Feasibility of acceptance-based health coaching targeting food cravings in pregnancy

Lauren Blau
University at Albany, State University of New York, lblau@albany.edu

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FEASIBILITY OF ACCEPTANCE-BASED HEALTH COACHING TARGETING FOOD CRAVINGS IN PREGNANCY

By

Lauren E. Blau

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Abstract

Excess gestational weight gain (GWG) is the leading high-risk condition in pregnancy in the United States and associated with a variety of poor delivery and health outcomes for the mother and infant. The majority of interventions addressing diet and physical activity in pregnancy have at best small effects on weight gain and pregnancy health outcomes. Past studies on weight loss in non-pregnant samples have demonstrated the utility of addressing psychological factors to modify eating behaviors. Currently, there is a lack of research to evaluate the efficacy of targeting psychological factors to improve cognitive and affective coping skills when attempting to facilitate health behavioral change specifically in pregnancy. Food cravings, an affective-laden cognitive experience, have been shown to account for over 30% of the variance in excess GWG and could therefore serve as useful targets for weight management among women in the perinatal period. The current studies sought to determine the acceptability and feasibility of an acceptance-based health coaching workshop targeting food cravings in pregnancy via community-based recruitment. Feasibility was addressed through examining the recruitment process, resources, retention rates, and measurement burden. Acceptability was evaluated through measures of credibility and expectancy and perceptions of appropriateness and utility of the intervention. Study 1 examined concurrent and retrospective acceptability for pregnant women while study 2 addressed prospective acceptability, with pregnant women and perinatal providers as identified stakeholders. Pregnant women in study 1 (n=4) were recruited through various sites in the community and provided detailed feedback on the proposed intervention. Recruitment for study 2 was conducted online in response to restrictions placed by the COVID-19 pandemic (n=47) and sought to address limitations that arose in study 1. Pregnant women in study 1 conducted a pre- and post-intervention assessment battery including measures of food cravings, eating patterns, thought suppression,
acceptance and willingness, and obsessive-compulsive aspects of eating. Pregnant women and perinatal providers in study 2 completed a series of questions developed by study coordinators to assess acceptability and perceived need of the proposed intervention. Results from study 1 showed that the proposed intervention was generally feasible and acceptable. Measures of feasibility showed treatment retention as adequate, and measurements were generally appropriate and minimally burdensome. Participants deemed the intervention credible for coping with food cravings and expected the skills learned to be helpful in the future. Recruitment for the intervention was a major barrier, with attempts to connect with sites in the community proving to be difficult. Study 2 provided some understanding related to issues with recruitment in study 1. Specifically, pregnant women preferred to participate in this intervention at their Ob/Gyn’s office and overwhelmingly stated that having the time to participate would be a major barrier. Lack of sufficient responses prevented us from reaching saturation in the sample of perinatal providers, but preliminary evidence suggests that they appeared willing to refer their patients to this workshop. Overall, the proposed acceptance-based health coaching study targeting food cravings in pregnancy appeared feasible, and future research should examine the efficacy of the proposed intervention in preventing excess GWG and associated adverse health outcomes on a larger scale.

Keywords: Food cravings, excess gestational weight gain, Acceptance and Commitment Therapy, health coaching interventions
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FEASIBILITY OF ACCEPTANCE-BASED HEALTH COACHING TARGETING FOOD CRAVINGS IN PREGNANCY

General Introduction

Excess gestational weight gain (GWG) is the leading high-risk condition in pregnancy in the United States and associated with a variety of poor delivery and health outcomes for mother and infant. Research has attempted to identify efficacious interventions to prevent excess gestational weight gain primarily by targeting diet and physical activity levels in pregnant women. The majority of interventions addressing diet and physical activity in pregnancy have at best small effects on weight gain and pregnancy health outcomes. Past studies on weight loss in non-pregnant samples have demonstrated the utility of targeting cognitive and affective factors to modify eating behaviors (Godin, Amireault, Belanger-Gravel, Vohl, Perusse & Guillaumie, 2010; Basset-Gunter et al., 2013). Psychological factors like depressive symptoms and stress are implicated in gestational weight gain and post-partum weight retention and the Institute of Medicine (IOM) suggests that psychosocial factors like stress, anxiety, depression and social support be considered in intervention design to help prevent excess GWG (Siega-Riz et al., 2010; Dayan et al., 2018; Matthews et al., 2018; Yaktine and Rasmussen, 2009).

To date, there is a lack of research to evaluate the efficacy of targeting psychological factors to improve cognitive and affective coping skills when attempting to facilitate health behavioral change specifically in pregnancy. Cognitive and affective factors such as frequent food cravings, high body dissatisfaction, emotional eating, and low levels of mindfulness have been implicated in excess gestational weight gain and postpartum weight retention (Orloff, Flammer, Hartnett, Liquorman, Samelson & Hormes, 2016; Blau, Orloff, Flammer, Slatch, & Hormes, 2018; Phillips, Ross, & Skouteris, 2001; Matthews et al., 2018). Food cravings
specifically have been shown to account for 30% of the variance in excess gestational weight gain and could thus serve as a useful target for interventions (Orloff et al., 2018). There is therefore a need for the development and evaluation of feasible, efficacious, and easily disseminable interventions to target cognitive and affective underpinnings of food cravings in pregnancy. Acceptance-based interventions could have a promising effect with this population, as acceptance and defusion techniques have previously been shown to effectively reduce cravings and consumption of sweets in overweight and obese women (Forman, Hoffman, Jurascio, Butryn & Herbert, 2013). Pregnancy is considered a “teachable moment,” and efficacious interventions targeting eating and weight behaviors can have life-long health benefits for both the mother and child.

Background

Obesity, defined as having a Body Mass Index (BMI) of over 30 kg/m², is on the rise in the United States with more than one-third of adult Americans and nearly 20% of children and adolescents affected (Hales, Carroll, Fryar, & Ogden, 2017). Slightly more women than men meet criteria for overweight and obesity, and about 37% of young adult women of child-bearing age are obese. This figure has tripled since 1975, making obesity the most common high-risk condition during pregnancy. Furthermore, over 50% of women in the United States gain more than the recommended amount of weight during gestation (Deputy, Sharma, Kim and Hinkle, 2015). According to the Institute of Medicine (IOM) guidelines, pregnant women should gain weight based on their pre-pregnancy body mass index (BMI) as follows: 28-40 pounds for BMI in the “underweight” range (<18.5 kg/m²); 25-35 pounds for “normal” weight women (18.5-24.9 kg/m²); 15-25 pounds for women with pre-pregnancy overweight (25.0-29.9 kg/m²); and 11-20 pounds for women with pre-pregnancy obesity (≥30.0 kg/m²) (Rasmussen & Yaktine, 2009). In
the United States, women with pre-pregnancy overweight and obesity appear to have increased odds of gaining above the recommended amounts compared to women with BMIs in the “normal” range. For example, in a cross-sectional, population-based study of the prevalence and characteristics associated with excess gestational weight gain (GWG), researchers found that 64% of overweight and obese (class I) women gained in excess of IOM recommendations (Deputy et al., 2015). Women who are overweight and obese prior to pregnancy are already at increased risk for adverse health and delivery outcomes. Maternal overweight and obesity, compounded by an increased likelihood to gain in excess of the IOM guidelines during gestation, pose a significant challenge for women in the perinatal period.

Risk factors for excess gestational weight gain. Demographic, medical, and behavioral characteristics interconnect to contribute to excess weight gain in pregnancy. Smoking cessation and hypertensive conditions have consistently been shown to be positively associated with excess GWG, while race and ethnic factors have been differentially associated with weight gain in pregnancy (Deputy et al., 2015). Although African Americans and Hispanics are more likely to be overweight or obese prior to pregnancy, they are no more likely than White and non-Hispanic women to gain in excess during gestation and may in fact have lower odds of gaining weight above the recommended amount (Hales et al., 2017; Krukowski, Bursac, McGehee, & West, 2013; Liu, Gallagher, Carta, Torres, Moran & Wilcox, 2014). Indeed, Black and Hispanic women have ~50% greater odds than White women to have inadequate GWG if they had a pre-pregnancy BMI of less than 25 kg/m² (Liu et al., 2014).

Maternal education has been shown to be associated differentially with excess gestational weight gain depending on race/ethnicity (Huynh et al., 2014). Having a college or more education was associated with a decreased risk for excess GWG in non-Hispanic White women
but an increase in GWG for Hispanic women. Maternal age also appears to be a risk factor, with younger mothers at increased risk of exceeding GWG guidelines whereas older women tend to gain less weight during pregnancy (Olafstdottir et al., 2006; Rodrigues et al., 2010; Stuebe, Oken, & Gillman, 2009; Restall et al., 2014). Low-income women (those living at <150% of the poverty line) are more likely to be overweight pre-pregnancy, gain in excess of the recommended amount during pregnancy, and experience a higher risk of poor health post-partum (Nunnery, Ammerman, & Dharod, 2018). Furthermore, women identify having low income as a barrier to appropriate weight gain due to the lack of access to fresh foods, the expense of buying fresh foods, and lack of safe or affordable exercise resources (Vandstone et al., 2018).

Demographic characteristics and pre-pregnancy BMI are therefore important factors to consider in ensuring healthy weight gain in pregnancy.

**Complications associated with excess gestational weight gain.** Excess gestational weight gain is associated with a variety of poor medical outcomes for both the mother and the child. Obesity and excess gestational weight gain in pregnancy increase risk of gestational diabetes mellitus (GDM), gestational hypertension, preeclampsia, and complicated delivery, including cesarean sections (Rasmussen and Yaktin, 2009; Gante, Amaral, Dores & Almeida, 2015). Obesity and excess weight gain during pregnancy also put women at risk of developing chronic diseases later in life including type 2 diabetes, hypertension, cardiovascular disease, and cancers (Aviram, Hod & Yogev, 2011; Colditz et al., 1995; Berg & Scherer, 2005; Calle & Kaaks, 2004). Furthermore, excess GWG puts the mother at risk for increased post-partum weight retention (PPWR) and obesity long-term (Siega-Riz et al., 2010; Amorim et al., 2007; Walker, 1996; Rooney & Schaubberger, 2002; Olson, Strawderman, Hinton, Pearson, and 2003; Scholl et al., 1995; Amorim et al., 2007; Rooney & Schaubberger, 2002). In a study of pregnant
women with obesity, risk for PPWR greater than 10 pounds was two times higher among women who gained more than 15 to 20 pounds during gestation, and four times higher for women who gained greater than 25 to 35 pounds (Vesco et al., 2009). Risk for significant PPWR thus appears to increase in an almost linear fashion as more excess weight is gained in pregnancy.

Excess weight gain in pregnancy is implicated in a variety of adverse conditions for the infant including low Apgar scores, macrosomia, increased body mass index, and heightened risk of overweight and obesity throughout his or her lifespan (Oken et al., 2007; Oken et al., 2010; Wrotniak, Shults, Butts, Stettler, 2008; Stotland, Hopkins, Caughey, 2004; Voerman et al., 2019). Risk for adolescent obesity is 1.55 times higher among those who were large for gestational age, which in turn puts them at increased risk for cardiovascular disease, diabetes, and metabolic health issues throughout their lifetime (Geserick et al., 2018). These findings support the theory that a portion of adult health is programmed during fetal development. The Barker Hypothesis, proposed almost three decades ago, theorizes that intrauterine growth retardation, low birth weight, and premature birth are predictors of hypertension, coronary heart disease, and diabetes in middle age (Barker, 1992). More recently, the fetal origins hypothesis (while controversial for its mainly correlational, not causal research) extends the Barker Hypothesis to propose the idea that events in utero can have latent effects that do not appear until mid-life or later (Almond and Currie, 2011). Emerging evidence suggests that this framework applies to risk for overweight/obesity as well, as research has shown that anywhere from 11.4% to 19.2% of childhood overweight/obesity could be attributable to excess GWG (Voerman et al., 2019).

**Interventions targeting excess gestational weight gain.** Because of the substantial adverse impact of excess weight gain and obesity during gestation on the weight-related health
trajectories of both the mother and the child, it is important to identify predictors of excess weight gain in pregnancy that may serve as suitable targets for preventive interventions. Diet and exercise are the mostly commonly cited factors contributing to excess gestational weight gain, due to their relatively direct impact on weight loss and maintenance outside of pregnancy. Diet and nutritional recommendations for pregnant women are based on pre-pregnancy BMI. For a pre-pregnancy BMI in the 18.5-24.9 kg/m² (“healthy”) range, women are recommended to gain one to four pounds during the first trimester and two to four pounds per month in the second and third trimesters (ACOG). However, the average woman in America does not fall into the “healthy” pre-pregnancy BMI range, so it is important to modify guidelines accordingly. The CDC recommends pregnant women eat a balanced diet high in whole grains, vegetables, fruits, low fat dairy, and lean protein, while limiting added sugars and solid fats. The importance of physical activity in pregnancy is also stressed in official guidelines, with the CDC recommending around 150 minutes per week of moderate aerobic activity throughout gestation. Along with dietary and physical activity guidelines, the CDC recommends tracking pregnancy weight gain, working with health care providers at the beginning of and throughout the pregnancy, and knowing caloric needs per trimester (2020).

Based on these recommendations, the majority of current interventions designed to prevent excess GWG target diet and exercise, yet few are effective in substantially modifying weight gain trajectories. Furthermore, a recent meta-analysis found minimal evidence to suggest that these interventions- even ones that reduced risk of excess GWG- lead to meaningful impacts on neonatal health outcomes (Muktabhant, Lawrie, Lumbiganon & Laopaiboon, 2015). Dietary interventions generally include a combination of caloric restriction, counseling with a dietician, and a specific dietary plan based on percentage of carbohydrates, protein, and fat (Tanentsapf et
The average difference in weight change between dietary interventions and treatment-as-usual control groups has been shown to range from 1-2 kg, which is generally not enough to prevent gestational weight gain above IOM guidelines (Tanantsapf, Heitman, & Adegboye, 2011; Buschur & Kim, 2012; Bennet et al., 2018; Mitanches, Ciangura, & Jacqueminet, 2020). There is also no evidence of a significant effect of dietary interventions on post-partum weight retention at six weeks post-partum (Tanentapf et al., 2011).

**Intervention impact on gestational diabetes mellitus.** Importantly, recent meta-analyses examining obstetric outcomes show very little evidence for the influence of physical activity or lifestyle interventions targeting excess gestational weight gain on health outcomes like birth weight, large/small for gestational age, pre-eclampsia, gestational diabetes or hypertensions, and pre-term delivery (Mitanches, Ciangura, & Jacqueminet, 2020; Thangaratinam et al., 2012). Gestational weight gain increases the risk of women developing gestational diabetes mellitus (GDM) and it is generally thought that by preventing excess GWG, risk for development of GDM will reduce as well. Meta-analyses that evaluated the effect of interventions on reducing risk of GDM, however, show mixed results. Overall, trials seem to decrease risk of GDM by 15 to 40%, with one review concluding dietary interventions are more effective and one review concluding interventions targeting physical activity are more effective (Bennett et al., 2018; Mitanchez, Ciangura, & Jacqueminet, 2020). It is important to note that a reduction in GDM risk was found in studies which focused on women who were of “healthy” BMI prior to pregnancy, not women with overweight or obesity. Lifestyle interventions, or those that include both dietary and physical activity components, did not change the risk of developing GDM or reduce risk of excess GWG (Bennett et al., 2018; Mitanchez et al., 2020). This is consistent with past reviews showing mixed-behavior interventions are not beneficial in reducing
excess gestational weight gain (Thangaratinam et al., 2012). This could be because women during pregnancy already have a wide range of new demands to navigate and attempting to change multiple behaviors at once may be more difficult and overwhelming than isolating one behavior at a time. As expected, these trials overall have not shown consistent benefits for the offspring either, like preterm birth, macrosomia, or large/small birth weight (Mitanchez et al., 2020). These inconsistencies across different interventions as well as lack of research and demonstrated efficacy specifically in women who are in overweight/obese BMI categories prior to pregnancy, points to the need for development of interventions that can not only target appropriate weight gain, but also effectively impact maternal and neonatal health outcomes across weight categories.

Research generally shows that while dietary interventions can be effective in reducing gestational weight gain in “normal” weight women, the reduction in weight is generally not enough to help them stay within IOM guidelines for GWG. Furthermore, these interventions have not been shown to be effective in pregnant women with overweight or obesity and are rarely studied in women from diverse ethnic backgrounds. Therefore, a task force was founded by the National Institutes of Health (NIH) in order to target adequate weight gain in pregnancy specifically for women with overweight/obesity. Seven clinical trials made up the Lifestyle Intervention for Expectant Moms “LIFE-Moms” research consortium which attempted to identify effective interventions to reduce excess GWG among overweight and obese women (Clifton et al., 2016). Secondary outcomes like maternal, neonatal, and anthropometric measures, physical activity, sleep and complications of pregnancy and delivery were also measured (Clifton et al., 2016). Results showed that certain interventions from the LIFE-Moms studies were effective in reducing GWG by a meaningful amount (defined as more than the average 2 kg in
prior studies). However, the studies that achieved significant weight loss were very methodologically involved, including partial meal replacements, weekly counseling sessions, home-based interventions, and/or additional technology (Phelan et al., 2018; Van Horn et al., 2018; Altazan et al., 2017; Haire-Joshu et al., 2019). It is difficult to determine how widespread and disseminable these studies would be for women across the United States without individual or hospital-based prenatal funding. Furthermore, the LIFE-Moms interventions did not show a significant effect on reducing pregnancy complications or improving neonatal outcomes, which is the ultimate goal in the development of interventions aimed at limiting excess gestational weight and ensuring healthy weight gain.

In summary, while some studies, such as the LIFE-MOMs cohort interventions, have shown to be effective in reducing gestational weight gain, the overall amount was either not enough to keep women within IOM guidelines for GWG (~2 kg), or the interventions were too involved methodologically and burdensome for participants for widespread dissemination. Furthermore, most interventions lack efficacy in women with overweight or obese pre-pregnancy BMIs who are at greatest risk for excess GWG and associated adverse outcomes. In light of the lack of an established “gold standard” intervention to prevent excess gestational weight gain and related health complications for mother and baby, there is an urgent to identify novel targets and mechanisms by which pregnant women can enact meaningful weight and health behavior change. Research in non-pregnant populations clearly shows that interventions targeting psychological and lifestyle interventions produce improvements in eating behaviors and weight outcomes (Peckmezian & Hay, 2017; Jacob et al., 2018). Therefore, it is necessary to examine psychological factors that influence eating and weight change in pregnancy in hopes to elucidate mechanisms that can influence dietary behavior.
Psychological Factors Impacting Gestational Weight Gain

Besides the apparent genetic and metabolic factors that influence risk for obesity and excess weight gain in pregnancy, psychological mechanisms like food cravings, cognitive restraint and emotionality have all been implicated in eating behavior change and weight gain during gestation.

**Affect.** Specific emotions and mood states have been associated with eating and weight gain in both pregnant and non-pregnant individuals (Canetti, Bachar, & Berry., 2002; Chang Nitzke, Guilford, Adair, & Hazard, 2008; Lobel et al., 2008; Blau et al., 2018). Affective experiences in pregnancy are common, and pregnant women frequently identify emotional and social factors as important influences on their eating behavior (Paterson, Hay-Smith, & Treharne, 2016). Emotional eating, or eating in response to an internal mood state, is associated with weight gain at 35 weeks gestation, such that emotional eaters in pregnancy have significantly higher weight gain compared to women who endorse other eating styles (van der Wijden, 2014). Elevated depressive symptoms have been shown to be related to weight gain across all trimesters of pregnancy and women who are more fatigued, stressed, and anxious consume more food in pregnancy compared to women who are not (Altazan et al., 2019; Redman et al., 2017; Hill et al., 2016; Hartley et al., 2015; Hurley et al., 2005). It has been hypothesized that depression and anxiety symptoms adversely impact a woman’s ability to manage weight in pregnancy (Smid, Victorson, & Plunkett, 2013). Targeting affective symptoms of depression and anxiety with existing empirically supported treatments could thus be effective in preventing excess GWG, specifically in women who are more likely to increase consumption in response to these affective experiences.
**Cognitive Restraint.** Cognitive dietary restraint is the perceived ongoing mental effort to limit caloric intake to manage weight gain. Cognitive dietary restraint has been associated with a variety of negative outcomes in non-pregnant populations, showing links to disordered eating, low self-esteem, and higher perceived stress (McLean and Barr, 2003). Studies in non-pregnant populations show that cognitive restraint is equivocally associated with weight gain (McGuire, Jeffery, French, Hannan, 2001; Urbanek, Metzgar, Hsiao, Piehowski, & Nickols-Richardson, 2015; McGuire, Jeffery, French, & Hannan, 2001). Theories of cognitive restraint propose a distinction between flexible restraint and rigid restraint, such that rigid restraint is more commonly associated with weight gain and disordered eating (Westenhoefer, Stunkard, & Pudel 1999).

Dietary restraint in pregnancy has also been associated with weight gain, such that women who endorse restrained eating prior to pregnancy are at increased odds of exceeding IOM guidelines for GWG (Heery et al., 2016). Restrained eating during pregnancy in normal weight and overweight/obese women is also associated with greater weight gain compared to that of non-restrictors or dieters (Mumford, Siega-Riz, Herring and Evenson, 2008). Past studies have shown that depressive symptoms and over-evaluation of eating, weight and shape is associated with increased dietary restraint, which in turn is associated with loss of control over eating (Goossens, Braet, & Bosmans, 2010). These findings suggest that dietary restraint is effective as a weight loss tool, but only when other psychological stressors common to pregnancy (like depression or body image dissatisfaction) are not already depleting limited cognitive resources. Pregnancy may increase cognitive load, leaving those high in restraint vulnerable to overeating and weight gain.
**Food Cravings.** Food cravings are defined as an intense desire or urge to consume a specific food that are subjectively difficult to resist (Gendall, Joyce & Sullivan, 1997; Pelchat, 2002; Hormes & Rozin, 2010). Food cravings have consistently been cited as a common experience in pregnancy, with at least 70% of women experiencing food cravings at some point during gestation (Bayley, Dye, Jones, DeBono & Hill, 2002; Pope, Skinner & Carruth, 1992; Fairburn, Stein & Jones, 1992; Flaxman & Sherman, 2000). Food cravings are present in early pregnancy, with the highest frequency occurring during the second trimester when nausea and taste aversions have largely subsided and weight gain typically begins to accelerate (Tierson, Olson & Hook, 1985; Weigel et al., 2000; Pope et al., 1992; Bayley et al., 2002).

Due to the ubiquitous nature of food cravings in pregnancy, there are many theories and hypotheses for why they occur. Early reports of food cravings hypothesized they were related to physiological need for increased energy intake, hormonal fluctuations, or nutrient deficits (Hook, 1978; Hormes & Rozin, 2010). In fact, many women endorse the belief that food cravings occur in response to physiological changes during pregnancy like hormonal fluctuations or acute nutritional deficiencies (Blau, Lipsky, Dempster, Colman, Siega-Riz, Faith, & Nansel, 2019). However, hypotheses regarding the etiology of food cravings during pregnancy that invoke physiological mechanisms have received little empirical support, with more recent theories attributing food cravings to cultural and psychosocial factors (Orloff & Hormes, 2014). Women in the United States report cravings for a variety of foods during gestation, most commonly citing urges for sweets and carbohydrates like chocolate, chocolate-containing foods, ice cream, fruit, cereals, and pizza (Hill & Heaton, 1994; Orloff et al., 2016). Research on eating behaviors in pregnancy demonstrates that food cravings are associated with increased caloric intake, higher consumption of sweets, and gestational diabetes mellitus (Pope et al., 1992; Belzer et al., 2010).
In fact, food cravings have been shown to account for almost one-third of the variance in excess GWG, further strengthening the connection between food cravings and weight gain in pregnancy (Orloff, Flammer, Hartnett, Liquorman, Samelson, & Hormes, 2016).

Not surprisingly, food cravings are associated with increased weight in non-pregnant populations as well (Buscemi, Ryabak, Berlin, Murphy, & Raynor, 2017; Dalton, Finlayson, Walsh, Halseth, Duarte, & Blundell, 2017). Cravings for high fats and fast foods have been shown to act as a mediator between external eating (eating in response to an external cue like sight or smell) and BMI (Burton, Smit & Lightowler, 2016). Interestingly, in pregnancy, food cravings for these high fat foods act as a mediator between emotional eating and excess gestational weight gain, which highlights the change from more external-based cues to affect and mood as predictors for increased gestational weight gain (Blau, Orloff, Flammer, Slatch, & Hormes, 2018). Internal, affective cues in pregnancy (as opposed to external cues in non-pregnancy) may be the crucial mechanistic change that research needs to target in order to achieve meaningful outcomes for weight.

Food cravings, therefore, appear to be an ideal target for intervention given their documented relationship to excess food consumption, emotional eating, and gestational weight gain. Dietary restraint in non-pregnant populations has been shown to increase frequency of food cravings (Polivy, Coleman, & Herman, 2005), such that those who have restricted specific foods experience greater overeating. Experiential avoidance, or a person’s unwillingness to be present in an unpleasant situation and attempting to change their aversive private experience has been implicated in cravings and binge eating (Hayes et al., 1996; Forman et al., 2007; Lillis, Hayes, & Levin, 2011). Experiential avoidance (EA) also plays a role in the association between cognitive restraint and food cravings (Fahrenkamp, Darling, Ruzicka, & Sato, 2019). Thought suppression,
an EA process by which individuals try to not think about unpleasant images and thoughts, seems to be a key factor in the relationship between experiential avoidance and food cravings (Coffino, Heiss, & Hormes, 2018). Due to the impact cognitive restraint has on “giving in” to food cravings and overeating, research is needed to examine whether targeting cognitive restraint and experiential avoidance can reduce the impact food cravings have on eating and weight in pregnancy.

**Proposed Model**

As stated previously, there is no evidence to support the claim linking food cravings to physiological causes in pregnant or non-pregnant populations (Rogers & Smit, 2000; Hormes, 2014). Cravings for food and other addictive substances (e.g., alcohol, cigarettes) are now theorized as cognitively motivated states. The Elaborated Intrusion (EI) Theory posits that cravings, or intense desires for a substance, are affectively-laden cognitive events that can be conceptualized by a two-step process. First, an external (e.g., smelling a freshly baked cookie walking by the bakery) or internal cue (e.g., stress, boredom, anxiety) elicits an automatic thought about the target of the craving (May, Andrade, Kavanagh & Hetherington, 2012; Kavanagh, Andrade, & May, 2005). Next, that thought is actively elaborated upon via imagery and implications of obtaining that craved item (e.g., what the cookie looks like, how it would taste in one’s mouth, memories of the last time eating the cookie). Studies showing that craving intensity is related to sensory modalities such as vividness of food image, and gustatory and olfactory modalities provide compelling empirical support for this theoretical framework (Tiggemann & Kemps, 2005). This elaborated imagery maintains and strengthens the craving episode and increases motivation to eat the craved food.
Certain cognitive techniques that disrupt the same working memory processes involved in the elaboration of craving-related imagery have been shown to be effective in reducing craving intensity (Kemps & Tiggemann, 2012). For example, by introducing dynamic visual noise displays, the elaboration process is disrupted, thereby reducing the vividness and intensity of the craving (Kemps & Tiggemann, 2007). Visual and olfactory imagery tasks have similarly been shown to reduce cravings by interfering with working memory resources that support craving-related imagery. This competing information interrupts the cognitive elaboration process that maintains the craving and thereby reduces craving intensity (Kavanagh et al., 2005; Kemps & Tiggemann, 2007).

In addition to strategies that interrupt the “elaboration” phase of EI theory, acceptance-based strategies can effectively target the initial “intrusion” phase. For example, cognitive defusion can reduce the intrusiveness of craving-related thoughts, thereby reducing vividness of imagery and craving intensity- halting the craving process prior to the elaboration stage (Schumacher, Kemps, & Tiggemann, 2017). By disrupting the EI process, both through targeting the automatic thought intrusion and then through disrupting the elaboration phase, preliminary evidence shows these interventions can reduce craving intensity and consumption.

**Need for Psychological Interventions to Target Cognitive and Affective Factors**

EI Theory, coupled with the previously discussed research on the role of emotions in weight-related behaviors, suggest that addressing cognitive and affective factors may lead to more long-lasting and meaningful health behavior change related to diet and weight for women in pregnancy compared with interventions targeting behaviors related to diet and physical activity. While there is a plethora of studies showing that cognitive and emotional factors influence eating and weight, few studies to date have used psychological approaches in...
pregnancy to target these health outcomes. Women shared in past focus groups that they can identify the relationship between stress and eating in their pregnancy and shared they would like specific skills to target stress-eating, making stress reduction a meaningful and potentially useful target for future interventions (Thomas et al., 2014). Gesell and colleagues (2015) implemented an intervention using a cognitive-behavioral framework in order to reduce the proportion of women who gained in excess of the IOM guidelines. Their intervention included health education, practicing core competency skills (impulse control, problem solving, time and money management, coping with stress and anxiety), social skills building, group exercise, group cooking, support system building, and measurement and weight tracking. This intensive, 12-week, 90-minute group session intervention was effective in reducing risk of exceeding IOM guidelines in normal weight women, but not for women with pre-pregnancy BMI in the overweight/obese classes. The intervention is promising but intensive, and more research is needed to examine the efficacy of psychological interventions on established predictors of weight gain.

Findings from a qualitative study of women’s motivations for changing eating behaviors in pregnancy are consistent with the hypothesized impact of cravings on food intake in pregnancy and highlight the difficulty women have with resisting urges to consume highly desired foods (Swift et al., 2017). Pregnant women surveyed in this study used terminology consistent with extremes and report a lack of control over their cravings. The women felt they ‘needed to’ eat a certain craved food or they ‘could not’ consume others, showing rigid thinking patterns (Swift et al., 2017). Pregnant women in other samples describe a similar intensity as well, including feeling a lack of perceived control over eating behaviors and weight gain (Bianchi, Huneau, Le Goof, Verger, Mariotti, & Gurviez, 2016). Self-efficacy, or the belief
surrounding our own ability to achieve a goal or complete a task depends on whether we think we can do it, has an important role in behavior change (Bandura, 1977). Varying levels of perceived self-efficacy and ability to endure cravings without having to act on them—also known as acceptance—are cited as important factors in food decision-making abilities (Bianchi et al., 2016).

**Acceptance and Commitment Therapy**

Researchers have examined the efficacy of cognitively- and behaviorally-based strategies for weight management in non-pregnant populations using the framework of acceptance and commitment therapy. Acceptance and Commitment therapy (ACT) is a third-wave cognitive behavioral approach based on Relational Frame Theory (RFT; Hayes, Barnes-Homes, & Roche, 2001). ACT methods were born from RFT, which asserts that the natural and normal use of language can have maladaptive consequences on our psychological well-being and behaviors (Lillis and Kendra, 2014). Humans abstract features of stimulus-responses towards contexts in which cues are related, but not necessarily suitable or adaptive. Evolutionarily, human language is necessary for protection, understanding, and learning. However, it is that same ability that can cause psychological suffering. Individuals make associations between stimuli based on past experience or learning, and according to RFT, all other related events are likely to be emotionally valanced in the same way. For example, if someone gets bitten by a snake and then later their friend hisses loudly at them, they are likely to be scared. Despite the fact there is no snake present, and at the time of the snake bite the snake did not hiss, the associations made between the bite, the snake and the hiss, results in a situation where an otherwise benign stimulus causes psychological pain. Relational Frame Theory asserts that these cognitive and language processes, unique to humans, cause psychological suffering. ACT as a
clinical treatment intervention therefore targets the psychological problems that the human language produces (McEnteggart, 2018).

Acceptance and Commitment Therapy addresses both psychological well-being and functioning by bridging together cognitive and behavioral approaches (Hayes, 2004). Unlike traditional Beckian cognitive therapy, ACT emphasizes the mindfulness model where the aim is to alter the function of thoughts, without altering their form. In this sense, cognitive restructuring and emphasis on the material of thoughts, which is often the focus of traditional CBT, is not relevant in ACT. The purpose of ACT interventions is not to reduce negative emotions or psychological distress but to encourage growth and psychological flexibility, working with the suffering rather than trying to get rid of it—known as “workability” (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Psychological flexibility in relation to ACT is the ability to recognize unwanted feelings, thoughts or bodily sensations and take values-based action despite them. ACT incorporates 6 major elements to increase psychological flexibility and workability: acceptance, mindfulness, defusion, self-as-context, values, and committed action (Hayes, 2004).

With regard to ACT-based interventions for health behavior change, mindfulness, acceptance, and defusion techniques are most commonly employed (Zhang et al., 2018).

The goal in applying an ACT-based framework to the context of food cravings would not be to eliminate cravings, but rather reduce their adverse impact on food intake and weight. Acceptance of affective and cognitive experiences is essential to the ACT framework, where emotions and thoughts are taught to be normal and expected, outside our control, and accepted as they are (Forman et al., 2009; Hayes, Strosahl & Wilson, 1999). In the context of food cravings, if someone is trying to avoid the thought or memory of a warm, chocolate chip cookie, attempts to suppress or avoid the craving will increase its intensity, both because the thought becomes
more salient and because the control efforts to suppress the thoughts are verbally linked to the cookie itself (Hayes, 2006). Mindfulness and acceptance of the craved food can be a powerful tool to notice and tolerate the food craving without attempting to suppress it or change it, thereby reducing the mental struggle.

Cognitive “defusion,” another tool of the ACT framework, involves creating distance between oneself and her thoughts or feelings through various techniques. Metaphors and exercises are used to explain cognitive defusion, including techniques like looking at thoughts instead of from them (“Rose-colored glasses”), noticing thoughts come and go (“Leaves on a Stream”), and thanking your mind for the thought (Harris, 2008). In the context of food cravings, cognitive defusion techniques can be useful in helping one recognize that the thought or emotion tied to the food craving does not have to be acted upon, but rather can come and go without one needing to “do” anything. The ability to defuse from the food craving experience involves creating enough space between oneself and her thoughts in order to reflect and then act in ways that align with her values.

Values clarification and committed action are vital, core principles of the ACT framework and methods by which clarifying values and moving towards goals are achieved. It is hypothesized that if women are able to accept and defuse cognitions related to food cravings, they will be better equipped to make behavioral decisions guided by their pregnancy goals. For example, a pregnant woman may have been diagnosed with gestational diabetes in a previous pregnancy and having a healthy second pregnancy may be a value of hers. Eating a nutrient-rich, low sugar diet during gestation may be a goal of hers in her next pregnancy, and food cravings may be a perceived barrier to achieving that goal. The ability to accept and defuse the urge associated with a food craving will ideally allow this woman to make clear decisions about her
eating patterns that are in line with her pregnancy goals. Tools like mindfulness, acceptance, and defusion can be used to enable continuation on the path of committed action, despite the food craving experience.

Acceptance and Commitment Therapy has been used successfully to target weight-related concerns, with at least preliminary empirical support for use to address body dissatisfaction and disordered eating patterns in women and college students, and emotional eating, body dissatisfaction, and quality of life in those who underwent bariatric surgery (Pearson, Follette & Hayes, 2012; Juarascio, Forman, & Herbert, 2010; Weineland, Arvidsson, Kakoulidis, & Dahl, 2011). Mindfulness has been shown to decrease binge-eating and emotional eating in populations who engage in these behaviors (Katterman, Kleinman, Hood, Nackers, & Corsica, 2014). Furthermore, mindfulness-based techniques show preliminary support for healthy weight management in pregnancy, with low levels of mindfulness correlating with excess GWG-possibly due to this previously identified decrease in emotional eating (Olson & Emery, 2015; Matthews et al., 2018).

Acceptance and Commitment Therapy approaches also have growing support as effective interventions for reducing the impact of food cravings on excess consumption (Forman, Hoffman, McGrath, Herbert, Brandsma, & Lowe, 2007; Forman, Hoffman, Juarascio, Butryn, & Herbert, 2013). An analog study in undergraduate students compared acceptance- versus control-based strategies for coping with food cravings, whereby participants were either taught distraction and cognitive restructuring (control-based) or experiential acceptance and defusion techniques (acceptance-based; Forman et al., 2007). Participants in the acceptance-based group were taught that cravings are outside of voluntary control and attempts to suppress an uncontrollable internal experience only make cravings more intense and/or distressing. A
mnemonic was created to help participants learn the strategies: Distancing, Acceptance, Willingness, Noticing (DAWN). Participants with a high susceptibility to the presence of food respond better to acceptance-based strategies, while those with a low susceptibility to the presence of food responded better to control-based strategies (Forman et al., 2007). Because pregnant women have been shown to be highly responsive to both external and emotional cues, ACT-based psychological strategies for weight management may be especially suitable for this population (Blau et al., 2018; van der Wijden, Steinbach, van der Poeg, van Mechelen, van Poppel, 2014).

No study to date has employed ACT-based interventions specifically for weight related issues in pregnant women. Lillis and Kendra (2014) posit that ACT could be a useful add-on or combined treatment for improved long-term weight loss outcomes. Due to the emphasis on cognitive defusion, acceptance of thoughts and emotions, and past success in targeting food cravings, ACT is a promising intervention for addressing adequate weight gain in pregnancy.

**Health Coaching Interventions**

Health coaching (HC) is a collaborative, person-centered approach to motivating health behavior change (Jordan, Wolever, Lawson, & Moore, 2015). Usually, health coaches work with individuals to establish and maintain dietary plans, safe exercise routines, and self-monitoring. While there can be significant overlap in the fields of health coaching and psychotherapy, one major way in which health coaching differs from therapy is that mental health and the therapeutic process are not addressed in health coaching (Jordan and Livingstone, 2013). Cavanaugh, who wrote the *Evidence-Based Coaching Handbook* describes the difference:

*One of the differentiation points between therapy and coaching is that in therapy, the level of instability, anxiety, or tension is so high as to be destructive of the*
person's ability to function effectively in his systems. They have slipped from the edge of chaos into chaos itself. Hence often one of the proximal goals of therapy is to help the person reduce distress so as to enable the emergency of a new order. In other words, therapy seeks to comfort the afflicted.

In coaching, however, the coach is often called upon to afflict the comfortable! We often seek to increase information flow, energy, and diversity to a level that helps the person move out of stable mind-sets and behaviors so as to create new insights, understandings, and actions (Cavanaugh, 2007).

The advantage of a health coaching model is that a variety of personnel can be trained to implement the intervention including social workers, nurses, mental health providers, and care coordinators. This allows for widespread dissemination and practice without hiring new providers or burdening an already established clinic with outside staff. The health coaching model could be especially useful when employing in the context of pregnancy, as most existing interventions that lower risk for excess GWG are time-consuming, expensive, and intensive, and thereby difficult to disseminate widely (Siega-Riz, Bodnar, Stotland, & Stang, 2020).

Past studies have shown the application of health coaching to reduce BMI in non-pregnant populations (Hill, Richardson, & Skouteris, 2015). Very few studies have examined the efficacy of health coaching models to target health and eating behaviors specifically in pregnant women. One case study elucidated the potential utility of an integrative health coaching intervention in a woman with pre-pregnancy overweight, including at the time of conception (Yang, Wroth, Parham, Strait, & Simmons, 2013). Through telephone sessions, the participant demonstrated improvements in physical activity, energy expenditure, knowledge and confidence to engage in health-promoting behaviors. While she did not reach her target weight by the end of
the intervention, the woman did achieve her target goal 8 months postpartum. A recent pilot study addressing the acceptability and feasibility of a one-on-one remote health coaching intervention during pregnancy was found to be acceptable, with effective recruitment strategies and high participant satisfaction (Seward et al., 2018). In the pilot study, health coaches employed flexible targets including encouragement of healthful diets, improve physical activity, decrease screen time and optimize sleep duration. Results were focused specifically on the acceptability and feasibility of the intervention, and clinical outcomes related to excess gestational weight gain were not reported.

Another study used a health coaching method to prevent excess GWG, incorporating one-on-one and group sessions with pregnant women (Hill, Skouteris, Fuller-Tyszkiewics, & McPhie, 2016; Skouteris et al., 2016). The HC model encouraged patients to target one healthy pregnancy goal among the domains of nutrition, physical activity, weight, energy levels, positive emotions/expectations, and stress. The primary outcome measure was GWG with secondary aims measuring coping skills, motivation, and nutrition. The intervention was not successful at limiting or preventing excess GWG, however, it was effective in improving motivation for change and active coping strategies for stress. Hill and colleagues (2016) posit that the lack of efficacy with regard to minimizing GWG may be due to the fact that their intervention did not focus or target a singular behavior to change, but rather let the women decide what their goals would be. Only 8% of participants chose to target weight gain specifically, making it unclear how many women were actually motivated to achieve the researchers’ primary outcome (Hill et al., 2016). These findings echo the conclusions of previously mentioned systematic reviews, which highlight that focusing on either diet or physical activity alone are more likely to reduce risk of excess GWG than combining behavioral changes. Comprehensive behavioral
interventions targeting different domains may be too broad of an intervention to have success with weight outcomes in pregnancy.

These studies serve as preliminary evidence that health coaching is an appropriate and accessible approach to facilitate behavior change in pregnant women. By focusing on a specific target that is a known predictor of GWG, such as food cravings, HC interventions could be vital in enacting meaningful change. Health coaching has the added benefit of reducing burden on OB/GYN providers, can be cost-effective as opposed to methodologically-intense interventions previously mentioned, and less stigmatizing than traditional psychotherapy.

**Proposed Intervention**

Obesity and overweight in pregnancy are one of the most common high-risk conditions in pregnancy and have significant effects on both the health outcomes of the mother and baby. Excess gestational weight gain is predictive of post-partum weight retention and risk of obesity in both the mother and her child. With 40% of women in the United States overweight or obese prior to pregnancy, and 48% of women gaining in excess of the recommended amount during pregnancy, it is extremely important to identify interventions that can target excess gestational weight and obesity in the perinatal period (CDC, 2020). To date, few studies have been effective in preventing excess gestational weight gain, and most studies that target diet and exercise do not address cognitive and affective factors that often drive eating- and weight-related behaviors (Blau & Hormes, 2020). Because food cravings have been shown to be predictive of excess gestational weight gain and identified as a psychologically salient aspect of women’s experience, targeting food cravings in pregnancy could mitigate risk for excess weight gain (Orloff et al., 2016; Blau et al., 2019).
As previously stated, food cravings are conceptualized in EI theory as cognitively motivated states. Encounters with cues can trigger cognitive, emotional, or physiological states which can cause intrusive thoughts or images (May et al., 2012). The thoughts and images are elaborated upon which strengthens the motivation to then eat the craved foods. This is consistent with past research showing that external and emotional aspects of eating are associated with weight gain (Blau et al., 2018; Burton, Smith, & Lightower, 2007). Furthermore, research has shown that psychological factors, specifically factors like emotional suppression and cognitive restraint, are related to gestational weight gain (Yu et al., 2021). Acceptance and Commitment interventions have demonstrated preliminary efficacy for eating and food cravings and mindfulness- based approaches could be effective by interrupting the “elaboration” process of the EI theory. Targeting mechanisms like acceptance, willingness to experience, cognitive defusion, and present-focused awareness, could be instrumental in helping women address their food cravings and therefore, weight, during the perinatal period.

Health coaching is a particularly useful model to use in the pregnancy population, as it has been shown to be effective in integrated care approaches without adding additional resources or personnel into daily practice (Liddy, Johnston, Nash Ward & Irving, 2014). In addition to the flexibility afforded by the ability of individuals from many different fields to practice, the health coaching model also allows for variation in delivery of intervention- whether that be in person, via telephone, or text-based measures.

To our knowledge, no study has used an ACT-based health coaching approach to target food cravings in pregnancy. Health coaching and ACT-based principle align well, as both ACT and health coaching are present-focused, non-judgmental approaches targeted at achieving goals and aligning with values (National Board for Health & Wellness Coaching; Hayes et al., 1999).
Using these two approaches in tandem could therefore be an ideal way to mitigate the effect of food cravings on gestational weight gain in pregnancy. It is thus important to examine the acceptability and feasibility of an ACT-based health coaching model in the pregnancy population.

**Study 1: Feasibility and Acceptability of Proposed Health Coaching Workshop**

**Introduction**

**Acceptability and Feasibility Studies**

Pilot or feasibility studies are used in clinical areas like public health, medicine, and psychology as a first step in developing successful interventions (Thabane et al, 2010; Bowen et al., 2009). While researchers often use “pilot” and “feasibility” synonymously, for the sake of the current project, “feasibility” will be used to as a term to describe preliminary studies, as “pilot” typically refers to a study trial, often already having a control group and/or employing randomization (Whitehead, Sully & Campbell, 2014). A feasibility study is defined as “a trial study carried out before a research design is finalized to assist in defining the research question or to test the feasibility, reliability, and validity, of the proposed study design.”

Feasibility studies are implemented to determine whether an intervention is appropriate for further, often larger scale testing like a randomized controlled trial (Lancaster, Dodd, & Williamson, 2002). Ideally, feasibility studies are used as the pre-requisite to efficacy testing and examine aspects like acceptability, demand, implementation, practicality, adaptation, integration, and expansion (Thabane et al., 2010; Bowen et al., 2009). Specific elements of the study that are examined include testing of data collection forms or questionnaires, randomization procedures, recruitment and consent, how appealing the planned intervention is to the target population, and selection of appropriate outcome measures (Lancaster et al., 2004). Feasibility studies are
indicated when: community partnerships need to be established, few studies have examined a specific technique, socio-cultural values of the target population have not been guided by research or knowledge, there is empirical need for a unique approach to the topic, method or other outcome, or previous interventions have not been successful or were successful in a different setting than the one of interest (Bowen et al., 2009). Many feasibility studies employ mixed method approaches, often using focus groups and qualitative data in order to either examine the attitudes, beliefs, and expectations of the target population or to provide insight into the experience of the participants (Creswell and Plano, 2018).

Feasibility studies can be useful for examining the acceptability of health behavior interventions before implementing them on a larger scale in vulnerable or specific populations, such as pregnancy, specifically because of the unique demands and experiences of women in the perinatal period. Many feasibility studies have been conducted recently on weight-related health behaviors in pregnancy in order to better understand women’s experiences, opinions, and needs (Styles, Loftus, Nicolson, & Harms, 2019; Locher, Waseleski, Sonneville, Resnicow & Chang, 2020; Hinton et al, 2017; Dangel, Demtchouk, Prigo, & Kelly, 2020; Jewell, Avery, Barber, & Simpson, 2014; Allen-walker, Hunter, Holmes & McKinley, 2020). While there have been feasibility studies conducted using ACT in the pregnancy period, they have focused primarily on the development of interventions targeting outcomes like perinatal mood and anxiety (Waters et al., 2020), not weight or eating related behaviors. Given the strong rationale for using ACT to target food cravings in pregnancy, there is a need to examine the feasibility of an ACT-based, health coaching workshop focusing on food cravings in pregnancy.

Current Study Design
The design of the current study was based on past work assessing the efficacy of ACT and health coaching groups in other settings and with non-pregnant populations. Acceptance and Commitment Therapy strategies can be applied to many different focus areas, and protocols have been tailored to fit the needs and resources of the context and population (Hayes, Association for Contextual Behavioral Sciences; ACBS). For example, ACT has been adapted for use in psychosis, gambling disorder, grief, couples therapy, anger, a variety of mood disorders, Irritable Bowel Syndrome, perinatal mood and anxiety disorders, eating disorders, and chronic pain (ACBS). While not all are evidence-based approaches, Hayes asserts that the strategies central to the ACT hexaflex- contact with present moment, acceptance, defusion, self-as-context, committed action, values- can and should be flexibility applied (ACBS). As discussed previously in this manuscript, mindfulness, acceptance, and cognitive defusion techniques appear most useful in interrupting the two-step Elaborated Intrusion (EI) process of food cravings (Forman et al., 2007; Schumacher et al., 2017). The objective in using an ACT-based approach to target food cravings is to reduce experiential avoidance and cognitive restraint, build awareness and experiential acceptance, and increase values-based living.

In addition to previous application for a variety of populations and disorders, Acceptance and Commitment Therapy has been used in different settings and modalities. The Acceptance and Commitment Therapy model has been adapted for use in primary care settings in a brief, time-limited format, including one-day group workshops (Strosahl, Robinson, & Gustavsson, 2012; Dindo, 2015). Principles of ACT have also been used in health coaching interventions showing preliminary success (Wolever et al., 2010; Spence, Cavanagh, & Grant, 2010). Dindo (2015) has argued that using the term “workshop” rather than “therapy” for an ACT-based group is better suited for settings where participants might have different expectations than if recruited
from a mental health care setting (Mohr, Hart & Howard, 2006). A benefit to one-day interventions is that they ensure treatment adherence. Because the pregnant population is already burdened by factors like childcare, household activities, pain, and pregnancy fatigue (Groth, Simpson, Fernandez, 2016; Goodrich, Cregger, Wilcox, & Liu), a one-time group intervention seems most feasible for maintaining treatment adherence. Due to the time-constraints commonly reported by women in the perinatal period, it is important to target women in settings that will facilitate recruitment and treatment adherence.

Many intervention studies targeting weight gain in pregnant women have been conducted in predominantly white women, recruited through clinical settings like hospitals or doctors’ offices (Leung, McDonald, Kaplan, Giesbrecht & Tough, 2013; Clifton et al., 2016). Feasibility of health coaching studies should be conducted in community settings in order to target women in more widely accessible locations, hopefully attracting a greater sample of women. During pregnancy, women are seen by healthcare providers less often at the beginning of their pregnancy, and approaching women in community-based settings, rather than at Obstetric clinics, might promote greater enrollment (Hutchesson et al., 2020). Furthermore, targeting women in community-based settings that are familiar to them and offer child-care may increase the likelihood of engagement.

Pregnancy has been deemed a “teachable moment” for the promotion of weight control and obesity prevention, specifically with regard to healthy eating and physical activity among women (Phelan, 2010). Pregnancy represents a crucial role shift and identity change in a woman’s life, in which she is balancing the desire to protect and nurture both self and fetus and may be especially motivated to make changes to her diet to positively impact baby’s health (Atkinson, Shaw, & French, 2016; Bianchi et al., 2016). Swift and colleagues (2017) found that
women make conscious decisions regarding behavior change starting at the beginning of their pregnancy, triggered by the confirmation of their conception. However, 30-40% of women do not begin receiving antenatal care until their second trimester (Hutchesson et al., 2020). Since food craving frequency and intensity typically increase at the start of the second trimester, which is also when weight gain usually accelerates, health coaching interventions should engage women during this time period. Targeting women’s food cravings at the start of the second trimester may be the key to enacting meaningful, lasting behavioral change to impact excess GWG.

**Specific Aims & Hypotheses**

Consistent with the goals of feasibility studies, our assessment strategies mainly captured implementation outcomes. Our primary aim was to evaluate the feasibility and acceptability of acceptance-based health coaching targeting food cravings in pregnant women, delivered in a one-session group format in the community. Indicators of feasibility include recruitment process, resources, retention rates, and measurement burden (Bowen et al., 2009; Lancaster et al., 2004; Proctor et al., 2011; Thabane et al., 2010). Acceptability was examined via assessments of intervention credibility and expectancy, and perceptions of appropriateness and utility of the intervention. Though not typically within the scope of feasibility studies, as a secondary aim, we also sought to examine the preliminary impact of the proposed intervention on clinical outcome measures; specifically, measures of acceptance, willingness, and thought suppression. Initial intervention effects will only be examined if the primary aim of feasibility is met.

It was hypothesized that it would be feasible to adapt an ACT protocol to a group format accessible to pregnant women in the community. It was furthermore hypothesized that ACT-based health coaching targeting food cravings in pregnancy would be an acceptable intervention
for women, as reflected in participant feedback forms, qualitative data, and responses to adherence questions. Regarding our secondary aim related to preliminary intervention efficacy, it was also hypothesized that the workshop would produce increased acceptance, willingness, and decreased thought suppression, measured using the Food Acceptance and Action Questionnaire, the White Bear Suppression Inventory, and the Obsessive Compulsive Eating Scale.

**Methods**

All methods were approved by the Institutional Review Board at our academic institution. All respondents were informed of the nature and purpose of the study and consented to the intervention and audio recording prior to participation.

**Participants**

Participants were four pregnant women recruited from local community organizations like the YMCA, JCC, and various yoga or perinatal health studios in the local area (see Table 1 for a comprehensive list of recruitment locations).

Inclusion criteria were as follows: 1) Pregnant women in their second trimester (i.e., between 14 and 27 weeks gestation), 2) ages 18-40 years, 3) fluent in written and spoken English, and 4) able to give informed consent. We elected to recruit women in their first and second trimesters for participation in a workshop during their second trimester, when nausea and aversions largely subside and food cravings increase (Weigel et al., 2011). Targeting women for a workshop during their second trimester also gives participants enough time to employ the skills they will hopefully learn, in order to make meaningful changes before delivery. Inclusion criteria were broad by design to capture as many women as possible across diverse samples and BMI groups. While the target of the study was food cravings, inclusion criteria did not specify that experience of cravings was a prerequisite for participation. Flyers described the research study as
a workshop to help women who experience cravings during pregnancy, therefore the workshop sample was expected to be largely self-selected to be women who identified with experiencing cravings during pregnancy. Language on the flyer was developed by the principal investigator and dissertation advisor, explaining that the study was looking for “women who are pregnant and interested in learning skills to help them cope more effectively with food cravings” using “mindfulness” and “acceptance-based strategies” (see Appendices A and B). One recruitment site specifically asked for an interview with the principal investigator in order to collaboratively develop recruitment language that was thought to appeal to her audience more. In that interview, language was developed to describe that the study was coming from a “body positive” perspective. “Body Positivity” is psychosocial movement developed to challenge fat shaming culture and unrealistic feminine beauty standards. Body positivity refers to promoting the acceptance of all bodies, regardless of shape or size, and helping people build confidence and acceptance of their own bodies (Cwynar-Horta, 2016). The goal of including a “Body positive perspective” in this interview was to explain that the goal of the workshop was not to tell women how or what to eat, but to reduce psychological suffering in order to facilitate a more flexible approach to attaining women’s value-driven goals in pregnancy (See Appendix E).

Recruitment

The principal investigator recruited participants through contacting community centers and health studios in a large city in the Northeast. Recruitment sites were targeted if they were family-oriented (YMCA, JCCS) or catered to the perinatal population (gyms with “Mommy and Me” classes, perinatal yoga, baby stores, etc.) Recruitment lasted four months and took place between November of 2019 and March of 2020. 18 sites were identified, informed of the nature of the study, and asked to post flyers at their location. Of the 18 identified locations, seven
offered to post flyers at their sites. The study coordinator met with five individuals from separate sites to explain the research study and request in-person recruitment. Of those five sites, three offered in-person recruitment—two Young Men’s Community Center (YMCA) and one Jewish Community Center (JCC). The other two sites—a baby store and a yoga instructor who taught prenatal classes at different studios—agreed to post flyers but did not offer in-person recruitment. Flyers were posted at the five locations and online, through Facebook groups associated with the local recruitment sites and perinatal sites with instructions to email study personnel if interested in participating (See Appendices C and D). In addition to postings online and at sites, the principal investigator recruited in-person from the YMCA throughout those four months. The principal investigator tabled at the YMCA for three days each week between November and February for recruitment purposes.

**Procedure**

Participants were asked to attend one health coaching workshop in their second trimester. The session length lasted about two hours: 20 minutes for the consenting process, 30 minutes to complete the baseline assessment battery, and one hour for the workshop. This was a mixed method, repeated measures design, as both quantitative and qualitative methods were used to assess acceptability and feasibility of the workshop and there were two follow-up timepoints post-intervention.

The health coaching workshops were facilitated by the principal investigator. In total, there were six workshop dates scheduled before the COVID-19 pandemic hit the United States. Two of the six workshops were completed. Participants were assigned a code number with paper and electronic data being stored in secure locations. All women in those two workshops were consented and given a baseline assessment to complete on the day of the intervention (See
Appendix F). The consenting, baseline assessment, and intervention took place at the site of recruitment. After consenting, participants completed the baseline survey on pen and paper (Appendix G), prior to the start of the intervention. Participants then attended the workshop (see Manual attached and description of Manual development below; Appendices K and L). After the intervention, participants completed a five-minute survey asking credibility, expectancy, and qualitative questions about their experience in the workshop and what they have learned in order to address acceptability and feasibility (Appendix H).

A 30-minute follow up survey was emailed to the participants one month after their participation in the workshop, which was largely identical to the baseline survey (Appendix I). The goal of the follow-up survey was to examine feasibility of the assessment battery (see description of measures below), specifically, comprehension and appropriateness of measures, clarity of measures, timing of measure completion, and appropriateness of the primary outcome (Lancaster et al., 2004). Secondary aims were to examine preliminary evidence of changes in measures of food craving frequency and giving in, patterns of food consumption, food acceptance and willingness, and cognitive restraint as a result of participating in the intervention. Participants were emailed a brief, five-question acceptability and adherence survey after their reported due date in order to examine adherence to and use of the ACT skills taught in the workshop during pregnancy (Appendix J). Questions in the adherence survey asked what skills participants had used in the remainder of their pregnancy and assessed credibility and perceived future utility of these skills.

Compensation

Participants were compensated with a $10 Visa gift card after each of the main assessment batteries (i.e., at the in-person workshop and first follow-up) for up to $20 in Visa
cards. If a participant wished to withdraw or was excluded from participation, they were not asked to return any compensation given and were not eligible to receive any more compensation.

**Protocol development**

Intervention development was based off previous ACT-based interventions (Penn Body Image Project) and conducted in collaboration with and guidance from Alix Timko, Ph.D., who has expertise in acceptance-based behavioral approaches for disordered eating. The study principal investigator developed the current intervention using materials and guidance from Dr. Timko’s Penn Body Image Project and adapted them to fit the current study.

The project protocol was designed to address four main pillars of the ACT “hexaflex,” namely awareness, defusion, acceptance and values. Previous studies targeting food cravings have used acceptance, mindfulness, and defusion techniques, and our approach added values in order to connect skills discussed with what women stated as important to them in pregnancy (Forman et al., 2017; Forman et al., 2013; Lacaille et al., 2014; Schumacher, Kemps, & Tiggemann, 2017). Adding the values portion to the ACT protocol was thought to be especially important in the pregnant population, as discussing values in the workshop could ideally help women clarify health-related goals and associated behaviors for their pregnancy. The overall aim of the intervention was to teach women skills based in ACT to address cognitive and affective processes known to impact food cravings. These cognitive processes included cognitive restraint, thought suppression, experiential avoidance. The goal was to address these maladaptive patterns by increasing psychological flexibility through greater experiential awareness, acceptance and willingness, and cognitive defusion. Through using awareness, defusion, acceptance, and committed action, the hope was women would be better equipped to interrupt the elaborated-intrusion theory of food cravings and continue on their value-driven path.
Skills-based learning was implemented in the workshop through metaphor and in-person exercises. To explain the concept of **awareness**, a mindful eating exercise was conducted in session. The chocolate cake metaphor (“Try for 30 seconds not to think about a warm, gooey, chocolate cake…”) explained how thought suppression seemingly paradoxically leads to an increase in the salience of thoughts relating to chocolate cake, which elicits and maintains the craving and urge to eat the craved food. To explain the concept of **experiential acceptance & willingness**, the Chinese finger trap metaphor, the Drop the Rope Activity, and Monsters on a Bus metaphor were explored and discussed. “Urge surfing,” a metaphor that linked the concept of a craving to a wave, encouraged the women to imagine the food craving experience as a wave and “ride the wave,” accepting the craving until it subsided. To address the concept of **defusion**, women were taught to create some space and disentangle from the thoughts, using examples like “I am having the thought that…”. The members participated in a “Leaves on a Stream” exercise to illustrate another method for cognitive defusion. A powerpoint was used and handouts distributed to participants (Appendix K).

The study principal investigator had previous experience in conducting Acceptance and Commitment Therapy as a clinical psychology graduate student and participated in a workshop reviewing skills and themes of ACT with Alix Timko prior to the intervention. The principal investigator facilitated the ACT-based health coaching workshop. The intervention workshop sessions took place at YMCA and JCC community rooms. Participants were informed of the time and location in advance of their workshop. The study intervention started with introductions and verbal review of informed consent. All participants were allowed to ask questions and review material before signing the informed consent documents. After informed consent and confidentiality was reviewed, the health coaching workshop commenced with a brief overview
of what health coaching is, assessment of current coping skills, and orientation to the ACT model. Participants were asked to identify a value specific to their pregnancy to keep in mind throughout the intervention. See Appendix K for full workbook.

**Measures: Self-Report**

**Demographics.** The following demographic information was collected: age, race, current weight, pre-pregnancy weight, height, and gestational age.

**Food Craving Inventory (FCI)** (White, Whisenhunt, Williamson, Greenway, & Netemeyer, 2002). The FCI measures frequency of craving for “high fat foods,” “carbohydrates/starches,” “sweets,” and “fast food fats,” along with the frequency of giving in to those cravings. The FCI was amended to capture cravings for foods we previously found to be frequently endorsed specifically by pregnant women (e.g., spicy or sour foods, fruits), along with non-food substances women may crave (e.g., alcohol and tobacco, caffeine). In the current sample, the measure was found to have adequate to poor reliability for scales measuring “frequency” of specific food cravings and likelihood of “giving in” to those cravings. The four factors include “high fat foods” (Cronbach’s α = 0.63 for “frequency,” 0.69 for “giving in” in the present sample), “sweets” (Cronbach’s α = 0.72, -0.60)\(^1\), “carbohydrates/starches” (Cronbach’s α = 0.40, 0.13), and “fast food fats” (Cronbach’s α = 0.71, 0.55). The FCI has been shown to have good validity and test-retest reliability (Martin, O’Neil, Tollefson, Greenway, & White, 2008; White & Grilo, 2005; White et al., 2002).

**Food Cravings Questionnaire- Trait- Revised (FCQ-T-r)**; Meule, Hermann, and Kubler, 2014). The FCQ-T-r is a 15-item self-report measure of general food craving and its correlates. Items included in the FCQ-T-r belonged to the original version’s subscales lack of

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\(^1\) Unlikely Cronbach’s alphas- negative or values greater than one- are due to small sample size.
control over eating (5 items), thoughts or preoccupation with food (5 items), intentions and plans to consume food (2 items), emotions before or during food craving (2 items), and cues that may trigger food craving (1 item). The FCQ-T-r does not include items of the original version's subscales anticipation of positive reinforcement, anticipation of relief, hunger, and guilt. Unlike the original version, the FCQ-T-r has a one-factorial structure. Indicators of reliability for the FCQ-T-r in this sample was yielded unlikely values due to the very small sample size on which they are based.

Food Craving Acceptance and Action Questionnaire (FAAQ; Jurascio, Forman, Timko, Butryn, & Goodwin, 2011). The FAAQ is a 10-item measure of acceptance about food related thoughts that is specifically designed to examine links between acceptance and problematic eating. The FAAQ was included at pre- and post-workshop assessment points to track dynamic changes in acceptance of cravings and attempts to control or change thoughts related to the target of the craving. Items are scored on a six-point Likert scale ranging from, “very seldom true” to “always true.” Indicators of reliability for the “Willingness” and “Acceptance” scale yielded unlikely values due to the very small sample size, ($\alpha = -2.22$ and 0.86, respectively). The FAAQ measures psychological flexibility about eating-related experiences, and ideally captured the main mechanism of change targeted by the ACT-based workshop. However, the FAAQ has never been formally validated in a pregnant sample. It was included here to begin to explore the appropriateness of this measure among women who are pregnant.

White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994; Muris, Merkelbach, & Horelenberg, 1996). The WBSI is a 15-item measure of thought suppression. Thought suppression has been shown to maintain craving episodes by paradoxically increasing
the salience of thoughts related to the target of craving. Participants in the workshop are taught that attempts to suppress thoughts and urges are not expected to be helpful. The WBSI was designed to assess degree of thought suppression. It was included here to examine its utility to quantify thought suppression specifically in a pregnant sample and in the context of the proposed intervention. Items are scored on a five-point Likert scale ranging from “strongly disagree” to “strongly agree.” Reliability in this sample was good (Cronbach’s α = .86).

**Dutch Eating Behavior Questionnaire (DEBQ; van Strien, Frijters, Berger, & Defares, 1986).** The DEBQ is a measure of specific eating styles. It assesses eating in response to “external” and “emotional” cues, along with “restrained” or chronically restricted eating. The item is scored on a five-point Likert scale ranging from “never” to “very often.” The scale contains 10 items related to “restrained” eating (Cronbach’s α = .91), 13 items related to “emotional” eating (Cronbach’s α = .96) and 10 items related to “external” eating (Cronbach’s α = .69). All three DEBQ subscales have been shown to be associated with food cravings and weight (Burton et al., 2007; Mumford et al., 2008). In pregnant women, food cravings mediate the relationship between emotional eating and gestational weight gain (Blau et al., 2018). In addition to administering the DEBQ to assess feasibility of this measure in the pregnancy sample, this scale was selected in order to further elucidate the relationship between external, restrained, and emotional eating on food craving frequency and consumption in pregnant populations.

**The Obsessive Compulsive Eating Scale (OCES; Niemic, Boswell, & Hormes, 2016).** The OCES is a 14-item measure of food cravings and disordered eating from a cognitive standpoint. Adapted from the Obsessive Compulsive Drinking Scale, the OCES has been psychometrically validated and used to assess cognitive aspects of cravings. The OCES items captures “obsessive” and “compulsive” dimensions underlying eating behaviors. Six items load
on to the “obsessive” subscale (Cronbach’s $\alpha = .94$) and eight on to the “compulsive” subscale (Cronbach’s $\alpha = .99$). The OCES addresses intrusiveness of thought, which is consistent with the first step of craving etiology according to the elaborated- intrusion theory of desire, and urge to act on the thought, consistent with the second step in EI theory. Furthermore, the OCES captures aspects of control like distraction and avoidance, which have been shown to increase distress.

Administering the OCES specifically in pregnancy is important in order to assess its feasibility for use and eventual validation in this population.

**Treatment Credibility.** Questions regarding treatment credibility and expectancies were administered immediately post-intervention. In an attempt to keep the post-intervention questionnaire brief, four items were included- three credibility questions and one expectancy question. These four items were based on the Credibility/Expectancy Questionnaire (CEQ), which assessed cognitive and affective elements regarding believability of treatment and whether participants think and feel it will be effective for them (Devily & Borkovec, 2000). The two items on the original scale that were omitted used an alternative rating scale (percentages) and were designed to assess expected improvement in symptoms by the end of a therapy.

Considering the proposed intervention is a one-time workshop in a health coaching setting, it did not seem applicable to include those questions. Furthermore, the proposed intervention was not attempting to alter specific “symptoms” and therefore these two questions were deemed inappropriate for use. Higher scores on the scale indicate higher credibility and expectancy of treatment outcomes. Questions were as follows and rated on a Likert scale ranging from 1 (*not at all*) to 9 (*very much so*): “At this point, how logical does the intervention seem to you?” “At this point, how successfully do you think this information will be in reducing your concerns about

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2 Of note, only two women completed the OCES, yielding unlikely Cronbach’s alpha values.
your eating patterns?” “How confident would you be in recommending this type of group to a friend who experiences similar concerns about food cravings in pregnancy?” “How much do you really feel that this group will help you reduce your concerns about your eating patterns?”

The CEQ has previously shown good internal consistency (ranging from .79 to .86) and good test-retest reliability. In the current sample, the Cronbach’s alpha for the four credibility and expectancy questions showed good internal consistency (Cronbach’s $\alpha = 0.82$). The CEQ has not been empirically shown to predict outcomes, however, the “expectancy” questions have been shown to covary with some change scores in the original studies testing psychometric properties of the scale (Devilly and Borkovec, 2000).

Five additional questions assessing feasibility and treatment fidelity in the current study were developed by the principal investigator and her dissertation advisors. The first question was “Do you think that this group was enough, or do you think a series of individual meetings would be more effective in helping you with food cravings?” and offered the following as answers: This was enough meetings, Maybe something in between or Definitely Individual. The second question, “Before coming in tonight, how much did you know about Acceptance and Commitment Training?” had participants answer on a Likert scale of 1 (Nothing) to 9 (Very much). The third question, “What strategies did you learn here today?” had multiple choice answers of: Distraction & Avoidance, Acceptance & Defusion, and/or Did not learn any skills. The final two questions, “Would you like this integrated into standard care? How about online?” and “What did you like about this group? What did you not like?” were open-ended and allowed participants to respond in writing.

Adherence. Questions regarding treatment adherence were asked at the follow up survey (one-month post intervention) and at the final time-point in post-partum within a couple weeks
after their previously reported due date. Questions asked at the one-month follow-up survey were as follows: “When experiencing pregnancy cravings, what method do you employ to deal with them?”; “What strategies did you learn to employ over the course of your pregnancy?” Answers provided were: *Distraction/ Avoidance, Exercise, Acceptance and Defusion, and Eat the craved food*. Questions asked at the final time-point after their due date were as follows: “What strategies did you employ to deal with food cravings?” “Did you feel as though the skills you learned were effective in helping manage the food cravings throughout your pregnancy?” “How likely are you to use these skills in the future?” Answers to the “strategies” question at the final time point were provided as: *Distraction/Avoidance, Exercise, Acceptance and Defusion, and Eat the craved food*. The other questions were answered on a five-point Likert scale ranging from “Definitely yes” to “Definitely not” and “Extremely likely” and to “Extremely unlikely.”

**Data Analysis**

As an acceptability and feasibility study, the analysis focused on parameters important for future pilot trials and are mostly descriptive in nature. As such, methodology was the focus of our study, not outcomes (Bugge et al., 2013). The current study attempted to address acceptability (how intended individuals react to the intervention), demand (need or interest in intervention), implementation (extent, likelihood, and manner by which the intervention can be fully implemented as planned), and practicality (explores whether intervention can be delivered when resources, time and commitment are constrained; Bowen et al., 2009).

We administered validated measures capturing outcomes relevant to the intervention (food craving frequency and general eating patterns) as well as relevant mechanisms believed to be targeted by the intervention (food acceptance). Missing data analyses was conducted to examine feasibility of measures, specifically number of items missing, any patterns of missing
items suggesting that they were hard to understand or not applicable to this population and/or context, and follow-up rates or completion. While we cannot yet test the effectiveness of the intervention in targeting the proposed mechanisms underlying food cravings and their adverse impact on GWG, descriptive statistics provided insight into sample characteristics (means, SD). Paired t-tests were conducted on measures that we expected to change due to the ACT-based intervention, including food craving consumption (FCI), thought suppression (WBSI), and acceptance and willingness of food cravings (FAAQ). As this was a feasibility study and not powered for statistical analyses, the paired t-tests should be interpreted with caution.

Results

Primary Aim: Acceptability and Feasibility of ACT-based Health Coaching

Feasibility

Recruitment. The success of attempts to connect with recruitment sites such as wellness clinics, therapists, and community centers in the city was variable. Of the 20 sites identified in the community, nine offered help in recruitment through posting flyers. Two community sites shared they did not have enough pregnant women frequenting their classes to help with recruitment and one said they were not interested in participating. Nine sites did not respond to requests to meet or help with recruitment. Of note, one community clinic shared that their major concern was making sure their patients ate enough and nutritiously, not managing cravings or weight gain. Five sites agreed to meet in person, and three centers agreed to hosting the workshops on site after this initial meeting. Only one site agreed to have the principal investigator on site weekly to table for recruitment. Feasibility of on-site recruitment was also difficult due to having only one researcher tabling and meeting with community providers.
Eight pregnant women expressed interest in the study either through emailing or in-person recruitment. After learning more about the workshop, six women signed up to participate in the workshop, and two women responded they were no longer interested. One woman shared that she wanted help with nausea, not cravings, and the other woman declined without indicating a specific reason. Six workshop dates were scheduled during Spring 2020; four of them occurred prior to the COVID-19 pandemic. Of those six workshops, two were conducted successfully; two workshops had participants sign up but did not show; and two workshops were cancelled due to pandemic shutdown. By March 13, 2020 recruitment ceased due to the COVID-19 pandemic.

Retention. All women (100%) in the intervention workshop completed the baseline questionnaire and the post-intervention credibility, expectancy and acceptability survey. 75% of women completed the one-month follow up survey and final adherence survey.

Measurement Burden. The baseline and post-intervention surveys took, on average, 12.31 minutes to complete. Missing data analysis showed two participants (50%) did not complete the baseline FCQ-T-r. Because it was listed after the OCES questionnaire, which states to ‘please discontinue’ if participant does not endorse avoiding any type of food, it could be hypothesized that at that point in the baseline assignment, the participants skipped the rest of the packet by accident. This was not the case in the follow-up assessment, as it was completed online and Qualtrics automatically takes participants to the next set of questionnaires.

Credibility, Expectancy, Acceptability

Conducting the workshop at the community centers was appropriate, as women were familiar with the area, parking was available, and privacy during the workshop was respected by staff. Women were directed by community-center staff to the multipurpose room where the workshop took place. The intervention started at the designated time and lasted, on average, 80
minutes, ranging from 60 minutes to 100 minutes. The range in length of time was likely due to the fact the first workshop had only one participant, while the second workshop had three participants. Given that women were encouraged to speak and discuss during the workshop, our hypothesis that the session would take two hours seems appropriate if the group size had been larger.

After completing the workshop, women reported the intervention seemed logical ($M=8.50$, on a scale of 1 (not at all logical) to 9 (very logical); $SD= 0.58$) and they thought skills they learned could be successful in reducing their concerns about eating ($M=8.00$; $SD= 0.82$), demonstrating both strong credibility and expectancy. Women were highly likely to agree that they would recommend the workshop to a friend ($M= 8.75$; $SD= 0.50$). When asked about how they felt about the workshop, women reported they felt the workshop would be helpful in reducing their concerns about food cravings ($M= 7.25$; $SD=0.96$). Average scores on the measures of credibility and expectancy (CEQ) have not been previously determined in the validation of this measure, however, given the average score reported in this workshop is 8.13 on a 9-point scale, it can be inferred that women felt the workshop was both credible and expected it to help. Women reported that they felt that something in between the one time workshop and a series of individual meetings would be most effective in helping with food cravings (“Something in between” = 3 participants; “Definitely individual meetings”= 1). Most women reported knowing very little about Acceptance and Commitment Training before the workshop [median= 1.5 on a Likert scale of 1 (nothing) to 9 (very much)] and all women reported they learned the strategies of acceptance and defusion after the workshop (100% selected “acceptance and defusion” from list of drop-down options). Participants reported unanimously (100%) that they
would like this type of intervention to be integrated in standard prenatal care, with one woman sharing,

“Absolutely! Online or offered as a class at your Obgyn.”

When asked what they liked and did not like about the intervention, women reported that they appreciated the skills were transferable to aspects other than food cravings as well as to other, non-pregnant states.

“I like that these strategies can be utilized in any demographic- not just pregnant woman.

“I liked that the skills can be applied to more than food cravings. These skills can be applied to most thoughts and feelings.”

Women also shared that they appreciated the non-judgment acceptance portion of the skillset.

“I also liked how the strategies are forgiving- non judgmental- and don't put any added stress on an individual.”

One woman shared she liked the small group setting, stating:

“Small group setting-liked.”

Overall, women felt that they learned new skills, thought that these skills would be helpful in managing not only cravings but also other aspects of their cognitive experiences and would like the intervention integrated into their standard perinatal care.

Post-Intervention Adherence

Participants (n=4) were asked questions about their continued adherence and use of skills taught during the active intervention phase at the one month follow-up and in the post-partum period. Three out of the four women (n=3) answered the survey at the one-month follow-up.
When asked what strategies they employed with regard to their food cravings, two women reported “Distraction & Avoidance” and one woman reported “Acceptance and Defusion.” When asked what strategies they learned to employ, women responded “Acceptance and Defusion” \((n=3)\). When asked whether they felt as though the skills they learned were effective in helping manage cravings during pregnancy, participants \((n=3)\) reported “Probably yes” on a five-point scale from “Definitely yes” to “Definitely not.” Women responded \((n=2)\) they were “Somewhat likely” to use these skills learned in the future, on a five-point scale from “Extremely likely” to “Extremely unlikely.” The one woman who reported using acceptance and defusion techniques reported that she was “Extremely likely” to use these skills in the future.

**Secondary Aims: Initial Evidence for Efficacy of Intervention**

**Descriptive Statistics.** Participants identified as White (100%), on average 34.50 years of age \((SD=3.11)\), and at 21.25 weeks gestation \((SD=5.315)\) at the time of study participation. Women were overweight prior to pregnancy according to their pre-pregnancy BMI taken from reported height and weight (BMI median= 26.3 kg/m\(^2\); \(M=24.90, SD=3.52\)).

Of the original FCI items, women reported the highest frequency of cravings for bacon \((M=3.25; SD=1.71)\) and chips \((M=3.00; SD=1.63)\). Despite experiencing these cravings, women reported they were not very likely to “give in” to the cravings for bacon \((M=2.50, SD=1.91)\) or chips \((M=2.25, SD=2.50)\). Of note, when examining the frequencies of craving for the items that had been added to the original FCI to try and capture craving targets especially relevant to pregnancy, women reported even more frequent cravings for cheese \((M=3.75; SD=0.96)\), spicy foods \((M=3.00; SD=1.41)\), and fruit \((M=3.00; SD=1.83)\) than for any of the original FCI Items. When looking at “giving in” to these cravings, women reported relatively more frequent consumption in response to cravings for these supplemental items including
cheese ($M=4.25; SD=0.96$) and fruit ($M=3.50; SD=1.91$), compared to the original items.

Women reported craving “sweets” most frequently ($M=16.25; SD=6.13$), followed by “high fat” foods ($M=14.00; SD=5.10$), “carbs/starches” ($M=12.50; SD=3.70$), and “fast foods” ($M=8.75; SD=4.27$). Women reported “giving in” to cravings for “sweets” most frequently ($M=14.20; SD=2.63$), followed by “high fat” foods ($M=11.75; SD=5.12$), “carbs/starches” ($M=11.50; SD=3.11$), and “fast foods” ($M=7.75; SD=3.30$).

**Exploration of Intervention-Related Changes in Food Cravings, Thought Suppression, and Acceptance.** As a secondary aim, changes in outcome measures were explored using paired-samples t-tests. Due to the fact that this study is underpowered and not fit to determine efficacy of the intervention, all inferential statistics should be interpreted with caution. A paired-samples t-test was conducted to compare the “frequency” of cravings before ($M=55.00; SD=14.18$) and one-month after ($M=39.67; SD=7.63$) the intervention. There was no significant difference in the scores for FCI “frequency” in pre- and post- conditions ($t(2)=3.19, p=.09, d=1.47$)

A paired samples t-test was conducted to compare the amount of “giving in” to cravings before ($M=47.33; SD=8.96$) and after ($M=35.00; SD=7.21$) the intervention. There was no significant difference in the scores for FCI “giving in” in pre- and post-conditions for the original FCI item totals ($t(2)=3.65; p=0.07; d=1.68$).

There was no significant difference in mean scores on the WBSI before ($M=51.00; SD=12.49$) and after ($M=40.67; SD=13.58$) the intervention ($t(2)=1.67; p=0.24; d=0.77$).

There was a significant difference in overall scores on the FAAQ before ($M=34.67; SD=4.93$) and after ($M=42.67; SD=2.31$) the intervention ($t(2)=8.00, p=.02, d=-3.69$). Specifically, there was a statistically significant increase in “willingness” (mean difference=3.33; $t(2)=10.00, p=0.01, d=-4.61$) and a non-significant increase in “acceptance” (mean
difference = 4.67; \( t(2) = 3.88, p = 0.06, d = 1.79 \). There was no statistically significant correlation between intervention credibility and expectancy scores and FAAQ post-intervention scores \( (r = -0.76, p = 0.45) \). All changes in means of the predicted measures- WBSI, FAAQ and FCI “frequency” and “giving in”- were in the expected direction.

**Discussion**

The goal of study 1 was to determine the feasibility and acceptability of a one-time group workshop using an acceptance-based health coaching framework to target food cravings in pregnancy. Measures of feasibility included recruitment, retention rates, and measurement burden. Acceptability was determined through intervention credibility and expectancy, and perceptions of appropriateness and utility. Overall, findings suggest implementing an ACT-based workshop through health coaching in pregnancy is feasible and acceptable to participants and deserves further exploration to address changes in food cravings.

**Recruitment and Retention.** Our experience with recruitment demonstrated the difficulty of successfully connecting with and engaging pregnant women in the workshop. Community engagement was variable, as many sites did not respond to emails or in-person requests. The YMCA and JCC organizations were most open to helping with recruitment, likely due to the fact these sites are familiar with community engagement and outreach. Furthermore, these community organizations market themselves towards family values and family-focused activities. It was expected that the more pregnancy-oriented sites (i.e., yoga studies that offer prenatal series or pregnancy centers) would be open to posting flyers and/or meeting with the research team. However, it was our experience that sites that marketed themselves towards pregnant women (e.g., yoga studios and gyms with pregnancy classes, pregnancy care centers) were not interested in collaboration or did not respond. Two sites reported they did not have the
volume of clients or regularity in their practice. One yoga studio shared they already had wellness-focused programs and they were not interested in outside collaboration. Pregnancy and perinatal focused websites, social media blogs, and commercial stores were more open to posting flyers and helping with recruitment. However, the majority of the women who attended the workshops were alerted to the workshop through flyers at the YMCA/JCC. Past intervention research in pregnant women has shown the feasibility of recruitment from large medical centers, hospital-based clinics, community health centers, and child-birth education classes, with hospital-based prenatal clinics as the highest-yielding strategy (Styles, Loftus, Nicolson & Harms, 2019; Vieten & Astin, 2008; Coleman-Phox et al., 2013). This could explain why recruitment from community-based organizations revealed lower results.

The small sample size in study 1 makes it difficult to determine acceptability of the workshop in a manner comparable to prior studies that administered full-length versions of validated measures of these constructs. However, according to responses to the credibility and expectancy questions that we did administer, women overwhelmingly found this study to be logical, and reported they thought and felt it would be helpful in reducing concerns about eating and food cravings. While studies have shown mixed predictive value of the CEQ on hypothesized outcomes, the high mean ratings found in the current sample suggest that women found the study to be believable and logical (credibility) and the skills they learned to be potentially helpful in reducing their concerns regarding food cravings (expectancy; Devilly & Borkovec, 2000).

Women reported they would like the workshop to be integrated into their standard of care, perhaps with a mix of individual and group meetings. Women shared that they liked that the skills they learned were widely applicable— not just useful for pregnancy or food cravings but
also relevant to other situations, thoughts, and feelings. Furthermore, all women reported that they would be highly confident in recommending the ACT-based workshop to friends. Anecdotally, women appeared engaged and talkative in the session, related to the material discussed and spoke to each other about their experience with cravings, weight gain, and the relationship with their health providers. Women offered to take flyers to other friends and coworkers they knew who were pregnant to refer to the workshop.

Measurement Appropriateness & Burden. There was minimal missing data in the pre- and post-intervention surveys, suggesting feasibility of the measurement battery. Two participants did not complete the FCQ-T at baseline, which is likely due to the fact it came after the OCES, which not everyone was eligible to complete. The OCES- a measure only completed if participants avoid certain foods- was completed by two women, one of which reported avoiding foods with artificial sweeteners and the other avoided shellfish due to an allergy. The OCES was developed in order to capture cognitive mechanisms underlying food cravings, particularly the role of intrusive thoughts and distress related to avoidance of the food. However, the two women in the current sample endorsed avoiding food due to “health” reasons (allergy to shellfish) and “religious” reasons (artificial sweetener). The OCES did not adequately capture the cognitive mechanisms that underly cravings in this sample and will need to be explored further in the pregnancy population before being included in future iterations of the current study.

Results from the FCI show that women, on average, did endorse craving the “high fat” and “sweet” foods typically reported by pregnant women in the United States. However, in the current sample, women even more frequently craved foods like cheese and fruit, and were also more likely to give into those foods compared to the original FCI items. This is consistent with
past research showing that fruit and fruit juices are the most commonly craved foods for pregnant women (Weigel, Coe, Castro, Caiza, Tello & Reyes, 2016; Orloff, 2018; Placek, 2017; McKerracher, Collard, and Henrich, 2016). This is important to note, as the FCI may not be an appropriate measure to capture all craved foods that are common in the pregnant population and future research should validate a measurement that includes a broader range of foods craved during pregnancy. Cravings are typically considered to be for highly palatable and calorically-dense foods and often considered to be “forbidden” or avoided. This study shows that pregnant women are likely to “give in” to cravings when they are for foods like fruit or cheese, which are not typically avoided or considered “unhealthy” in our society.

We selected measures for inclusion in the battery of questionnaires that are consistent with EI Theory and capture the cognitive and emotional factors associated with food craving, not just frequency and “giving in” alone (May, Andrande, Kavanagh, & Hetherington, 2012). The FAAQ performed well in this sample, as women completed the measure fully and without any issues indicating lack of understanding or applicability. According to the exploratory analyses, participants experienced an increase in willingness and acceptance of thoughts related to eating and food cravings one month after the intervention. This further suggests that the FAAQ may be an especially suitable measure of the mechanisms targeted by the intervention. There was no relationship between post-intervention credibility, expectancy, and acceptability questions and follow up acceptance and willingness scores. The study was not adequately powered or designed for any analyses of intervention effects. It would be interesting in the future to assess whether credibility and expectancy measures predict increased acceptance and willingness.

**Adherence.** While women immediately post-intervention shared they thought skills learned in the workshop (specifically acceptance, mindfulness and defusion) would be useful in
helping with their food cravings, only one woman reported at the post-partum follow-up that she was utilizing these skills. It could be that one workshop was not enough to learn and enact these skills in a meaningful way. Other pilot studies of acceptance-based interventions targeting eating and weight have varied in length from one day to 12, weekly, one-hour sessions (Lillis, Hayes, Bunting, & Masuda, 2009; Forman, Butryn, Hoffman, & Herbert, 2009). Single-day ACT-based workshops targeting specific conditions have shown preliminary efficacy (Dindo, 2015). Single-time workshops also foster treatment adherence and completion and reduce burden on participants. A meta-analysis of treatment adherence and dropout for intervention studies showed that, on average, dropout rate from these studies up to 50%, averaging a 20% dropout rate (Cooper & Conklin, 2015). Furthermore, there were no differences in dropout rates based on factors like therapy orientation, therapist credentials or experience, intended number of sessions, gender, or age. With over 40% of participants dropping out of mental health treatment after one session (Pekarki & Qierzbicki, 1986), having a single-day approach to skill-building may be best for an already busy and burdened population. It could be that the lack of adherence or use of skills reported in the post-partum period was due to the stress and burden of the COVID-19 pandemic. Women may have been preoccupied with other concerns as well as stress related to giving birth in during the heights of the pandemic. Therefore, women may have shifted priorities and relied on previously used coping skills (like distraction) to manage their food cravings.

Limitations and Conclusions

While the findings of study 1 support the acceptability and initial feasibility of the ACT-based health coaching intervention, recruitment in the community was not shown to be feasible and warrants further investigation to understand possible barriers. Recruitment was abbreviated due to the COVID-19 pandemic, however, it was slow prior to the shutdown as well. There were
two main identified barriers to recruitment for the study: 1) few community organizations appeared interested in facilitating recruitment, and 2) despite having community settings that agreed to advertise to pregnant women specifically, few women contacted the study coordinator to sign up for a group or inquire further about the workshop. Possible reasons for this should be explored further. Study 2, a mixed-method survey, was developed in order to assess in more detail recruitment and acceptability issues identified in study 1. Specifically, the aim of the qualitative portion was to explore pregnant women’s interest in the proposed study, their past experience with mindfulness, believability in the proposed intervention, potential barriers to participation, and COVID-19 related concerns.

Study 2:

**Mixed Method Study Examining Prospective Acceptability of Proposed Health Coaching Workshop**

Qualitative research in pregnancy is important to conduct as the experiences, opinions, and motivations of pregnant women’s behavior may differ from those of the general population. Pregnancy is a unique and transitional time in a woman’s life, and qualitative studies may be particularly suited to better capture mechanisms and motivators of health behavior in pregnant women. Qualitative studies have demonstrated that women perceive food cravings to be a barrier to healthy eating during pregnancy and a driver of dietary choice (Goodrich et al., 2013; Groth et al., 2016). Past focus groups have shown that food cravings are psychologically salient aspects of the perinatal experience, and women recognize that resisting or restricting the craving often makes them want the craved food more (Blau et al., 2019). Some women report pregnancy as a time in which it is more socially acceptability to gain weight, and this has contributed to relaxed dietary restrictions and having “permission” to give into their cravings (Padmanabhan,
Summerbell, & Heslehurst, 2015). At the same time, women frequently report that pregnancy signifies their transition to motherhood, and they recognize that the choices they make with regard to their health impact their fetus (Swift et al., 2017).

Study 1 was based on these prior findings and the assumption that pregnant women frequently struggle with food cravings and are interested in learning skills to better manage cravings for the sake of their own health and the health of their baby. It was further postulated that group-based health coaching would be a suitable format to teach them these skills. However, recruitment for the acceptance-based health coaching intervention to target food cravings proved to be difficult, even prior to the COVID-19 pandemic. The observed difficulty may be due to the fact women react differently to the experience of food cravings and weight changes in pregnancy. While pregnancy is a significant and naturally occurring life transition often though to motivate women to implement behavior change (Phelan, 2010), that motivation may not necessarily generalize to a desire to learn skills to manage the adverse impact of food cravings on consumption and weight. Difficulties with recruitment could have been related to lack of interest or relevancy to pregnant women, another aspect could be the location of the recruitment in the community was not adequate for gaining credibility for the intervention. Therefore, more research is needed to address the initial perceptions, understanding, and need of an acceptance-based group targeting food cravings in pregnancy. Qualitative research is particularly well suited to assess these perceptions.

Exploratory or pilot studies often incorporate focus group and qualitative data from participants to determine feasibility of a planned intervention. Qualitative research can be used alone or in tandem with quantitative methods in order to reform and enhance theory and methodology of the study prior to conducting a full randomized controlled trial (O’Cathain et al.,
2015). Specifically, the aim of collecting qualitative data in feasibility studies is to address issues of recruitment (how best to recruit), need (are targeted participants interested in the intervention), prospective acceptability (how an individual feels about the intervention prior to participating), and intervention coherence (extent to which a participant understands the intervention’s purpose) (Bowen et al., 2010; Sekhon, Cartwright, & Francis, 2017).

Acceptability of a planned intervention can be defined by three stages- prospective, concurrent, and retrospective- contributing to a total of seven constructs (Sekhon et al., 2017). **Prospective acceptability** refers to how a participant feels about the proposed intervention, the perceived burden on the participant of the intervention, and the extent to which the intervention fits with individual’s value system *prior* to participating in an intervention. **Concurrent acceptability** refers to the extent to which the participant understands the intervention and how it works as well as, and opportunity costs, or the extent to which benefits must be given up in order to engage in the intervention. **Retrospective acceptability** refers to (after the intervention) perceived effectiveness, or the extent to which the intervention is perceived as likely to achieve its purpose, and self-efficacy, or the confidence that participants can perform the behaviors required to participate in the intervention. In study 1, concurrent and retrospective acceptability was assessed and found to be high, however, prospective acceptability was not evaluated. Because prospective acceptability refers to participants’ perspective, the content, the context, and the quality of the intervention, assessing prospective acceptability is vital to the delivery of an effective intervention (Sekhon et al., 2017). Assessing prospective acceptability from the perspective of pregnant women and healthcare professionals may have been useful to facilitate recruitment and avoid barriers experienced in study 1.
A wide range of methods are commonly used in feasibility studies, including participant observation, focus groups, telephone and in-person interviews, social mapping, mixed methods, and action research (O’Cathain et al., 2015). These approaches are used to address 1) content and delivery, 2) trial design, conduct and process, 3) measures, 4) outcomes, and 5) target conditions (i.e. the experience of the disease, behavior, or beliefs; O’Cathain, Thomas, Drabble, Rudloph & Hewison, 2013). Qualitative approaches, while often used in feasibility studies, can also be conducted in tandem with randomized controlled trials. While qualitative data collection is ideally implemented pretrial (as in as part of a pilot or feasibility study or separately in preparation for the main trial), the majority (72%) of qualitative studies are not undertaken pretrial but in fact conducted during or post trial, often to address acceptability and/or failure to recruit (O’Cathain et al., 2013).

Qualitative studies have been conducted post-trial to explore stakeholder factors that might have reduced the acceptability or feasibility of the intervention delivery (Pope et al., 2010). 15% of qualitative studies reviewed by O’Cathain and colleagues (2013) were conducted post trial to address design, conduct, and processes issues like recruitment and retention, diversity of participants, acceptability in principle and practice, and burden on stakeholders. Qualitative studies, therefore, whether enacted pre, during, or post-intervention, can be effective in assessing weaknesses in methodology or misunderstandings regarding stakeholder beliefs and addressing these issues in preparation for a subsequent clinical trial.

An extension of the previous feasibility study (Study 1) was conducted in response to the difficulties with recruitment and community outreach, in order to better understand both pregnant women and provider believability and expectancy of the proposed health-coaching workshop, and to examine perceived need for strategies and skills to cope with food cravings.
Through examining prospective acceptability, we can better understand stakeholder opinions on this acceptance-based group and hopefully elucidate key uncertainties related to acceptability and feasibility discovered in study 1.

We sought to recruit two sets of participants, namely pregnant women and prenatal care providers. Prenatal care providers were included in study 2 in response to difficulties with recruitment in the community, to understand potential acceptability in health care settings. Perinatal providers report giving advice on topics such as weight gain, physical activity and nutrition during their visits with prenatal patients, however, provider counseling is often limited and not fully consistent with current weight, dietary and physical activity guidelines (Whitaker, Wilcox, Liu, Blair & Pate, 2016). Furthermore, few women have reported receiving IOM-consistent advice about gestational weight gain during their perinatal health visits (Deputy et al., 2018). It is interesting that there is such a reported discrepancy between what providers and patients are reporting with regard to weight and eating-related advice. Perinatal providers like Obstetric physicians, nurses, and midwives play an important role in encouraging and supporting women’s healthy choices in pregnancy (Super & Wagemaker, 2021) and could play a vital part in pregnant women’s buy-in with regard to engaging in health-related interventions. Therefore, it is important to understand how perinatal providers perceive the proposed study description, and whether they feel it would be a beneficial workshop for their patients.

**Current Study**

Two surveys were administered to enhance our understanding of pregnant women and perinatal provider opinions on the proposed ACT health coaching group targeting food cravings to prevent excess gestational weight gain. Pregnant women’s perspectives surrounding food cravings, the proposed acceptance-based workshop, and past experience with mindfulness in
pregnancy were explored through a mixed method questionnaire using forced-response, open-ended short answers, and space for free text comments. A separate mixed method questionnaire was used to explore provider opinions on the acceptance-based health coaching group, which included forced-response questions, open-ended questions, multiple choice, and space for elaboration. The surveys were developed by the study coordinator with input from her dissertation committee members. The majority of questions were forced response (yes, no, maybe) with encouragement and space for elaboration (“Please elaborate in the comment box below”) in order to streamline analysis while at the same time facilitating sharing of opinions.

During recruitment for study 1, it became apparent that perinatal providers were difficult to engage, as three perinatal health clinics (one community health center, one Ob/Gyn clinic, and one fertility clinic) did not respond to our request to post flyers or help with recruitment for the study. It could be that perinatal providers were too busy to respond. Furthermore, pregnant women in the group reported balancing careers, childcare, and doctor’s appointments. Therefore, questionnaires were designed to be brief, straightforward, and taking ideally no longer than 5 minutes in order to facilitate completion and reduce burden on participants. The two questionnaires were designed in order to elucidate information about feasibility and acceptability that could be beneficial in the future implementation of study 1 on a larger scale.

**Specific Aims**

The goal of the mixed method study was to assess interest in the health coaching ACT-based workshop, knowledge of mindfulness, believability of the ACT approach, barriers to participation, and preferred mode of implementation. Specific aims of the mixed method survey in pregnant women were as follows:
1) Characterize pregnant women’s perceived need for skills training targeting food cravings

2) Assess the believability of acceptance-based health coaching targeting food cravings in pregnancy

3) Explore perceived barriers to participation in acceptance-based health coaching targeting food cravings in pregnancy

4) Determine the preferred mode of implementation of acceptance-based health coaching targeting food cravings in pregnancy

The goal of the mixed method survey in perinatal providers was to:

1) Explore perinatal providers’ perceived need for and willingness to offer acceptance-based health coaching targeting food cravings in pregnancy to their patients

2) Explore provider perceptions of perceived barriers to patient participation in an acceptance-based health coaching group

3) Assess provider opinion on best mode of implementation of an acceptance-based health coaching group targeting food cravings in pregnancy

Method

All methods were approved by the local Institutional Review Board. All respondents were informed of the nature and purpose of the study and consented prior to participation.

Recruitment

Recruitment commenced in October 2020 and was conducted fully online in response to restrictions on face-to-face context imposed by the COVID-19 pandemic. Participants were recruited via email and social media sites. Pregnant women were recruited from identified
Facebook groups (Academic Mamas; Pregnant During COVID-19) and utilizing snowballing methodologies. The snowballing technique is a chain-referral sampling method that is based on referrals; for example, a pregnant woman was contacted and asked to complete the survey and encouraged to send the survey on to other pregnant women they knew. Perinatal providers included Obstetric physicians and midwives who were identified and invited to participate via email, postings on social media platforms, and snowballing methods.

**Participants and Inclusion/Exclusion Criteria**

Participants were women who were currently pregnant or had recently given birth (within last 6 months) and obstetric or perinatal providers who currently provide care to pregnant patients. For all participants, inclusion criteria consisted of being at least 18 years of age and fluent in English. A total of 94 participants started the surveys in Qualtrics; 47 of those 94 responses were complete. Incomplete responses (i.e., surveys that were opened but no questions were answered) were not included in the analyses reported here. There were 60 responses were collected from the Qualtrics survey targeting pregnant women; 33 of those were completed surveys. The Qualtrics survey conducted with perinatal providers collected 34 responses, with 14 completed surveys. Therefore, the current selection included 33 pregnant women and 14 perinatal providers.

**Procedure**

Potential participants were emailed an introduction to the Qualtrics survey or taken to a Facebook/Reddit post describing the study with an option to click on the link to complete the survey (see Appendix M and N). Informed consent was obtained prior to participation in the survey. This study received a waiver of signed informed consent since the signature would have been the only identifier collected from participants. Participants were notified that their
completion of the survey was considered indication of their consent. Survey completion took on average 5.6 minutes.

Description of the acceptance-based health coaching workshop in the survey targeting pregnant women was as follows:

“My research interest is in health behaviors during pregnancy. Pregnancy is a time when women experience a lot of physical and emotional changes – some exciting, some more challenging. Pregnant women I have spoken to in my research often report noticing a lot of pretty drastic changes in their eating patterns and many have expressed to me that they would specifically like help managing their food cravings. I am not a nutritionist or dietician and I come from a Body Positive perspective, so I really want to steer clear of simply telling women what to eat and not eat or how they should manage their weight in pregnancy. I think women hear a lot of that from their providers and often consider it a source of stress, rather than something that is actually useful to them. Instead, I wanted to find a way to help women change their perspective and perhaps learn new skills to help them deal more effectively with unpleasant or difficult experiences like cravings in pregnancy.

My dissertation is piloting a workshop to teach women mindfulness and acceptance-based skills to help them navigate the many stressors that come with the perinatal period- and food cravings is one area where these skills may be helpful to them. My aim is to help women manage food cravings and hopefully reduce excess gestational weight gain.
Mindfulness-based practices have been used for centuries by people from all backgrounds and have been shown to be effective for stress reduction, improving health behaviors, and enhancing overall mental well-being. We want to see whether these skills can be useful to women in pregnancy (and beyond) and whether and how group workshops like ours should be integrated in regular prenatal care.”

Description of the acceptance-based health coaching group for the perinatal provider survey was as follows:

“Research in our lab has shown that food cravings are responsible for some of the excess gestational weight gained in pregnancy. Furthermore, qualitative studies from women in the perinatal period have shown that food and specifically cravings are a psychologically salient aspect of their experience. We are proposing to use a cognitively-based strategy to influence weight management in pregnant women, using the framework of Acceptance and Commitment Therapy (ACT). This health-coaching group would focus on mindfulness and cognitive defusion techniques to help women manage food cravings with the hope to reduce excess gestational weight gain. We want to see whether these skills can be useful to women in pregnancy (and beyond) and whether and how group workshops like ours should be integrated in regular prenatal care.”

Qualitative Data Analysis

The research team was comprised of the current investigator (LB) and two female counseling psychology Ph.D. students (RP and KK) who served as coders for the study. In order
to minimize bias in the analytic process, the two coders were not in any way involved with the
original project development or data collection. Prior to the analysis, the investigator met with
the coders to discuss the coding process and provide readings about relevant qualitative research
methods (Hill, Knox, Thompson, Williams & Hess, 2005; Hill, Thompson, & Williams, 1997;
Morrow, 2005; Morrow, 2007). The method of analysis chosen for study 2 was a hybrid
approach, using both “deductive” and “inductive” analyses, as the survey employed a set of *a
priori* topics while also allowing for exploration of themes (Boyatzis, 1998; Crabtree and Miller,
1999; Fereday & Muir-Cochrane, 2006). The coders used an open-coding technique (Strauss and
Corbin, 1990) based in grounded theory to analyze the data with quotes as the unit of analysis
(Glaser & Strauss, 1967). Content analysis was conducted by all three researchers (LB, RP, &
KK) through a consensus process. Two researchers (RP and KK) performed the initial thematic
analysis of qualitative data. Because themes were developed largely *a priori*, agreement among
themes was unanimous. The three researchers first became familiar with the qualitative data and
identified key concepts. Codes were developed independently, using Excel spreadsheets to
highlight various concepts and generate initial codes. Coded data were then reviewed by the
research team members who compared their independent codes and reached consensus about
each code’s definition and meaning, creating a code scheme for each theme (Hill, Knox
Thompson, Williams & Hess, 2005). Phrases were allowed to have overlapping codes. To
establish reliability, disagreements were resolved through discussion and the principal
investigator was used to reach a consensus in case of disagreement between the two initial
ratings (Hill, Knox, Thompson, Williams, & Hess, 2005). Yes/No/Maybe responses to questions
were independently coded and examined via frequency analysis (See Table 1).
Data saturation refers to the point in qualitative research when no new information is discovered in data analysis and the researchers can be reasonably assured that further data collection would yield similar emerging themes and conclusions (Faulkner & Trotter, 2017). Because data analysis in this study used a hybrid of both inductive and a priori approaches, theoretical and data models of saturation were addressed (Saunders et al., 2018). Inductive thematic saturation relates to the emergence of new codes or themes, and a priori thematic saturation relates to the degree to which identified codes or themes are exemplified in the data. Morse (2015) explains inadequate data saturation as, “there are too few examples in each category to identify the characteristics of concepts, and to develop theory.” Therefore, saturation is assumed to have been met when emergence of new codes has halted and when themes are adequately represented in the data (Saunders et al., 2018).

**Results**

**Frequency Analysis- Pregnant Women**

A total of 33 pregnant women completed the survey. Of note, 60 participants opened the survey but did not continue past the consent form. Although education level and occupation were not formally assessed, some participants were recruited from Facebook groups specifically targeting women in academic positions, so education levels are likely to be above average in the sample surveyed here. Of the 33 who completed the survey, 11 women identified the current pregnancy as their first pregnancy, 14 identified it as their second pregnancy, three women as their third, and five did not answer this question.

The majority of pregnant women reported having previous experience with mindfulness (28= “Yes;” 2= “No;” 3= “Maybe”) and thought the approach would be beneficial in better managing their food cravings (15= “Yes;” 6= “No;” 12= “Maybe”). Women overwhelmingly
reported that they would like this approach integrated into their standard care at their provider’s office (11= “Yes;” 1= “No;” 0= “Maybe”). Women did not report being more likely to participate in this group now compared to their first pregnancy, if previously pregnant (4= “Yes;” 9= “No;” 7= No answer). Women preferred to attend the group online rather than in person (11= “Online;” 7= “In person;” 11= “Not interested;” 4= No answer).

**Qualitative Codes**

The semi-structured approach of the survey allowed for elaboration and text-based answers for questions related to the nature of the intervention study. The elaboration and text-based answers were analyzed as the qualitative data. Eight mixed methods questions were presented in the survey and codes were developed for each of these pre-determined themes (See Appendices O and P).

**Mindfulness.** Five codes were developed to capture the themes that emerged from the question “When you think of mindfulness, what comes to mind?” The codes are: (1) Meditation and yoga (2) Relaxation and calm (3) Present moment awareness (4) Acceptance, and (5) Intentionality. The majority of women cited phrases that fit Oxford English Dictionary’s definition of mindfulness as “a mental state achieved by focusing one's awareness on the present moment, while calmly acknowledging and accepting one's feelings, thoughts, and bodily sensations, used as a therapeutic technique” (Oxford University Press, 2021). Nine quotes were coded under meditation and yoga; four quotes were coded under relaxation and calm; 23 were coded under present moment awareness; four quotes were coded under acceptance; and six quotes were coded under intentionality. In general women described past experiences with mindfulness and often quotes fell under multiple codes. For example,
“Mindfulness is the opposite of involuntary thinking. It’s when you recognize what is happening and are aware of your thoughts and emotions triggered, and pause in that understanding without reacting.”

Other women shared that mindfulness was about “being present,” “nonjudgmental,” and “not caught up in past regrets or future anxieties.”

Of note, one quote did not fit into any of the above categories as it related to a unique personal experience (See coding table):

“My cousin was the first to describe mindfulness to me after a Thich Nat Hahn retreat”

**Past Experience with Mindfulness.** Four codes were developed to capture answers to the question, “Do you have any past experience with mindfulness?” The four quotes are: (1) Therapy (giving/receiving) (2) Yoga and meditation (3) Courses/workshops and (4) Self-help app/books. Four quotes were captured by the code of therapy; six quotes were coded under the code for yoga and meditation; two quotes were coded under the code for courses/workshops; and four quotes were coded under self-help. Of note, two quotes did not fall into any of the defined categories. The two quotes that did not fit into any of the defined codes also did not overlap meaningfully with one another (See Appendix O). Women described past experiences with mindfulness as part of therapy, wellness courses, workshops and through self-help methods. Among women who reported past experiences with mindfulness, the amount and depth of practice varied. A few women described their experience with mindfulness as stemming from being in the role of providers themselves:
“DBT trained. I lead practices in skills groups weekly and use it in my own life.”

“I do a brief mindfulness minute (or 5) with my students before class to regroup and transition.”

“Teaching strategies to middle schoolers, meditation.”

Other women reported they used mindfulness through applications:

“Use of the calm app”

“I have looked into yoga and meditation apps, but never established any habits.”

Utility of Intervention. Six codes were developed to capture the theme of the perceived usefulness of the proposed intervention in response to the question, “Do you feel as though the approach detailed above would help you to better manage food cravings? Why?” The codes designated to this theme are: (1) No problems with cravings (2) Needs support (3) Ambivalence (4) Increased self-awareness (5) Cognitive triggers and, (6) Emotional triggers. About half (46%, \( n=15 \)) of pregnant women responded they thought this intervention would be helpful in managing their cravings.

A few women shared they did not have any problems with cravings and therefore did not see the utility of the group intervention.

“I think the approach sounds fine, but I didn’t really struggle with cravings or excess weight gain in pregnancy, so probably wouldn’t feel compelled to put effort into this approach.”

Other women shared that they felt it could be helpful and included that they would need a lot of support around cravings and eating. This is exemplified by the following quotes:
“But it seems that we would need lots of training support. I know there is emotional baggage that comes with eating for many, including me.”

“Makes sense to me…but I would need a lot of support and encouragement to actually do it.”

Some women reported ambivalence related to the intervention, specifically taking issue with the idea that cravings are a negative experience.

“This is an odd question with an underlying assumption that food cravings are wrong and need to be managed.”

“Maybe…conceptually, I think it’s a fabulous idea. Implementing it consistently would be hard. During pregnancy, food was the only thing I felt like I could turn to for physical reward/enjoyment. So cravings weren’t a bad concept for me.”

One woman appreciated that the intervention would be using a Body Positive framework and not simply telling women how they should manage their weight:

“I like the idea of a Body Positive approach to dealing with the emotions around cravings, eating, weight gain, etc during and after pregnancy.”

The concept of targeting emotional and cognitive triggers as an approach to manage cravings was identified and women shared that they thought it would be helpful.

“Resistance and suppression of cravings amplifies them; acceptance and non-judgement help detach from emotional aspects to make cognitive decisions making more accessible.”

“I tend to overthink, so it would be helpful to use strategies that can prevent rumination.”
"Yes, because sometimes sitting with a craving for sweets, eg, helps me decide to say eat fruit instead of a baked good."

One of the most commonly cited reasons for why women believed the approach would be helpful in addressing their food cravings was to increase their self-awareness. Women reported that increased mindfulness would be helpful in determining physical hunger versus emotional needs.

"Using mindfulness to help key into my true desires and understanding what I’m actually craving — be it food (and truly what kind of food) or space/affection/ encouragement/ sleep etc."

"It would help me pause before binge eating."

"Noticing when I’m actually hungry VS just craving/stress-eating."

**Timing of Intervention.** Five codes were developed based off responses to the question, “Would you like this integrated into standard care at your provider’s office?” A follow up question, “Would you want this at the same time as appointments, happening between appointments or another time?” was only displayed to participants who responded that they would like the health coaching intervention integrated into standard care at their provider’s office. Responses were coded as (1) Yes- convenience (2) Yes- time-limited (3) No- convenience (4) No- time- limited and, (5) Time limited-being a mom. Responses were coded under “Yes-Convenience” if women wanted this to happen at their provider’s office for convenience and ease at routine appointments. The “Convenience” code often overlapped with “Time-limited (being a mom)” as women shared that being a mom was demanding enough on their time as it is, and having the workshop occur at the same time as appointments could be beneficial. For example:
“Yes. The same time as appointments. There are a lot of appointments that occur during pregnancy, so I wouldn't want to add any additional appointments to the list (it would mean coordinating my schedule and taking off of work, additional medical copays, etc).”

“Yes. Same time or as something you can elect to sign up for- time is limited for people with newborns.”

Other women shared that while they would want the intervention as part of their routine perinatal care, they do not want it during the appointments as there is already a time-pressure at their regularly scheduled OB/GYN appointments.

“Yes. Between appointments or another time. There is already enough that happens during appointments.”

“Yes. Some time with my PCP to intro concept but bulk of time on my own. My OB seems to [sic] busy to talk to me about most things, which is why I switched to a midwife.”

“No. A one-time workshop-type education (similar to birthing classes) to follow-up on an appointment.”

Three quarters (73%) of women responded they would like it integrated into standard care. Women shared that they could see the proposed workshop useful as a follow-up or at the same visit, as long as it would not interrupt the amount of time they get with their provider. Additionally, women were open to attending the proposed workshop at the same time as the appointment, in order to reduce burden of an extra appointment, as one woman shared, she “wouldn’t want to increase number of visits to provider’s office.”
**Location of Intervention.** Participants were asked whether they would prefer to participate in the intervention online or in-person and asked to elaborate if their answer would change based on the COVID-19 pandemic: “Would you be open to attending a group like this in person or online Why? Please elaborate further if your answer would change during the COVID-19 pandemic.” Three codes emerged from the responses, including (1) barriers (2) convenience and, (3) COVID concerns. Of note, eight quotes did not fit any code, mostly due to the fact their text elaborations did not add additional information besides stating their interest. Of those that did not fit any code, one woman shared she did not like groups, one woman shared she was open to doing this group now if available, one woman did not understand what group the question was referring to, three shared they were not interested in the group regardless. One quote did not fit any code, and expressed interest in a multidisciplinary group targeting multiple different health behaviors:

“In Person. I think if it was a part of another group I was in, like we did a month of mindfulness together or something before moving on to a month of exercise or a moth [sic] of literacy or something.”

One woman shared that childcare was a barrier to attending the workshop- online or in person. Of the women who preferred delivery of the workshop online, “access and ease of scheduling,” and being “more convenient” were cited as common reasons. Many women shared that in non-COVID times they would prefer in person, but due to COVID concerns, online was preferrable.

“In person. An in-person group may increase commitment and provide a social support of other mamas. During COVID-19 pandemic, I would prefer online for safety reasons.”
Barriers to Intervention. *A priori* codes were developed for the following question, “What barriers do you anticipate occurring that would prevent you from being able to participate in a group like this? (examples: time, internet connection, childcare, career/job, other).” After reviewing responses, three codes were developed, including (1) time/schedule (2) child-care and (3) career/job. 20 responses were coded under “time/schedule” as a possible barrier to participation. More specifically, 13 participants shared that childcare, or having another child at home, was a major barrier to them joining the workshop. 12 participants cited their careers/jobs as barriers to participation. Two responses did not fit any code.

Similar to themes that emerged from the previous question about burden on mothers in the perinatal period, one woman summarized by stating her barrier would be:

“*Job and the already significant number of prenatal care visits, childcare / less time because of looking after other children.*”

Another woman shared that she would be more likely to attend if it could be incorporated into other types of perinatal classes as well.

“All of these things. *I suppose if this group would be a type of cohort that would continue to other newborn mom and me types of classes, I’d make more of an effort to attend.*”

One of the responses that did not fit any code highlighted the benefits and costs to both online and at home implementations.

“*Most women would be able to join the online [sic] as it would allow higher attendance and women could join from home and with other obstacles that might prevent them.*”
COVID Concerns. Responses to the question, “If this is not your first pregnancy, are there differences for you during COVID-19 compared to non-pandemic pregnancies?” fell into two codes, (1) limited support and (2) fewer appointments. Six responses did not fit either code. Women shared that they had less access to things like child-care and family support, and visitors were not allowed at their doctor visits.

“I had fewer prenatal visits and the visits I had were very short and rushed generally. I wasn't able to have a doula with me during birth which meant I ended up caving in and getting an epidural, although I am fine with that decision, it wasn't my original birth plan.”

“Yes. Less in person appts. Way more stress. Much lower support from others.”

One response that did not fit either code exemplified the difficulties with accessing preferred food preferences during a pandemic:

“More limited food options, some food not hot when delivered, increase in craving for nostalgic foods in early pandemic.”

Differences Between Multiple Pregnancies. Multiparous women were asked whether they were more likely to participate in the proposed workshop with their current pregnancy, compared to their first (or any other prior) pregnancy. For women who had previously been pregnant, answers were coded as (1) Less time and, (2) Awareness of health. The time-commitment concern related to this workshop was summarized by one woman:

“No. With two under the age of 3 there is just a lot less time and my kid-free time I cherish not working or being on screen at this time.”
Other women described that because they had been through pregnancy before, they were more aware of how the perinatal period affects their mental health and therefore more likely to join a workshop.

“Yes….I think I just have a better understanding of what the challenges are pre- and especially post-partum are. I had several postpartum depression and anxiety after my first son was born, so I am taking much more care of my mental health this time around.”

**Frequency Analysis and Qualitative Responses- Perinatal Providers**

Out of 34 collected responses, 13 responses from perinatal providers were recorded as complete and analyzed; 21 incomplete surveys were excluded from the analyses presented here. There are too few examples in each theme to identify characteristics of concepts, therefore we did not reach saturation in the current sample and all results should be interpreted with caution (Morse, 2015; Saunders et al., 2018). Thematic codes were not developed due to insufficient saturation. Responses to questions were coded as yes/no/maybe and a frequency analysis was developed.

Overall, perinatal providers were split on whether their practice would benefit from having this intervention on site (4= “Yes,” 5= “No,” 4= Maybe).

Two providers shared reasons for their responses, including:

“**IMHO dietary support is important, but other services (like a genetic counselor) would be more useful, to me, as an allocation of resources...**”

“**Would have to be cost effective and think service better provided online [sic].**”
When asked “Would you refer your perinatal patients to this workshop?” providers overwhelmingly responded that they would refer patients to the proposed ACT-based health coaching workshop (10= “Yes,” 0= “No,” 1= “Maybe.”), which highlights that while providers would not benefit from this group being on site at their practice, they would refer patients to the workshop.

“Hands on approach and tools for women to prevent excessive weight gain in pregnancy are valuable.”

“I would send early OB patients to help weight control.”

One provider believed that implementing health behavior changes take time.

“Behavioral changes take time.”

When asked whether this workshop would be best conducted online or in-person, providers answered that it would be better done online (12= “Online,” 2= “In person”). Participants shared that it could be less burdensome for patients to have a workshop online.

“A lot of pregnant women have other kids and it is hard for them to come to in person workshops.”

Other providers felt that COVID has impacted their preference for online interventions:

“COVID has proven telehealth has been widely accepted and convenient. this area is perfect for remote education.”

Providers (n=13) identified potential barriers to patient participation and the majority (n=10) noted lack of time as a barrier (4= “Transportation,” 6= “Interest,” 5= “Childcare,” 5= “Financial.” Of the 13 responses, three stated their answers to these questions would be different due to the COVID-19 pandemic, with one provider stating:
“One dietary provider could cover many clinic sites. Plus, easier/less time to schedule.”

Discussion

Acceptability and Feasibility

The aim of study 2 was to determine prospective acceptability in order to make recommendations for the implementation of a larger trial in the future. Study 2 attempted to help elucidate reasons for difficulties with recruitment and identify potential barriers to participation both on from the provider and participant perspective. Specific hypotheses to account for difficulties with recruitment included 1) acceptability and expectancy (Do women/providers think this workshop would be helpful with regard to food cravings?), 2) feasibility of participation (What barriers do you anticipate occurring that would prevent you/your patients from participating?), 3) knowledge/understanding of intervention (What is your past experience with mindfulness?), 4) method of implementation (Would you like this group integrated into your standard of care in pregnancy? Would you be willing to refer your patients to this group? In person or online?), and 5) likelihood based on nulli- or multi-para (Are you more likely to do this now compared to your previous pregnancy?). The goal of this study was to assess who to recruit and how to better recruit.

Mixed method designs included Yes/No/Maybe question counts and multiple choice with open-ended responses that were coded through frequency analyses. Qualitative data was explored using a “hybrid” model of inductive and deductive analyses, incorporating methods consistent with grounded theory to develop thematic content (Fereday & Muir-Cochrane, 2006).

Expectancy and Perceived Need. The majority of women in the pregnant women sample were able to identify, at minimum, some aspects of mindfulness and endorsed past
experience with mindfulness to varying degrees. Women in the current sample recognized that cognitive and emotional triggers are salient aspects of their pregnancy experience, specifically in relation to food cravings, eating, and weight gain. Other women, albeit a smaller sub-group, shared that cravings were not an issue for them during pregnancy and therefore would not be interested in a group to address food cravings. Almost half of women surveyed thought the described workshop would be helpful in addressing their food cravings. The other women predominantly indicated that they were unsure and reported either needing more detail about the study or expressed the expectation that they would need a lot of support and consistency in implementing the described approach. Despite food cravings being a common and widely reported experience in pregnancy, data from this sample indicate that only a proportion of women see them as an issue that needs to be addressed. Therefore, future iterations of study 1 should specifically target pregnant women who are struggling with food cravings and/or eating behaviors in general. Future directions for implementation of this proposed study will be considered in the next section, titled General Discussion.

**Implementation and Barriers.** Barriers to participation were largely described to be due to issues of time, including the demands of childcare and having a career. Issues of convenience and where/when the group took place were important considerations as well, with women differing on whether they would prefer to be offered participation at the same time as other perinatal appointments or in between appointments. Some women expressed concern that perinatal appointments are already being condensed and packed with information. Some women stated that because there was already so much going on during perinatal visits that they would like the workshop to be available at another time. Others shared that they had too many appointments and would prefer the workshop at the same time as routine appointments in order
to reduce number of visits to the providers’ office. Women seemed to want the workshop integrated into their perinatal care as long as it did not take away from time with their provider. This could be one of the reasons why recruitment in the community for Study 1 was slow—women would prefer a workshop like this to be available to them at their provider’s office.

Women were slightly more likely to prefer the option to participate in the group online rather than in person, reportedly due to convenience and fewer barriers—like location and other childcare demands—to attendance. Women who said that they would prefer in-person groups endorsed reasons related to increased social support and fewer distractions in the environment. While asked whether COVID was a concern or consideration in their answer to the question, only a few women responded that they would prefer in-person groups during non-pandemic times.

**COVID Concerns.** While women may not have been explicit about COVID concerns when asked, it is important to note the difference in the perinatal experience during pandemic and non-pandemic times. Women reported that being pregnant during COVID resulted in fewer and generally rushed in-person appointments, more stress, and less perceived support from friends and providers. Under normal circumstances, there would be less pressure on providers to keep the number of patients in the office limited to one-at-a-time, less elaborate cleaning protocols in between patients, and generally more time spent with each patient. These changes in circumstances could have impacted the extent to which women could envision participating in the intervention as part of routine prenatal visits, when it may seem more natural to do so outside of the COVID pandemic.

**How to Recruit.** It is important to note that one woman in the current sample shared the impression that the description of the workshop unfairly pathologized food cravings as inherently
“bad” experiences. Another woman noted that she liked the Body Positive approach. Women in previous studies utilizing focus groups shared that providers often contribute to their negative feeling of guilt, blame, and irresponsibility when referencing their eating patterns and inadequate (i.e., too much or too little) weight gain in pregnancy (Nikolopoulos, Mayan, MacIsaac, Miller & Bell, 2017). Keeping this in mind, future descriptions in recruitment materials for the proposed group should emphasize the concept of acceptance as part of the intervention; that is, the goal of the group is not to eliminate or “get rid” of cravings, but reduce distress and struggle related to the experience of them in order to facilitate health behaviors aligned with women’s values. An emphasis on a Body Positive approach also seems to be appealing to potential participants and should be retained in recruitment materials.

Who to Recruit. Multiparity appeared to impact the likelihood that women would consider participating in the proposed health coaching intervention; however, it did so in inconsistent ways. Some multiparous women shared that they are more likely to sign up for the ACT-based health coaching workshop now compared to their first pregnancy, because of their previous experience of struggles with mental health or weight-related health outcomes with prior pregnancies. In other words, women saw the workshop as a potentially helpful way to prevent difficulties they had encountered during previous pregnancies. Other multiparous women shared that they were less likely to engage in a workshop such as the one being described to them here because they have less available time due to demands of caring for their older child(ren) and lack of energy. Therefore, it seems as though nulliparous women may be harder to convince that the workshop would be beneficial because of a lack of experience with the impacts of pregnancy on their physical and mental health, but they may also be more able to participate due to fewer constraints on their time and schedule. Ideally, targeting nulliparous women and teaching them
skills in their first pregnancy could be beneficial in addressing food cravings in subsequent pregnancies. Perhaps future recruitment materials add anecdotal quotes or stories from other pregnant women about their experience with food cravings and eating in pregnancy, in order to increase buy-in from nulliparous women.

**Provider Perceptions.** Perinatal providers were important stakeholders in addressing acceptability of the proposed workshop, as they can be considered a gateway to recruitment of pregnant women. Perinatal providers seemed to generally recognize the importance of weight control and reported that they would refer their patients to the proposed workshop. Perinatal providers were mixed, however, on whether they would like a provider on site to implement the intervention versus referring women to providers outside their own practice. Providers also generally preferred a remote or online format for the workshop rather than having women attend in person, so the question of whether they would consider having a provider onsite to offer it may not have been relevant. Providers in study 2 demonstrated a focus on weight and nutrition when discussing the proposed workshop, whereas pregnant women’s responses about the proposed workshop focused more on food cravings. This is consistent with past research showing that women are often told how much to weight to gain and what not to eat, but not about what they should be doing or how to appropriately reach these goals (Ferrari, Siega-Riz, Evenson, Moos, & Carrier, 2013). There seems to be a disconnect between what the providers deem as important (weight and nutrition) and what the pregnant women deem as salient for them (food cravings and eating patterns). If providers were to be involved in recruitment for a future health coaching ACT-based workshop, it would be important to coach providers briefly on how best to frame the workshop to their patients.
It is important to note that despite perinatal provider being actively recruited through many different methods for four months, very few providers completed the survey. Furthermore, almost twice the number of providers opened the survey (i.e., continued past the consent form) and discontinued before actually starting to complete the survey. There are few possible explanations for this. Providers could have read through the description for the study and decided they were not interested, either because the description of the study was not clear, or because the topic itself was not of interest. Alternatively, perinatal providers are also pressed for time often seeing back-to-back patients, and it could be that after reading through the study explanation did not have the time to complete the survey. Unfortunately, none of the responses we received elucidated why providers did not complete the survey. Of the responses collected, providers appear to be willing to refer patients to the workshop but would not want someone onsite to provide this kind of service. This discrepancy may highlight that perinatal providers do not see the health coaching workshop as an integrated care approach to health. A focus group with perinatal providers could be a helpful next step, as a way to address some of the outstanding questions about provider understanding, expectancy, and credibility with regard to the proposed workshop.

Limitations

Perhaps the most significant limitation in the current study is the sample size of perinatal providers. Unfortunately, despite various methods of recruitment, perinatal providers did not complete the survey to reach saturation. Possible reasons for this are varied, and future research should determine ways in which perinatal providers can be better facilitate and be integrated into behavioral health interventions.
Additionally, it is important to note that although demographics were not formally assessed, due to the method of recruiting the sample of pregnant women was believed – and appeared to be - highly educated. The majority of women had familiarity with mindfulness interventions either through their own work or through access to yoga/meditation. They also exhibited vocabulary consistent with an understanding of affective and cognitive processes, like “rumination,” “emotional triggers,” and health “literacy.” Therefore, themes developed from the current sample may not translate to women of differing education levels, and it would be important use language during future recruitment that is consistent and approachable to women of all education levels.

**General Discussion**

Excess gestational weight gain is associated with an increased risk for a number of adverse pregnancy and birth outcomes, including gestational diabetes mellitus, preeclampsia, gestational hypertension, cesarean section, macrosomia, & preterm birth (Singh & DiBari, 2019). Excess weight gain in pregnancy is also a predictor of postpartum weight retention in the mother and increased risk for overweight, obesity, and future metabolic conditions in the child (Vesco et al., 2009; Oken et al., 2007; Tam et al., 2018). With the prevalence of overweight/obesity increasing to 54% in women of childbearing age, and almost half of U.S. women gaining in excess of the recommended amount of gestational weight in pregnancy, it is vital to identify effective treatment interventions (Singh & DiBari, 2019; Rasmussen & Yatkine, 2009).

Current interventions have shown modest effects in reducing GWG, with dietary interventions generally resulting in the largest reduction (Thangaratinam et al., 2012). However, most studies targeting diet only show a mean GWG reduction of about 2 kg, which is not enough
to help women adhere to IOM guidelines or to effectively attenuate the adverse health effects of excess GWG (Tanentsapf et al., 2011). Furthermore, interventions that have shown a significant and meaningful effect on excess GWG are intensive and expensive, which make feasibility of widespread implementation and dissemination unlikely (Siega-Riz, Bodnar, Stotland, & Stang, 2020). There is thus an urgent need to develop interventions targeting modifiable predictors of excess gestational weight gain that are easily translatable to community settings and accessible to a wide range of pregnant women.

Food cravings are ubiquitous in pregnancy and may be a useful target for preventing weight gain as they are a documented predictor of over-consumption in non-pregnant and pregnant samples and in those with overweight/obesity (Pope et al., 1992; Potenza & Grilo, 2014; Thomas, Doshi, Crosby & Lowe, 2011). Food cravings have been implicated in excess consumption and subsequent weight gain in pregnancy, with research showing food cravings account for over 30% of the variance in excess GWG (Orloff et al., 2018). According to the Elaborated Intrusion theory, food cravings are maintained and strengthened through emotionally charged cognitive elaborations and metal imagery. Consistent with EI theory, cognitive restraint and experiential avoidance have been shown to increase the salience and intensity of cravings (Polivey et al., 2005; Forman et al., 2007; Lillis, Hayes, & Levin, 2011). By disrupting this intrusion and elaboration process, acceptance-based techniques like mindfulness and cognitive defusion have been shown to decrease the frequency and intensity of the food cravings and likelihood of eating (Schumacher et al., 2018; Lacaille et al., 2014). The present investigation was based on the assumption that Acceptance and Commitment Therapy-focused interventions could serve as a useful framework to successfully interrupt the food craving process, including in pregnancy, to prevent excess GWG (Forman et al., 2007).
Health coaching may be a useful framework to implement skills-based interventions in pregnancy, as a variety of health care professionals can serve as coaches, thereby reducing the likelihood of burdening clinics by bringing other providers on-site to conduct the intervention. Furthermore, health coaching is an easily disseminable framework because it is cost-effective and less time-intensive than traditional therapies (Swieskowski, 2008). Health coaching interventions have been shown to be effective in integrated health care settings (Strosahl, Robinson, & Gustavsson, 2012). Integrating ACT-based workshops with health coaching models lends itself well to skills-focused, values-based interventions. The current studies examined the feasibility of an acceptance-based health coaching approach to target food cravings in pregnancy.

Study 1 examined the acceptability and feasibility of an acceptance-based health coaching group workshop targeting food cravings in pregnancy in a mixed methods design. Indicators of feasibility included the recruitment process, resources, retention rates, and measurement burden. Acceptability was evaluated using assessments of credibility and expectancy, and perceptions of appropriateness and utility. Results showed that the intervention was generally feasible and acceptable. Women thought the workshop was appropriate and the approach was deemed credible for coping with food cravings. Participants expected the skills learned to be helpful in the future. Treatment retention was adequate, and measurements were shown to be generally appropriate and minimally burdensome. However, a major limitation was the recruitment process in community settings. Specifically, attempts to connect with recruitment sites was difficult and of the sites contacted, very few agreed to help with recruitment. It was unclear in study 1 whether the recruitment process itself (i.e., sites, materials used, method of recruitment) was a barrier, whether the perceived need for the intervention was lacking, or
whether it was both. Therefore, a follow up mixed method study was developed in order to
address, in more detail, issues related to recruitment and acceptability.

Study 1 provided sufficient evidence for concurrent and retrospective acceptability, as
women in the workshops appeared to understand the intervention, how it worked, and believed
the skills learned to be likely to help with food cravings during their pregnancy. Study 2 used a
mixed method approach to capture the prospective acceptability of the ACT-based workshop in
perinatal providers and pregnant women via brief quantitative and qualitative assessments. The
aim of addressing prospective acceptability was to assess need for the acceptance-based health
coaching workshop, knowledge of mindfulness, believability of the identified approach,
perceived barriers to participation, and preferred mode of implementation. Results showed that
women were interested in the proposed approach only if they struggled with food cravings or
eating during pregnancy. Most women surveyed had past experience with mindfulness and
understood how a mindfulness and acceptance-based approach could potentially address coping
with food cravings. Women overwhelmingly reported that time and convenience of the described
workshop would be major factors in their ability and willingness to participate. Furthermore,
women shared they would like the workshop integrated into their standard prenatal care at their
provider’s office, which could explain difficulties with recruitment of these women in the
community setting. Study 2 elucidated potential barriers experienced in Study 1, specifically
related to difficulty with provider engagement. Providers surveyed stated that they would refer
their patients to the workshop, but they would not necessarily want someone on-site to
implement the intervention. Providers responses in Study 2 appeared to focus more on the weight
and nutrition of their patients than on food cravings eating behaviors, highlight differences in
what providers and pregnant women deemed important. Further discussion and ideas for future directions and implementations of study 1 on a larger scale are as follows.

**Future Directions**

The current feasibility studies provide useful information for future iterations of this intervention and its implementation on a larger scale. Aspects related to who to recruit, how best to recruit, and changes in the study intervention itself will be discussed.

**Who to recruit.** Responses from pregnant women indicated that it would be particularly useful to pre-screen women prior to the intervention and target those who are experiencing very frequent and/or intense food cravings. Results from our study 2 survey showed that some women did not find food cravings to be particularly salient or difficult experiences for them, with a few noting that they did not experience them at all during their pregnancy. While women who were experiencing cravings likely self-selected for participation in the present set of studies, it is important to note that recruitment should focus on women who endorse food cravings as barriers to healthy eating. Women also shared that they recognize the connection between eating and emotions, and some indicated a concern that the proposed intervention could be potentially triggering for women with disordered eating or a history of eating disorders. While it is beyond the scope of this manuscript, it could be beneficial to develop a more comprehensive intervention for women who endorse having a history of disordered eating to address related issues in more depth and via appropriately trained interventionists. Pregnancy can be an especially challenging time for women with eating disorders (ED) both psychologically and physically, and further research should be done to develop interventions specific to pregnant women with ED histories (Claydon et al., 2018).
Another important factor regarding the target population for the intervention is recruitment of nulli-parous versus multi-parous women. While some women shared that they understood the utility of the proposed intervention better due to difficulties with eating and health outcomes (like weight gain and gestational diabetes) in a previous pregnancy, overall, multi-parous women reported that they were less likely to participate in the intervention now compared to their first pregnancy due to having less time and the burden of other childcare. Based on these findings, future interventions should target first time mothers and focus on increasing their motivation to participate, with the added hope that skills learned in the first pregnancy could translate to subsequent pregnancies as well.

How to recruit. Methods for improved recruitment were also addressed in this study. Women overwhelming shared in both studies that they would want the proposed intervention integrated into their standard care at their perinatal providers’ office. However, women were split on whether they would want the workshop at the same time as appointments or in between them, due to the already information-heavy nature of perinatal appointments. Practically, it would be difficult to run the workshop as a group and still have them at the same time as individual women’s prenatal appointments. Because participants in study 1 shared that they would like something in between the one-time workshop and a series of individual meetings, future interventions could have the one-time group workshop introducing the basic concepts, followed by a series of individual meetings tied to women’s prenatal appointments.

Past health coaching interventions have shown recruitment and retention to be effective at primary care offices, however, researchers were unable to determine physician “buy in” (Liddy et al., 2014). Other health coaching interventions have described the importance of physician referrals and open communication between health coaches and providers in recruitment for
health coaching (Lichet, Davis, Scripps, & Cone, 2007; Francis, Feyer, & Smith, 2007). The discrepancy between women expressing the desire to have group participation integrated into care, and provider lack of response is important to explore. Perinatal providers seemed hard to engage as indicated by a lack of willingness to post recruitment flyers at their sites in Study 1 and minimal responses to the mixed method survey in Study 2. Many providers did not respond to requests to complete the survey in Study 2 and those who did were split on whether they would like someone on site to implement the proposed workshop. Providers did share they would be more willing to refer a patient to the workshop, but did not necessarily want the workshop to be held at their clinic. Furthermore, perinatal provider’s responses in study 2 focused on nutrition and weight, while pregnant women’s responses focused more on food cravings and eating patterns. These discrepancies highlight the disconnect between provider and patient need. Lack of “buy-in” from perinatal providers, therefore, could be a potential barrier to implementation and integrated care. As mentioned previously, further research is needed to assess provider views on the proposed intervention, perhaps through a focus group to also explore how they approach topics of eating and weight gain with their pregnant patients. Future iterations of study 1 could provide education about the benefits of ACT-based health coaching in order to incorporate them into the integrated care approach. One health coaching study targeting diabetes management invited primary care clinic staff to attend a lunch-and-learn session to provide some background on their project, discuss possible impact of this study on the practice, and answer questions (Liddy et al., 2014). This approach proved to be successful for recruitment in their study and could be a useful model to use for future iterations of our study.

Addressing understanding and acceptability of recruitment materials was another takeaway from this feasibility study. One woman shared that she appreciated the “Body Positive”
approach, and another took issue with the way recruitment materials seemingly described cravings as an inherently “bad” thing that needed to be managed. Future recruitment materials should be more explicit in that the intervention does not encourage “managing” cravings, but rather aims to reduce distress related to food cravings and increase the ability to move forward in identified health behavior goals despite the experience of cravings.

A possible way to address these concerns would be to frame this intervention in terms of helping with overall health of the woman and their baby— not just to prevent excess gestational weight gain. Because excess GWG can cause a wide variety of poor health outcomes (e.g., gestational diabetes, hypertension, preterm birth, neonatal outcomes) it could be more motivating to frame this workshop in terms of helping overall health, not specifically weight. This approach could be less stigmatizing and reduce negative emotions associated with weight, by shifting focus on the overall health of the mother and her baby. Women experience feelings of blame, guilt, and humiliation when health providers discuss weight, and using appropriate weight gain as the focus of an intervention might discourage some women from participating (Nikolopoulos et al., 2017). Overwhelmingly, women report their major motivator for achieving appropriate weight gain in pregnancy is the health of their future child (Vanstone, Kandasamy, Giacomini, DeJean, & McDonald, 2016). Common secondary motivators for adequate weight gain in pregnancy are to facilitate postpartum weight loss, prevent diabetes, heart disease, and other negative maternal outcomes. Food cravings are consistently identified as barriers to health eating and framing this health coaching intervention as teaching acceptance- and mindfulness- based skills focused on food cravings to help achieve healthy pregnancy outcomes could be more accepted by pregnant women than focusing on weight as an outcome.
Changes to the intervention. In order to develop a more feasible and acceptable intervention targeting food cravings in pregnancy, certain changes to the intervention itself should be considered based on the findings reported here. Women responded that while they understood the treatment rationale and felt the intervention was credible, they shared they would need a lot of support (i.e., more than a one-time workshop) to implement these skills. While past studies have shown the preliminary efficacy of a one-time workshop in teaching acceptance and mindfulness skills for weight control, it could be necessary to incorporate follow-up or “booster” sessions to ensure long-term behavior change in the pregnancy population (Lillis et al, 2009). There is a need to balance the burden that additional appointments would put on pregnant women with ensuring that the intervention gives women enough time and support to build and effectively use these skills. One way to maximize skill-building while also reducing burden on women would be to add individual follow-up telephone or videoconferencing sessions with participants until they give birth. A previous study used telephone- based health coaching to help women achieve appropriate weight gain in pregnancy. While researchers found the 10-session telephone health coaching showed some value for helping women gain weight within the target range for their pre-pregnancy BMI, they experienced issues with program enrollment and retention (Rissel et al., 2019). It could be that the telephone sessions would be more acceptable to women who already have completed a one-day, in person workshop to build “buy-in,” rapport with the provider, and credibility. This approach would be consistent with past research demonstrating the most common method for interventions targeting gestational weight gain is through a combination of in-person, telephone, and text messaging, with more than half of interventions using more than one type of medium (Vincze et al., 2019).

Limitations
There are several significant limitations to these studies. First, the sample of women in both studies 1 and 2 lacked diversity. While socio-economic status and education was not formally assessed, it was apparent through responses that the women were educated and financially stable. All of the women who participated in the intervention study identified as White. While sites for recruitment targeted a wide range of community sites, the majority of women who participated were recruited through YMCAs and JCCs. Therefore, the generalizability of these findings is important to consider and should be interpreted with caution. Future studies are needed to address how best to enroll and retain pregnant women of diverse and/or minority backgrounds. Black and Hispanic women are more likely to gain inadequately based on the IOM guidelines for weight gain in pregnancy compared to White women (Headen, Davis, Mujahid, & Abrams, 2012). Furthermore, because adolescent obesity is more prevalent in Black, Hispanic, and Native Americans compared to White women, and women who are overweight/obese prior to pregnancy are at an increased risk of excess GWG, it is important to develop interventions that are acceptable to women of minority racial and ethnic status.

It is also important to note that the current study did not have the staff or resources for a greater recruitment effort. The principal investigator identified, contacted, communicated, and met with all community centers and was in charge of organization and scheduling of the groups. Future studies, such as randomized controlled trials, should involve more staff to connect with recruitment sites, increase enrollment, and hopefully implement the study on a larger scale.

Lastly, the COVID-19 pandemic was a factor in recruitment, retention, and possibly adherence as well. It is important to note that recruitment was originally planned to continue for four additional months, before the pandemic caused the country-wide shut-down. Follow-up surveys were sent via email to women during the start of the pandemic which could explain why
one woman did not complete it. Furthermore, the adherence survey was sent in the post-partum after women’s identified due date, during the height of the COVID-pandemic, which could explain why only one woman from the workshop reported using acceptance and defusion skills in the remainder of her pregnancy. According to a recent study published on eating patterns during the COVID-19 pandemic, there has been a reported increase in food intake for high energy dense foods in response to the pandemic lock-down (Buckland et al., 2021). Managing the stress of being pregnant during a pandemic could have prevented some women from using these new acceptance and mindfulness skills and revert back to previous coping methods like distraction and avoidance. It would be important to assess adherence and retention to the acceptance-based study in non-pandemic times.

**Conclusions**

It is clear that there is a need for feasible and acceptable interventions to target food craving and appropriate weight gain in pregnancy. The current studies demonstrated preliminary support for the feasibility of an acceptance-based health coaching workshop for women struggling with food cravings. Women reported this to be an acceptable approach for food cravings and expressed interest in learning acceptance and mindfulness skills to reduce cognitive and emotional distress related to eating in pregnancy. Incorporating perinatal provider support and clarifying recruitment materials in order to better appeal to pregnant women is important. Further large scale and longitudinal research is needed to address intervention efficacy and adherence in the long-term.
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Table 1

Recruitment Sites in the Community

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<thead>
<tr>
<th>Site Contacted</th>
<th>Agreed to post flyer</th>
<th>Agreed to host workshops</th>
<th>Answered, not interested</th>
<th>Did not respond</th>
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<td>YMCA-X</td>
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<td>A Fertility Clinic</td>
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<td>YMCA X</td>
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<td>A private fertility clinic</td>
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<td>OBGYN clinic at academic hospital</td>
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<td>A gym for pregnant women</td>
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Note: A yoga studio and a community care pregnancy clinic responded that they did not have the volume of pregnant clientele to help with recruitment.
Appendix A
Flyer for Study 1

Pregnancy Cravings?

Have you been experiencing food cravings during your pregnancy?

Would you like to learn effective strategies for coping with food cravings?

What: A research study run by SUNY Albany to test the effectiveness of a brief mindfulness-based workshop in pregnancy.

We are looking for women who are pregnant and interested in learning skills to help them cope more effectively with food cravings and emotional eating in pregnancy. Participation will consist of completion of questionnaires about cravings, patterns of food consumption, general health and participating in a group session to learn skills for managing cravings.

You will receive a $10 Visa gift card for 2 surveys completed throughout the course of your pregnancy for $20.00 in gift cards.

Who can participate? Any woman who is currently having a singleton pregnancy, is over 18 years of age, can speak/read English, and is struggling with managing food cravings.

If you are interested in participating please email Lauren Blau, M.A. at lblau@albany.edu
Pregnancy Cravings?

Have you been experiencing food cravings during your pregnancy?

Would you like to learn mindfulness and acceptance-based strategies to help with these?

**What:** A research study run by SUNY Albany to test the effectiveness of a **brief mindfulness workshop** in pregnancy.

We are looking for women who are pregnant and interested in learning skills to help them cope more effectively with food cravings and emotional eating in pregnancy. Participation will consist of completion of questionnaires about cravings, patterns of food consumption, general health and participating in a **group session** to learn skills for managing cravings.

You will receive a **$10 Visa gift card** for 2 surveys completed throughout the course of your pregnancy for **$20.00 in gift cards**.

Who can participate? Any woman who is currently having a singleton pregnancy, is over 18 years of age, can speak/read English, and is struggling with managing food cravings.

If you are interested in participating, please email Lauren Blau, M.A. at **lblau@albany.edu**
Appendix C

Facebook Post for Study 1

X is looking for women who are pregnant and interested in learning skills to help them cope more effectively with food cravings and emotional eating in pregnancy. Participation will consist of completion of questionnaires and about cravings, patterns of food consumption, general health and participating in one group session at the YMCA to learn skills. Participants will be compensated up to $20 Visa Gift card for their time.

If you are interested, sign up for a group by emailing Lauren Blau, M.A. at lblau@albany.edu.
Appendix D

Facebook Post for Study 1

“X is looking for women who are pregnant and interested in learning skills to help them cope more effectively with food cravings and emotional eating in pregnancy. Participation will consist of completion of questionnaires about cravings, patterns of food consumption, general health and participating in one group session at the X JCC to learn skills for managing cravings.

If you are interested in participating please email Lauren Blau, MA, at lblau@albany.edu”
Appendix E

Capital District Moms Interview

Are you originally from the Capital District? Where are you originally from? What brought you to the Capital District?
I’m originally from California but have lived on the east coast for the past 10 years. I came to Albany a few years ago to get my degree in clinical psychology at SUNY Albany.

What is your favorite thing about living in the Capital District?
I love the Capital District's proximity to mountains, lakes, and walking trails. When the weather permits, I take my dog and picnic at Thatcher Park or hike near Lake George. In Albany, Washington Dog Park has been our go-to spot for many years now. My favorite time in the Capital District is late summer/early fall, when the weather is still warm but the leaves are just starting to change.

What is your dissertation about?
My research interest is in health behaviors during pregnancy. Pregnancy is a time when women experience a lot of physical and emotional changes – some exciting, some more challenging. Pregnant women I have spoken to in my research often report noticing a lot of pretty drastic changes in their eating patterns and many have expressed to me that they would specifically like help managing their food cravings. I am not a nutritionist or dietician and I come from a Body Positive perspective, so I really want to steer clear of simply telling women what to eat and not eat or how they should manage their weight in pregnancy. I think women hear a lot of that from their providers and often consider it a source of stress, rather than something that is actually useful to them. Instead, I wanted to find a way to help women change their perspective and perhaps learn new skills to help them deal more effectively with unpleasant or difficult experiences like cravings in pregnancy. My dissertation is piloting a workshop to teach women mindfulness and acceptance-based skills to help them navigate the many stressors that come with the perinatal period- and food cravings is one area where these skills may be helpful to them. Mindfulness-based practices have been used for centuries by people from all backgrounds and have been shown to be effective for stress reduction, improving health behaviors, and enhancing overall mental well-being. We want to see whether these skills can be useful to women in pregnancy (and beyond) and whether and how group workshops like ours should be integrated in regular prenatal care.

You are looking for some participants to help you. Who are you looking to help you? When? Where? What will they be required to do? Will they be compensated? How long does the group session last? Etc.
I am looking for pregnant women who would like to learn mindfulness and acceptance-based skills in a one-time in-person group workshop. I welcome women who are totally new to mindfulness practices as well as those who already have some level of familiarity with it. Women will be asked to sign a consent form, fill out a brief and confidential questionnaire about their food cravings and related experiences in pregnancy, and attend a one-hour interactive, skills-focused group workshop. After they attend group women have the option to fill out two more confidential questionnaires (via online surveys that can be completed from their phone or
personal computer) before they give birth. Women will be compensated $10 for their participation in the group workshop, and another $10 if they complete the follow-up questionnaires.

**Do you need to register ahead of time? How do you sign up?**
To sign up for the one-time group workshop, women can contact me, Lauren Blau, at [lblau@albany.edu](mailto:lblau@albany.edu). We have many group dates coming up, both during the week and on weekends. Have friends who want to participate as well? Women are encouraged to bring them along! The more the merrier.
Appendix F

Informed Consent for Study 1

University at Albany
INFORMED CONSENT INFORMATION
FOR RESEARCH PARTICIPATION

Study Title: Acceptance-Based Health Coaching Targeting Food Cravings in Pregnancy

Principal Investigator: Lauren Blau, M.A.

Co-Principal Investigator: Julia Hormes, Ph.D.

IRB Study Number:

I am a graduate student at the University at Albany, in the Department of Psychology. I am planning to conduct a research study, which I invite you to take part in. This form has important information about the reason for doing this study, what we will ask you to do if you decide to be in this study, and the way we would like to use information about you if you choose to be in the study.

Why are you doing this study?

Food cravings are often cited as the cause of excess food consumption and weight gain in pregnancy. Gaining too much weight in pregnancy can increase the risk of complications in gestation, delivery, and the post-partum period.

This study examines the effectiveness of a brief intervention that seeks to help pregnant women better cope with food cravings. It specifically aims to change the way pregnant women respond to food cravings.

What will I do if I choose to be in this study?

You will be asked to attend a group intervention to teach skills helping with food cravings and eating behaviours in pregnancy. As part of the group process, you will first complete a confidential, baseline self-report questionnaire on pen and paper. The baseline self-report asks questions about eating styles, eating behaviors, food cravings, and basic demographics. The group meeting will last an hour. Meetings will be audio recorded to assure adherence to the treatment protocol.

You will be asked via email to complete a similar questionnaire in approximately 1 month at home using a computer or tablet. Upon completion of the study you will be asked to fill out a short questionnaire indicating strategies you used to cope with cravings, which will be sent out via email when you are full term (39 weeks or so).
**Study time:** Study participation will take approximately the length of your pregnancy from the second trimester until full term. You will take the first assessment today during your second trimester while you attend one of the group-based health-coaching sessions. In 1 month, you will take a 30-minute follow-up survey, similar to the baseline assessment. At time of delivery, you will be asked to complete a brief 2-minute survey about strategies and coping skills you used in pregnancy.

**Study location:** All study procedures will take place at the site of recruitment.

I will be audio-recording the group session for quality assurance purposes. I will keep these tapes in a locked cabinet in my office until I upload to a secure database, whereby they will be deleted from the tape recorder. They will only be used by our co-Investigator who reviews the tapes to ensure compliance with our protocol. Audio recordings of the group sessions are required.

**What are the possible risks or discomforts?**
Questionnaires will ask you about everyday thoughts and behaviours related to your food choices and eating behaviours, thoughts, and mood. All questions included in the assessments have been widely used in previous research studies and/or clinical settings. We do not anticipate any risk in your participation other than you may feel uncomfortable answering some of the questions. You can skip any question that you are uncomfortable answering without any adverse consequences regarding your participation in the study. If any of the questions asked bring up thoughts that make you uncomfortable or causes you distress, you should contact:

Julia M. Hormes, Ph.D.
Phone: (518) 442-4911
email: JHormes@albany.edu

If you decide that you would like to seek outside help for any thoughts or feelings that may be distressing, the research team will discuss the best possible referrals and help you obtain any follow-up care.

As with all research, there is a chance that confidentiality of the information we collect from you could be breached – we will take steps to minimize this risk, as discussed in more detail below in this form.

**What are the possible benefits for me or others?**
We cannot promise any benefits to you or others from your participation in this research. However, possible benefits include the opportunity to reflect on your own behaviours as they relate to your health and wellbeing.

We cannot promise any benefits to others from your taking part in this research. However, possible benefits to others include a better understanding of food intake and weight-related health specifically in pregnant, which may ultimately lead to the development of interventions targeting weight- and diet-related health in pregnancy.

**How will you protect the information you collect about me, and how will that information be shared?**
Results of this study may be used in publications and presentations. Your study data will be handled as confidentially as possible. If results of this study are published or presented, individual names and other personally identifiable information will not be used.

We cannot guarantee privacy. However, all possible efforts will be made to keep your personal information and other health information, including research study records private.

Further, any information you provide will be kept confidential. Any questionnaires that you complete as part of the study and any other information and materials collected as part of this study will be labeled with a randomly selected identification number (as opposed to your name or other identifying information) and kept separate from any materials containing identifying information. The file that links this ID number to your name and other identifying information will only be accessible to authorized study personnel.

The audio recording of each group session will happen individually, with no label associated. The recording will be transferred immediately to a password-protected SUNY Albany computer after each session. The uploaded file will be labeled with the participant ID number in a password-protected file. Then the audio file will be immediately deleted from the recording device. The Co-Investigator will code the session using the password-protected Albany computer; the file will not be transferred to any other device.

If we think that you intend to harm yourself or others, we will notify the appropriate people with this information.

**Financial Information**

Participation in this study will involve no cost to you. If you agree to take part in this research study, you will receive the following:

- Assessment 1 (baseline) & group session - $10 gift card
- Assessment 2 (1 month post-intervention) - $10 gift card

You can receive up to $20 in gift cards for your time and expenses. If you withdraw from the study at any point you will not be penalized, however you will not receive any more gift cards. The first gift card will be given at the group session, after the baseline assessment and participation in group is completed. The second gift card will be mailed to your home address after completing the post-intervention session via laptop or device.

**What are my rights as a research participant?**

Participation in this study is voluntary. You do not have to answer any question you do not want to answer. If at any time and for any reason, you would prefer not to participate in this study, please feel free not to. If at any time you would like to stop participating, please tell me. We can take a break, stop and continue at a later date, or stop altogether. You may withdraw from this study at any time, and you will not be penalized in any way for deciding to stop participation. If you decide to withdraw from this study, the researchers will ask you if the information already collected from you can be used.

**What if I am a University at Albany student or employee?**
You may choose not to participate or to stop participating in this research at any time. This will not affect your class standing, grades, employment, or any other aspects of your relationship with the University at Albany.

**Who can I contact if I have questions or concerns about this research study?**

If you have questions, you are free to ask them now. If you have questions later, you may contact the researchers at

Lauren Blau, M.A.
lblau@albany.edu

OR

Julia M. Hormes, Ph.D.
Phone: (518) 442-4911
email: JHormes@albany.edu

If you have any questions about your rights as a participant in this research, you can contact the following office at the University at Albany:

**Institutional Review Board**
University at Albany
Office of Regulatory and Research Compliance
1400 Washington Ave, MSC 100E
Albany, NY 12222
Phone: 1-866-857-5459
Email: rco@albany.edu

**Consent**
I have read this form and the research study has been explained to me. I have been given the opportunity to ask questions and my questions have been answered. If I have additional questions, I have been told whom to contact. I agree to participate in the research study described above and will receive a copy of this consent form.

____________________________________________
Participant’s Name (printed)

______________________________________________________
Participant’s Signature  Date

Participant’s Email Address
Participant’s Cell Number

_____ Check here if you DO NOT want to be sent a reminder text to complete surveys.
Appendix G
Baseline Assessment for Study 1

Q115 Participant Number

Q6 What is your age (in years)?

Q1 How far along are you in your pregnancy? (in weeks)

Q5 What is your anticipated due date? (Please enter in month/day format)

Q140 How much do you currently weigh? (Please respond in pounds)

Q12 What was your weight prior to getting pregnant? (Please respond in pounds)
Q16 Which of the following best describes your racial heritage (please select all that apply):

☐ American Indian or Alaskan Native (1)

☐ Hispanic or Latino (2)

☐ Asian (3)

☐ Native Hawaiian/Pacific Islander (4)

☐ Black or African American (5)

☐ White (6)

☐ Other (7) _____________________ _____________________

The following measures were administered:
FCI, FAAQ, WBSI, DEBQ, FCQ-T-r

Q141 When experiencing pregnancy cravings, what method do you employ to deal with them?

☐ Distraction/Avoidance (1)

☐ Exercise (2)

☐ Acceptance (3)

☐ Eat the craved food (4)
Appendix H

Post Intervention Credibility and Expectancy

We would like you to indicate below how much you believe, right now, that the group you just had will help you with your food cravings. Belief usually has two aspects to it: (1) what one thinks will happen and (2) what one feels will happen. Sometimes these are similar; sometimes they are different. Please answer the questions below in terms of what you think. In the second set answer in terms of what you really and truly feel.

1. At this point, how logical does the intervention to you seem?

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   not at all logical | somewhat logical | very logical

2. At this point, how successfully do you think this information/group will be in reducing your concerns about your eating patterns?

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   not at all successful | somewhat successful | very successful

3. How confident would you be in recommending this type of group to a friend who experiences similar concerns about food cravings in pregnancy?

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   not at all confident | somewhat confident | very confident

For this set, close your eyes for a few moments, and try to identify what you really feel about the treatment and its likely success. Then answer the following questions.

1. At this point, how much do you really feel that this group will help you to reduce your concerns about your food cravings?

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   not at all | somewhat | very much

For these last questions, think about what you learned today and your overall experience in group.

1. Do you think that this group was enough, or do you think a series of individual meetings would be more effective in helping you with food cravings?

   This was enough | Maybe something in between | Definitely individual meetings
2. Before coming in tonight, how much did you know about Acceptance Commitment Training?

1 2 3 4 5 6 7 8 9
Nothing somewhat Very much

What strategies did you learn here today to help with cravings and emotional eating?

a. Distraction & Avoidance
b. Acceptance & Defusion
c. Did not learn any skills

Would you like this integrated in standard care? How about online?

What did you like about this group? What did you not like?
Appendix I
One Month Follow-Up Assessment

Q115 Participant Number

Q6 What is your age (in years) ?

Q1 How far along are you in your pregnancy? (in weeks)

Q5 What is your anticipated due date? (Please enter in month/day format)

Q151 What is your height? (In feet' inches)

Q140 How much do you currently weigh? (Please respond in pounds)

The following measures were administered:
FCI, FAAQ, WBSI, DEBQ, FCQ-T-r
Q141 When experiencing pregnancy cravings, what method do you employ to deal with them?

- Distraction/Avoidance (1)
- Exercise (2)
- Acceptance and Defusion (3)
- Eat the craved food (4)

Q148 What strategies did you learn to employ in over the course of your pregnancy?

- Distraction/Avoidance (1)
- Exercise (2)
- Acceptance and defusion (3)
- Eat the craved food (4)
Appendix J
Final Timepoint Strategies Survey

Q11 Participant Number

________________________________________________________________

Q13 What was your weight at full gestation? (in pounds)

________________________________________________________________

Q5 What strategies did you employ to deal with food cravings?

○ Distraction/Avoidance

○ Exercise

○ Acceptance and defusion

○ Eat the craved food

Q12 Did you feel as though the skills you learned were effective in helping manage cravings throughout your pregnancy?

○ Definitely yes

○ Probably yes

○ Might or might not

○ Probably not

○ Definitely not
Q10 How likely are you to use these skills learned in the future?

- [ ] Extremely likely
- [ ] Somewhat likely
- [ ] Neither likely nor unlikely
- [ ] Somewhat unlikely
- [ ] Extremely unlikely
Appendix K

Study 1 Participant Workbook

Thought Suppression

Chinese Finger-Trap Metaphor

Cognitive Defusion Exercise- Leaves on a Stream

Mindful Eating Exercise

Drop the Rope Exercise
Appendix L

Study 2 Pregnant Women Survey

Q16 As a participant in this study, you will be asked as a pregnant or recently pregnant woman your opinion on the described health-coaching group. The information you provide when completing this online questionnaire will be used for research purposes. You will NOT be asked to indicate any information that would enable us to link your responses to your identity. Data will be stored on secure networks with password protection to ensure confidentiality. Participation is voluntary. You can discontinue participation at any point without penalty. The survey will last approximately 5 minutes and you will receive no compensation. Although you may not receive direct benefit from your participation, others may ultimately benefit from the knowledge obtained from this research. The risk of participating in this survey is minimal. This project has been approved by the University at Albany Institutional Review Board. Approval of this project only signifies that the procedures adequately protect the rights and welfare of the participants. Please note that absolute confidentiality cannot be guaranteed due to the limited protections of Internet access. Please be sure to close your browser when finished so no one will be able to see what you have been doing. If you have any questions about this study, please contact the Principal Investigator: Lauren Blau, lblau@albany.edu; or the co-investigator Julia H. Hormes, PhD, jhormes@albany.edu. By clicking "next," you indicate your understanding of the purpose of the study and your consent to participate. You additionally are indicating that you are at least 18 years of age and are fluent in English.

Q1 My research interest is in health behaviors during pregnancy. Pregnancy is a time when women experience a lot of physical and emotional changes – some exciting, some more challenging. Pregnant women I have spoken to in my research often report noticing a lot of pretty drastic changes in their eating patterns and many have expressed to me that they would specifically like help managing their food cravings. I am not a nutritionist or dietician and I come from a Body Positive perspective, so I really want to steer clear of simply telling women what to eat and not eat or how they should manage their weight in pregnancy. I think women hear a lot of that from their providers and often consider it a source of stress, rather than something that is actually useful to them. Instead, I wanted to find a way to help women change their perspective and perhaps learn new skills to help them deal more effectively with unpleasant or difficult experiences like cravings in pregnancy. My dissertation is piloting a workshop to teach women mindfulness and acceptance-based skills to help them navigate the many stressors that come with the perinatal period- and food cravings is one area where these skills may be helpful to them. Our aim is to help women manage food cravings and hopefully reduce excess gestational weight gain. Mindfulness-based practices have been used for centuries by people from all backgrounds and have been shown to be effective for stress reduction, improving health behaviors, and enhancing overall mental well-being. We want to see whether these skills can be useful to women in pregnancy (and beyond) and whether and how group workshops like ours should be integrated in regular prenatal care.
Q2 Please try to answer the following questions as if the pandemic has passed, and COVID-19 is no longer a factor in your decision-making, but feel free to elaborate in the open-ended responses how the presence of COVID-19 may impact your responses as well, as we understand that answers might change during a pandemic.

Q3 When you think of “mindfulness” what comes to mind?

________________________________________________________________

Q4 Any past experience with mindfulness?

☐ Yes ________________________________

☐ No ________________________________

☐ Maybe ________________________________

Q5 Do you feel as though the approach detailed above would help you to better manage food cravings? Why? What elements about this are appealing or would you think wouldn’t be helpful?

☐ Yes ________________________________

☐ No ________________________________

☐ Maybe ________________________________

Display This Question:

If Do you feel as though the approach detailed above would help you to better manage food cravings?... = Yes
Q6 Would you like this integrated into your standard care at your provider's office?

- Yes
- No

Display This Question:

If Do you feel as though the approach detailed above would help you to better manage food cravings?... = Yes

Q7 Would you want this to be something to happen at the same time as your appointments, happening between appointments, or another time (please elaborate)?

Q8 Would you be open to attending a group like in person or online? Why? Please elaborate if your answer would change during the COVID-19 pandemic.

- In Person
- Online
- Not interested in this group

Q9 What barriers do you anticipate occurring that would prevent you from being able to participate in a group like this? (Examples: time, internet connection, child care, career/job, other)

Q10 What number pregnancy is this for you?
Q11 How far along are you in your pregnancy? (in weeks) 
________________________________________________________________

Q12 If you've recently given birth, when did you give birth? (month/day) 
________________________________________________________________

Q13 If this is not your first pregnancy, are there differences for you during COVID-19 compared to non-pandemic pregnancies? 
________________________________________________________________

Q14 Are you more likely to do this now compared to your first pregnancy? Why?

☐ Yes ________________________________

☐ No ________________________________

☐ N/A (first pregnancy) ________________________________
Appendix M

Study 2 Perinatal Provider Survey

Q7 As a participant in this study, you will be asked as a professional in the perinatal field your opinion on the described health-coaching group. The information you provide when completing this online questionnaire will be used for research purposes. You will NOT be asked to indicate any information that would enable us to link your responses to your identity. Data will be stored on secure networks with password protection to ensure confidentiality. Participation is voluntary. You can discontinue participation at any point without penalty. The survey will last approximately 5 minutes and you will receive no compensation. Although you may not receive direct benefit from your participation, others may ultimately benefit from the knowledge obtained from this research. The risk of participating in this survey is minimal. This project has been approved by the University at Albany Institutional Review Board. Approval of this project only signifies that the procedures adequately protect the rights and welfare of the participants. Please note that absolute confidentiality cannot be guaranteed due to the limited protections of Internet access. Please be sure to close your browser when finished so no one will be able to see what you have been doing. If you have any questions about this study, please contact the Principal Investigator: Lauren Blau, lblau@albany.edu; or the co-investigator Julia H. Hormes, PhD, jhormes@albany.edu. By clicking "next," you indicate your understanding of the purpose of the study and your consent to participate. You additionally are indicating that you are at least 18 years of age and are fluent in English.

Q1 Research in our lab has shown that food cravings are responsible for some of the excess gestational weight gained in pregnancy. Furthermore, qualitative studies from women in the perinatal period have shown that food and specifically cravings are a psychologically salient aspect of their experience. We are proposing to use a cognitively based strategy to influence weight management in pregnant women, using the framework of Acceptance and Commitment Therapy (ACT). This health-coaching group would focus on mindfulness and cognitive defusion techniques to help women manage food cravings with the hope to reduce excess gestational weight gain. We want to see whether these skills can be useful to women in pregnancy (and beyond) and whether and how group workshops like ours should be integrated in regular prenatal care. Please try to answer the following questions as if the COVID-19 pandemic is not a factor.
Q2 Would your practice benefit from having a provider on site to do this intervention? Please elaborate and go into as much detail as possible.

- Yes ________________________________________________
- No ________________________________________________
- Maybe ________________________________________________

Q3 Would you refer your perinatal patients to this workshop? Please elaborate in the comment box why or why not.

- Yes ________________________________________________
- No ________________________________________________
- Maybe ________________________________________________

Q4 Do you think this workshop would be best done in person or online/remotely? In the space for a response, please indicate if the COVID pandemic impacts your decision either way.

- In person ________________________________________________
- Online ________________________________________________
Q5 Of the following options, which do you anticipate as potential barriers to your patients participating in this group?

☐ Lack of time
☐ Transportation
☐ Financial
☐ Interest
☐ Childcare
☐ Other (please enter) ________________________________

Q6 Does COVID-19 change your responses to the above questions? If so, how?

☐ Yes ________________________________
☐ No ________________________________
☐ Maybe ________________________________
### Appendix N

Study 2 Thematic Codes for Pregnant Women

<table>
<thead>
<tr>
<th>Theme</th>
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<tbody>
<tr>
<td><strong>Mindfulness</strong></td>
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<tr>
<td>1. Meditation &amp; Yoga</td>
<td>“Meditation, DBT”  \  “Meditation, relaxation”*  \  Meditation, biofeedback”  \  “Meditation, slowing down, expanded awareness, intentionality”*  \  “Being present and intentional, and it also has connotations of meditation”*  \  “Meditation and yoga”  \  “Yoga and/or meditation”  \  “Guided meditation and setting aside a space for moment of peace”  \  “Meditation, awareness of actions and consequences”*  \  “Meditation”</td>
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<tr>
<td>2. Relaxation &amp; Calm</td>
<td>“Meditation, relaxation”  \  “Introspective thought with the goal of calm”  \  “Calm”  \  “Reflection, being present, calm, accepting”*</td>
</tr>
<tr>
<td>3. Present Moment Awareness</td>
<td>“ ‘Paying attention with intention.’ Being present to what is. Slowing down”  \  “Being present, in the moment”  \  “Noticing and accepting feelings, being present and intentional”  \  “Meditation, slowing down, expanded awareness, and intentionality”  \  “Introspective thought with the goal of calm”*  \  “Being aware of my brain and body, like my mental state and how my body is feeling at a given moment”  \  “Being present, finding acceptance in one’s own thoughts and feelings”*  \  “Paying attention to the present moment without judgment or need to change anything”*  \  “Being present and intentional, and it also has connotations of meditation”*  \  “Paying attention to within vs outside”  \  “Nonjudgment, acceptance, present”*  \  “Being compassionate when it comes to others, putting someone else first before you desires, being mentality focus on something”*  \  “Aware of your present thoughts and feelings”</td>
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<td>Theme</td>
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<tr>
<td>Past Experience with Mindfulness</td>
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<tr>
<td>1. Therapy</td>
<td>“DBT trained. I lead practices in skills groups weekly and use it in my own life.”</td>
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<td>“Some biofeedback sessions in high school for headaches, and some books in preparation for childbirth”*</td>
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<td>4. Acceptance</td>
<td>“Being present, finding acceptance in one’s own thoughts and feelings”*</td>
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<td></td>
<td>“Paying attention to the present moment without judgment or need to change anything”*</td>
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<td>“Reflection, being present, calm, accepting”*</td>
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<tr>
<td>5. Intentionality</td>
<td>“Meditation, slowing down, expanded awareness, intentionality”*</td>
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<td>“Being present and intentional, and it also has connotation of meditation”*</td>
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<td>“Being compassionate when it comes to others, putting someone else first before your desires, being mentality focus on something”*</td>
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<td>“Consciously making choices by being present.”*</td>
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<td>“Mindfulness is the opposite of involuntary thinking. It’s when you recognize what is happening and are aware of your thoughts and emotions triggered, and pause in that understanding without reacting.”*</td>
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<td></td>
<td>“Being thoughtful and intentional with your choices”</td>
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<tr>
<td>No Code</td>
<td>“My cousin was the first to describe mindfulness to me after a Thich Nat Hahn retreat”</td>
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| **No Code** | “When I became a mother I totally forgot about myself and put my son first in every decision I’ve made so far”
“Certainly, we are all programmed with reactionary responses to all kinds of life experiences, triggers, scenarios, smells and this drives my behavior as I want it” |
| **Theme** | **Quotes** |
| **Expectancy of workshop** | |
| **1. No problem with cravings** | Maybe. “I think the approach sounds fine, but I didn’t really struggle with cravings or excess weight gain in pregnancy, so probably wouldn’t feel compelled to put effort into this approach.”
No. “I didn’t experience cravings or excess weight gain. I experienced stress related to low weight gain.”
No. “I didn’t find food cravings in pregnancy to be an issue.” |
| **2. Needs support/difficulty implementing** | No. “Unless I was doing it every time I felt hungry, no”*
Maybe. “I’d have to hear more about the techniques to decide, but it could be promising”*
Maybe. “Maybe but I’m often eating on the go due to schedule demands”* |
| 3. Ambivalence | Yes. “Makes sense to me….but I would need a lot of support and encouragement to actually do it” Yes. “But it seems that we would need lots of training support. I know there is emotional baggage that comes with eating for many, including me” Maybe. “Conceptually, I think it’s a fabulous idea. Implanting it consistently would be hard. During pregnancy, food was the only thing I felt like I could turn to for physical reward/enjoyment. So cravings weren’t a bad concept for me”* Maybe. “Could consider reflection before and after eating, thinking in the moment the specific reasons you are about to eat something (hunger, bored, stressed, etc)”* |
|  | No. “Unless I was doing it every time I felt hungry, no”* Maybe. “No sure” No. “I worry that extra attention on food cravings may trigger some women” Maybe. “I’d have to hear more about the techniques to decide, but it could be promising”* Maybe. “Maybe but I’m often eating on the go due to schedule demands”* Maybe. “This I an odd question with an underlying assumption that food cravings are wrong and need to be managed” No. “I honestly haven’t experienced food cravings as much as others.” Maybe. “There’s not a lot of detail about the approach as mentioned above, so I’m not sure.” Maybe. “Usually my food cravings are in regard to nutrients I’m lacking. So usually I find it beneficial to listen to my cravings. Which I guess in mindfully eating in a way” Maybe. “Conceptually, I think it’s a fabulous idea. Implanting it consistently would be hard. During pregnancy, food was the only thing I felt like I could turn to for physical reward/enjoyment. So cravings weren’t a bad concept for me”* Maybe. “Could consider reflection before and after eating, thinking in the moment the specific reasons you are about to eat something (hunger, bored, stressed, etc)”* |
| 4. Increased self-awareness | Yes. “Can be very powerful for noticing what is there.” Yes. “Using mindfulness to help key into my true desires and understanding what I’m actually craving-
<table>
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<tr>
<th>Theme</th>
<th>Quotes</th>
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<tr>
<td>5. Cognitive triggers</td>
<td>Yes. “Using mindfulness to help key into my true desires and understanding what I’m actually craving—be it food (and truly what kind of food) or space/affection/encouragement/sleep etc”* Yes. “I tend to overthink, so it would be helpful to use strategies that can prevent rumination.” Yes. “Resistance and suppression of cravings amplifies them; acceptance and non-judgement help detach from emotional aspects to make cognitive decisions making more accessible”* Yes. “Pay attention in the moment to emotional needs and hunger cues”* “Yes, because sometimes sitting with a craving for sweets, eg, helps me decide to say eat fruit instead of a baked good”</td>
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<td>6. Emotional triggers</td>
<td>Yes. “I like the idea of a Body Positive approach to dealing with the emotions around cravings, eating, weight gain, etc during and after pregnancy” Yes. “Noticing when I’m actually hungry VS just craving/stress-eating”* Yes. “Resistance and suppression of cravings amplifies them; acceptance and non-judgement help detach from emotional aspects to make cognitive decisions making more accessible”*</td>
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<td>No Code</td>
<td>No. “I have never thought about mindfulness in relationship to my eating habits” Yes. “Certainly mindfulness as it relates to eating during pregnancy is just as helpful as not being pregnant and how it relates to our overall health and lifestyle, energy levels, etc.”</td>
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<tr>
<td>be it food (and truly what kind of food) or space/affection/encouragement/sleep etc)* Yes. “It would help me pause before binge eating.” Yes. “Pay attention in the moment to emotional needs and hunger cues”* Yes. “Noticing when I’m actually hungry VS just craving/stress-eating”* Maybe. “Usually my food cravings are in regard to nutrients I’m lacking. So usually I find it beneficial to listen to my cravings. Which I guess in mindfully eating in a way”* Yes. “Being aware that I am reaching for a sugary snack would help me to remind myself to reach for fruit or glass of water instead—awareness is the main step in breaking habits”</td>
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<tr>
<td>Integration into Standard Care</td>
<td>Yes- Convenience</td>
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<td>Yes- Time-limited</td>
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<td>No- Time-limited</td>
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<td>Being a Mom</td>
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<tr>
<td>Theme</td>
<td>Quotes</td>
</tr>
<tr>
<td>Mode of Implementation</td>
<td>1. Barriers</td>
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<td>Theme</td>
<td>Quotes</td>
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<tr>
<td>Barriers</td>
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<td>1. Time/schedule</td>
<td>“Schedule, work, childcare”</td>
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<td>2. Childcare</td>
<td>“Time, care responsibilities for other child, work”</td>
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<tr>
<td>3. Career/job</td>
<td>“All of the above”</td>
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<tr>
<td>4. Finances</td>
<td>“Time, other priorities”</td>
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<td>“Job and the already significant number of prenatal care visits, childcare/less time because of looking after other children”</td>
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2. Convenience

- “Online. Fewer barriers to attending”
- “Online. Yes- scheduling”
- “In person preferable but would require very convenient location and time. In person would allow me to leave my daily life/activities, whereas online these can be a distraction”
- “Online. Access and ease of scheduling”
- “Online. More convient”

3. COVID concerns

- “In person. In a non-COVID world, I would like to do this in person, but I would be open to an online session”
- “In person. An in-person group may increase commitment and provide a social support of other mamas. During COVID-19 pandemic, I would prefer online for safety reasons”
- “Online. COVID and also in person gain not feasible for women with new babies unless this is only for pregnant women”
- “Online due to COVID19 and also my location”
- “In person. I prefer and enjoy learning things in-person. However during the pandemic, I would only do online”

No code

- “I’m not much into groups”
- “Probably not”
- “In person. A group for what? Again, very odd phrasing.”
- “Online. I have already given birth, but I might have considered it”
- “Online. I’m open to this now if available”
- “Personally, I mindful as it relates to eating before and during this pregnancy. I enjoy the hormones and cravings but they haven’t created problems for me. I think it’s a very important idea for the many women that struggle with this. Maybe I could advocate in some way by sharing my experience”
- “Not interested whether it is during the pandemic or not”
“Finding time in my schedule”
“Time, child care, day job, potentially finances”
“Finding time in my schedule”
“Time!!”
“Childcare/finances for childcare, time, career”
“Time, child care, day job, potentially finances”
“Definitely time and ability to travel”
“Time and childcare, always.”
“Career/job, time”
“Time and child care”
“Time”
“Career/job, childcare”
“All of these things, I supposed if this group would be a type of cohort that would continue to other newborn mom and me type classes, I’d make more of an effort to attend”
“Time zone differences”
“Time”
“I live in Japan so the time zone is a barrier”
Time/Interest”
“Time, job, childcare”
“Interest, time, career”

No code
“I can’t continue with these questions. They don’t make much sense”
“Most women would be able to join the online as it would allow higher attendance and women could join from home and with other obstacles that might prevent them”

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<th>Quotes</th>
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<tr>
<td>Differences between pregnancies</td>
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| 1. Limited support | “Less in person appts. Way more stress. Much lower support from others”
| | “Lack of access to family, less exercise due to lack of access to gym and lack of child care”
| | “Yes, no visitors allowed at the hospital”
| | “I had fewer prenatal visits and the visits I had were very short and rushed generally. I wasn’t able to have a doula with me during birth which meant I ended up caving in and getting an epidural, although I am fine with that decision, it wasn’t my original birth plan”*
| | “Yes, only I can visit my doctor alone. [I’m] sure [when] its [time] to deliver only 1 [person] would be allowed in the room with me”
| | “Yes, no visitors at appointments, limited visitors and other restrictions like wearing a mask in the hospital” |
“More caution for medical appointments, some were online, partner not allowed to appointments; had to do a COVID test before delivery, only one support person allowed during birth and after; only two nights in the hospital after c-section (compared to 3 last time)”
“The only difference would be that this is more isolating with Covid restrictions”

2. Fewer appointments

“From my third trimester through postpartum period received very little in-person care. Most was done virtually. I went to a different provider around 16 weeks pp for an IUD, whereas normally that would have been another time to check in with my regular provider (they weren’t doing “routine” appointments at the time, like IUD insertions)”
“All of the perinatal healthcare policy changes (telehealth appts, partner unable to attend appts, masks worn during delivery, quick discharge from hospital, etc)”
“I had fewer prenatal visits and the visits I had were very short and rushed generally. I wasn't able to have a doula with me during birth which meant I ended up caving in and getting an epidural, although I am fine with that decision, it wasn't my original birth plan”*

No Code

“More limited food options, some food not hot when delivered, increase in craving for nostalgic foods in early pregnancy”
“2nd baby even less time for me”
“The only difference would be that this is more isolating with Covid restrictions”

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<td>Likelihood compared to first pregnancy</td>
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| 1. No- less time | No. “Busier with 2 kids”
No. “Less available time and energy”
No. “Less time to do it”
No. “Not enough time”
No. “I have less time because I have another child to care for”
No. “With two under the age of 3 there is just a lot less time and my kid-free time I cherish not working or being on screen at this time”
No. “No childcare for the toddler” |
| 2. Yes- Awareness of health needs | Yes. “By this you mean the group? If so, yes, I think I just have a better understanding of what the challenges are pre- and especially post-partum are. I had several |
postpartum depression and anxiety after my first son was born, so I am taking much more care of my mental health this time around.”
Yes. “Absolutely, I didn't know what to expect my first time now I am more mentally prepared and know how to deal with the pain now”
Yes. “Because my gestational diabetes was not diet-controlled this time”
## Appendix O

### Study 2 Quotes from Perinatal Providers

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<th>Question:</th>
<th>Quotes</th>
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| Would your practice benefit from having providers on site? (See frequency table) | Yes. “Behavioral changes take time.”  
No. “I see only GYN patients, no OB patients.”  
Maybe. “IMHO dietary support is important, but other services (like a genetic counselor) would be more useful, to me, as an allocation of resources (sorry!)”  
Maybe. “would have to be cost effective and think service better provided on line [sic].” |
| Would you refer your perinatal patients to this service? (See frequency table) | Yes. “I would send early OB patients to help weight control.”  
Yes. “Hands on approach and tools for women to prevent excessive weight gain in pregnancy are valuable.” |
| Do you think this workshop would be best done in person or online/remote? In the space for a response, please indicate if the COVID pandemic impacts your decision either way. (See frequency table) | Online. “COVID does impact my decision, but through COVID I’ve also learned that patients really like remote visits. They find it convenient, especially if working or have other childcare responsibilities.”  
Online. “A lot of pregnant women have other kids and it is hard for them to come o [sic] in person workshops.”  
Online. “COVID has proven telehealth has been widely accepted and convenient. This area is perfect for remote education.”  
Online. “Less burdensome for patients and potentially improving compliance.” |
| Of the following options, which do you anticipate as potential barriers to your patients participating in this group? (See frequency table) | “We are fortunate in San Diego to care for a population that is active and health oriented. many keep up with exercise and good eating habits.” |
| Does COVID-19 change your responses to the above questions? If so, how? (See frequency table) | Yes. “One dietary provider could cover many clinic sites. plus, easier/less time to schedule.” |