. **Motivational interviewing-based questions and phrases to discuss weight management advantages**

MI core skill	General question or statement example	Example for excessive weight gain	Example for insufficient weight gain
Open-ended question	What do you think your weight gain will be like in this pregnancy? Tell me about your weight gain in your last pregnancy. Can you describe ways that you have managed weight gain in the past? Can you describe your favorite foods to me? Your work schedule seems really busy. How do you usually fit meals and hydration into your workday? It sounds like your work might include evening and night shifts. Tell me about your usual schedule.	You plan to put more protein into your eating. How might you make a change in your eating before your next visit to do that? It sounds as if you have been really rushed with work and taking care of your toddler. So busy that you are often grabbing snacks like donuts and having hamburgers and milkshakes for lunch most days. What do you think could be done with your schedule or usual home routines to make time for regular meals? Tell me about who usually plans and prepares meals at home. What do you think would need to happen for you to make a meal with more fruits or vegetables after work?	You plan to put more protein into your eating this next month. How might you make a change in your eating before your next visit to do that? It sounds as if you have been really rushed with work and taking care of your toddler. So busy that sometimes you miss meals. What do you think could be done with your schedule or usual home routines to make time for regular meals and an extra snack a day? Tell me about who usually plans and prepares meals at home. What would need to happen for you to have an extra snack at work?
Affirmation	You plan to gain about 25-30 lb (11-14 kg) during the pregnancy. You are satisfied with your weight gain this month. You have gotten into the habit of eating mindfully without watching a streaming show or checking your Instagram. You don't like many vegetables but often have fruit and use whole grain bread.	Managing your weight has been a challenge. You sounded worried about your weight gain this month. The baby is growing perfectly, and your weight gain is right in the range you planned. Your plans are working. Avoiding desserts has helped you manage weight in the past. You are describing a real increase in walking this month. You've done better than your own goals.	Eating enough to gain weight feels triggering to you. You sounded worried about your weight gain this month. The baby is growing perfectly, and your weight gain is right in the range you planned. Your plans are working. You added a hard-boiled egg and almond butter toast into your breakfast routine and that helped you gain some weight this month.

(*continues*)

Table 1. **Motivational interviewing-based questions and phrases to discuss weight management advantages (*Continued*)**

MI core skill	General question or statement example	Example for excessive weight gain	Example for insufficient weight gain
Reflection	Weighing yourself at home makes you feel like a failure, and you would prefer not be weighed at all. You are satisfied with your weight gain. You feel your weight gain in your first pregnancy was just right.	You are worried that your weight gain was higher than you planned since your last visit. You are feeling successful with your plan to cook more dinners at home. You feel good about saying no to extra-large portions when your mother pushes you to eat for two.	You are worried that if you eat more each day you might gain too much weight. You are surprised but happy that you were able to gain 2 lb (1 kg) this month. You think you won't be able to lose weight after the baby is born if you gain too much weight now.
Summary	I think you have a plan for this pregnancy. You want to use nuts and dried fruits in afternoon snacks and have fish at least once a week. You're going to try to walk in the park 3 times a week. Those are a lot of plans. Have I missed anything? I'll be eager to hear how those work for you next month. Let's think about what we've talked about. We talked about foods rich in minerals and fiber and the extra daily portion needed in pregnancy. What would you like to do about eating until your next visit?	Now that you are in your third trimester, the baby moving keeps you up at night and you are hungry when you wake up. You don't want to cook at night and you eat whatever is around. Is that right? Can you think of foods that you like that you could have at night without cooking? We talked about how well you've started walking several days a week and that you've switched to low-fat milk. Is there something I've forgotten? How will you continue those for another month?	You are able to buy the foods you like and make more time to sit with a meal and use mindful techniques to enjoy meals. We talked about how you enjoy split pea soup and lentil dahl. Every day, you're going to add in a meal portion with a nut butter or pea or lentil dish. What have I forgotten? We'll see if those additions help with weight gain at the next visit.

Abbreviation: MI, motivational interviewing.

Table 2. **Evidence-based, advantageous strategies for prenatal nutrition and weight management**

- Accurate knowledge of healthy prenatal weight gain ranges using Institute of Medicine guidelines
- Dietary intake rich in increased fruits, vegetables, fiber, nuts, legumes, whole grains and dairy products: low-glycemic index diet, DASH diet, Mediterranean diet, MyPlate diet, Nordic diet
- Meal planning
- Portion control
- Home meal preparation
- Mindful eating
- Intuitive eating
- Periodic self-weighing
- Adequate sleep (6-7 h a night)
- Regular physical activity

Abbreviation: DASH, Dietary Approaches to Stop Hypertension.

EVIDENCE-BASED STRATEGIES FOR WEIGHT MANAGEMENT

Although prospective, randomized controlled trials to investigate weight management in pregnancy are few and generally have small sample sizes, current evidence contains dietary and behavioral strategies that can improve nutrition during pregnancy while optimizing gestational weight gain.

Diets

Numerous dietary patterns that exclude certain foods are used during weight management attempts outside of pregnancy. Diets such as low fat and carbohydrate free are not recommended in pregnancy because they may lack essential nutrients and energy for the growing fetus.[16] Low-GI diets, the Mediterranean diet, the MyPlate diet, the DASH Diet, the flexitarian diet, and the Nordic diet have similar foundations that include fiber-rich fruits and vegetables, unprocessed whole grains, legumes, plant-based oils, and lean meats such as fish as their base.[16–19] In 1 meta-analysis, Mediterranean and DASH diets were associated with 15% to 38% reductions in the relative risk for gestational diabetes.[20] One meta-analysis found that in adults initially in good health who did not follow a low-glycemic diet, the high GI intakes or high glycemic loads were strongly associated with type 2 diabetes.[21] A meta-analysis of studies including nonpregnant adults demonstrated that a low-GI diet reduced body mass and improved fasting blood glucose control,[22] as did another meta-analysis of low-GI diets used for obesity management.[23] These last 2 meta-analyses that include nonpregnant adults were summarized here because these include the effect of low-GI diets on weight. Weight loss is not recommended in pregnancy; however, eating patterns that support weight loss outside of pregnancy can assist individuals with avoiding excessive gestational weight gain. How long dietary changes made in pregnancy are retained has not been extensively studied. At 5 years' time in 1 Irish study of 370 women who were coached in use of a low-GI diet, there was no difference between the individuals in the intervention and control groups in terms of retained gestational weight, glycated hemoglobin A1C (HbA1C), and use of a low-glycemic diet.[24] The macro- and micronutrient patterns in low-GI diets, the Mediterranean diet, the MyPlate diet, the DASH diet, the flexitarian diet, and the Nordic Diet can optimize both prenatal nutrition and gestational weight gain.[16–24]

Meal portions, preparation, and planning

A Canadian study of 970 pregnant people showed that one-third overestimated the amount of weight needed for a healthy pregnancy.[25] Many planned too much weight gain in the first trimester and worried about the effect of inadequate weight gain on the fetus.[25] Overestimation of healthy weight gains was more prevalent in those with prepregnancy overweight and obesity.[2,25] Adult Americans consume at least 11% of their total caloric intake by eating at snack bars or fast food restaurants.[26] Over the 20-year period from 1986 to 2016, restaurant entrée portion sizes increased by 26 g and desserts by 48 g,[26] with a 5-time increase in portion size of ultraprocessed foods since 2002.[27] This increase in portion size has been linked to peoples' underestimation of energy intake[28] and to increasing obesity in the United States.[26,27] Portion control has been demonstrated to be a successful strategy for weight maintenance[29,30]; however, some studies that used portion control for weight loss showed initial weight loss with portion control use declining over a year's time.[31] Studies have additionally found that a large portion at one meal did not decrease the size of subsequent meals.[27,32] Using portion control as a method to reduce excessive gestational weight gain depends on the individual having an accurate understanding of the added caloric and nutrient requirements of pregnancy.

Eating meals rich in fresh fruits, vegetables, and whole grains often requires home meal preparation. Culinary medicine promotes home meal preparation based on the reduced risk of type 2 diabetes and lower weight gain in those who cook at home compared with those who dine out frequently.[33] People who cook at home choose higher-quality foods while spending less money on food, and consume fewer calories overall.[33]

Skipping meals has been found to be associated with overweight and obesity,[34] while grazing (eating

small amounts of foods frequently) was associated with higher intake and decreased intake of nutrients.[35] Planned meals at conventional eating times yielded lower caloric intake than eating more than 3 meals a day or grazing.[35] Planning meals and snacks during pregnancy to optimize nutritional intake is recommended by the Society of Obstetricians and Gynaecologists of Canada (SOGC).[7] Providing to-go containers at the start of a large meal was found to decrease consumption during the meal with a concomitant reduction in caloric intake.[32] Meal planning, home preparation of meals, and portion size consideration are useful strategies for gestational weight gain optimization.

Mindful and intuitive eating

Mindful eating and intuitive eating are often used interchangeably; however, the strategies have distinct differences. Mindfulness is described as a temporary state of nonjudgment and present-centered attention.[36] When applied to eating, mindfulness implies that eating is the center of attention. Individuals are encouraged to notice their emotional state during eating, sensations of hunger, the aroma and taste of the food, and feelings of satiety.[36] Regular application of mindful techniques may assist with weight regulation over time.[37] Data related to interventions using mindful eating are underpowered and lacking in pregnancy. In a study of mindful eating, nonpregnant women with overweight and obesity were taught an intervention that was designed to improve 3 behaviors: stress-related eating, mindless eating, and dietary compliance to the DASH diet.[36] Mindfulness eating quality scores improved significantly ($P = .001$), and stress-related eating scores improved ($P \leq .001$) along with body weight ($P = .02$). The researchers concluded that mindful eating may be effective in addressing stress-related eating and its relationship to weight maintenance.[36] A small study of 24 individuals found that mindful eating reduced energy intake compared with usual eating style but the difference was insignificant.[37]

Intuitive eating relies on perceived hunger and satiety cues instead of certain diets or portion control.[38] Like mindful eating, intuitive eating does not have a supportive research base. A population-based study of 2287 male and female young adults with a mean age of 25.3 years used Project EAT-III data to investigate intuitive eating behaviors.[38] For both genders, intuitive eating was inversely associated with body mass index (BMI = weight in kg/height in m^2). Those who reported trusting their body to tell them how much to eat had lower odds of disordered eating behaviors. Females who stopped eating when they felt full had lower odds of chronic dieting and binge eating.[38] Trusting the body for hunger and satiety clues may be less reliable in people with high BMIs, particularly those with metabolic disease such as diabetes.[39] Excess adipose changes the reception of ghrelin and leptin, appetite hormones, confounding sensations of hunger and satiety,[39] thereby reducing eating-related intuition. It is likely that for mindful eating and intuitive eating to be effective weight management strategies, both must be supported by a knowledge of the increased energy needs of pregnancy and what foods satisfy those energy needs without being excessive.

Self-weighing

Low weight gain and high weight gain during pregnancy have long been associated with perinatal morbidity and mortality.[6,7,10] As the incidences of overweight and obesity increased in post-industrialized countries, routine weighing in prenatal care was linked more with weight bias and shaming than reductions in excessive gestational weight gain that might lower risk for preeclampsia and gestational diabetes.[3,4,40] The National Institute for Health and Clinical Excellence guidelines from the United Kingdom do not recommend routine weighing during pregnancy to avoid provoking anxiety.[3] In the United States, Black and Hispanic women have higher rates of excessive gestational weight gain.[41] Ever-experiencing racial discrimination, a chronic stressor, was linked with a 71% increase in the odds of excessive gestational weight gain in a prospective study of 413 Black and Latina women.[41] Researchers concluded that the Black and Latina women were members of 2 stigmatized groups: a historically oppressed group and those who are overweight.[41] Clinicians need to be mindful of the combined biases of weight and race when counseling clients.

One Australian group, noting that pregnant people who gained within the Institute of Medicine (IOM) guidelines[42] for healthy gestational weight gain had the lowest risk for perinatal complications, studied antenatal weighing practices in 3 cohorts of approximately 13 000 participants each.[43] Retrospective record reviews showed that those with a BMI categorized as underweight and those with a BMI of 40 or more were most likely to have weights remeasured at subsequent prenatal visits, with repeat weights ranging from a low of 4.2% in the usual care group to a high of 61.8% for the cohort with scales in clinic and prompts to weigh included in the electronic medical record.[43] Routinely offering weight measurements to all clients, regardless of prepregnancy weight, can reduce opportunities for weight bias to influence healthcare.

In a study that followed 225 adults with overweight or obesity who were attempting weight loss using

Table 3. Conversation using motivational interviewing and advantageous nutrition and weight management strategies for more gestational weight gain than recommended

(Ask) Care provider: As we discussed earlier, we planned to talk about gestational weight gain again today. Last appointment you mentioned regular self-weighing was a strategy you were using—how is that going?
Client: I'm feeling hopeless. I am walking every day after dinner, I started packing a lunch instead of eating out, and I have been drinking only water—but I am still gaining over 2l b a week!
(*Affirmation—being careful to avoid praise) Care provider:* You are dedicated to your health and have had success with making changes during this pregnancy. It is disappointing when it feels like your efforts are not having the outcome you are hoping for. Do you want to talk about this more today? We have 5 minutes left in our appointment if you would like to troubleshoot.
Client: I would like that. I've been happy with the changes I have made. Now that I am packing a salad with lemon juice dressing for lunch, I feel starving when I get home. I need a snack before dinner, usually something quick like a muffin or bowl of cereal so that I have the energy or focus to even make dinner! After dinner I have some sweets or chips while watching my shows.
(Offering facts followed by open-ended question) Care provider: In the past, people have told me that when they do not eat enough at lunch, they find themselves feeling hungrier later. We know that balanced meals with proteins, fibre, and healthy fats help a person feel full longer. Protein food ideas could be lean cuts of animal meats, low-fat Greek yogurts, hummus, eggs, or nuts and seeds. Carbohydrate ideas include whole grains breads or pastas or fruits. Healthy fat examples are a portion of an avocado, or maybe flax oil or olive oil mixed with lemon for your salad dressing. What kinds of foods have left you feeling full for longer in the past?
Client: A handful of almonds with an apple used to be my favorite after school snack as a kid! Maybe I will bring that for my final break at work. I should add more food to lunch time, greens and lemon juice is not leaving me feeling satisfied.

mobile activity trackers, food logging, and self-weighing, the behavior most consistently linked to weight loss was self-monitoring of weight.[44] Community midwives in England followed 76 women who were randomized to usual care or an intervention that included setting individual weight gain targets, weekly self-weighing, and weight gain graphing.[45] The intervention group had a 6% reduction in excessive gestational weight gain.[45] In contrast, a larger study of 782 women in Australia with half randomized to the control group and half to an intervention group who were weighed at each antenatal visit and received counseling consistent with the IOM guidelines[42] found no difference between the groups in gestational weight gain and concluded that routine antenatal weighing was not effective at reducing excessive gestational weight gain.[46] Women with weight gain goals in an intervention group with weekly counseling from a registered dietician and self-weighing had 21% lower gestational weight gain than a group receiving routine care.[47]

Patients can be encouraged to weigh themselves between antenatal visits and to weigh themselves during the visit and then report the weight to the antenatal care provider. Daily weighing between Thanksgiving and New Year's Day has been shown to assist individuals in constraining weight gain,[48] suggesting that periodic self-weighing over holidays could be a useful strategy for pregnant individuals attempting to optimize gestational weight gain. The SOGC, the ACOG, and the National Health and Medical Research Council of Australia recommend periodic weight measurements during pregnancy as components of a plan to optimize gestational weight gain.[7,10,49]

Adequate sleep

Inadequate sleep is associated with excess weight[50,51] and diabetes.[51] Shortened sleep or disrupted sleep can occur with stress, shift work, late-night activities, or sleep apnea. Sleep less than 6 to 7 hours a night disrupts the usual function of the hypothalamic-pituitary-adrenal axis, causing hypercortisolism with expansion of the visceral fat mass.[39] Visceral fat mass dysregulation increases circulating inflammatory cytokines that contribute to insulin resistance and glucose intolerance, which may, in turn, increase appetite.[39] Grelin, an appetite stimulating hormone, is increased after short sleep, while leptin, a satiety hormone, is decreased, further stimulating overeating.[51] Short sleep has been shown to increase intake by 200 to 500 kcal/day.[51] This increase could exceed the average of 300 kcal/day needed for adequate fetal growth.[52] A large meta-analysis combining 153 prospective cohort studies with a combined cohort of 5 172 710 participants reviewed risk ratios for a half dozen health outcomes, finding that less than 6 hours of sleep a night increased the relative risk of diabetes, hypertension, and obesity.[50] Sleep restriction may increase food intake because of longer waking hours,[53] and disruption of hormonal appetite pathways.[39] The effect of sleep on dietary intake was examined in one meta-analysis of

15 studies to reveal that restricted sleep results in higher energy intake (mean 204 kcal/day) and a higher percentage of daily calories coming from fat, protein, and carbohydrates.[54] Sleep affects diet and diet may influence sleep.[55] Melatonin, the hormone produced by the pineal gland in response to darkness, induces sleepiness and is synthesized from tryptophan. Tryptophan and natural melatonins are found in fruits, vegetables, legumes, nuts, dairy products, and lean meats such as turkey and salmon.[55] The diets useful for managing weight gain described earlier in this article are high in natural tryptophan and melatonins and would, therefore, assist with improved sleep and have a secondary effect on improved weight management. Advice on adequate rest is an important component of weight management.

Increased physical activity

The research behind physical activity in pregnancy does not need restating. That robust research base supports 30 minutes of physical activity as simple as walking 5 days a week. Physical activity improves cardiovascular health, lowers the risk for gestational diabetes and hypertensive disorders, and reduces risk for a cesarean birth.[56,57]

DISCUSSION

Some patients and healthcare providers think any mention of gestational weight gain is based on weight bias.[3,4] Clinicians promoting physiologic pregnancy and birth may believe that the body will intuitively seek foods that are needed for the pregnancy and fetal

Table 4. Conversation using motivational interviewing and advantageous nutrition and weight management strategies for less gestational weight gain than recommended

(Ask for permission to discuss weight) Care provider: Hi Lucy, today our goals are to discuss some routine screening, review your last ultrasound, and discuss gestational weight gain—how does that sound to you?
Client: That sounds good. I am feeling tired lately. I haven't weighed myself at home because we don't have a scale, so I only know my weight when I come here and use your scale.
(Ask for permission) Care provider: Monitoring weight in pregnancy gives us information that can prompt discussions like these. Let's start by looking at your weight trend in pregnancy so far. Is that okay?
Client: Okay. Sure.
(Tell facts. Ask open-ended question.) Care provider: Your pre-pregnancy BMI was 28. The guidelines we use recommend a weight gain of 0.6 pounds per week in the second and third trimester. Let's round that to about half a pound a week. Weight doesn't add on evenly in pregnancy. Over the past 6 weeks you've been gaining about 0.2 pounds per week-just over a pound. I would have expected at least 3 more pounds in that time. Now that you are nearing your third trimester and have no conditions or illnesses affecting your weight, I would have expected more of a gain by now, at least 20 pounds. Your total weight gain is 8 pounds. What do you think could be contributing to this weight trend?
Client: I have been so stressed about gaining too much, because my last baby was bigger than the doctors expected. Maybe I have been undereating. My nausea resolved by my second trimester, but I maintained the habit of skipping breakfast every day, sometimes I also miss lunch.
(Screening for disordered eating) Care provider: Does your weight affect the way you feel about yourself?
Client: No, not at all, I just did not realize I was missing too many meals. It makes more sense now that I am so tired.
(Reflection and Open-ended question) Care provider: A combination of stress and habit formation from coping with first trimester nausea seems to be leading to a new routine of skipping meals. We know that eating enough in pregnancy is important for your energy levels and growth for the baby. What strategies to eat more regular meals have worked for you in the past?
(Change talk) Client: I used to boil 6 eggs on a Sunday and have two with sourdough toast and sliced cucumbers for breakfast sometimes. I am not really into breakfast foods, but I love these multigrain wraps my spouse used to make with black beans, greens, tomatoes, scrambled eggs, salsa, cheese, and some avocado. Having breakfast together in the morning used to be nice family time, I think I would like to get back into that routine again.
(Affirmation and open-ended question) Care provider: Meal prepping and shared family meals are strategies that have worked in the past for you, now that we have discussed the benefits of gaining enough weight in pregnancy, what strategies might you try in the next week or two?
Client: I think I will onboard my spouse to have breakfast with me in the morning again. I think I will be able to meal prep hardboiled eggs, so they are easy to grab if I am in a hurry, or I'll pick up some Greek yogurt cups to pair with toast and fruit or cucumbers.
(Summary) Care provider: Reforming the routine of a regular meal pattern will likely give you the additional energy you need to achieve the desired weight gain. Your next appointment is in two weeks. What do you think about checking in on weight again with the goal of gaining at least 1 pound by then?
Client: That sounds reasonable to me.

Abbreviation: BMI, body mass index.

health. Even if pregnant individuals intuitively sought healthy foods, those foods might not be accessible in local stores nor affordable. Experience with iron supplementation to prevent maternal anemia and folic acid supplementation to reduce the impact of neural tube defects has shown the benefits of antenatal nutritional support.[16] The 2009 IOM gestational weight gain guidelines that denounced dieting during pregnancy showed success in reducing low-birth-weight newborns.[42] In a world where restaurant food portions are excessive[27] and at least a dozen manufactured chemicals serve as obesogens by interrupting hormonal appetite and metabolism processes,[58] most pregnant people need guidance in planning for gestational nutrition and energy needs.

The Health at Every Size (HAES) program promotes weight inclusivity, accepting a diversity of body shapes and sizes without striving for an ideal, health enhancement measures, eating for well-being, and life-enhancing movement.[59] Forty-one Black women aged 18 to 24 years living in the United States were interviewed in 1 study.[59] The women were interested in holistic well-being, clinician attention to individualized health needs, and access to information to support their own health.[59] Canadian Indigenous researchers have called for HAES principles to be used when considering the weight and health of Indigenous individuals, who suffer from weight stigma and discrimination.[60] The advantageous strategies outlined in this review (see Table 2) are consistent with HAES principles.

Motivational interviewing paired with an advantage approach may assist clinicians in providing respectful care that is also essential to HAES programs. An advantage approach recognizes that most individuals attempt to manage their weight at some time. With the patient's permission to discuss prenatal weight gain, the clinician explores the client's past strategies for weight management. Respectful care centers on the client's goals for health, nutrition, and gestational weight gain, not expertise imposed by the healthcare provider. The clinician cross-checks the client's previous weight management strategies against the advantageous strategies supported by the research literature (see Table 2). The clinician can validate strategies from Table 2 that were used in the past and suggest other strategies that the client has not used previously. Tables 1, 3, and 4 present examples of dialogue using MI.

CONCLUSION

Nutritious foods and planned weight management are essential components of optimal gestational weight gain. Advantageous strategies for gestational weight gain optimization include diets such as low-GI and Mediterranean diets, meal planning, home meal preparation, portion control, mindful eating, intuitive eating, self-weighing, adequate sleep, and regular physical activity. Those involved in antenatal care can provide important support to pregnant people by affirming the weight management advantages that patients have used in the past and plan to use during pregnancy. Motivational interviewing can be used to elicit patients' knowledge and experience with weight management and then, by affirming patients' goals and plans for gestational nutrition and weight gain, support the client to achieve those goals. All clinicians involved in perinatal care have the opportunity to assist the patient with optimization of gestational nutrition and weight gain, thereby influencing health for decades to come.

References

1. Saarikko J, Niela-Vilén H, Rahmani AM, Axelin A. Identifying target behaviors for weight management interventions for women who are overweight during pregnancy and the postpartum period: a qualitative study informed by the Behaviour Change Wheel. *BMC Pregnancy Childbirth*. 2021;21(1):200. doi:10.1186/s12884-021-03689-6.
2. Nichols SF, Galesloot S, Bondarianzadeh D, Buhler S. Dietary changes albertan women make during pregnancy: thematic analysis of self-reported changes and reasons. *Can J Diet Pract Res*. 2019;80(1):39–43. doi:10.3148/cjdpr-2018-031.
3. Christenson A, Johansson E, Reynisdottir S, Torgerson J, Hemmingsson E. Shame and avoidance as barriers in midwives' communication about body weight with pregnant women: a qualitative interview study. *Midwifery*. 2018;63:1–7. doi:10.1016/j.midw.2018.04.020.
4. Christenson A, Johansson E, Reynisdottir S, Torgerson J, Hemmingsson E. "... or else I close my ears" How women with obesity want to be approached and treated regarding gestational weight management: a qualitative interview study. *PLoS One*. 2019;14(9):e0222543. doi:10.1371/journal.pone.0222543.
5. Spencer L, Rollo M, Hauck Y, et al. The effect of weight management interventions that include a diet component on weight-related outcomes in pregnant and postpartum women: a systematic review protocol. *JBI Database System Rev Implement Rep*. 2015;13(1):88–98. doi:10.11124/jbisrir-2015-1812.
6. American College of Obstetricians and Gynecologists. Obesity in pregnancy: ACOG Practice Bulletin, Number 230. *Obstet Gynecol*. 2021;137(6):e128–e144. doi:10.1097/aog.0000000000004395.
7. Maxwell C, Gaudet L, Cassir G, et al. Guideline No. 391—pregnancy and maternal obesity part 1: pre-conception and prenatal care. *J Obstet Gynaecol Can*. 2019;41(11):1623–1640. doi:10.1016/j.jogc.2019.03.026.
8. Kominiarek MA, Peaceman AM. Gestational weight gain. *Am J Obstet Gynecol*. 2017;217(6):642–651. doi:10.1016/j.ajog.2017.05.040.
9. McDowell M, Cain MA, Brumley J. Excessive gestational weight gain. *J Midwifery Womens Health*. 2019;64(1):46–54. doi:10.1111/jmwh.12927.
10. American College of Obstetricians and Gynecologists. ACOG Committee opinion no. 548: weight gain during pregnancy. *Obstet Gynecol*. 2013;121(1):210–212. doi:10.1097/01.aog.0000425668.87506.4c.

11. Champion ML, Harper LM. Gestational weight gain: update on outcomes and interventions. *Curr Diab Rep*. 2020;20(3):11. doi:10.1007/s11892-020-1296-1.
12. Ismail K, Stahl D, Bayley A, et al. Enhanced motivational interviewing for reducing weight and increasing physical activity in adults with high cardiovascular risk: the MOVE IT three-arm RCT. *Health Technol Assess*. 2019;23(69):1–144. doi:10.3310/hta23690.
13. Levensky ER, Forcehimes A, O'Donohue WT, Beitz K. Motivational interviewing: an evidence-based approach to counseling helps patients follow treatment recommendations. *Am J Nurs*. 2007;107(10):50–59. doi:10.1097/01.Naj.0000292202.06571.24.
14. Jevitt CM. Best practices in weight management counseling with pregnant women. In: Anderson B, Rooks J, Barroso R, eds. *Best Practices in Midwifery: Using the Evidence to Implement Change*. 2nd ed. Springer Publishing Company; 2016:131–157.
15. Laitner MH, Minski SA, Perri MG. The role of self-monitoring in the maintenance of weight loss success. *Eat Behav*. 2016;21:193–197. doi:10.1016/j.eatbeh.2016.03.005.
16. Marshall NE, Abrams B, Barbour LA, et al. The importance of nutrition in pregnancy and lactation: lifelong consequences. *Am J Obstet Gynecol*. 2022;226(5):607–632. doi:10.1016/j.ajog.2021.12.035.
17. Angelico F, Baratta F, Coronati M, Ferro D, Del Ben M. Diet and metabolic syndrome: a narrative review. *Intern Emerg Med*. 2023;18(4):1007–1017. doi:10.1007/s11739-023-03226-7.
18. Davis C, Bryan J, Hodgson J, Murphy K. Definition of the mediterranean diet: a literature review. *Nutrients*. 2015;7(11):9139–9153. doi:10.3390/nu7115459.
19. Geiker NRW, Magkos F, Zingenberg H, et al. A high-protein low-glycemic index diet attenuates gestational weight gain in pregnant women with obesity: the "An optimized programming of healthy children" (APPROACH) randomized controlled trial. *Am J Clin Nutr*. 2022;115(3):970–979. doi:10.1093/ajcn/nqab405.
20. Mijatovic-Vukas J, Capling L, Cheng S, et al. Associations of diet and physical activity with risk for gestational diabetes mellitus: a systematic review and meta-analysis. *Nutrients*. 2018;10(6):698. doi:10.3390/nu10060698.
21. Livesey G, Taylor R, Livesey HF, et al. Dietary glycemic index and load and the risk of type 2 diabetes: a systematic review and updated meta-analyses of prospective cohort studies. *Nutrients*. 2019;11(6):1280. doi:10.3390/nu11061280.
22. Ni C, Jia Q, Ding G, Wu X, Yang M. Low-glycemic index diets as an intervention in metabolic diseases: a systematic review and meta-analysis. *Nutrients*. 2022;14(2):307. doi:10.3390/nu14020307.
23. Zafar MI, Mills KE, Zheng J, Peng MM, Ye X, Chen LL. Low glycaemic index diets as an intervention for obesity: a systematic review and meta-analysis. *Obes Rev*. 2019;20(2):290–315. doi:10.1111/obr.12791.
24. O'Brien EC, Geraghty AA, O'Sullivan EJ, et al. Five-year follow up of a low glycaemic index dietary randomised controlled trial in pregnancy-no long-term maternal effects of a dietary intervention. *BJOG*. 2019;126(4):514–524. doi:10.1111/1471-0528.15500.
25. Lu CH, Van Blyderveen S, Yu ZM, et al. A goal set too high: factors associated with planning excess gestational weight gain in a prospective cohort study. *J Matern Fetal Neonatal Med*. 2022;35(25):7865–7873. doi:10.1080/14767058.2021.1937988.
26. McCrory MA, Harbaugh AG, Appeadu S, Roberts SB. Fast-food offerings in the United States in 1986, 1991, and 2016 show large increases in food variety, portion size, dietary energy, and selected micronutrients. *J Acad Nutr Diet*. 2019;119(6):923–933. doi:10.1016/j.jand.2018.12.004.
27. Young LR, Nestle M. Portion sizes of ultra-processed foods in the United States, 2002 to 2021. *Am J Public Health*. 2021;111(12):2223–2226. doi:10.2105/ajph.2021.306513.
28. Almiron-Roig E, Solis-Trapala I, Dodd J, Jebb SA. Estimating food portions. Influence of unit number, meal type and energy density. *Appetite*. 2013;71:95–103. doi:10.1016/j.appet.2013.07.012.
29. Ramage S, Farmer A, Apps Eccles K, McCargar L. Healthy strategies for successful weight loss and weight maintenance: a systematic review. *Appl Physiol Nutr Metab*. 2014;39(1):1–20. doi:10.1139/apnm-2013-0026.
30. Roe LS, Rolls BJ. Which strategies to manage problem foods were related to weight loss in a randomized clinical trial? *Appetite*. 2020;151:104687. doi:10.1016/j.appet.2020.104687.
31. Rolls BJ, Roe LS, James BL, Sanchez CE. Does the incorporation of portion-control strategies in a behavioral program improve weight loss in a 1-year randomized controlled trial? *Int J Obes (Lond)*. 2017;41(3):434–442. doi:10.1038/ijo.2016.217.
32. Zuraikat FM, Roe LS, Smethers AD, Rolls BJ. Doggy bags and downsizing: packaging uneaten food to go after a meal attenuates the portion size effect in women. *Appetite*. 2018;129:162–170. doi:10.1016/j.appet.2018.07.009.
33. Klein L, Parks K. Home meal preparation: a powerful medical intervention. *Am J Lifestyle Med*. 2020;14(3):282–285. doi:10.1177/1559827620907344.
34. Ma X, Chen Q, Pu Y, et al. Skipping breakfast is associated with overweight and obesity: a systematic review and meta-analysis. *Obes Res Clin Pract*. 2020;14(1):1–8. doi:10.1016/j.orcp.2019.12.002.
35. Zeballos E, Chelius C. The effects of grazing on daily caloric intake and dietary quality. *Int J Behav Nutr Phys Act*. 2021;18(1):163. doi:10.1186/s12966-021-01226-4.
36. Knol LL, Appel SJ, Crowe-White KM, Brantley C, Adewumi OE, Senkus KE. Development, feasibility, and initial results of a mindful eating intervention: project mindful eating and exercise (MEE): feeding the mind, body, and Soul. *Am J Health Educ*. 2021;52(4):171–184. doi:10.1080/19325037.2021.1930615.
37. Simonson AP, Davis KK, Barone Gibbs B, Venditti EM, Jakicic JM. Comparison of mindful and slow eating strategies on acute energy intake. *Obes Sci Pract*. 2020;6(6):668–676. doi:10.1002/osp4.441.
38. Denny KN, Loth K, Eisenberg ME, Neumark-Sztainer D. Intuitive eating in young adults. Who is doing it, and how is it related to disordered eating behaviors? *Appetite*. 2013;60(1):13–19. doi:10.1016/j.appet.2012.09.029.
39. Kessler C. Pathophysiology of obesity. *Nurs Clin North Am*. 2021;56(4):465–478. doi:10.1016/j.cnur.2021.08.001.
40. Hurst DJ, Schmuhl NB, Voils CI, Antony KM. Prenatal care experiences among pregnant women with obesity in Wisconsin, United States: a qualitative quality improvement assessment. *BMC Pregnancy Childbirth*. 2021;21(1):139. doi:10.1186/s12884-021-03629-4.
41. Reid AE, Rosenthal L, Earnshaw VA, et al. Discrimination and excessive weight gain during pregnancy among Black and Latina young women. *Soc Sci Med*. 2016;156:134–141. doi:10.1016/j.socscimed.2016.03.012.
42. Institute of Medicine Guidelines. The National Academies Collection: reports funded by National Institutes of Health. In: Rasmussen KM, Yaktine AL, eds. *Weight Gain During Pregnancy: Reexamining the Guidelines*. Washington DC: National Academies Press; 2009.
43. Wilkinson S, Beckmann M, Donaldson E, McCray S. Implementation of gestational weight gain guidelines—what's

more effective for ensuring weight recording in pregnancy? *BMC Pregnancy Childbirth*. 2019;19(1):19. doi:10.1186/s12884-018-2162-x.
44. Robertson MC, Raber M, Liao Y, et al. Patterns of self-monitoring technology use and weight loss in people with overweight or obesity. *Transl Behav Med*. 2021;11(8):1537–1547. doi:10.1093/tbm/ibab015.
45. Daley AJ, Jolly K, Jebb SA, et al. Feasibility and acceptability of regular weighing, setting weight gain limits and providing feedback by community midwives to prevent excess weight gain during pregnancy: randomised controlled trial and qualitative study. *BMC Obes*. 2015;2:35. doi:10.1186/s40608-015-0061-5.
46. Brownfoot FC, Davey MA, Kornman L. Routine weighing to reduce excessive antenatal weight gain: a randomised controlled trial. *BJOG*. 2016;123(2):254–261. doi:10.1111/1471-0528.13735.
47. Downs DS, Savage JS, Rivera DE, et al. Adaptive, behavioral intervention impact on weight gain, physical activity, energy intake, and motivational determinants: results of a feasibility trial in pregnant women with overweight/obesity. *J Behav Med*. 2021;44(5):605–621. doi:10.1007/s10865-021-00227-9.
48. Kaviani S, vanDellen M, Cooper JA. Daily self-weighing to prevent holiday-associated weight gain in adults. *Obesity (Silver Spring)*. 2019;27(6):908–916. doi:10.1002/oby.22454.
49. Fealy S, Davis D, Foureur M, Attia J, Hazelton M, Hure A. The return of weighing in pregnancy: a discussion of evidence and practice. *Women Birth*. 2020;33(2):119–124. doi:10.1016/j.wombi.2019.05.014.
50. Itani O, Jike M, Watanabe N, Kaneita Y. Short sleep duration and health outcomes: a systematic review, meta-analysis, and meta-regression. *Sleep Med*. 2017;32:246–256. doi:10.1016/j.sleep.2016.08.006.
51. Papatriantafyllou E, Efthymiou D, Zoumbaneas E, Popescu CA, Vassilopoulou E. Sleep deprivation: effects on weight loss and weight loss maintenance. *Nutrients*. 2022;14(8):1549. doi:10.3390/nu14081549.
52. King TL, Brucker MC, Osborne K, Jevitt CJ. *Varney's Midwifery*. 6th ed. Burlington, MA: Jones & Bartlett Learning; 2019.
53. Capers PL, Fobian AD, Kaiser KA, Borah R, Allison DB. A systematic review and meta-analysis of randomized controlled trials of the impact of sleep duration on adiposity and components of energy balance. *Obes Rev*. 2015;16(9):771–782. doi:10.1111/obr.12296.
54. Fenton S, Burrows TL, Skinner JA, Duncan MJ. The influence of sleep health on dietary intake: a systematic review and meta-analysis of intervention studies. *J Hum Nutr Diet*. 2021;34(2):273–285. doi:10.1111/jhn.12813.
55. Zuraikat FM, Wood RA, Barragán R, St-Onge MP. Sleep and diet: mounting evidence of a cyclical relationship. *Annu Rev Nutr*. 2021;41:309–332. doi:10.1146/annurev-nutr-120420-021719.
56. American College of Obstetricians and Gynecologists. Physical activity and exercise during pregnancy and the postpartum period: ACOG Committee Opinion, Number 804. *Obstet Gynecol*. 2020;135(4):e178–e188. doi:10.1097/aog.0000000000003772.
57. Mottola MF, Davenport MH, Ruchat SM, et al. No. 367-2019 Canadian guideline for physical activity throughout pregnancy. *J Obstet Gynaecol Can*. 2018;40(11):1528–1537. doi:10.1016/j.jogc.2018.07.001.
58. Kladnicka I, Bludovska M, Plavinova I, Muller L, Mullerova D. Obesogens in foods. *Biomolecules*. 2022;12(5):680. doi:10.3390/biom12050680.
59. Adams V, Gladden A, Craddock J. Perceptions of health among Black women in emerging adulthood: alignment with a Health at Every Size perspective. *J Nutr Educ Behav*. 2022;54(10):916–924. doi:10.1016/j.jneb.2022.07.004.
60. Cyr M, Riediger N. (Re)claiming our bodies using a Two-Eyed Seeing approach: Health-At-Every-Size (HAES®) and Indigenous knowledge. *Can J Public Health*. 2021;112(3):493–497. doi:10.17269/s41997-020-00445-9.

The NCPD test for this article is available online only. Log onto the journal website, www.jpnnjournal.com, or to www.NursingCenter.com/CE/JPNN to access the test. For more than 100 additional nursing continuing professional development activities related to neonatal topics, go to www.NursingCenter.com/ce.

Lippincott® NursingCenter®

NCPD Nursing Continuing Professional Development

TEST INSTRUCTIONS

- Read the article. The test for this nursing continuing professional development (NCPD) activity is to be taken online at **www.NursingCenter.com/CE/JPNN**. Tests can no longer be mailed or faxed.
- You'll need to create an account (it's free!) and log in to access My Planner before taking online tests. Your planner will keep track of all your Lippincott Professional Development online NCPD activities for you.
- There's only one correct answer for each question. A passing score for this test is 8 correct answers. If you pass, you can print your certificate of earned contact hours and access the answer key. If you fail, you have the option of taking the test again at no additional cost.
- For questions, contact Lippincott Professional Development: 1-800-787-8985.
- Registration deadline is March 6, 2026.

PROVIDER ACCREDITATION

Lippincott Professional Development will award 2.0 contact hours for this nursing continuing professional development activity.

Lippincott Professional Development is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation.

This activity is also provider approved by the California Board of Registered Nursing, Provider Number CEP 11749 for 2.0 contact hours. Lippincott Professional Development is also an approved provider of continuing nursing education by the District of Columbia, Georgia, West Virginia, New Mexico, South Carolina, and Florida, CE Broker #50-1223. Your certificate is valid in all states.

Payment: The registration fee for this test is $21.95.

The authors and planners have disclosed that they have no financial relationships related to this article.