# PRENATAL VISIT COMMUNICATION AND MATERNAL BODY WEIGHT: PATIENT-CENTERED INTERVIEWING AND BEHAVIORAL COUNSELING FOR RECOMMENDED GESTATIONAL WEIGHT GAIN

by
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**Dissertation abstract**

**Background:** Pregnancy and prenatal care are widely regarded as teachable moments for lifestyle and behavior change. However, clinicians cite many barriers to integrating high quality behavioral counseling for weight control into routine practice: lack of training, time constraints, perceptions that counseling is ineffective, and avoidance of sensitive discussions about weight. Moreover, a number of studies suggest that clinicians harbor (both implicit and explicit) weight bias; these negative attitudes towards overweight and obesity may reduce not only the effectiveness of patient-centered communication and behavioral counseling, but also the quality of care that patients receive. The purpose of this dissertation was to examine the relationship between maternal body weight (pre-pregnancy BMI and gestational weight gain) and provider communication (behavioral counseling and patient-centered communication) during prenatal care.

**Methods:** The dissertation was a secondary data analysis using audio recordings, surveys and medical records reviews, collected as part of a randomized control trial of patient activation intervention. A total of 22 clinicians and 120 of their patients were recruited from a single urban teaching hospital's obstetric outpatient clinic in Baltimore, MD.

Audio recordings of prenatal visits were analyzed for patient-centered communication using the Roter Interaction Analysis System (RIAS), and then behavioral counseling strategies were also analyzed, using the 5A's behavioral counseling framework (*Assess, Advise, Agree, Assist* and *Arrange*).

Multivariate multilevel regression models with generalized estimating equations were used to examine the association between: 1) 5A's behavioral counseling and gestational weight gain,

2) patient initiation of behavioral counseling discussion and the quality of behavioral counseling, and 3) maternal pre-pregnancy body weight and patient-centered communication.

**Results:** The majority of clinicians were female (95.5%), White (59.1%), and obstetrics and gynecology residents (81.8%). Clinicians saw an average of 5.5 patients (range 1 – 18). The majority of patients were Black (84.2%), and 9.2% of patients had either gestational or pre-existing diabetes; 15.0% had pregnancy-induced or chronic hypertension. Overall, the patients' median age was 22.0 years (interquartile range 6.0 years) and mean pre-pregnancy BMI was 28.4 $kg/m^2$ (SD 6.5 $kg/m^2$). In adjusted analyses, women who received counseling with 2 or more 5A's strategies gained an average of 13.9 fewer pounds compared to women who did not receive any counseling (95% CI 4.9 – 23.0 pounds, p = 0.002). As compared to patients who received no counseling (predicted probability = 0.81, 95% CI 0.72 – 0.90), the predicted probability of excess gestational weight gain was significantly lower for patients who received counseling with 1 of the 5A's strategies (PP = 0.50, 95% CI 0.35 – 0.64, p = 0.001) and was lowest among patients who received counseling with 2 or more of the 5A's strategies (PP = 0.39, 95% CI 0.16 – 0.61). In the subset of prenatal visits that included behavioral counseling with at least one of the 5A's, there were more behavioral counseling episodes per visit (p = 0.05) and the total duration of counseling was longer (p = 0.05) when patients initiated these discussions. Clinicians were more likely to use two or more 5A's strategies in patient-initiated compared to clinician-initiated counseling episodes (p = 0.04). Patient-initiated behavioral counseling discussions included more socioemotional content than those initiated by clinicians (p = 0.02). Clinicians asked fewer lifestyle questions (p = 0.04) and used fewer approval (p = 0.01) and concern statements (p = 0.002) when providing care to patients with overweight, compared to patients with average weight. Clinicians gave

less lifestyle information ($p = 0.01$) and used fewer self-disclosure statements when providing prenatal care to patients with obesity ($p < 0.001$) compared patients with average weight. There were no significant differences in biomedical questions, information giving or counseling. In post-visit surveys, clinicians were significantly less likely to strongly agree or agree that they liked patients with obesity and that these patients were accurate historians compared to patients with average weight ($p < 0.05$).

**Conclusions:** In this dissertation, behavioral counseling with the 5A's was associated with significantly less weight gain. Additionally, patient initiation of behavioral counseling was associated with more extensive, higher quality behavioral counseling during pregnancy, possibly mediated by socio-emotional cueing. However, the findings of this dissertation also suggest that clinician weight bias may influence patient-provider communication during routine prenatal care, resulting in less patient centered communication received by women with overweight or obesity. Interventions that promote the use of compassionate, nonjudgmental communication, including high quality behavioral counseling, may improve the quality of prenatal care and health outcomes for all women, irrespective of body weight.

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**Preface**

This dissertation is original, unpublished, independent work by the author, Katie O. Washington Cole under the supervision of the dissertation advisor, Dr. Debra Roter, and the thesis advisory committee. The work in this dissertation was carried out in the Department of Health, Behavior, and Society at The Johns Hopkins University Bloomberg School of Public Health, from September 2012 to December 2015. The parent study was funded by the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (R01HD050437). KWC was supported by a training grant from the National Institute of General Medical Sciences (T32GM00730941).

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# DISSERTATION OVERVIEW

Pregnancy is widely regarded as a "teachable moment" for health behavior change (Lawson & Flocke, 2009; McBride, Emmons, & Lipkus, 2003; Phelan, 2010). High quality prenatal visit communication, which includes patient-centered interviewing and behavioral counseling, may facilitate the adoption of healthy nutrition and physical activity behaviors that facilitate recommended gestational weight gain (S. C. Alexander et al., 2007; Cogswell, Scanlon, Fein, & Schieve, 1999; Whitlock, Orleans, Pender, & Allan, 2002). However, weight bias and stigma may limit the degree to which patient-provider communication is effective and responsive to the needs and preferences of patients with overweight or obesity (Gudzune, Beach, Roter, & Cooper, 2013; Puhl & Heuer, 2009). The purpose of this dissertation was to examine the relationship between maternal body weight and patient-provider communication during prenatal care.

**Specific Aim 1: To examine the relationship between behavioral counseling – using the 5A's – and gestational weight gain.**

Objective 1a: To describe clinicians' use of the 5A's behavioral counseling strategies – *Assess, Advise, Agree, Assist and Arrange* – in discussion of weight, nutrition and physical activity during prenatal care.

Objective 1b: To examine the relationship between behavioral counseling (using the 5A's strategies) and gestational weight gain (mean weight gain and probability of gaining in excess of Institute of Medicine guidelines).

**Specific Aim 2: To examine the relationship between patient initiation of behavioral counseling discussions and measures of prenatal visit communication.**

Objective 2a: To describe the use of socio-emotional communication in behavioral counseling episodes initiated by patients compared to those initiated by clinicians.

Objective 2b: To examine the relationship between patient initiation of behavioral counseling discussions and the overall patient-centeredness of prenatal visits.

Objective 2c: To examine the relationship between patient initiation and the quality of behavioral discussions as measured by the 5A's behavioral counseling framework.

**Specific Aim 3: To examine the relationship between maternal pre-pregnancy body weight and clinician communication throughout prenatal visits.**

Objective 3a: To examine the relationship between patient body weight and biomedical, psychosocial and lifestyle communication during prenatal care.

Objective 3b: To examine the relationship between patient body weight and patient-centered interviewing strategies (activating, partnering and rapport building communication).

Objective 3c: To examine the relationship between patient body weight and clinician ratings of the interpersonal aspects of the patient-provider relationship.

The conceptual model for this dissertation is presented below (Figure 1). Women gain weight throughout pregnancy in order to support fetal growth and prepare for lactation. Behavioral counseling using the 5A's may promote gestational weight gain within clinical recommendations (Specific Aim 1). Additionally, patient initiation of discussions about weight, nutrition and physical activity may influence the quality of behavioral counseling

clinicians provide (Specific Aim 2). Finally, because of negative attitudes towards overweight and obesity, patient body weight at the start of pregnancy may affect clinicians' use of patient-centered communication (Specific Aim 3).

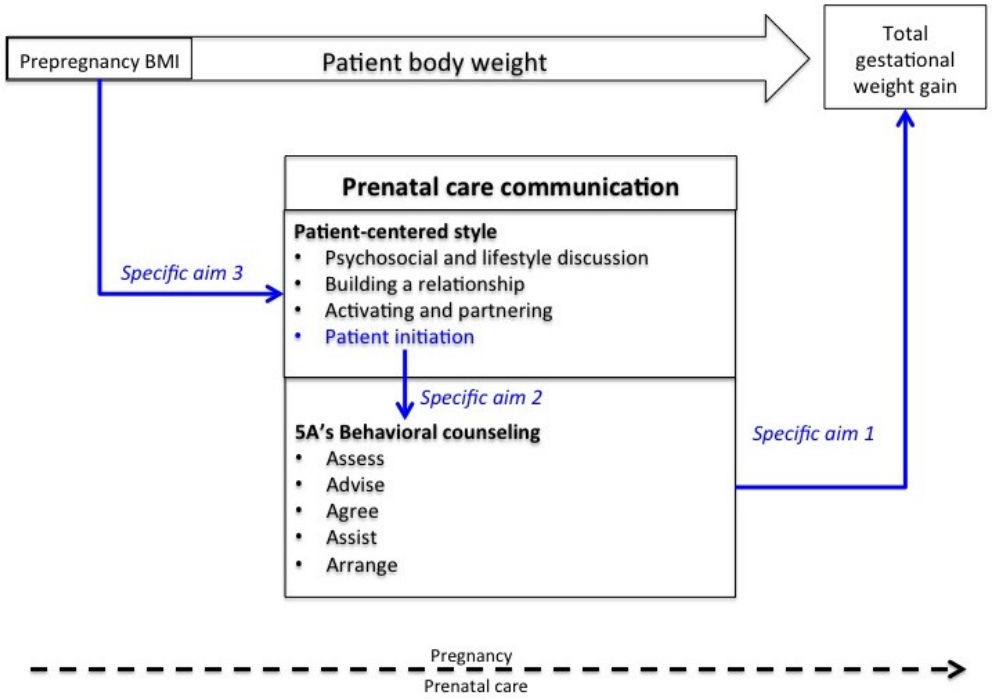



Figure 1 Dissertation conceptual model

The research in this dissertation also includes two classes of communication: 1) patient-centered interviewing and behavioral counseling for weight, nutrition and physical activity. This approach provides complementary perspectives on the relationship between maternal body weight and patient-provider communication in prenatal care.

# CHAPTER 1: Literature Review

In this chapter, I will review several different bodies of literature that inform the study questions and hypotheses. Part I reviews the literature on maternal body weight: pre-pregnancy weight and gestational weight gain, and the relative health outcomes for women and infants, including those interventions that promote recommended gestational weight gain.

Part II reviews the literature on the relationship between maternal body weight and the quality of patient-provider communication during routine prenatal care, with a focus on high-quality behavioral counseling and patient-centered interviewing strategies.

## ***Part I: Maternal body weight and health outcomes for women and infants***

Part I of this literature review is divided into three sections. First, the historical evolution of clinical recommendations regarding gestational weight gain is reviewed. The second section reviews the evidence of an association between maternal body weight and health outcomes for women and infants. The final section is a review of evidence of the effectiveness of behavior change for recommended gestational weight gain.

### *1.0 Historical evolution of gestational weight gain recommendations*

Clinicians and researchers have long recognized that maternal body weight, including body weight at the start of pregnancy and gestational weight gain, affects health outcomes for women and infants (Gunderson & Abrams, 1999). However, the nature of clinical recommendations has evolved as new evidence and population trends emerge. During the first half of the 20$^{th}$ century, clinicians created formal systems of prenatal care to reduce maternal, fetal and infant morbidity and mortality (G. R. Alexander & Kotelchuck, 2001).

During this time, pregnant women were advised to restrict their weight gain to 15 – 20 pounds, largely because of the association between excess gestational weight gain and preeclampsia (Viswanathan et al., 2008). By 1970, however, the Committee on Maternal Nutrition recommended gestational weight gain of at least 24 pounds for all women, as increasing adverse infant health outcomes were found to be associated with restricted weight gain during pregnancy (Gunderson & Abrams, 1999).

In 1990, *Nutrition in Pregnancy,* a report from the Institute of Medicine (IOM), included more specific recommendations for gestational weight gain (Institute of Medicine, 1990). The IOM recommended specific ranges of weight gain based on prepregnancy body mass index (BMI), defined as a woman's weight, in kilograms, divided by the square of her height, in meters. In this report, women with lower BMI were advised to gain more weight and women with higher BMI were advised to gain less weight. Additionally, the IOM recommended higher gestational weight gain for adolescents and African-American women in response to the evidence that these groups were at increased risk of delivering infants with low birth weight (Institute of Medicine, 1990).

In 2009, the IOM released a new report, *Weight Gain in Pregnancy: Reexamining the Guidelines*, which further refined their recommendations (Institute of Medicine, 2009). The IOM recommended that clinicians use BMI criteria from the World Health Organization to advise specific amounts of weight gain based on BMI at the start of pregnancy: 28 – 40 pounds for women with underweight (< 18.5 $kg/m^2$), 25 – 35 pounds for women with average weight (18.5 – 24.9 $kg/m^2$), 15 – 25 pounds for women with overweight (25 – 29.9 $kg/m^2$) and 11 – 20 pounds for women with obesity (> 30 $kg/m^2$). The IOM also removed the recommendation that adolescents and African American women gain more weight, as there

was limited evidence to suggest that increased weight gains led to improved pregnancy outcomes for these women and their infants (Institute of Medicine, 2009).

Optimizing the recommendations for gestational weight gain is challenging because of the complex interactions of weight gain with prepregnancy body weight, as well as other risk and protective factors (Institute of Medicine, 1990; Viswanathan et al., 2008). Gestational weight gain has several components (products of conception, and increases in maternal fat stores, plasma volume, and uterine and breast tissue) and each of these components is affected by a number of biological, behavioral, and environmental mechanisms (Viswanathan et al., 2008). Moreover, rigorous and resource-intensive study designs are necessary to identify causal relationships between maternal body weight (prepregnancy body weight and gestational weight gain) and health outcomes for women and infants (long and short term) while accounting for key confounding, mediating and moderating factors.

## *2.0 Effects of maternal body weight on health: overview*

In examining the relationship between maternal body weight and pregnancy outcomes for women and infants, researchers have separately considered two distinct independent variables: 1) women's body weight, prior to pregnancy and 2) weight gain throughout the course of a pregnancy.

### *2.1 Effects of maternal body weight on health: pre-pregnancy body weight*

Overweight and obesity have become increasingly prevalent in the United States. Overall, 55.8 percent of women between the ages of 20 and 39 have BMI > 25 $kg/m^2$ (minimum criteria for overweight) and 31.9 percent have BMI > 30 $kg/m^2$ (minimum criteria

for obesity; Flegal, Carroll, Kit, & Ogden, 2012). Among Mexican-American women, 68.8 percent and 37.8 percent of women have BMI $> 25$ kg/m$^2$ and BMI $> 30$ kg/m$^2$, respectively. Among African-American women, 74.2 percent and 56.2 percent have BMI $> 25$ kg/m$^2$ and BMI $> 30$ kg/m$^2$, respectively (Flegal et al., 2012). Stevens et al. (2012) found that the prevalence of obesity among women in North America has more than tripled between 1980 and 2008. Flegal et al. (2012) reported no significant increase in the general prevalence of obesity among women in the United States between 1999 and 2010. However, there was a statistically significant increase in the prevalence of obesity among Mexican-American and African-American women during the same time frame (Flegal et al., 2012). While underweight BMI is associated with a number of adverse pregnancy outcomes, overweight and obesity have a greater population health impact among reproductive age women in the United States, and high BMI, as a proxy of increased body weight, will be the focus of the remainder of this section.

Catalano reviews the complications associated with increased body weight – specifically, pre-pregnancy obesity measured using BMI – in early pregnancy, late pregnancy, the peripartum period, and for infants through childhood (Catalano, 2007). Some studies have shown that pre-pregnancy obesity is associated with spontaneous abortion (Fedorcsak, Storeng, Dale, Tanbo, & Abyholm, 2000; Lashen, Fear, & Sturdee, 2004) and congenital anomalies (cardiovascular and neural tube defects; Cedergren & Källén, 2003; S. A. Rasmussen, Chu, Kim, Schmid, & Lau, 2008; Waller et al., 1994) in early pregnancy. In late pregnancy, researchers have shown that pre-pregnancy obesity is associated with pregnancy-induced hypertension (Sibai et al., 1995; Weiss et al., 2004), gestational diabetes (Chu et al., 2007; Weiss et al., 2004), and preterm delivery (Schieve et al., 2000; Weiss et al.,

2004). Studies suggest that pre-pregnancy obesity may lead to increased rates of cesarean delivery (Weiss et al., 2004). Other complications during the postpartum stage include operative morbidities – including wound breakdown and anesthesia complications – which are a consequence of the increased risk of cesarean deliveries among women with obesity (Catalano, 2007; Weiss et al., 2004). Finally, outcomes for the infant include macrosomia (Ehrenberg, Mercer, & Catalano, 2004), and obesity in childhood (Ehrenthal et al., 2013).

Some complications associated with maternal obesity are the consequences of biological processes, such as dysfunction in metabolic regulation. However, other complications are related to challenges in clinical management. For example, pre-pregnancy obesity may mechanically impair existing ultrasound technologies used to examine fetal anatomy; advanced ultrasound equipment may improve diagnosis and clinical management (Hendler, Blackwell, Bujold, et al., 2004; Hendler, Blackwell, Treadwell, et al., 2004; Wolfe, Sokol, Martier, & Zador, 1990). Increased plasma volume in pregnant women with obesity may create inaccuracies in blood tests, such as those used to screen for neural tube defects and Downs Syndrome (Drugan, Dvorin, Johnson, Uhlmann, & Evans, 1989; Wald, Cuckle, Boreham, Terzian, & Redman, 1981).

### *2.2 Effects of maternal body weight on health: gestational weight gain*

Gestational weight gain includes the products of conception (fetus and placenta) as well as increased maternal uterine tissue, breast tissue, fat stores and plasma volume. Thus, when compared to non-pregnant adults, pregnant women are less in control of weight gain (Viswanathan et al., 2008). Nevertheless, nutrition and physical activity still contribute to

gestational weight gain (Phelan, Jankovitz, Hagobian, & Abrams, 2011; Tanentsapf, Heitmann, & Adegboye, 2011; Thangaratinam et al., 2012).

A number of studies suggest that the majority of women do not achieve gestational weight gain within IOM guidelines. In a study of 266,172 women enrolled in WIC programs in 9 states, Schieve and colleagues (1999) found that mean gestational weight gain decreased with increased pre-pregnancy BMI. However, the mean gestational weight gain in each BMI category still tended to be in excess of recommendations at that time (Schieve et al., 1999). In a sample of 3870 women, who delivered in a urban, teaching hospital, Caulfield and colleagues (1996) found that only 28.2% of black women and 32.5% of white women gained weight consistent with IOM recommendations. In a longitudinal cohort study including 1100 women delivering at participating hospitals, Brawarsky et al. (2005) found that 33.2% of women with average weight gained weight consistent with recommendations, compared to 22.6% of women with overweight and 29% of women with obesity.

A systematic review by Viswanathan et al. (2008) suggests that both inadequate and excess gestational weight gain are associated with suboptimal health outcomes. Excess gestational weight gain is associated with increased risk of cesarean delivery. (DeVader, Neeley, Myles, & Leet, 2007; Graves, DeJoy, Heath, & Pekow, 2006; Kiel, Dodson, Artal, Boehmer, & Leet, 2007). Both low and high weight gains are associated with an increased risk of preterm birth (Rosenberg, Garbers, Lipkind, & Chiasson, 2005). Lower gestational weight gain is associated with lower birth weight while higher gestational weight gain is associated with higher birth weight (Abrams & Selvin, 1995; J. E. Brown, Murtaugh, Jacobs, & Margellos, 2002; Kieffer et al., 2006). Higher gestational weight gains are associated with increased post-partum weight retention in the short- and long-term (Linné, Dye, Barkeling, &

Rössner, 2004; Muscati, Gray-Donald, & Koski, 1996; Ohlin & Rössner, 1990). Finally, lower gestational weight gain is associated with decreased likelihood of breastfeeding initiation (Li, Jewell, & Grummer-Strawn, 2003; K. M. Rasmussen, Hilson, & Kjolhede, 2002).

### *3.0 Behavior change for recommended weight gain during pregnancy: overview*

The Institute of Medicine (IOM) and the American College of Obstetricians and Gynecologists (ACOG) recommend that women intending to become pregnant do so at a healthy weight (Institute of Medicine, 2009). Additionally, the IOM and ACOG also recommend behavioral intervention during pregnancy to promote recommended gestational weight gain for all women to support fetal growth and lactation (American College of Obstetricians and Gynecologists, 2013a; Institute of Medicine, 2009). Health behavior changes adopted during pregnancy have the potential to improve health outcomes for women and their families throughout the life course.

#### *3.1 Behavior change for recommended weight gain during pregnancy: pregnancy as a teachable moment for health behavior change*

Pregnancy is an ideal time to adopt changes in health behaviors. Smoking cessation is a particularly illustrative example as quit rates among pregnant women are higher (10 – 60% across various studies) than quit rates observed in the general population (2 – 10%; McBride et al., 2003). With this example in mind, many researchers conceptualize pregnancy as a "teachable moment" for health behavior change. (Bond, 2010; Chilukuri et al., 2015; Cohen, Clark, Lawson, Casucci, & Flocke, 2011; Matteson, Peipert, Allsworth, Phipps, & Redding, 2006; Wood, France, Hunt, Eades, & Slack-Smith, 2008) In a review of weight control and

obesity prevention in pregnancy, Phelan (2010) applied the teachable moment concept to explore opportunities for behavioral intervention for nutrition, physical activity, and recommended gestational weight gain.

There are several reasons that pregnancy may be a window of opportunity for behavior change (McBride et al., 2003; Phelan, 2010). First, for many women, the benefits of behavior change for infant and child health may be a powerful motivating factor. Second, many women who are not engaged with the healthcare system, prior to becoming pregnant, are in more frequent contact with health professionals through prenatal care. Third, in an extension of the Health Belief Model, changing social roles and emotional responses during pregnancy, childbirth and the neonatal period may facilitate specific "cues to action" for health behavior change.

*3.2 Behavior change for recommended weight gain during pregnancy: interventions*

A number of systematic reviews and meta-analyses have demonstrated that behavioral interventions during pregnancy can affect gestational weight gain (Agha, Agha, & Sandell, 2014; M. J. Brown et al., 2012; Campbell, Johnson, Messina, Guillaume, & Goyder, 2011; Gardner, Wardle, Poston, & Croker, 2011; Hill, Skouteris, & Fuller-Tyszkiewicz, 2013; Oteng-Ntim, Varma, Croker, Poston, & Doyle, 2012; Phelan et al., 2011; Tanentsapf et al., 2011; Thangaratinam et al., 2012). The majority of studies in the United States are specifically focused on limiting weight gain, and many studies specifically target women with existing overweight or obesity for intervention. An earlier review found that the existing intervention studies were very heterogeneous and showed no effect on gestational weight gain (Campbell et al., 2011). However, a number of more recent studies suggest that behavioral interventions are effective in significantly reducing gestational weight gain (Agha

et al., 2014; M. J. Brown et al., 2012; Gardner et al., 2011; Hill et al., 2013; Oteng-Ntim et al., 2012; Phelan et al., 2011; Tanentsapf et al., 2011; Thangaratinam et al., 2012). Tanentsapf and colleagues (2011) also found a significant reduction in postpartum weight retention and cesarean deliveries comparing intervention to control participants.

Researchers reported several insights based on all of the reviewed studies. First, intervention studies were methodologically heterogeneous, and most studies reported differences in mean weight gain, rather than adherence to IOM guidelines (Agha et al., 2014; M. J. Brown et al., 2012; Campbell et al., 2011; Gardner et al., 2011; Hill et al., 2013; Oteng-Ntim et al., 2012; Phelan et al., 2011; Tanentsapf et al., 2011; Thangaratinam et al., 2012). Additionally, most studies did not report on other outcomes of interest (e.g. pregnancy complications). Second, it appeared that interventions targeting women at higher risk of excess gestational weight gain (women with overweight, obesity or gestational diabetes) were generally more effective than interventions that included women irrespective of risk (Oteng-Ntim et al., 2012; Tanentsapf et al., 2011). This finding highlights the importance of assessing and targeting intervention intensity based on risk. Third, few studies explicitly included theory, measured antecedents to behavior change or completed process evaluations to ensure the fidelity of interventions (M. J. Brown et al., 2012; Campbell et al., 2011). Researchers further noted that, without theory and measurement of intermediate process and behavioral outcomes, it is challenging to replicate effective interventions or to understand why and how they are effective(M. J. Brown et al., 2012).

Several systematic reviews identified strategies that seemed particularly effective in reducing gestational weight gain. Tanentsapf et al. (2011) reported that caloric restriction starting no later than the second trimester was a consistent strategy across the most effective

intervention studies. M. J. Brown et al. (2012) found that individualized nutrition and physical activity goals, self-monitoring, and performance feedback were key characteristics across successful interventions. Phelan and colleagues (2011) compared effective strategies for weight control in non-pregnant adults to strategies that are effective in pregnant women. The authors found that calorie restriction, structured meal planning, behavioral therapy, body weight monitoring, diet monitoring and ongoing provider contact were proven strategies for pregnant and non-pregnant adults. Other strategies found to be effective in non-pregnant adults (e.g. meal replacement, higher doses of physical activity, etc.) required further evaluation in the context of pregnancy (Phelan et al., 2011).

Overall, these studies suggest that it is possible to intervene during pregnancy to change health behaviors and outcomes. However, additional research is needed to develop interventions that increase the proportion of women achieving recommended weight gain, reduce pregnancy complications, improve health outcomes for women and children in the short and long term, and facilitate the adoption of healthy behaviors across the life course.

## ***Part II: Maternal body weight and patient-provider communication quality in routine prenatal care***

Part II of this literature review is divided into two sections. The first section reviews evidence related to brief behavioral counseling for nutrition, physical activity and recommended weight gain during routine prenatal care. The second section includes a review of the evidence of a relationship between patient body weight and patient-centered interviewing strategies during prenatal care.

### *1.0 Brief behavioral counseling for nutrition, physical activity, and recommended gestational weight gain: overview*

In the majority of studies described in Part I section 3.2 of this literature review, health professionals with specialized training in nutrition and physical activity delivered intensive behavioral interventions outside of routine prenatal care (Agha et al., 2014; M. J. Brown et al., 2012; Campbell et al., 2011; Gardner et al., 2011; Hill et al., 2013; Oteng-Ntim et al., 2012; Phelan et al., 2011; Tanentsapf et al., 2011; Thangaratinam et al., 2012). However, high quality behavioral counseling during routine prenatal care has the potential to reach a greater number of women and may facilitate the adoption of behavior change during pregnancy (Whitlock et al., 2002). Additionally, behavioral counseling in routine prenatal care may provide an opportunity to identify women who are good candidates for more resource-intensive behavioral interventions, such as those described previously.

#### *1.1 Brief behavioral counseling for nutrition, physical activity, and recommended gestational weight gain: the 5A's behavioral counseling framework*

In 2002, the U.S. Preventative Services Task Force (USPSTF) adopted the 5A's framework as an evidence-based model for behavioral counseling during routine care (Whitlock et al., 2002). The Counseling and Behavioral Interventions Work Group noted that the heterogeneity and complexity of behavioral interventions limits the degree to which some efficacious behavioral interventions can be implemented in healthcare settings. However, they reported that several strategies – *Assess, Advise, Agree, Assist, and Arrange* – were consistently associated with changes in behavior and health outcomes across a number of different health behaviors and contexts (Whitlock et al., 2002).

For behavioral counseling on nutrition, physical activity, and weight control, the 5A's strategies are conceptualized as follows: 1) *Assesses* weight, nutrition, or physical activity, 2) *Advises* on topics of nutrition, physical activity or weight, 3) *Agrees* on a specific plan or course of action, 4) *Assists* in identifying barriers and supports for behavior change and 5) *Arranges* a specific plan for follow up (S. C. Alexander et al., 2011; Jay, Gillespie, Schlair, Sherman, & Kalet, 2010; Whitlock et al., 2002). This framework provides clinicians with a simple heuristic that can be used to structure behavioral counseling for pregnant and non-pregnant patients.

### *1.2 Brief behavioral counseling for nutrition, physical activity, and recommended gestational weight gain: effectiveness in non-pregnant and pregnant patients*

Several studies in adult primary care (with nonpregnant patients) provide evidence that brief behavioral counseling can be effective in behavior change and weight loss. In one study, researchers found that nearly 80% of people who reported being counseled to lose weight subsequently attempted weight loss, compared to 30% of people who did not receive counseling (Sciamanna, Tate, Lang, & Wing, 2000). Using data from the Behavioral Risk Factor Surveillance System, researchers found that people who reported receiving weight control counseling from their clinicians also were significantly more likely to report eating fewer calories and less fat while increasing their physical activity (Loureiro & Nayga, 2006). In a study using direct observation of communication during primary care, Alexander and colleagues (2011) found that counseling using the 5A's framework was associated with improved nutrition and physical activity and weight loss after 3 months. In a separate study, using similar methods, Cox and colleagues (2011) found that motivational interviewing techniques were associated with improvements in nutrition and physical activity. Moreover,

Kreuter and colleagues (2000) reported that patients who received behavioral counseling during routine care were more likely to engage with health education material in the weeks following the visit. Their findings suggest that brief behavioral counseling during routine care may prime patients to enact health behavior change.

No studies have used observation of communication in routine prenatal care to evaluate the effectiveness of behavioral counseling on gestational weight gain. However, survey data suggest that clinician counseling is related to pregnant women's intended and actual weight gain. In a study of 2237 pregnant and 1661 postpartum women, Cogswell and colleagues (1999) found that a larger proportion of women who were advised to gain weight within guidelines subsequently achieved recommended weight gain (44%), compared to those who were advised to gain too little (31%) or too much weight (18.5%). The authors also found that women who were advised to gain in excess of the IOM and ACOG guidelines were 3.6 times as likely to gain excess weight compared to women who received advice consistent with the IOM and ACOG guidelines (Cogswell et al., 1999).

### *1.3 Brief behavioral counseling for nutrition, physical activity, and recommended gestational weight gain: existing practices in the routine care of pregnant and non-pregnant patients*

While the effects of routine behavioral counseling are somewhat modest, consistent, high-quality behavioral counseling in routine care – including prenatal visits – may lead to substantial population impact (Whitlock et al., 2002). However, a number of studies suggest that clinicians do not routinely counsel their patients – pregnant or non-pregnant – on weight, nutrition or physical activity. In a study of 300 primary care visits, Flocke and colleagues (2005) found that only 56% of primary care visits included any discussion of weight, nutrition or physical activity. Moreover, the discussions were rather limited, with most

clinicians *Assessing* and *Advising* their patients and fewer clinicians providing more extensive counseling and plans for referral and follow up (Flocke et al., 2005). In a study of 461 primary care visits, Alexander and colleagues found that a much larger proportion of patients than previously reported (83%) received counseling, but clinicians still rarely used the *Agree, Assist* and *Arrange* counseling strategies (S. C. Alexander et al., 2011). In a survey of 2458 people from the National Ambulatory Medical Care Survey, Bleich and colleagues (2011) found that only a third of patients with obesity had received an obesity diagnosis and only a fifth received any behavioral counseling. Furthermore, the authors found that one of the most important predictors of receiving counseling was having a recorded obesity diagnosis (Bleich, Pickett-Blakely, & Cooper, 2011). Similarly, in a survey of 13,288 people from the Behavioral Risk Factors Surveillance Study, Sciamanna and colleagues (2000) found that fewer than half (47%) of patients with obesity and other related comorbidities received behavioral counseling. Among patients with obesity and no comorbid conditions, only 32% received counseling.

To date, no studies have described behavioral counseling practices in prenatal care through observation of prenatal visits. However, in a survey of 2237 pregnant and 1661 postpartum women, Cogswell et al. (1999) reported that 47% of women received behavioral counseling consistent with guidelines from the Institute of Medicine (IOM) and the American College of Obstetricians and Gynecologists (ACOG). Moreover, 27% of women reported receiving no advice from a health professional about how much weight they should gain in pregnancy. In a survey of 310 women, McDonald et al. (2011) found that only 28.5% of women reported receiving any behavioral counseling on health weight gain, nutrition and physical activity, and only 12% of women received behavioral counseling consistent with

recommendations. While Herring et al. (2010) found that 83% of obstetric clinicians (n = 58) believed that obesity was an important problem, only 63% of clinicians correctly reported the BMI threshold for obesity and only 29% of clinicians correctly reported the recommendations for health weight gain based on pre-pregnancy BMI. In a survey of 900 clinicians, Power and colleagues (2006) found that only 57.9% of clinicians reported counseling their patients on weight gain during pregnancy "most of the time," and only 35.7% reported modifying their recommendations based on prepregnancy weight gain.

Notably, in a study of 2464 pregnant women from the Behavioral Risk Factors Surveillance Survey, Bish and colleagues (2009) found that 7.5% of pregnant women reported attempting to lose weight while 34.3% reported attempting to maintain weight. The authors suggested that these women's commitment to weight loss and weight maintenance might have been reflective of previous counseling that they had received; in their study, women who were advised to lose weight in the last 12 months were 9 times as likely to report attempting weight loss or maintenance compared to those who were not advised to lose weight. Together, these findings suggest that increased attention to behavioral counseling during routine prenatal care is needed in order to ensure recommended weight gain during pregnancy.

### *1.4 Brief behavioral counseling for nutrition, physical activity, and recommended gestational weight gain: barriers to counseling in routine primary and prenatal care*

Researchers have attempted to elucidate barriers to behavioral counseling through a number of quantitative and qualitative studies. Barriers reported by obstetric clinicians tend to be consistent with those reported by clinicians in other healthcare contexts (S. C. Alexander et al., 2007; Foster et al., 2003; Huang et al., 2004; Kushner, 1995; Ruelaz et al.,

2007; Timmerman, Reifsnider, & Allan, 2000). In a survey of 900 obstetric clinicians, Power and colleagues (2006) found that only 35% felt that prenatal care is an opportunity to modify behaviors that will lessen the likelihood of maternal obesity. Additionally, 82% perceived lack of patient motivation as a barrier while about half perceived lack of visit time or support services as a barrier. Clinicians who reported that their counseling would be very likely to help their patients with weight control were significantly more likely to report that they counsel their patients on weight most of the time (Power et al., 2006).

Two qualitative studies corroborate these findings and provide rich insight into obstetric clinicians' attitudes and beliefs about nutrition, physical activity, maternal body weight and recommended weight gain during pregnancy. In semi-structured interviews with 16 clinicians, Oken and colleagues (2012) found that most clinicians were concerned about excess gestational weight gain, although some reported that other factors (including pre-pregnancy BMI) were more important to consider. Most of the clinicians reported giving all women a weight gain range at their initial prenatal visit. However, there was not consistent agreement with respect to counseling provided throughout the rest of the pregnancy. Most clinicians were concerned that weight was a sensitive issue and that patients would not be responsive or interested in information about weight control (Oken et al., 2012).

Separately, in focus groups with 52 clinicians, Stotland and colleagues (2010) found that clinicians thought that gestational weight gain was an important issue for short and long term health of women and infants. Clinicians were primarily concerned about obesity and excess gestational weight gain, with rare discussions of inadequate weight gain, and they generally perceived that pregnancy provided a window of opportunity to facilitate behavior change because of women's concerns about infant health and pregnancy complications.

However, clinicians also cited several barriers to behavioral counseling, including lack of training perceived inefficacy of counseling, sensitivity of the topic, the inability to override conflicting advice from patients' friends and family, perception that much of gestational weight gain is beyond a woman's control, and clinicians' own experiences and challenges related to weight. Moreover, some clinicians were concerned that discussions of weight would lead to harmful weight control behaviors or deter patients from continuing their prenatal care (Stotland et al., 2010).

Across qualitative and quantitative studies, it is clear that there are a number of barriers to high-quality behavioral counseling for nutrition, physical activity and recommended weight gain during pregnancy. While a growing number of studies explore strategies to improve clinician counseling (Heslehurst et al., 2014), there is a need to identify strategies that facilitate more effective behavioral counseling and the adoption of healthy nutrition and physical activity practices during pregnancy.

### *1.5 Brief behavioral counseling for nutrition, physical activity, and recommended gestational weight gain: patient interest as a facilitator*

Patient interest in nutrition, physical activity and recommended weight gain is common and may be an important facilitator of behavioral counseling in health care settings. McDonald et al. (2011) found that 84% of women were either comfortable or very comfortable discussing weight with their clinicians, while Kominiarek and colleagues (2010) found that 76% of patients were interested in learning more about the health risks associated with maternal body weight during pregnancy. In one study, patients with greater behavioral intention to adopt healthy weight control behaviors received more extensive behavioral counseling from their clinicians (S. C. Alexander et al., 2011).

Patient initiation of counseling topics has received limited attention in the patient-provider communication literature, but findings from surveys and focus groups suggest that patient initiation of behavioral counseling discussion may influence behavioral counseling quality. Flocke et al. (2005) found that clinicians gave patients more referrals and were more likely to come up with a plan or arrange for follow-up, when patients initiated behavioral counseling episodes, rather than the clinicians themselves. In a qualitative study, clinicians reported that they would not discuss the topic of weight in discussions with pregnant women, unless the patients raised the topic first. Clinicians reported that patient initiation was a cue that the patient felt comfortable with the clinician providing more extensive behavioral counseling (Stotland et al., 2010).

There are also a small number studies on patient initiation of other topics during healthcare visits. In one observational study of a several different biomedical, lifestyle and psychosocial topics, patients who initiated a given topic spoke for a longer period of time, providing clinicians with more information (Tai-Seale, McGuire, & Zhang, 2007).

Separately, in a qualitative study, researchers found that clinicians perceive information disclosure to be more reliable, and patient-provider relationship to be stronger, when patients initiated discussions, rather than the clinicians themselves (Nakash, Dargouth, Oddo, Gao, & Alegría, 2009).

Overall, these studies suggest that clinicians may hear patient initiation of counseling topics as cue of interest. Additionally, clinicians may respond by providing higher quality behavioral counseling during routine care. To date, there are no studies of the relationship between patient initiation and the quality of behavioral counseling in prenatal care.

### *2.0 Pre-pregnancy body weight and patient-centered interviewing strategies: overview*

As noted in section 1.4, clinicians report a number of perceived barriers to behavioral counseling during routine care. Moreover, patient interest in counseling – which may be inferred when pregnant women raise the topic of nutrition, physical activity or weight gain during routine care– may facilitate a window of opportunity for clinicians to provide high-quality behavioral counseling. Negative attitudes towards patients with overweight and obesity, however, may be an implicit barrier to effective patient-provider communication, including behavioral counseling and patient-centered communication.

### *2.1 Pre-pregnancy body weight and patient-centered interviewing strategies: evidence of a relationship between patient body weight and quality of care*

A number of studies suggest that clinician weight bias – both implicit and explicit – may act as an unacknowledged barrier to high quality care for patients with overweight or obesity (Puhl & Heuer, 2009; Puhl & Heuer, 2010). Moreover, suboptimal healthcare access and quality – mediated by weight bias – may be an additional mechanism whereby patients with overweight or obesity experience adverse health outcomes. In a survey of 620 clinicians, researchers found that clinicians associated obesity with a number of negative words, including like "lazy," "non-compliant," "weak-willed," "awkward" and "sloppy" (Foster et al., 2003). Separately, several studies using the Implicit Association Test have shown that health professionals have implicit anti-fat bias (Schwartz, Chambliss, Brownell, Blair, & Billington, 2003; Teachman & Brownell, 2001). Relative to the general population, this bias is only somewhat buffered through experience providing care and treatment for patients with overweight and obesity (Teachman & Brownell, 2001). Moreover, in a study that asked clinicians to rate their actual patients on a number of measures after a medical

visit, researchers found that clinicians believed that patients with obesity were less adherent to medications than patients with average weight, irrespective of patient scores on a validated adherence question scale (Huizinga, Bleich, Beach, Clark, & Cooper, 2010). In a similar study, researchers found that clinicians reported less respect for patients with obesity compared to patients with average weight (Huizinga, Cooper, Clark, & Beach, 2009).

A number of studies suggest that negative attitudes towards patients with overweight and obesity may affect healthcare quality and access. Although studies of the relationship between patient body weight and satisfaction with care are somewhat mixed, the general consensus is that, irrespective of body weight, patients generally report being satisfied with their overall care (Fong, Bertakis, & Franks, 2006; Hebl, Xu, & Mason, 2003; Wee et al., 2002). However, Wadden and colleagues (2000) found that women (n = 259) were significantly less satisfied with their care for obesity and weight management, relative to their satisfaction with overall care. Gudzune and colleagues (2013) found that "doctor shopping" (having claims with 5 or more primary care physicians in a 24 month period) among patients with overweight and obesity, was associated with increased healthcare utilization but possibly decreased continuity of care for these patients. In some studies, participants report delaying care because of concerns about how health professionals discuss weight-related issues during routine care (Adams, Smith, Wilbur, & Grady, 1993; Amy, Aalborg, Lyons, & Keranen, 2006; Drury, Aramburu, & Louis, 2002; Olson, Schumaker, & Yawn, 1994).

Several studies suggest that the expression of negative attitudes towards patients with overweight and obesity in obstetrics and gynecology may differ from other healthcare contexts. In qualitative studies, pregnant patients with obesity reported that their obstetrical

clinicians were judgmental and accusatorial when discussing body weight, and provided little helpful information about nutrition, physical activity, or the need for extra diagnostic testing (Lindhardt, Rubak, Mogensen, Lamont, & Joergensen, 2013; Smith & Lavender, 2011). A number of studies have shown that women with obesity are significantly less likely to obtain a number of recommended women's health services, including breast cancer and cervical cancer screening (Fontaine, Faith, Allison, & Cheskin, 1998; Maruthur, Bolen, Brancati, & Clark, 2009a, 2009b; Nelson, Moser, Gaffey, & Waldron, 2009; Wee, McCarthy, Davis, & Phillips, 2000). In a focus group study, medical students reported that they most frequently heard derogatory humor about patients with overweight and obesity in obstetrics and gynecology and surgery (Wear, Aultman, Varley, & Zarconi, 2006).

*2.2 Patient body weight and patient-provider communication*

The partnership model of patient-provider communication has been linked to increased patient satisfaction, improved recall of clinician recommendations, increased adherence, improvement in clinical outcomes, and reduced malpractice claims. Patient-centered interviewing skills – including open-ended communication, empathy, and rapport building strategies – may increase patient involvement in the medical visit, which may enhance history-taking, diagnosis, shared decision-making and patient behavior change. Several studies suggest that there is an association between patient body weight and clinician use of patient-centered interviewing strategies, which are a marker of the quality of communication in medical visits.

In one study of the quality of clinician communication, Wong and colleagues (2015) found an interaction between race and patient body weight. Black patients with obesity were

significantly less likely to report that their clinicians explained things well, compared to White patients with average weight. Black patients with overweight and obesity were also significantly less likely to report that their clinicians spent enough time with them, compared to White patients with average weight (Wong et al., 2015).

Previous studies suggest an association between implicit bias and the use of patient-centered interviewing strategies in studies of observed (by audio or video recording), rather than reported communication (Cooper et al., 2012; Schaa, Roter, Biesecker, Cooper, & Erby, 2015). However, there are only two studies that use observational methods to examine the relationship between patient body weight and patient-provider relationship. Gudzune and colleagues found that clinicians used significantly fewer rapport-building communication behaviors when providing care to patients with overweight and obesity, without any increased attention to biomedical, lifestyle or psychosocial content (Gudzune, Beach, et al., 2013). Bertakis and Azari (2005) found that clinicians spent more time discussing exercise and the technical aspects of the medical visit, while spending less time on health education. There are no studies that examine the relationship between patient body weight and clinician communication in routine prenatal care visits.

## ***Conclusions***

The findings in this literature review suggest that maternal body weight – including pre-pregnancy body weight and gestational weight gain – is a complex issue with a number of intersecting social, behavioral, and biological antecedents and consequences. On one hand, the quality of prenatal care – including patient-centered interviewing strategies – may be influenced by patient body weight, as mediated by negative attitudes towards overweight and

obesity among health professionals. On the other hand, certain aspects of patient-provider communication – such as high quality behavioral counseling – may lead patients to adopt healthy behaviors and achieve recommended gestational weight gain. Furthermore, both clinician and patient contributions to the communication exchange may influence the overall quality of patient-provider relationship.

In the remaining chapters of this dissertation, I report and summarize the findings of 3 studies that provide greater insight into the relationship between maternal body weight and the quality of communication during routine prenatal care – including patient-centered interviewing strategies and behavioral counseling for nutrition, physical activity and recommended weight gain during pregnancy.

# CHAPTER 2

## Influence of the 5A's counseling strategy on limiting weight gain during pregnancy: an observational study

**Chapter 2 Abstract**

**Objective:** To examine clinicians' use of the 5A's (Assess, Advise, Agree, Assist, Arrange) during prenatal visits and evaluate the effect of this approach on total gestational weight gain.

**Methods:** We studied audio recordings of prenatal visits between 22 clinicians and 120 of their patients, coding visits for clinicians' use of the 5A's. The relationship between the 5A's and gestational weight gain was evaluated using multilevel models to account for patient clustering within clinician, and adjusted for patient age, race, parity, pre-pregnancy body mass index (BMI), co-morbidities, number of prenatal visits and pregnancy duration at the time of the recorded visit.

**Results:** Overall, 33% of the prenatal visits included use of one of the 5A's and 22% included use of two or more of the 5A's. Counseling conversations lasted an average of 65 seconds (range: 3 – 219 seconds), and most commonly included *Assess* or *Advise* (49% and 85% of counseling conversations, respectively) and less frequently included *Agree, Assist* or *Arrange* (3%, 3% and 11% of counseling conversations, respectively). No recorded visits used all of the 5A's strategies. In adjusted analyses, patients who received counseling with two or more of the 5A's gained an average of 11.4 fewer pounds than patients who received no counseling ($p = 0.01$). The predicted probability of excess gestational weight gain was lower among women receiving counseling with at least one of the 5A's ($p < 0.05$).

**Conclusions:** The 5A's may be a promising counseling strategy to promote gestational weight gain consistent with Institute of Medicine recommendations.

## 1.0 Introduction

Healthy weight gain during pregnancy may improve health outcomes for women and infants (American College of Obstetricians and Gynecologists, 2013a; Institute of Medicine, 2009; Viswanathan et al., 2008). The American College of Obstetricians and Gynecologists (ACOG) recommends that obstetric clinicians provide behavioral counseling to pregnant women to promote adherence to guidelines for gestational weight gain (Institute of Medicine, 2009). Nevertheless, studies suggest that patients do not routinely receive such counseling (Cogswell et al., 1999; Herring et al., 2010; McDonald et al., 2011; Power et al., 2006). Clinicians cite many barriers to integrating counseling into routine practice, including lack of training, time constraints, perceptions that counseling is ineffective, and avoidance of sensitive discussions about weight (Power et al., 2006; Power, Holzman, & Schulkin, 2002; Stotland et al., 2010; Whitlock et al., 2002).

In 2002, the U.S. Preventative Services Task Force adopted the *5A's* (*Assess, Advise, Agree, Assist, and Arrange*) as an evidence-based model for behavioral counseling (Vallis, Piccinini–Vallis, Sharma, & Freedhoff, 2013; Whitlock et al., 2002). The framework provides a simple strategy that can be readily implemented during routine prenatal care (Vallis et al., 2013). In primary care settings, non-pregnant adults counseled using the 5A's were shown to have greater intention and motivation to lose weight (Jay et al., 2010), as well as improvements in nutrition, and modest weight loss after 3 months (S. C. Alexander et al., 2011). If effective in prenatal care, the 5A's may improve women's nutrition, physical activity and weight management during and after pregnancy.

The objectives of this study were to: 1) use the 5A's to identify and characterize behavioral counseling episodes, by patient body weight and 2) examine the association between

obstetric clinicians' use of the 5A's and patients' total gestational weight gain. We hypothesized that patients who were counseled using the 5A's would have lower total weight gain – and be less likely to gain weight in excess of recommendations – as compared to patients who were not.

## 2.0 Methods

We conducted a cross-sectional, secondary data analysis using audio recordings, surveys and medical record reviews collected as part of a randomized control trial of a patient activation intervention (Roter et al., 2015). In the parent study, 23 clinicians and 130 of their patients were recruited from a single urban teaching hospital's obstetric outpatient clinic in Baltimore, MD. The majority of patients attending the clinic were eligible for Medicaid and the Women, Infants and Children (WIC) program. Clinicians were nurse practitioners, resident physicians, and attending physicians. At the time of recruitment, the revised IOM guidelines for gestational weight gain had been released and were intended to be the standard for behavioral counseling at this clinic (Institute of Medicine, 2009).

Patients were recruited from consenting clinicians' panels, and agreed to have a single prenatal visit recorded. The sample included audio recordings of 130 unique patients during regular prenatal encounters. We used 50 audio recordings of prenatal visits from the non-intervention cohort (June – December 2009) and 80 visits from the intervention cohort (June 2010 – January 2011). Members of the intervention cohort received one of two communication skills programs designed to encourage patient engagement and decision-making in their prenatal visits. The interventions did not include specifically focus on nutrition, physical activity, gestational weight gain, or the 5A's. The Johns Hopkins Institutional Review Board approved the study procedures.

For the current analysis, we excluded 10 prenatal visits – 3 patients who did not have a recorded height to calculate pre-pregnancy body mass index (BMI) and 7 underweight patients (BMI <18.5 kg/m$^2$). The final sample included 22 clinicians and 120 of their patients. We characterized use of the 5A's in a subsample of prenatal visits that included any behavioral counseling (16 clinicians and 66 of their patients).

*2.1 Characterization of behavioral counseling using the 5A's*

We conducted two stages of coding. First, we used the Roter Interaction Analysis System (RIAS) to identify behavioral counseling episodes. Second, we coded clinicians' use of the 5A's in behavioral counseling episodes.

RIAS is a valid and reliable, computer-based coding system for analyzing medical dialogue (Roter & Larson, 2002). Trained RIAS coders assigned each complete thought, expressed by the patient or clinician, to 1 of 37 mutually exclusive and exhaustive categories representing the functions of the medical dialogue. A random 10% subset of the recordings was double coded to establish inter-coder reliability of RIAS coding, which averaged 0.90 across clinician categories and 0.91 for patient categories. We used the lifestyle categories (patient and clinician lifestyle questions and lifestyle information giving; and clinician lifestyle counseling) to identify weight-related behavioral counseling in each of the recorded visits.

Behavioral counseling discussions were then transcribed and the 5A's were coded: 1) *Assesses* weight, nutrition, or physical activity, 2) *Advises* on topics of nutrition, physical activity or weight, 3) *Agrees* on a specific plan or course of action, 4) *Assists* in identifying barriers and supports for behavior change and 5) *Arranges* a specific plan for follow up. Table 2.1 includes definitions and examples of each of these counseling strategies from the recordings. Two independent coders analyzed the transcripts and 20% were double coded to assess inter-rater

reliability of 5A's analysis. Coders discussed disagreements and made final decisions by consensus. For each category, the inter-rater agreement ranged from 89% to 96%, and the overall kappa (a measure of inter-rater reliability that accounts for chance agreement) was 0.87. In addition to the 5A's, coders characterized counseling conversations with respect to the following features: 1) when in the visit the discussion occurred (opening, history taking, physical exam, counseling, or closing), 2) patient or clinician initiation of the discussion, 3) primary reason for the conversation (e.g. stomach pain, concerns about work activities) and 4) the content of the discussion (e.g. physical activity, sugar-sweetened beverages).

*2.2 Measures*

We examined the effect of 5A's counseling on total gestational weight gain. The independent variable was the total count of 5A's strategies used throughout the prenatal visit, which was operationalized as a categorical variable using indicator variables for each of three groups: no strategies used, 1 strategy used, and ≥2 or more strategies used.

The dependent variable was gestational weight gain, assessed as a continuous variable for total weight gain and a binary variable for excess weight gain. To calculate gestational weight gain, each patient's self-reported pre-pregnancy weight (in pounds, extracted from the medical record) was subtracted from the weight recorded at the last prenatal visit, as recommended by ACOG. We created a binary variable for excess weight gain vs. within or below recommended weight gain. Consistent with IOM and ACOG guidelines (Institute of Medicine, 2009), excess weight gain was defined as > 35 pounds patients with average weight (18.5 – 25.0 $kg/m^2$), > 25 pounds for patients with overweight (25 – 30 $kg/m^2$), and > 20 pounds for patients with obesity (≥ 30 $kg/m^2$).

*2.3 Statistical analyses*

Descriptive analyses were used to characterize the sample with respect to patient and clinician variables. Chi-square tests were used to characterize differences in behavioral counseling strategies.

Multilevel regression models were used to examine the effect of the 5A's on gestational weight gain, accounting for clustering of patients by clinician. Multilevel linear regression models were used to model total gestational weight gain. Multilevel logistic models were used to model the odds of excess weight gain. Models were fit with an exchangeable correlation structure and robust standard errors, which tend to produce accurate statistical inferences even if the correlation structure is mis-specified. Final models were adjusted for patient age, race, parity, prepregnancy body mass index (BMI), co-morbidities (gestational or pre-existing diabetes; pregnancy-induced or pre-existing hypertension, parent study intervention assignment (non-intervention, treatment or comparison group), number of prenatal visits at recorded visit, and pregnancy duration at the recorded visit. We did a sensitivity analysis excluding women who did not have a weight recorded at 37 weeks or later (preterm births, did not continue prenatal care at participating clinic, etc.), which did not change the results.

**3.0 Results**

Tables 2.2 and 2.3 show a description of the sample characteristics. The overall sample included 22 clinicians and 120 of their patients. The majority of clinicians were female (95.5%), White (59.1%), and obstetrics and gynecology residents (81.8%). Clinicians saw an average of 5.5 patients (range 1 – 18). The average visit length was 24.8 minutes (range 5.4 – 61.2 minutes). Prenatal visits with behavioral counseling were an average of 4.7 minutes longer than prenatal visits without counseling ($p = 0.02$). Overall, patients' median age was 22.0 years (interquartile

range 6.0 years) and mean pre-pregnancy BMI was 28.4 kg/m$^2$ (SD 6.5 kg/m$^2$). The median pregnancy duration at recorded visit was 20.1 weeks (IQR 13.1 weeks). The majority of patients were Black (84.2%), and 9.2% of patients had diabetes (gestational or pre-existing) and 15.0% had hypertension (pregnancy-induced or pre-existing). There were no differences between patients who received counseling and those who did not.

As shown in Table 2.4, 66 prenatal visits (55.0%) included any behavioral counseling with at least one of the 5A's strategies. Of those visits, 41% included 2 or more of the 5A's strategies. The most commonly used strategies were Assess (48.5%) and Advise (84.9%), with Agree (3.0%), Assist (3.0%) and Arrange (10.6%) used rarely. No visits included use of all 5A's. A significantly greater proportion of patients with obesity were Advised about nutrition, weight or physical activity compared to patients with overweight or average weight. Compared to visits with no behavioral counseling, prenatal visits with 1 of the 5A's were an average of 5 minutes longer ($p = 0.01$) while visits with 2 or more of the 5A's were an average of 7 minutes longer ($p = 0.001$).

Overall, 74.2% of counseling conversations included a discussion about nutrition and 28.8% included a discussion about physical activity. Patients were advised to gain a specific amount of weight in only 7 prenatal visits (6% of the total sample). The amount of weight recommended was always consistent with the range of the ACOG and IOM guidelines. Clinicians initiated counseling conversations in 54.5% of the prenatal visits. In 50% of prenatal visits, weight, nutrition, or physical activity was discussed in relation to medical issues (contractions, nausea, vomiting, constipation, diabetes, hypertension, fetal size, etc.). In 71.2% of visits, these topics were discussed in relation to lifestyle issues (work, school, breastfeeding, or

health behavior change). Clinicians and patients discussed both medical and lifestyle issues in 29.8% of visits.

The association between behavioral counseling and total gestational weight gain is summarized in Figure 2.1. Women who received counseling with 2 or more 5A's strategies gained an average of 11.4 fewer pounds compared to women who did not receive any counseling (95% CI 2.9 – 20.0 pounds, p = 0.01). The association between behavioral counseling and the predicted probability of gestational weight gain in excess of recommendations is summarized in Figure 2.2. As compared to patients who received no counseling (predicted probability = 0.75, 95% CI 0.64 – 0.87, p = 0.03), the predicted probability of excess gestational weight gain was significantly lower for patients who received counseling with 1 of the 5A's strategies (PP = 0.52, 95% CI 0.37 – 0.66, p = 0.03) and was lowest among patients who received counseling with 2 or more of the 5A's strategies (PP = 0.49, 95% CI 0.31 – 0.67, p = 0.04).

**4.0 Discussion**

By studying recorded prenatal visits, we have contributed a unique characterization of behavioral counseling on weight, nutrition and physical activity, as well as an examination of the association between the 5A's strategies and gestational weight gain. Although ACOG recommends that obstetric clinicians provide all pregnant women with behavioral counseling to promote healthy weight gain in pregnancy (American College of Obstetricians and Gynecologists, 2013a, 2013b; Institute of Medicine, 2009), our results are consistent with previous studies –using self-reported data – which suggested that these guidelines are not being implemented (Cogswell et al., 1999; Herring et al., 2010; McDonald et al., 2011; Power et al.,

2006). Although recommended by ACOG, clinicians advised patients to gain a specific amount of weight in only 7 visits – 6% of the total sample.

In this cross-sectional, secondary data analysis, clinicians provided patients with limited behavioral counseling. Overall, 55% of the prenatal visits included any discussion of weight, nutrition or physical activity. Among those who received counseling, counseling for the majority of patients included only one of the 5A's. No patients received counseling that included all 5A's. Similar to observations in primary care settings with non-pregnant adults, the quality of 5A's counseling was limited most commonly to *Advise* and *Assess* (S. C. Alexander et al., 2011; Jay et al., 2010). As noted by Alexander and colleagues (2011), these are the strategies – data gathering and information giving – that are most consistent with clinical training and practice. The less frequently used strategies – *Agree, Assist*, and *Arrange* – require more time, follow-through, and perhaps greater confidence in a positive outcome, which may not be consistently taught and practiced in the context of medical education (Power et al., 2006; Power et al., 2002; Stotland et al., 2010). Nevertheless, increasing attention to these counseling strategies can enhance counseling effectiveness (Cogswell et al., 1999; Loureiro & Nayga, 2006; Sciamanna et al., 2000; Whitlock et al., 2002).

Even the incomplete use of 5A's counseling provided some benefit with respect to weight gain in our study. Additionally, our results support the hypothesis that use of multiple 5A's strategies may produce greater effects than use of only one of the 5A's (Serdula, Khan, & Dietz, 2003). Patients who were counseled with 2 or more of the 5A's gained less weight compared to women who did not, adjusted for patient age, race, parity, pre-pregnancy BMI, co-morbidities, parent study intervention assignment, number of prenatal visits at recorded visit, and pregnancy duration at the recorded visit. It is important to note that visits that used more A's were longer

than visits that did not, which may suggest that clinicians could benefit from specific training to use this method more efficiently. Our findings suggest that brief behavioral counseling can be effective and raises the question of what might be possible if high quality counseling – with complete use of all of the 5A's strategies – was implemented throughout routine prenatal care.

Our findings should be interpreted with caution in light of several limitations. First, a small minority of women (14.2%) gained weight consistent with recommendations, and for analytical purposes we chose to create a single category for participants who gained less weight than recommended and those who gained weight consistent with recommendations. Given that the majority of women in this sample (63.3%) gained weight in excess of recommendations, we believe that our approach is relevant and that our findings are meaningful. Second, we recorded a single prenatal visit for each patient, and it is possible that these visits were not representative of the behavioral counseling patients received at other times during pregnancy. We adjusted for the number of prenatal visits to attempt to account for these differences. Third, we believe that our sample represents an urban obstetrics clinic staffed primarily by trainees, and practices without resident physicians or in other settings may have different experiences. However, given that many obstetric clinicians train and deliver care in similar environments, we believe that this is an important first study in this area.

Our study also has a number of strengths. We used audio recordings of actual prenatal visit communication to examine the relationship between behavioral counseling and total gestational weight gain, eliminating the recall bias inherent in studies that rely on self-reported data. Moreover, compared to randomized control trials, the observational methods provide evidence of the effectiveness of 5A's behavioral counseling in routine prenatal care.

While studies to confirm our findings and examine the relationship in other settings are needed, our findings suggest that brief counseling during routine prenatal care may reduce the proportion of pregnant women who experience excess gestational weight gain in an urban prenatal clinic population. Improving counseling practices among obstetric clinicians – perhaps by using the full 5A's framework – may lead to improved health outcomes for women and infants. If these findings are confirmed in larger, more diverse samples, additional training should be provided to obstetric clinicians to enhance behavioral counseling skills.

Table 2.1 5A's coding framework definitions and examples

| Strategy | Definition | Example |
|---|---|---|
| Assess | Clinician asks the patient about weight, nutrition and/or physical activity. | "How is your diet?"<br>"How often do you exercise" |
| Advise | Clinician provides the patient with advice about weight, physical activity or nutrition. | "You should eat at least 3 small meals each day with nutritious snacks in between."<br><br>"Your goal would be to gain between 15 – 25 pounds during the course of your entire pregnancy" |
| Agree | Patient and clinician agree to a specific course of action with respect to weight, physical activity or nutrition. | Clinician: "How can we work to make sure you are getting in the right fluids?"<br><br>Patient: "I can stop drinking soda. I can also drink no more than a cup of juice and at least 5 or 6 cups of water every day." |
| Assist | Clinician and patient work together to identify barriers and/or supports for nutrition or physical activity. | Clinician: "Is there anyone at home who can help you with cooking?"<br>Patient: "My mother cooks for me at least once per week." |
| Arrange | Clinician arranges for follow up with clinician, nutritionist or social worker. | "I know you're having trouble getting healthy food. Would you like to speak to a social worker about that?"<br><br>"It seems like you are having difficulty figuring out what to eat. I'd like you to talk to a nutritionist about that. |

Table 2.2 Selected clinician characteristics for study sample

| | **Clinicians n = 22** |
|---|---|
| **Gender; n (%)** | |
| Female | 21 (95.5) |
| Male | 1 (4.5) |
| **Race; n (%)** | |
| White | 13 (59.1) |
| Black | 6 (27.3) |
| Asian | 3 (13.6) |
| **Clinician Type; n (%)** | |
| Resident | 18 (81.8) |
| Nurse practitioner | 2 (9.1) |
| Attending | 2 (9.1) |
| **Number of visits** | |
| Mean (range) | 5.5 (1 – 18) |

Table 2.3 Selected patient characteristics for study sample

| | **Patients** (n = 120) | **Did not receive behavioral counseling** (n = 54) | **Received behavioral counseling present** (n = 66) | **p** |
|---|---|---|---|---|
| **Visit length (minutes)** | | | | |
| Mean (SD) | 24.8 (11.1) | 22.3 (10.7) | 27.0 (11.1) | **0.02*** |
| **Age; n (%)** | | | | |
| < 20 years old | 32 (26.7) | 12 (22.2) | 20 (30.3) | 0.20 |
| 20 – 35 years old | 83 (69.2) | 38 (70.4) | 45 (68.2) | |
| > 35 years old | 5 (4.1) | 4 (7.4) | 1 (1.5) | |
| **Race; n (%)** | | | | |
| Black | 101 (84.2) | 44 (81.5) | 57 (86.4) | 0.28 |
| White | 14 (11.7) | 6 (11.1) | 8 (12.1) | |
| Other | 5 (4.1) | 4 (7.4) | 1 (1.5) | |
| **Education; n (%)** | | | | |
| Less than high school | 39 (32.5) | 18 (33.3) | 21 (31.8) | 0.55 |
| Completed high school or GED | 38 (31.7) | 20 (37.0) | 18 (27.3) | |
| Some college | 28 (23.3) | 11 (20.4) | 17 (25.8) | |
| No answer | 15 (12.5) | 5 (9.3) | 10 (15.2) | |
| **Insurance; n (%)** | | | | |
| Medicaid | 93 (77.5) | 43 (79.6) | 50 (75.8) | 0.72 |
| Private insurance | 7 (5.8) | 4 (7.4) | 3 (4.6) | |
| Self-pay | 5 (1.7) | 2 (3.7) | 3 (4.6) | |
| No answer | 15 (12.5) | 5 (9.3) | 10 (15.2) | |
| **Parity; n (%)** | | | | |
| Primiparous | 57 (47.5) | 28 (51.9) | 29 (43.9) | 0.39 |
| Multiparous | 63 (52.5) | 26 (48.2) | 37 (56.1) | |
| **Pregnancy duration; n (%)** | | | | |
| First trimester | 24 (20.0) | 7 (13.0) | 17 (25.8) | 0.09 |
| Second trimester | 62 (51.7) | 27 (50.0) | 35 (53.0) | |
| Third trimester | 34 (28.3) | 20 (37.0) | 14 (21.2) | |
| **Prenatal visit; n (%)** | | | | |
| First visit | 61 (50.8) | 24 (44.4) | 35 (53.0) | 0.35 |
| Second or later visit | 59 (49.2) | 30 (55.6) | 31 (47.0) | |
| **Body mass index; n (%)** | | | | |
| Average | 39 (32.5) | 19 (35.2) | 20 (30.3) | 0.85 |
| Overweight | 37 (30.8) | 16 (29.6) | 21 (31.8) | |
| Obese | 44 (36.7) | 19 (35.2) | 25 (37.9) | |
| **Co-morbidities; n (%)** | | | | |
| Diabetes (pre-existing or gestational) | 11 (9.2) | 7 (13.0) | 4 (6.1) | 0.19 |
| Hypertension (pre-existing or pregnancy-induced) | 18 (15.0) | 9 (16.7) | 9 (13.6) | 0.64 |

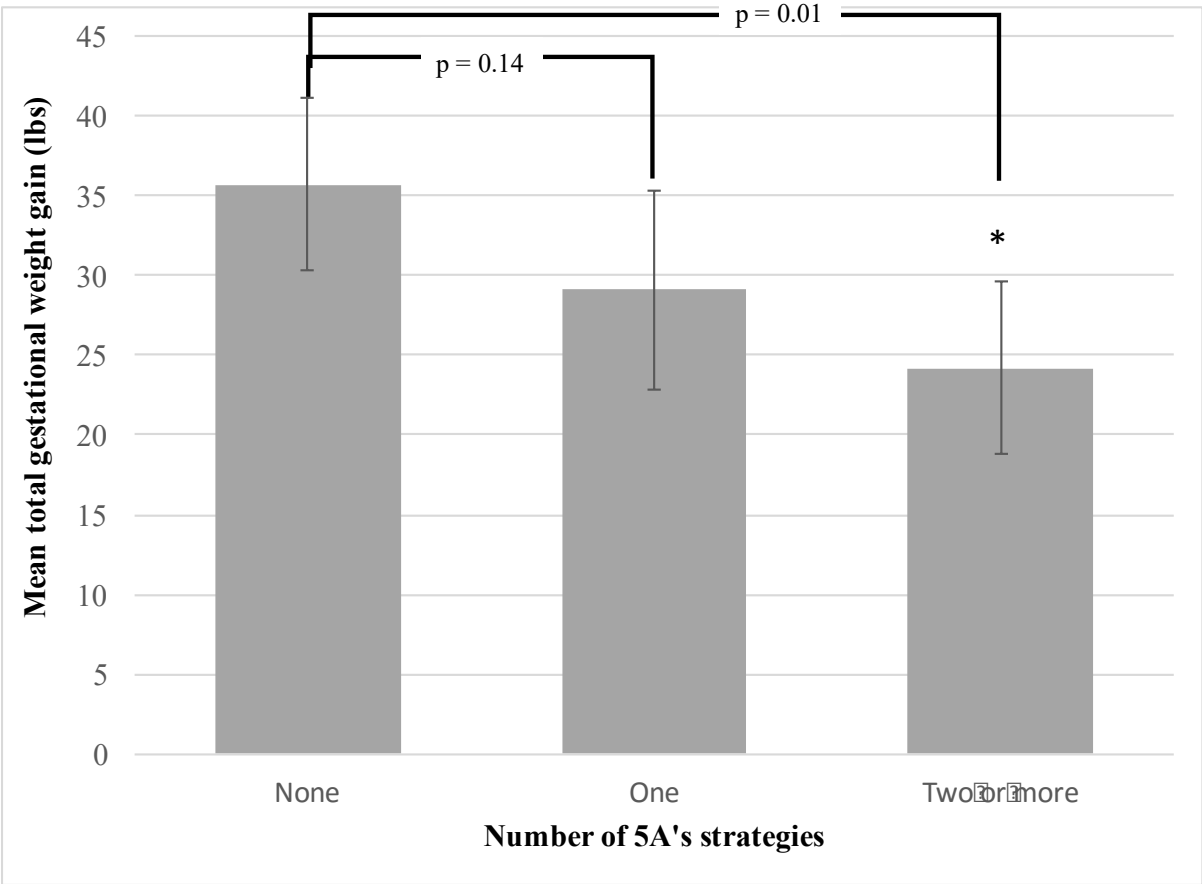
Table 2.4 Characteristics of weight-related behavioral counseling conversations (n = 66)

| | Total N = 66 | Average (n = 20) | Overweight (n = 21) | Obese (n = 25) | p |
|---|---|---|---|---|---|
| **Counseling strategies used†** | | | | | |
| Assess | 32 (48.5) | 12 (60.0) | 8 (38.1) | 12 (48.0) | 0.37 |
| Advise | 56 (84.9) | 13 (65.0) | 19 (90.1) | 24 (96.0) | **0.01*** |
| Agree | 2 (3.0) | 0 (0.0) | 0 (0.0) | 2 (8.0) | 0.18 |
| Assist | 2 (3.0) | 0 (0.0) | 1 (4.8) | 1 (4.0) | 0.63 |
| Arrange | 7 (10.6) | 1 (5.0) | 2 (9.5) | 4 (16.0) | 0.48 |
| **Total number of 5A's strategies used** | | | | | |
| 1 | 39 (59.1) | 14 (70.0) | 13 (61.9) | 12 (48.0) | 0.49 |
| 2 | 23 (34.9) | 6 (30.0) | 7 (33.3) | 10 (40.0) | |
| 3 | 2 (3.0) | 0 (0.0) | 1 (4.8) | 1 (4.0) | |
| 4 | 2 (3.0) | 0 (0.0) | 0 (0.0) | 2 (8.0) | |
| **Prenatal visit segment†** | | | | | |
| Opening | 5 (7.6) | 1 (5.0) | 3 (14.3) | 1 (4.0) | 0.37 |
| History | 54 (81.8) | 15 (75.0) | 18 (85.7) | 21 (84.0) | 0.63 |
| Physical Exam | 14 (21.2) | 5 (25.0) | 4 (19.1) | 5 (20.0) | 0.88 |
| Counseling | 12 (18.2) | 4 (20.0) | 4 (19.1) | 4 (16.0) | 0.94 |
| Closing | 3 (4.6) | 1 (5.0) | 0 (0.0) | 2 (8.0) | 0.43 |
| **Initiation of counseling** | | | | | |
| Patient | 30 (45.4) | 8 (40.0) | 12 (57.1) | 10 (40.0) | 0.43 |
| Clinician | 36 (54.6) | 12 (60.0) | 9 (42.9) | 15 (60.0) | |
| **Reason for discussion†** | | | | | |
| Medical | 33 (50.0) | 8 (40.0) | 14 (66.7) | 11 (44.0) | 0.17 |
| Behavioral and lifestyle | 47 (71.2) | 16 (80.0) | 12 (57.1) | 19 (76.0) | 0.22 |
| **Topics discussed†** | | | | | |
| Nutrition | 49 (74.2) | 16 (80.0) | 12 (57.1) | 21 (84.0) | 0.09 |
| Physical activity | 19 (28.8) | 7 (35.0) | 5 (23.8) | 7 (28.0) | 0.73 |
| Specific amount of weight | 7 (10.6) | 1 (5.0) | 2 (9.5) | 4 (16.0) | |
| Fluid intake (including sugar sweetened beverages) | 28.0 (42.4) | 8 (40.0) | 10 (47.6) | 10 (40.0) | 0.84<br>0.86 |

Chi-square tests were used to characterize differences in behavioral counseling strategies by patient body weight; *p < 0.05

†Categories are not mutually exclusive and may not sum to 100%

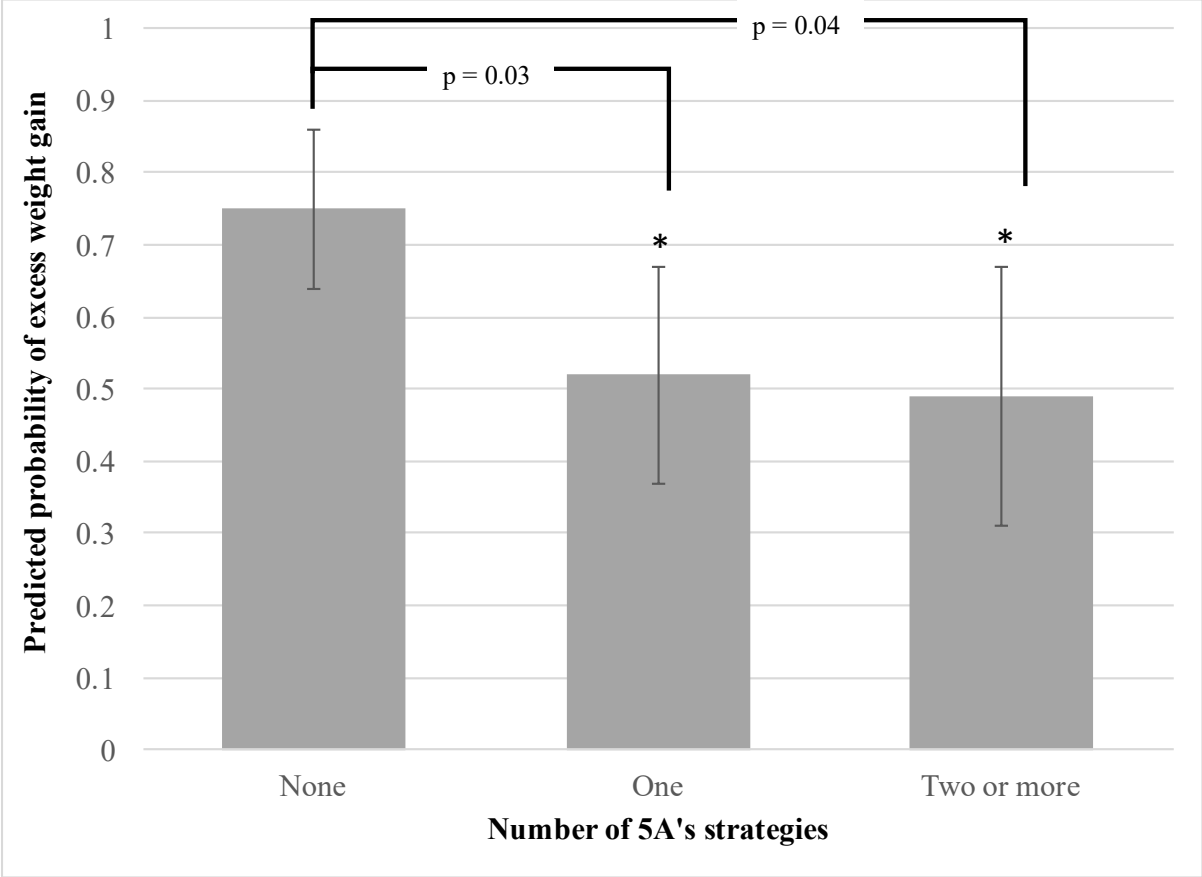
Figure 2.1 Adjusted mean gestational weight gain[a] among patients receiving counseling with 1 or ≥ 2 5A's strategies compared to those receiving no counseling




*p < 0.05

[a]Multilevel linear regression models with exchangeable correlation structure, robust standard errors, and adjustments for patient age, race, parity, co-morbidities, pre-pregnancy BMI, pregnancy duration, number of prenatal visits at index visit, and intervention assignment.

Figure 2.2 Adjusted predicted probability of excess weight gain[a] among patients receiving counseling with 1 or ≥ 2 5A's strategies compared to those receiving no counseling




* $p < 0.05$

[a]Marginal probabilities estimated from multilevel logistic regression models with exchangeable correlation structure, robust standard errors, and adjustments for patient age, co-morbidities, pre-pregnancy BMI, parity, pregnancy duration, number of prenatal visits at index visit, and intervention assignment

# CHAPTER 3

Starting the conversation: patient initiation of weight-related behavioral counseling during pregnancy

**Chapter 3 Abstract**

**Objective:** To examine the relationship between patient initiation and the quality of behavioral counseling for nutrition, physical activity and weight gain during pregnancy.

**Methods:** We examined audio recordings of prenatal visits between 22 obstetricians and 120 of their patients for behavioral counseling using the Roter Interaction Analysis System and the 5A's behavioral counseling framework. We used multivariate mixed effects models, accounting for clustering within clinicians, to examine the relationship between patient initiation and behavioral counseling.

**Results:** Overall, 55% of prenatal visits included any behavioral counseling. Patients initiated behavioral counseling episodes in almost half of these visits (45.5%). There were more behavioral counseling episodes per visit ($p = 0.05$) and the total duration of counseling was longer ($p = 0.05$) when patients initiated these discussions. Clinicians were more likely to use two or more 5A's strategies in patient-initiated compared to clinician-initiated counseling episodes ($p = 0.04$). Patient-initiated counseling episodes included more socioemotional communication relative to those initiated by clinicians.

**Conclusions:** Patient initiation may lead to more extensive, higher quality behavioral counseling during pregnancy, possibly mediated by socioemotional cueing.

**Practice implications:** Interventions that activate pregnant women to initiate discussions of weight gain with clinicians may improve the quality of behavioral counseling during pregnancy.

## 1. Introduction

Despite the potential benefits of behavioral counseling on healthy weight gain during pregnancy, studies suggest that obstetric clinicians do not routinely counsel pregnant women on weight, nutrition and physical activity. Studies suggest that the majority of women do not recall being counseled about weight gain during pregnancy (Cogswell et al., 1999; McDonald et al., 2011), and many clinicians report not providing their pregnant patients with high quality behavioral counseling on nutrition, physical activity and weight control (Herring et al., 2010; Power et al., 2006; Stotland et al., 2010). Clinicians cite many reasons for not providing counseling, including limited time, the perceived inefficacy of behavioral counseling, the complexity of health behaviors, a lack of training on nutrition and physical activity, and the perceived sensitivity of discussions about weight (Herring et al., 2010; Huang et al., 2004; Kushner, 1995; Power et al., 2006; Power et al., 2002; Timmerman et al., 2000; Whitlock et al., 2002). Moreover, patients with overweight and obesity are significantly more likely to be counseled to gain weight in excess of IOM and ACOG recommendations (McDonald et al., 2011).

Nevertheless, behavioral counseling from health professionals during routine prenatal care may facilitate the adoption of health behaviors and promote recommended weight gain during pregnancy (Cogswell et al., 1999; Phelan, 2010; Shub, Huning, Campbell, & McCarthy, 2013; Stotland et al., 2010). In one study, researchers found that a larger proportion of pregnant women who were advised to gain within Institute of Medicine (IOM) and American College of Obstetricians and Gynecologists (ACOG) guidelines subsequently achieved recommended weight gain compared to those who received incorrect or no counseling (Cogswell et al., 1999). Moreover, a number of studies in primary care suggest

that people who receive behavioral counseling are more likely to attempt weight loss (Sciamanna et al., 2000), improve nutrition and physical activity (S. C. Alexander et al., 2007; Loureiro & Nayga, 2006), and achieve modest weight control (S. C. Alexander et al., 2007).

Although patient initiation of counseling topics has received limited attention in patient-provider communication research, it is an aspect of patient participation in prenatal visits that may affect the quality of behavioral counseling that patients receive (Nakash et al., 2009; Stotland et al., 2010; Tai-Seale et al., 2007). In a qualitative study, clinicians providing care to pregnant women perceived that patient initiation was a cue of patient interest in behavioral counseling, and some clinicians reported that they would only provide counseling on nutrition, physical activity, and recommended weight gain to patients who raised the topic during their prenatal visits (Stotland et al., 2010). In a primary care study with non-pregnant patients, researchers found that clinicians were more likely to provide referrals and come up with a plan for follow-up when patients initiated discussions of weight, nutrition and physical activity (Flocke et al., 2005). Outside of the literature on weight control, researchers have found that clinicians perceive information disclosure to be more reliable, and patient-provider relationship to be stronger, when patients initiate discussions, rather than the clinicians themselves (Nakash et al., 2009). Additionally, clinicians have been shown to spend more time on a number of different biomedical, psychosocial, and lifestyle topics when patients raise the topics (Tai-Seale et al., 2007).

In two studies in primary care, patients were shown to initiate the majority of discussions of weight, nutrition and physical activity (Cox et al., 2011; Pollak et al., 2007).

However, we are not aware of any studies that describe the proportion of patients who initiate discussions of recommended weight gain during pregnancy or studies that examine the relationship between patient initiation and other measures of communication during prenatal care.

The objective of this study was to examine the relationship between patient initiation of behavioral counseling episodes and several communication outcomes. We hypothesized that both patients and clinicians would use more socioemotional communication strategies when patients initiated behavioral counseling episodes. We also hypothesized that prenatal visits in which patients initiated behavioral counseling episodes would be more patient-centered, overall, than prenatal visits in which clinicians initiated behavioral counseling episodes. Finally, we hypothesized that patients who initiated weight-related behavioral counseling episodes would receive higher quality counseling, and that clinicians would spend more time on counseling using a greater number of evidence-based behavioral counseling strategies. We evaluated counseling quality using the 5A's framework (*Assess, Advise, Agree, Assist and Arrange)* as adopted by the U.S. Preventatives Services Task Force in 2002 (Whitlock et al., 2002).

## 2. Methods

### *2.1 Design and participants*

We conducted a cross-sectional, secondary data analysis using audio recordings, surveys and medical record reviews collected as part of a randomized control trial of a patient communication intervention (Roter et al., 2015). In the parent study, 23 clinicians and 130 of their patients were recruited from a single urban teaching hospital's obstetric

outpatient clinic in Baltimore, MD. The majority of patients attending the participating clinic were eligible for Medicaid and the Women, Infants and Children (WIC) program. Clinicians were nurse practitioners, resident physicians, and attending physicians. At the time of recruitment, the revised IOM guidelines for gestational weight gain had been released and were intended to be the standard for behavioral counseling at the participating clinic.

Patients were recruited from consenting clinicians' panels, and agreed to have a single prenatal visit recorded. We used 50 audio recordings of prenatal visits from the baseline cohort (June – December 2009) and 80 additional visits from the randomization cohort, in which patient participants received one of two communication skills programs (June 2010 – January 2011). The communication interventions were designed to encourage patients to engage actively in their prenatal visits by asking questions, expressing worries, problem-solving challenges unique to pregnancy, and contributing actively to decision-making. The interventions did not include specific discussions of nutrition, physical activity, gestational weight gain, or the 5A's.

For the current analysis, patients who did not have height or pre-pregnancy weight recorded (n = 3) or were underweight (BMI < 18.5 $kg/m^2$; n = 7) were excluded. The final sample for the current study included 22 obstetrical clinicians and 120 of their patients. The Johns Hopkins University Institutional Review Board approved the study procedures.

*2.2 Patient initiation of weight-related behavioral counseling episodes*

The independent variable for this study was patient initiation of behavioral counseling episodes. Audio recorded prenatal visits were examined for all behavioral counseling on weight, nutrition and physical activity, and the speaker initiating a behavioral counseling episode was determined by listening to the entire discussion in context.

*2.3 Audio recording analysis: overview*

The relationship between patient initiation and communication was examined using three different measures: 1) socioemotional valence (based on RIAS; section 2.3.2), 2) patient-centeredness throughout the prenatal visit (based on RIAS; section 2.3.3), and 3) behavioral counseling quality (5As coding; section 2.3.4).

*2.3.1 Audio recording analysis: Roter Interaction Analysis System (RIAS)*

The Roter Interaction Analysis System (RIAS) was used to code each recorded prenatal visit. Trained RIAS coders assigned each complete thought, expressed by the patient or clinician, to 1 of 37 mutually exclusive and exhaustive categories representing the functions of the medical dialogue. A random subset of 10% of the audio recordings was double coded to establish inter-coder reliability of RIAS coding, which averaged 0.90 across clinician categories and 0.91 for patient categories. The lifestyle categories (patient and clinician lifestyle questions, lifestyle information giving and clinician lifestyle counseling) were used to identify weight-related behavioral counseling in each of the recorded prenatal visits. All behavioral counseling episodes were transcribed and transcripts were analyzed for key characteristics.

*2.3.2 Audio recording analysis: Socioemotional valence of behavioral counseling episodes*

Behavioral counseling episodes were classified as having socioemotional content if they included at least one RIAS socioemotional statement (e.g. empathy, shows worry or concern, legitimizes, clinician self-disclosure, reassures, encourages, or shows partnership). Each behavioral counseling episode was then assigned to one of the following categories: 1)

emotionally neutral, 2) clinician emotional expression, 3) patient emotional expression, or 4) mutual emotional expression.

*2.3.3 Audio recording analysis: patient engagement and patient-centeredness of overall prenatal visit communication*

As in a number of other RIAS-based studies (Johnson, Roter, Powe, & Cooper, 2004; Roter, 2000), patient-engagement was assessed as clinician verbal dominance, calculated as the total number of clinician statements relative to the total number of patient statements in the prenatal visit. Second, patient-centeredness was operationalized as a ratio of the psychosocial and socioemotional focus of the prenatal visit relative to the biomedical focus of the prenatal visit. The numerator included psychosocial and lifestyle disclosure, all patient questions and emotional statements plus the clinician's psychosocial questions, psychosocial and lifestyle information and counseling and facilitation statements. The denominator included clinician medical questions, clinician orientations, and both patient and clinician biomedical information.

*2.3.4 Audio recording analysis: behavioral counseling quantity and quality*

Three indicators of behavioral counseling quality and quantity were: 1) the total duration of counseling, 2) the number of distinct counseling episodes throughout the prenatal visit, and 3) the number of 5A's behavioral counseling strategies used. The 5A's behavioral counseling framework is an evidence-based model for behavioral counseling adopted by the U.S. Preventative Services Task Force in 2002 (Whitlock et al., 2002). The 5A's were coded from the transcripts of behavioral counseling using Atlas.ti, and included: 1) *Assesses* weight, nutrition, or physical activity, 2) *Advises* on topics of nutrition, physical activity or weight, 3)

*Agrees* on a specific plan or course of action, 4) *Assists* in identifying barriers and supports for behavior change and 5) *Arranges* a specific plan for follow up. Table 3.1 includes definitions and examples of each of these counseling strategies. Two independent coders analyzed the transcripts and 20% were double coded to assess inter-rater reliability of 5A's coding. Coders discussed disagreements and made final decisions by consensus. There was substantial inter-rater reliability across all categories. For each category, inter-rater agreement ranged from 89% to 96%, and the overall kappa (a measure of inter-rater reliability that accounts for chance agreement) was 0.87.

*2.4 Statistical analyses*

Descriptive analyses were used to characterize the sample with respect to patient and clinician variables. One-way ANOVA and chi-square tests were used to examine differences in demographic characteristics, comparing patients who received behavioral counseling to those who did not. We examined the relationship between patient initiation and all communication outcomes in the subset of prenatal visits that included any behavioral counseling (n = 66). Chi-squared tests were used to examine the relationship between patient initiation and socioemotional valence typologies. Multilevel models were used for all other variables, to account for clustering of patients by clinician. All models were fit with an exchangeable correlation structure and robust standard errors, which tend to produce accurate statistical inferences even if the correlation structure is mis-specified. Multilevel linear regression was used to model 0RIAS patient-centeredness and clinician verbal dominance ratios and the total duration of behavioral counseling. Multilevel Poisson regression was used to model the total number of behavioral counseling episodes in each prenatal visit. Multilevel

logistic regression was used to model the use of 2 or more 5A's strategies vs. one 5A's strategy.

We adjusted for several variables in the final models. We calculated pre-pregnancy body mass index (BMI) using the height and weight reported in the medical record. As recommended by the American College of Obstetrics and Gynecology (ACOG), we used the calculated BMI to categorize patient participants into one of three groups: average (18.5 – 24.9 kg/m$^2$), overweight (25.0 – 29.9 kg/m$^2$), and obese (≥30 kg/m$^2$). The other variables included in the models were patient age (< 20 years vs. ≥ 20 years), pregnancy duration (first, second or third trimester), presence of diabetes (gestational or chronic), presence of hypertension (pregnancy-induced or chronic), number of prenatal visits at recorded prenatal visit (first visit vs. second or later visit), and clinician type (nurse practitioner vs. resident or attending physician). Multivariate models of the number of behavioral counseling episodes, the number of 5A's strategies, patient centeredness and clinician verbal dominance also included adjustments for visit length. All multivariate models included adjustment for parent study intervention group assignment. Regression analyses were completed using Stata 13.

## 3. Results

### *3.1 Descriptive characteristics*

The final study sample included 22 obstetrical clinicians and 120 of their patients. Tables 3.2 and 3.3 show a description of the study sample. The majority of clinicians were female (95.5%), White (59.1%), obstetrics and gynecology residents (81.8%). Sixty-nine percent of participants were between the ages of 20 and 35, and the mean age was 22.8 years (SD 5.1 years). The majority of patients were Black (84.2%) and in their second trimester of pregnancy (51.7%). Thirty-six percent of patients were being seen for their first prenatal

visit. Overall, 32.5% of patients had average pre-pregnancy BMI while 30.8% had overweight pre-pregnancy BMI and 36.7% had obese pre-pregnancy BMI. The mean prenatal visit length was 24.8 minutes (SD 11.1).

Table 3.3 also describes differences between patients who received behavioral counseling and those who did not. Sixty-six prenatal visits (55%) included any behavioral counseling on weight, nutrition or physical activity. In visits that included any behavioral counseling, 30 patients (45.5%) initiated these discussions while clinicians initiated counseling in 36 prenatal visits (54.5%). The mean number of distinct counseling episodes per prenatal visit was 1.7 (SD 1.0). The mean total duration of behavioral counseling across all episodes was 64.9 seconds (SD 54.5 seconds). Forty-one percent of prenatal visits included counseling with 2 or more of the 5A's strategies.

*3.2 Characteristics of patients who did and did not receive behavioral counseling*

Prenatal visits that included any weight-related behavioral counseling were 4.7 minutes longer (27 vs. 22.3 minutes) than prenatal visits that did not ($p = 0.02$). Patients who received behavioral counseling did not differ from patients who did not based on age, race, pregnancy duration, number of prenatal visits at index visit, BMI, or co-morbidities ($p > 0.05$)

*3.3 Patient initiation and communication outcomes: overview*

We found significant differences between patient- and clinician-initiated behavioral counseling episodes for all communication outcomes including socioemotional valence of

behavioral counseling, overall patient-centeredness of prenatal visits and the quality of behavioral counseling.

*3.3.1 Patient initiation and communication outcomes: socioemotional valence of behavioral counseling*

Four typologies of socioemotional valence were observed, based on RIAS communication categories: 1) emotionally neutral, 2) clinician emotional expression only, 3) patient emotional expression only, or 4) mutual emotional expression (Table 3.7). Patients tended to express worry and concern and ask their clinicians for reassurance as it related to weight, nutrition and physical activity. Clinicians most often reassured patients, expressed approval or expressed concern, as it related to weight, nutrition and physical activity. Patient-initiated behavioral counseling episodes tended to be more emotionally expressive, with patients expressing socioemotional content in 47.1% of patient-initiated counseling episodes (compared to 15.4% of clinician initiated episodes; $p = 0.02$). In 31% of patient-initiated behavioral counseling discussions, patients and clinicians mutually expressed socioemotional content (compared to 10.3% of clinician-initiated episodes; $p = 0.02$). Clinician-initiated episodes tended to be emotionally neutral (48.7%) compared to patient-initiated behavioral counseling episodes (22.6%, $p = 0.02$).

*3.3.2 Patient initiation and communication outcomes: overall patient engagement and patient-centeredness*

Table 3.6 shows differences in patient engagement and patient-centeredness in patient-initiated counseling discussions compared to those initiated by clinicians. Clinicians were less verbally dominant in prenatal visits that included patient-initiated behavioral

counseling episodes (ratio = 2.89, 95% CI = 2.56 – 3.21) compared to prenatal visits in which clinicians initiated behavioral counseling episodes (ratio 2.16, 95% CI = 1.80 – 2.52, p = 0.004; Table 6). Additionally, prenatal visits that included patient-initiated behavioral counseling episodes were significantly more patient-centered (ratio = 0.78, 95% CI = 0.69 – 0.86) compared to prenatal visits in which clinicians initiated behavioral counseling episodes (ratio = 0.65, 95% CI = 0.57 – 0.73, p = 0.04).

*3.3.3 Patient initiation and communication outcomes: behavioral counseling quality*

Table 3.5 summarizes the differences in behavioral counseling quantity and quantity based comparing patient-initiated to clinician initiated counseling discussions. In prenatal visits that included any behavioral counseling (n = 66), the number of behavioral counseling episodes was significantly higher when patients initiated the discussion compared to when clinicians initiated (IRR 1.25, 95% CI = 1.00 – 1.55, p = 0.05; Table 5). The total duration of behavioral counseling across all episodes was an average of 28 seconds longer (95% CI 0.11 – 56.0 seconds, p = 0.05) when patients initiated discussions rather than clinicians. Clinicians were significantly more likely to use 2 or more of the 5A's strategies if patients initiated discussions compared to when clinicians initiated counseling episodes (OR = 3.76, 95% CI = 1.08 – 13.04, p = 0.04).

## 4. Discussion and Conclusion

*4.1 Discussion*

The U.S. Preventative Services Task Force (USPSTF) suggests that behavioral counseling for weight, nutrition, and physical activity plays an important role in reducing

morbidity and mortality. While most behavioral counseling leads to modest effects, these may translate to substantial population-level impact and meaningful improvement in health outcomes for many people (Whitlock et al., 2002). We found that that patient initiation affects the quantity and quality of behavioral counseling provided to pregnant women during routine prenatal care.

In our study, there was substantial variation in the quality of weight-related behavioral counseling provided to pregnant women during prenatal care. Overall, 55% of prenatal visits included any behavioral counseling, and of these, 41% included two or more of the 5A's strategies. A number of factors may influence the variation in the quality of behavioral counseling, including clinicians' perceptions of the effectiveness of counseling, time constraints, a lack of training in nutrition, physical activity and weight control, and the perceived sensitivity of discussions about patient body weight (Huang et al., 2004; Kushner, 1995; Loureiro & Nayga, 2006; Power et al., 2006; Power et al., 2002; Timmerman et al., 2000).

We found that patient initiation affected both the quantity and quality of behavioral counseling offered to patients. A greater number of behavioral counseling episodes in patient-initiated discussions suggests that patients and clinicians identified different salient points for these discussions throughout the prenatal visits. Additionally, the longer total duration of counseling and use of more of the 5A's strategies in patient-initiated episodes suggests that patients' interest in nutrition, physical activity and weight cued clinicians to provide more extensive, higher quality counseling. Clinicians in our study sample may have perceived patients who initiated these conversations to be more receptive to counseling than patients who do not raise these topics in their prenatal visits. Moreover, patients who initiated

conversations about weight, nutrition and physical activity may have been more prepared to ask follow up questions, provide more information and to participate actively in discussion of weight, nutrition and physical activity (Flocke et al., 2005).

We used RIAS to explore the socioemotional valence of behavioral counseling episodes. Overall, patient-initiated behavioral counseling episodes included more socioemotional content than did clinician-initiated episodes. Socioemotional expression – including statements of worry or concern and requests for reassurance – appears to be a strategy employed by some patients to make their clinicians aware that behavioral counseling is important and relevant. Moreover, it appears that clinicians may respond to patient socioemotional expression with higher quality behavioral counseling. In contrast, the emotionally neutral tone of clinician-initiated behavioral counseling episodes may be perceived, by patients, as a signal of clinician disinterest, which may discourage patients from disclosing their concerns about weight; likewise patients' emotionally neutral response may discourage clinicians from pursuing a possibly sensitive topic (S. C. Alexander et al., 2011; Flocke et al., 2005; Stotland et al., 2010).

Patient initiation of behavioral counseling episodes was also related to overall prenatal visit communication. The participatory style observed in discussions of weight, nutrition and physical activity was not limited to these discussions, but rather, extended throughout the entire prenatal visit as patients and their providers discussed other topics. Overall, prenatal visits with patient-initiated, rather than clinician-initiated, behavioral counseling were more patient centered, with more of an emotional, psychosocial and lifestyle focus relative to biomedical focus. Additionally, patients who initiated behavioral counseling episodes were significantly less verbally dominated by their clinicians compared to patients

whose clinicians initiated behavioral counseling. These findings suggest that patients who are more active in weight-related discussions are also more active throughout the entire prenatal visit. It is possible that these patients were predisposed to assert themselves during their prenatal care. However, clinicians' use of a more patient-centered interviewing style may have provided patients with the opportunity to start these discussions.

Other researchers have also reported a relationship between patient initiation and the quality of behavioral counseling. Flocke and colleagues (2005) found that clinicians provided more referrals and were more likely to come up with a plan and arrange for follow up if patient raised the topic of weight control during primary care visits. Moreover, in a qualitative study, obstetric clinicians reported providing behavioral counseling on nutrition weight control in response to patient initiation (Stotland et al., 2010). Specifically, clinicians participating in the study reported that, rather than providing routine assessment and counseling, they would not weight, nutrition or physical activity unless the patient raised the topic or if patients were gaining more or less weigh than recommended by the IOM. Although Alexander and colleagues (2011) did not directly assess patient initiation, the authors found that primary care patients who reported greater intention to lose weight – and who were presumably more interested in weight discussion – received more extensive behavioral counseling.

It is important to note that patient initiation of a given topic may not be an accurate proxy of patient interest in that topic. Indications are that the majority of pregnant women (76%) express interest in learning more about weight-related risks from a health professional Kominiarek et al. (2010) and report being comfortable discussing weight with their prenatal care providers (80%, McDonald et al., 2011). In the same studies, McDonald et al. (2011)

found that only 28.5% of women reported received any counseling (and only 12.5% of reported receiving counseling consistent with clinical guidelines), and Kominiarek et al. (2010) found that only 9% of pregnant women had discussed obesity related risks with a health professional. These studies suggest that clinicians may miss opportunities to counsel women who are interested in and concerned about nutrition, physical activity and healthy weight gain in pregnancy. With the high prevalence of overweight and obesity among reproductive age women (Flegal et al., 2012; Stevens et al., 2012) and the minority of pregnant women gaining weight consistent with ACOG and IOM guidelines (Brawarsky et al., 2005; Carmichael, Abrams, & Selvin, 1997; Caulfield et al., 1996), clinicians need strategies to provide high quality behavioral counseling consistent with pregnant women's values, needs and social context (Whitlock et al., 2002). Moreover, this counseling should be compassionate and nonjudgmental.

Our study has several limitations. First, study participants (clinicians and patients) may not be representative of other clinic populations or prenatal care settings, and the study findings may not be generalizable to other settings. Additionally, we analyzed a single prenatal visit for each patient. Since most patients had multiple prenatal visits throughout their pregnancies, this analysis may not be representative of all of the weight-related behavioral counseling each patient received. However, since we recruited women across pre-pregnancy BMI categories, whose pregnancies represented a range of pregnancy durations, and who saw a number of different clinicians, we believe that our study captured wide cross section of routine prenatal practice.

Our study also has several strengths. To our knowledge, ours is the first study to examine the relationship between patient initiation of discussion of weight, nutrition and

physical activity and the quality of behavioral counseling received during routine prenatal care. Additionally, our study uses recordings of prenatal visits – rather than clinician or patient self-report – to operationalize our measures of behavioral counseling quality, eliminating recall bias. We were also able to account for a number of potential confounders (including BMI, age, pregnancy duration, co-morbidities, number of prenatal visits, and clinician type), which supports our conclusion of an independent association between patient initiation and the quality of behavioral counseling patients receive.

*4.2 Conclusion*

Researchers have explored the concept of patient participation and engagement extensively. However, patient initiation of specific counseling topics has received limited attention in the literature. This study suggests that patient initiation influences the quality of behavioral counseling that patients receive. Additionally, the findings suggest that patients and clinicians are more socioemotionally expressive when patients initiate discussions of weight, nutrition and physical activity. The socioemotional content of the behavioral counseling episodes seems to be communicated by patients – and heard by clinicians – as cue of interest and motivation to improve nutrition, physical activity and weight gain.

*4.3 Practice Implications*

Clinicians should consider devoting more time to topics raised by patients during prenatal care. Additionally, facilitative communication strategies may encourage patients to raise topics that are of particular concern to them throughout their pregnancies. It may also be valuable to provide more consistent behavioral counseling to patients, even if the patients themselves do not initiate these discussions. The findings suggest that strategies to increase

patient participation in behavioral counseling episodes may lead to improvements in the quality of behavioral counseling provided during prenatal care.

Table 3.1 5A's coding framework definitions and examples

| Strategy | Definition | Example |
|---|---|---|
| Assess | Clinician asks the patient about weight, nutrition and/or physical activity. | "How is your diet?"<br>"How often do you exercise" |
| Advise | Clinician provides the patient with advice about weight, physical activity or nutrition. | "You should eat at least 3 small meals each day with nutritious snacks in between."<br><br>"Your goal would be to gain between 15 – 25 pounds during the course of your entire pregnancy" |
| Agree | Patient and clinician agree to a specific course of action with respect to weight, physical activity or nutrition. | Clinician: "How can we work to make sure you are getting in the right fluids?"<br><br>Patient: "I can stop drinking soda. I can also no more than a cup of juice and at least 5 or 6 cups of water every day." |
| Assist | Clinician and patient work together to identify barriers and/or supports for nutrition or physical activity. | Clinician: "Is there anyone at home who can help you with cooking?"<br>Patient: "My mother cooks for me at least once per week." |
| Arrange | Clinician arranges for follow up with clinician, nutritionist or social worker. | "I know you're having trouble getting healthy food. Would you like to speak to a social worker about that?"<br><br>"It seems like you are having difficulty figuring out what to eat. I'd like you to talk to a nutritionist about that. |

Table 3.2 Clinician characteristics for study sample (n = 22)

| | **Clinicians (n = 22)** |
|---|---|
| **Gender; n (%)** | |
| Female | 21 (95.5) |
| Male | 1 (4.5) |
| **Race; n (%)** | |
| White | 13 (59.1) |
| Black | 6 (27.3) |
| Asian | 3 (13.6) |
| **Profession; n (%)** | |
| Resident | 18 (81.8) |
| Nurse practitioner | 2 (9.1) |
| Attending | 2 (9.1) |
| **Number of visits** | |
| Mean (range) | 5.5 (1 – 18) |

Table 3.3 Patient characteristics for study sample (n = 120)

| | **Patients** (n = 120) | **Did not receive behavioral counseling** (n = 54) | **Received behavioral counseling present** (n = 66) | **p** |
|---|---|---|---|---|
| **Visit length (minutes)** | | | | |
| Mean (SD) | 24.8 (11.1) | 22.3 (10.7) | 27.0 (11.1) | **0.02*** |
| **Age** | | | | |
| < 20 years old | 32 (26.7) | 12 (22.2) | 20 (30.3) | 0.20 |
| 20 – 35 years old | 83 (69.2) | 38 (70.4) | 45 (68.2) | |
| > 35 years old | 5 (4.1) | 4 (7.4) | 1 (1.5) | |
| **Race; n (%)** | | | | |
| Black | 101 (84.2) | 44 (81.5) | 57 (86.4) | 0.28 |
| White | 14 (11.7) | 6 (11.1) | 8 (12.1) | |
| Other | 5 (4.1) | 4 (7.4) | 1 (1.5) | |
| **Education** | | | | |
| Less than high school | 39 (32.5) | 18 (33.3) | 21 (31.8) | 0.55 |
| Completed high school or GED | 38 (31.7) | 20 (37.0) | 18 (27.3) | |
| Some college | 28 (23.3) | 11 (20.4) | 17 (25.8) | |
| No answer | 15 (12.5) | 5 (9.3) | 10 (15.2) | |
| **Insurance** | | | | |
| Medicaid | 93 (77.5) | 43 (79.6) | 50 (75.8) | 0.72 |
| Private insurance | 7 (5.8) | 4 (7.4) | 3 (4.6) | |
| Self-pay | 5 (1.7) | 2 (3.7) | 3 (4.6) | |
| No answer | 15 (12.5) | 5 (9.3) | 10 (15.2) | |
| **Pregnancy duration** | | | | |
| First trimester | 24 (20.0) | 7 (13.0) | 17 (25.8) | 0.09 |
| Second trimester | 62 (51.7) | 27 (50.0) | 35 (53.0) | |
| Third trimester | 34 (28.3) | 20 (37.0) | 14 (21.2) | |
| **Prenatal visit** | | | | |
| First visit | 61 (50.8) | 24 (44.4) | 35 (53.0) | 0.35 |
| Second or later visit | 59 (49.2) | 30 (55.6) | 31 (47.0) | |
| **Body mass index** | | | | |
| Average | 39 (32.5) | 19 (35.2) | 20 (30.3) | 0.85 |
| Overweight | 37 (30.8) | 16 (29.6) | 21 (31.8) | |
| Obese | 44 (36.7) | 19 (35.2) | 25 (37.9) | |
| **Co-morbidities; n (%)** | | | | |
| Diabetes | 11 (9.2) | 7 (13.0) | 4 (6.1) | 0.19 |
| Hypertension | 18 (15.0) | 9 (16.7) | 9 (13.6) | 0.64 |

Table 3.4 Descriptive characteristics of weight-related behavioral counseling conversations (n = 66)

| | Prenatal visits (n = 66) |
|---|---|
| **Initiation of behavioral counseling** | |
| Patient-initiated | 30 (45.5) |
| Clinician-initiated | 36 (54.5) |
| **Number of counseling episodes per prenatal visit** | |
| Mean (SD) | 1.7 (1.0) |
| **Total duration of behavioral counseling (seconds)** | |
| Mean (SD) | 64.9 (54.5) |
| **Number of 5As strategies** | |
| One | 39 (59.1) |
| Two or more | 27 (40.9) |

Table 3.5 Adjusted differences between clinician- and patient-initiated behavioral counseling episodes

| | Clinician-initiated | Patient-initiated | p |
|---|---|---|---|
| **Number of behavioral counseling episodes per prenatal visit;** Adjusted IRR (95% CI)[a] | 1.00 (ref) | 1.25 (1.00 – 1.55) | 0.05* |
| **Total duration of counseling;** Adjusted mean in seconds (95% CI)[b] | 52.9 (37.6 – 68.3) | 80.9 (60.0 – 101.8) | 0.05* |
| **Use of 2 or more 5As strategies;** Adjusted odds ratio (95% CI)[c] | 1.00 (ref) | 3.76 (1.08 – 13.04) | 0.04* |

[a]Multilevel Poisson model with adjustment for patient age, pregnancy duration, co-morbidities, pre-pregnancy BMI, number of prenatal visits, clinician type and intervention assignment.
[b]Multilevel linear model with adjustment for patient age, pregnancy duration, co-morbidities, pre-pregnancy BMI, number of prenatal visits, clinician type and intervention assignment.
[c]Multilevel logistic model with adjustment for patient age, pregnancy duration, co-morbidities, pre-pregnancy BMI, number of prenatal visits, clinician type and intervention assignment.

Table 3.6 Adjusted differences[a] in overall communication in prenatal visits with clinician-initiated vs. patient-initiated behavioral counseling episodes

| | **Clinician-initiated** | **Patient-initiated** | **p** |
|---|---|---|---|
| **Patient-centeredness** | 0.65 (0.57 – 0.73) | 0.78 (0.69 – 0.86) | 0.04 |
| **Clinician verbal dominance** | 2.89 (2.56 – 3.21) | 2.16 (1.80 – 2.52) | 0.004 |

[a]Multilevel linear model with adjustment for patient age, pregnancy duration, co-morbidities, pre-pregnancy BMI, number of prenatal visits, clinician type and intervention assignment.

Table 3.7 Patient initiation and socioemotional valence of behavioral counseling episodes

| Socioemotional valence | Clinician initiated | Number (%) | Patient initiated | N (%) |
|---|---|---|---|---|
| **Emotionally neutral** | **Clinician**: And um, how is your, um, eating? Are you eating healthy?<br>**Patient**: I mean it's pregnancy.<br>**Clinician**: What do you eat, usually?<br>Patient: Um. Like a burger, chicken, um, sometimes I have sandwiches.<br>**Clinician**: Yeah, you getting fruits and vegetables?<br>**Patient**: Yeah I eat a lot of spinach. I do eat spinach a lot.<br>**Clinician**: Ok, yeah.<br>**Patient**: Almost everyday.<br>**Clinician**: Yeah you want to try to have the most fruits and vegetables, water and then sort of less dairy and you know carbohydrates, meaning like the breads. And then minimal, you want to have, like the sugars the sweets all that kind of stuff, ok? Alrighty. | 19 (48.7) | **Patient**: Um, I didn't, I couldn't see the dietitian last time. Because um.<br>**Clinician**: You think you can do it this time?<br>**Patient**: Yes.<br>**Clinician**: Let me write that on the front of your chart to make sure that you can see her. And you're eating ok? (pause) Ok, great. | 7 (22.6) |
| **Clinician emotional expression** | **Clinician**: Yeah like how many extra pounds do you think you can gain during pregnancy that we would consider, oh that's normal?<br>**Patient**: 15.<br>**Clinician**: That's pretty good! That's pretty close. So I would say probably, let me see if I can pull up your weight here. That would be our recommended weight gain for you – 15 – 20 pounds – over the course of the next 9 months. Now by no means do we want you to diet or do anything like that. Ok? | 14 (35.9) | **Patient**: I work around fast food.<br>**Clinician**: Ok…that's ok. Just don't eat too much of it, and you'll be ok.<br>**Patient**: Ok.<br>**Clinician**: Ok? | 9 (29.0) |

| | | | | |
|---|---|---|---|---|
| **Patient emotional expression** | **Clinician**: Ok it's best for you and the baby if you can have a little bit [to eat] in the morning.<br>**Patient**: I can't. They have breakfast way too early.<br>**Clinician**: What time do they have breakfast?<br>**Patient**: At um, between 6:30 and 7:30.<br>**Clinician**: Oh.<br>**Patient**: And I'm just not ready to get up to eat breakfast at 6:30 or 7:30. | 2 (5.1) | **Patient**: I'm trying to find some energy.<br>**Clinician**: What?<br>**Patient**: I'm trying to find some energy. I don't know why I feel so weak. I ate a sandwich this morning.<br>**Clinician**: Yeah.<br>Patient: And I drank an apple juice.<br>**Clinician**: You just feeling weak today or has that been going on for a while?<br>**Patient**: Well I've been feeling weak a bit much. I feel weak a lot.<br>**Clinician**: Are you eating ok? Eating enough?<br>**Patient**: Yeah.<br>**Clinician**: Ok. Good. | 5 (16.1) |
| **Mutual emotional expression** | **Clinician**: And then, so I'm a little bit concerned about your weight gain. Right. You're kind of right. I mean you started off in like an "overweight" category.<br>**Patient**: Yeah.<br>…<br>**Patient**: So what would be the normal weight though?<br>**Clinician**: Um let me see how much you weighed at the beginning of pregnancy.<br>**Patient**: Ok.<br>**Clinician**: So you want to have gained between 15 and 25 pounds.<br>**Patient**: Yeah.<br>**Clinician**: And you've gained 34 pounds right now.<br>**Patient**: Wow. | 4 (10.3) | **Patient**: Is it bad that I only eat once a day?<br>**Clinician**: Yes. That would be problem number 1.<br>**Patient**: I really don't be hungry.<br>**Clinician**: I know, but even if it's a small something, but this is the way you look at it. Even if you eat a little small something, right? You don't have to eat one big meal.<br>**Patient**: Yeah.<br>**Clinician**: You can take what you eat in one big meal and do what? Separate it over the day right? Because babies need glucose throughout the day too, right?<br>**Patient**: Yeah.<br>**Clinician**: And so do you. And that's going to be important too for managing your blood sugar. | 10 (31.0) |
| **Total** | | 39 (100) | | 31 (100) |

# CHAPTER 4

Providing prenatal care to pregnant women with overweight or obesity: Differences in clinician communication by patient body weight

**Chapter 4 Abstract**

**Objective:** To examine the relationship between patient body weight and clinician communication during prenatal care.

**Methods:** We examined audio recordings of prenatal visits between 22 obstetrical clinicians and 117 of their patients. Visits were coded using the Roter Interaction Analysis System (RIAS). Multivariate multilevel Poisson models, accounting for clustering within clinicians, were used to examine the relationship between patient weight and clinician communication.

**Results**: Clinicians asked fewer lifestyle questions ($p = 0.04$) and used fewer approval ($p = 0.01$) and concern statements ($p = 0.002$) when providing care to patients with overweight, compared to patients with average weight. Clinicians gave less lifestyle information ($p = 0.01$) and used fewer self-disclosure statements when providing care to patients with obesity ($p < 0.001$) compared patients with average weight. There were no significant differences in biomedical questions, information giving or counseling. In post-visit surveys, clinicians were significantly less likely to strongly agree or agree that they liked patients with obesity and that these patients were accurate historians compared to patients with average weight ($p < 0.05$).

**Conclusion:** These results suggest that clinician weight bias may influence patient-provider communication during routine prenatal care, resulting in less patient-centered communication received by women with overweight and obesity.

## 1.0 Introduction

Clinicians report negative attitudes towards patients with overweight or obesity, reporting less respect for these patients and associating overweight and obesity with words such as “lazy,” “non-compliant,” “weak-willed,” “awkward” and “sloppy” (Foster et al., 2003; Huizinga et al., 2010; Huizinga et al., 2009; Lindhardt et al., 2013; Puhl & Brownell, 2003; Puhl & Heuer, 2009; Puhl & Heuer, 2010; Schwartz et al., 2003; Smith & Lavender, 2011). In qualitative studies, pregnant patients with obesity reported that their obstetric clinicians were judgmental and accusatorial when discussing body weight, providing little helpful information about nutrition, physical activity, or the need for extra diagnostic testing (Lindhardt et al., 2013; Smith & Lavender, 2011). In a focus group study, medical students reported that they most frequently heard derogatory humor about patients with overweight or obesity in obstetrics and gynecology (Wear et al., 2006).

Despite American College of Obstetricians and Gynecologists (ACOG) recommendations (2014b) to provide nonjudgmental, compassionate and partnership-oriented care to all patients, irrespective of body weight, studies have shown that these negative attitudes and perceptions may affect how clinicians communicate with patients (Bertakis & Azari, 2005; Gudzune, Beach, et al., 2013; Wong et al., 2015). Because patient-centered communication (including open-ended communication, empathy, and rapport building strategies) may enhance history-taking, diagnosis, shared decision-making and patient behavior change (American College of Obstetricians and Gynecologists, 2014a; Kitson, Marshall, Bassett, & Zeitz, 2013; Roter, 2000; Roter & Hall, 2006; Whitlock et al., 2002), differences in communication by patient body weight may diminish the quality of prenatal care for patients with overweight or obesity (American College of Obstetricians and

Gynecologists, 2014b; Fontaine et al., 1998; Gudzune, Bleich, et al., 2013; Maruthur et al., 2009a, 2009b).

In this study, we used recordings of actual prenatal visits to examine the association between clinician communication and patient body weight. We hypothesized that clinicians would use fewer patient-centered interviewing strategies when providing care to patients with overweight or obesity compared to patients with average weight. We also hypothesized that clinicians would rate patient attributes less positively when providing prenatal care to patients with overweight or obesity, compared to patients with average weight.

## 2.0 Methods

We conducted a cross-sectional, secondary data analysis using audio recordings, surveys and medical record reviews collected as part of a randomized control trial of a patient communication intervention (Roter et al., 2015). In the parent study, 23 clinicians and 130 of their patients were recruited from a single urban teaching hospital's obstetric outpatient clinic in Baltimore, MD. The majority of patients attending the participating clinic were eligible for Medicaid. Clinicians were nurse practitioners, resident physicians, and attending physicians.

Patients were recruited from consenting clinicians' panels, and agreed to have a single prenatal visit recorded. We used 50 audio recordings of prenatal visits from the baseline cohort (June – December 2009) and 80 additional visits from the randomization cohort, in which patient participants received one of two communication skills programs (June 2010 – January 2011). The communication interventions were designed to encourage patients to engage actively in their prenatal visits by asking questions, expressing worries,

problem-solving challenges unique to pregnancy, and contributing actively to decision-making.

For the current study, patients who did not have height or pre-pregnancy weight recorded (n = 3) and underweight patients (BMI < 18.5 kg/m$^2$; n = 7) were excluded. Patients who did not complete a questionnaire for depression screening were also excluded (n = 3), as this was a covariate included in the final multivariate regression models. The final sample for the current study included 22 obstetrical clinicians and 117 of their patients. The Johns Hopkins University Institutional Review Board approved the study procedures.

*2.1 Measures*

The dependent variables for this study were counts of clinician communication strategies used during prenatal visits. We considered domains of communication consistent with the functions of medical dialogue: 1) data gathering, 2) education and counseling, 3) activating and partnering, and 4) building a relationship (Cohen-Cole, 1991; Roter & Hall, 2006). The Roter Interaction Analysis System (RIAS) was used to code each recorded prenatal visit for each of the communication categories included in this analysis. Trained RIAS coders assigned each complete thought, expressed by the patient or clinician, to 1 of 37 mutually exclusive and exhaustive categories representing the functions of the medical dialogue. A random subset of 10% of the audio recordings was double coded to establish inter-coder reliability, which averaged 0.90 across clinician categories and 0.91 for patient categories.

Table 4.1 provides detail about each of the communication domains, the RIAS codes included in the current study and sample quotations. Data gathering communication includes

open and closed ended biomedical (i.e. medical history, symptoms, therapeutic regimen, etc.) and psychosocial (i.e. social relationships, psychological experiences) and lifestyle (i.e. health behaviors and habits) questions. Education and counseling includes all informative statements as well as clinician statements providing advice in the biomedical, psychosocial and lifestyle domains. The activation and partnership domain includes participatory facilitators and procedural talk, especially those statements that encourage patient involvement in and contribution to the prenatal visit (i.e. checking for understanding, cues of interest, asking permission). The relationship-building domain includes exchanges that build social, emotional and positive rapport (i.e. statements of optimism, concern, empathy, approval).

The secondary dependent variables were clinician ratings of the following items on a 5-point Likert scale (strongly disagree to strongly agree): 1) "This patient provided an accurate history of her medical condition," 2) "This patient trusts me a great deal," 3) "I understood what the patient wanted to know," 4) "The patient had a good understanding of the most important information I gave her," and 5) "All in all, I like the patient a lot." Clinician responses were dichotomized (Strongly Agree/Agree vs. Neutral/Disagree/Strongly Disagree) for the final multivariate regression analysis.

The independent variable for the study was patient pre-pregnancy body mass index (BMI), which was calculated using the height and weight reported in the medical record. As recommended by the American College of Obstetrics and Gynecology (ACOG), we used the calculated BMI to categorize patient participants into one of three groups: average weight (18.5 – 24.9 $kg/m^2$), overweight (25.0 – 29.9 $kg/m^2$), or obese (≥30 $kg/m^2$). Several other patient and clinician variables were used to characterize the study sample. Patient variables

included age, race (Black, White, or other), intervention status, number of co-morbidities, pregnancy duration at the recorded prenatal visit, and depressive symptoms (as measured by Edinburgh Depression Screen, Bergink et al., 2011). Presence of depressive symptoms was defined as an EDS score > 10. Clinician variables included clinician gender, race (White, Black or Asian) and type (resident physician, attending physician, or nurse practitioner).

*2.2 Statistical analyses*

Bivariate descriptive analyses by pre-pregnancy BMI category were used to characterize the sample with respect to patient and clinician variables. ANOVA was used for continuous variables and $\chi^2$ tests were used for dichotomous or continuous variables.

To account for clustering of patients by clinician, multilevel Poisson regression models with generalized estimating equations (GEE) were used to evaluate the association between BMI category and clinician communication. Multilevel logistic regression models with generalized estimated equations (GEE) were used to evaluate the association between BMI category and clinician ratings of prenatal visits. All models were fit with an exchangeable correlation structure and robust standard errors, which tend to produce accurate statistical inferences even if the correlation structure is mis-specified.

Final models were adjusted for covariates that were associated with patient-clinician communication in the literature, including patient age, depressive symptoms, co-morbidities, clinician type and clinician race. Final models also included adjustments for pregnancy duration, visit length and intervention assignment. We did a sensitivity analysis adding resident training level and patient race to the full model, which did not change the results.

## 3.0 Results

The final study sample included 22 obstetrical clinicians and 117 of their patients. Participant characteristics are summarized in Tables 4.2 and 4.3. The mean prenatal visit length was 24.8 minutes (SD 11.1 minutes). The majority of clinicians were female (95.5%), White (59.1%), and obstetrics and gynecology residents (81.8%). Overall, patients' mean age was 22.9 years (SD 5.2 years), mean pre-pregnancy BMI was 30.8 kg/m$^2$ (SD 7.0 kg/m$^2$) and mean pregnancy duration at recorded visit was 22.0 weeks (SD 7.9 weeks). A larger proportion of patients with overweight and obesity had diabetes (chronic and gestational) and hypertension (chronic and pregnancy-induced) compared to patients with average weight (p = 0.02). There were no significant differences in patient age, race, education, insurance status, pregnancy duration, visit length, intervention status, or depressive symptoms by pre-pregnancy BMI category.

Differences in clinician communication strategies by patient body weight are summarized in Table 4.4. Clinicians asked fewer lifestyle questions when providing care to patients with overweight compared patients with average weight (IRR 0.66, 95% CI 0.44 – 0.99, p = 0.04). Clinicians gave significantly less lifestyle information when providing care to patients with obesity compared to patients with average weight (IRR 0.51, 95% CI 0.32 – 0.82, p = 0.01). Clinicians were significantly less likely to seek clarification (IRR 0.76, 95% CI 0.64 – 0.93, p = 0.01) and used significantly fewer concern statements (IRR 0.68, 95% CI 0.53 – 0.86, p = 0.002) and approval statements (IRR 0.68, 95% CI 0.51 – 0.91, p = 0.01) when providing care to patients with overweight compared to patients with average weight. Clinicians used significantly fewer self-disclosure statements (IRR 0.40, 95% CI 0.19 – 0.84 p = 0.02) in providing care to patients with obesity compared to patients with average weight.

There were no significant differences in clinician biomedical or psychosocial questions, information giving or counseling by patient BMI category ($p > 0.05$). There were no significant differences in patient communication behaviors by patient BMI category ($p > 0.05$, data not shown).

Differences in clinician ratings of patient attributes are summarized in Table 4.5. Clinicians were significantly less likely to strongly agree or agree that patients with obesity were accurate historians (predicted probability = 0.51, 95% CI = 0.41 – 0.61) compared to patients with average weight (predicted probability = 0.81, 95% CI = 0.69 – 0.94, $p < 0.001$). Clinicians were significantly less likely to strongly agree or agree that they liked patients with obesity (predicted probability = 0.57, 95% CI = 0.41 – 0.73) compared to patients with average weight (predicted probability = 0.82, 95% CI = 0.71 – 0.94, $p = 0.04$).

## 4.0 Discussion

ACOG recommends that clinicians provide nonjudgmental, compassionate and high quality care to all patients, irrespective of body weight, noting that negative attitudes towards patients with overweight and obesity may undermine the patient-provider relationship (American College of Obstetricians and Gynecologists, 2014a). The findings in this cross-sectional study of routine prenatal care visits support the hypothesis that clinicians use fewer patient-centered interviewing strategies and give lower ratings of patient-provider interaction when providing prenatal care to patients with overweight or obesity.

Clinicians engaged in less lifestyle discussion when providing care to patients with overweight or obesity, asking overweight patients a third fewer lifestyle questions and giving obese patients less than half as much lifestyle information compared to patients with average

weight. This is concerning, given that the lifestyle domain includes discussions of nutrition, tobacco use, physical activity, postpartum contraception, and breastfeeding. Our study suggests that patients with overweight or obesity may not be receiving effective behavioral counseling in these domains. This finding may be expected, given that many clinicians report limited self-efficacy to counsel patients with respect to lifestyle and behavior change, and they may also perceive these discussions to be time-consuming and ineffective (Oken et al., 2012; Power et al., 2006; Power et al., 2002; Stotland et al., 2010; Whitlock et al., 2002). Our study suggests that clinicians may be particularly hesitant to discuss these issues when providing prenatal care to patients with overweight or obesity.

Consistent with the findings in Gudzune, Beach, et al. (2013), we found differences in the relationship building, activating and partnering communication domains by patient body weight. As noted by ACOG, these patient-centered communication strategies may increase patient participation in prenatal visits and enhance the patient-provider relationship by cueing patients to clinicians' ability to appreciate patient perspectives and experiences (American College of Obstetricians and Gynecologists, 2014a). In providing care to patients with overweight, clinicians less frequently checked to make sure patients understood the discussion. Clinicians also used fewer concern and approval statements when providing prenatal care to patients with overweight and fewer self-disclosure statements when providing care to patients with obesity.

Similar to studies by (Gudzune, Beach, et al., 2013) and Bertakis and Azari (2005), we found no difference in biomedical communication by patient body weight. It might be expected that elevated risk profile for patients with overweight and obesity might increase the need for biomedical communication, and that the relative importance of biomedical

concerns would outweigh lifestyle and psychosocial issues as well as relationship building, activating and partnering communication strategies. Our findings of no difference in biomedical communication do not support these hypotheses. This finding is surprising, given that patients with overweight and obesity in our sample had an increased burden of diabetes and hypertension compared to patients with average weight.

Consistent with previous literature, clinicians gave lower ratings of their interactions with patients with obesity compared to patients with average weight (Huizinga et al., 2010; Huizinga et al., 2009). Patients with obesity were rated as being less accurate historians, and clinicians reported liking patients with obesity less than patients with average weight. In combination with the differences in clinician communication strategies, these ratings suggest that clinicians' negative attitudes towards patients with overweight or obesity adversely affect the quality of patient-provider relationship.

Our study has several limitations. First, this is a small sample of prenatal visits in an urban, teaching hospital environment. The majority of the providers were white, resident physicians and the majority of patients were young African-American women. Our findings may not be generalizable to all patient populations or to prenatal visits in other healthcare contexts (e.g. suburban, rural, community hospitals). Given that our study is cross-sectional and only one prenatal visit was recorded for each patient, the results may or may not be representative of communication throughout patients' entire pregnancies. Additionally, our study design does not allow us to determine if differences in clinician communication by patient body weight affect clinical outcomes.

However, our study also has several strengths. We used audio recordings of prenatal visits – rather than clinician or patient report – to examine the relationship between patient

body weight and well-established communication domains. In our analysis, we were able to account for a number of different factors that may influence communication, which lends legitimacy to the hypothesis of an independent association between patient body weight and communication. Additionally, our study combines an examination of recorded communication with clinician ratings of their interactions with patients, providing a more complete picture of the association between patient body weight and quality of the patient-provider relationship.

Previous studies of provider attitudes (Foster et al., 2003; Huizinga et al., 2010; Huizinga et al., 2009; Schwartz et al., 2003), patient experiences (Lindhardt et al., 2013; Smith & Lavender, 2011), and access to women's health services (Fontaine et al., 1998; Østbye, Taylor Jr, Yancy Jr, & Krause, 2005; Wee et al., 2000), suggest that patient body weight affects the quality of care patients receive. Increased use of patient-centered communication strategies will enhance the quality of prenatal care for patients with overweight and obesity, potentially leading to increased access to preventive care and improved health outcomes.

Table 4.1 Description of clinician communication behaviors and Roter Interaction Analysis System (RIAS) codes.

| Communication Domain | RIAS Codes | Example Statements |
|---|---|---|
| **Data gathering** | Medical questions | "Have you had any contractions?" |
| | Psychosocial questions | "Who will help you when the baby is born?" |
| | Lifestyle questions | "How many cigarettes do you smoke every day?" |
| **Patient education and counseling** | Medical information and counseling | "Your blood pressure is elevated." |
| | Psychosocial information | "You are at risk for post-partum depression." |
| | Lifestyle information | "Breastfeeding provides nutrients for the baby." |
| | Lifestyle and psychosocial counseling | "You should eat several small meals every day." |
| **Activating and partnership** | Check for understanding, clarification | "You said that this is your third pregnancy, right?" |
| | Asks for permission | "May I start your physical exam?" |
| | Asks for opinion | "What do you think is causing your dizziness?" |
| **Rapport building** | Self-disclosure | "I have a hard time remembering to take pills too." |
| | Statements of concern | "I'm worried about your high blood pressure." |
| | Statements of approval | "It's great that you quit smoking." |
| | Reassurance and optimism statements | "Your blood sugar looks much better." |
| | Empathy statements | "You seem very upset." |
| | Legitimizing statements | "It's normal to be worried about that." |

Table 4.2 Clinician characteristics for study sample

| | **Clinicians (n = 22)** |
|---|---|
| **Gender; n (%)** | |
| Female | 21 (95.5) |
| Male | 1 (4.5) |
| **Race; n (%)** | |
| White | 13 (59.1) |
| Black | 6 (27.3) |
| Asian | 3 (13.6) |
| **Profession; n (%)** | |
| Resident | 18 (81.8) |
| Nurse practitioner | 2 (9.1) |
| Attending | 2 (9.1) |
| **Number of visits** | |
| Mean (range) | 4.5 (1 – 17) |

Table 4.3 Characteristics for average weight, overweight, and obese patients in study sample

| | **Total** (n = 117) | **Average** (n = 39) | **Overweight** (n = 37) | **Obese** (n = 41) | **p** |
|---|---|---|---|---|---|
| **Visit length (minutes)** | | | | | |
| Mean (SD) | 24.8 (11.1) | 25.8 (14.0) | 23.6 (9.3) | 25.0 (9.6) | 0.69 |
| **Age (years)** | | | | | |
| Mean (SD) | 22.9 (5.2) | 21.8 (4.9) | 23.0 (5.6) | 23.7 (4.9) | 0.26 |
| **Pregnancy duration (weeks); n (%)** | 22 (18.8) | 8 (20.5) | 7 (18.9) | 7 (17.1) | 0.98 |
| First trimester | 62 (53.0) | 19 (48.7) | 20 (54.1) | 23 (56.1) | |
| Second trimester | 33 (28.2) | 12 (30.8) | 10 (27.0) | 11 (26.8) | |
| Third trimester | | | | | |
| **Race; n (%)** | | | | | |
| Black | 98 (83.8) | 35 (89.7) | 30 (81.1) | 33 (80.5) | 0.81 |
| White | 14 (12.0) | 3 (7.7) | 5 (13.5) | 6 (14.6) | |
| Other | 5 (4.3) | 1 (2.6) | 2 (5.4) | 2 (4.9) | |
| **Education** | | | | | |
| Less than high school | 38 (32.5) | 11 (28.2) | 14 (37.8) | 13 (31. 7) | 0.49 |
| High school or GED | 37 (31.6) | 12 (30.8) | 8 (21.6) | 17 (41.5) | |
| Some college | 27 (23.1) | 10 (25.6) | 11 (29.7) | 6 (14.6) | |
| No answer | 15 (12.8) | 6 (15.4) | 4 (10.8) | 5 (12.2) | |
| **Insurance** | | | | | |
| Medicaid | 90 (76.9) | 27 (69.2) | 30 (81.2) | 33 (80.5) | 0.79 |
| Private insurance | 7 (6.0) | 4 (10.3) | 2 (5.4) | 1 (2.4) | |
| Self-pay | 5 (4.3) | 2 (5.1) | 1 (2.7) | 2 (4.9) | |
| No answer | 15 (12.8) | 6 (15.4) | 4 (10.8) | 5 (12.2) | |
| **Co-morbidities; n (%)** | | | | | |
| Diabetes (gestational or chronic) | 11 (9.4) | 1 (2.6) | 2 (5.4) | 8 (19.5) | **0.02*** |
| Hypertension (pregnancy-induced or chronic) | 17 (14.5) | 1 (2.6) | 6 (16.2) | 10 (24.4) | **0.02*** |
| **Depression; n (%)** | | | | | |
| No depressive symptoms | 81 (69.2) | 31 (79.5) | 26 (70.3) | 24 (58.5) | 0.13 |
| Depressive symptoms present | 36 (30.8) | 8 (20.5) | 11 (29.7) | 17 (41.5) | |

Table 4.4 Adjusted incidence rate ratios[a] of clinician communication – patients with overweight and obesity compared to patients with average weight

| **Clinician Communication** | **Average (n = 39)** IRR | **Overweight (n = 37)** IRR (CI) | **p** | **Obese (n=44)** IRR (CI) | **p** |
|---|---|---|---|---|---|
| **All clinician statements** | 1.00 (ref) | 0.91 (0.75 – 1.10) | 0.32 | 0.97 (0.82 – 1.16) | 0.78 |
| **Data Gathering** | | | | | |
| Medical Questions | 1.00 (ref) | 0.91 (0.76 – 1.08) | 0.29 | 0.97 (0.80 – 1.19) | 0.78 |
| Lifestyle Questions | 1.00 (ref) | **0.66 (0.44 – 0.99)** | **0.04*** | 1.04 (0.75 – 1.44) | 0.81 |
| Psychosocial Questions | 1.00 (ref) | 0.68 (0.43 – 1.07) | 0.10 | 0.90 (0.59 – 1.40) | 0.65 |
| **Education and Counseling** | | | | | |
| Medical information and counseling | 1.00 (ref) | 0.93 (0.72 – 1.20) | 0.57 | 1.04 (0.79 – 1.37) | 0.78 |
| Lifestyle information | 1.00 (ref) | 0.76 (0.42 – 1.39) | 0.37 | **0.51 (0.32 – 0.82)** | **0.01*** |
| Psychosocial information | 1.00 (ref) | 2.37 (0.85 – 6.65) | 0.10 | 0.61 (0.16 – 2.37) | 0.68 |
| Psychosocial and lifestyle counseling | 1.00 (ref) | 0.72 (0.36 – 1.46) | 0.36 | 0.79 (0.50 – 1.27) | 0.33 |
| **Activating and partnering** | | | | | |
| Check for understanding, clarification | 1.00 (ref) | **0.76 (0.64 – 0.93)** | **0.01*** | 0.90 (0.74 – 1.10) | 0.30 |
| Asks permission | 1.00 (ref) | 1.30 (0.50 – 3.39) | 0.59 | 1.73 (0.56 – 5.30) | 0.77 |
| Asks opinion | 1.00 (ref) | 1.00 (0.74 – 1.34) | 0.98 | 1.06 (0.70 – 1.61) | 0.85 |
| **Relationship building** | | | | | |
| Laughter and joking | 1.00 (ref) | 0.76 (0.46 – 1.26) | 0.28 | 0.73 (0.41 – 1.31) | 0.29 |
| Approval statements | 1.00 (ref) | **0.68 (0.51 – 0.91)** | **0.01*** | 1.01 (0.84 – 1.20) | 0.94 |
| Empathy statements | 1.00 (ref) | 0.70 (0.27 – 1.84) | 0.47 | 0.97 (0.53 – 1.79) | 0.93 |
| Legitimizing statements | 1.00 (ref) | 1.39 (0.44 – 4.35) | 0.57 | 1.95 (0.78 – 4.89) | 0.15 |
| Concern statements | 1.00 (ref) | **0.68 (0.53 – 0.86)** | **0.002*** | 0.88 (0.63 – 1.22) | 0.44 |
| Reassurance statements | 1.00 (ref) | 0.86 (0.64 – 1.15) | 0.30 | 0.89 (0.68 – 1.18) | 0.42 |
| Self-disclosure statements | 1.00 (ref) | 0.55 (0.26 – 1.17) | 0.12 | **0.40 (0.19 – 0.84)** | **0.02*** |

[a]Multilevel Poisson regression models with exchangeable correlation structure, robust standard errors, and adjustments for patient age, pregnancy duration, depressive symptoms, number of co-morbidities, clinician type, clinician race, visit length and intervention assignment.

Table 4.5 Adjusted predicted probability[a] of clinician reporting "Strongly Agree" or "Agree" in rating patient-clinician interaction – patients with overweight and obesity compared to patients with average weight

| | **Average (ref)** Adjusted predicted probability (CI)[b] | **Overweight** Adjusted predicted probability (CI) | **p** | **Obese** Adjusted predicted probability (CI) | **p** |
|---|---|---|---|---|---|
| The patient provided an accurate history of her medical condition. | 0.81 (0.69 – 0.94) | 0.63 (0.50 – 0.76) | 0.12 | **0.51 (0.41 – 0.60)** | **<0.001*** |
| This patient trusts me a great deal. | 0.68 (0.48 – 0.87) | 0.61 (0.44 – 0.78) | 0.57 | 0.44 (0.28 – 0.60) | 0.14 |
| I understood what the patient wanted to know. | 0.77 (0.63 – 0.90) | 0.85 (0.73 – 0.98) | 0.43 | 0.79 (0.72 – 0.86) | 0.75 |
| The patient had a good understanding of the most important information I gave to her. | 0.68 (0.50 – 0.86) | 0.76 (0.64 – 0.88) | 0.50 | 0.57 (0.42 – 0.71) | 0.44 |
| All in all, I like the patient a lot. | 0.82 (0.71 – 0.94) | 0.85 (0.64 – 1.00) | 0.83 | **0.57 (0.41 – 0.73)** | **0.04*** |

[a]Multilevel logistic regression models with exchangeable correlation structure, robust standard errors, and adjustments for patient age, pregnancy duration, depressive symptoms, number of co-morbidities, clinician type, clinician race, visit length and intervention assignment.

[b]Adjusted probability of clinician reporting Strongly Agree or Agree vs. Neutral, Disagree or Strongly Disagree.

# CHAPTER 5: Discussion

## 1.0 Key findings

Together, the findings in this dissertation illustrate the challenges and opportunities for women and their prenatal care providers in navigating the topic of body weight during pregnancy. Previous research shows that maternal body weight – both pre-pregnancy weight and gestational weight gain – affect health outcomes for women and infants (Catalano, 2007; Catalano & Ehrenberg, 2006; Chu et al., 2007; Sibai et al., 1995; Viswanathan et al., 2008) and pregnancy is widely regarded as a window of opportunity to intervene to promote healthy nutrition and physical activity (Phelan, 2010). However, there are significant barriers to high quality patient-provider communication – including behavioral counseling and patient interviewing strategies – with particular concern for the prenatal care experiences of patients with overweight and obesity.

The research in the first study found wide variation in the quality of behavioral counseling on nutrition, physical activity and weight gain during prenatal care. Patients who received counseling with a greater number of evidence-based strategies had lower mean weight gain and were less likely to gain weight in excess of clinical recommendations. The findings in the second study suggested that patient initiation of the discussion leading to behavioral counseling is associated with the quality and quantity of counseling that clinicians provide. Patient initiation of this discussion may cue clinicians to pregnant women's interest and emotional investment in behavioral counseling.

The findings in the third study suggested that clinicians' use fewer patient-centered interviewing strategies when providing prenatal care to women with overweight and obesity. Moreover clinicians gave lower ratings of patient-provider interaction when providing prenatal care to patients with obesity; compared to patients with average weight, clinicians

were less likely to strongly agree or agree that they liked patients with obesity and less likely to rate them as accurate historians.

**2.0 Study strengths**

The research in this dissertation has several strengths and makes an important contribution to the literature. The data analyzed include measures of actual communication during recorded prenatal visits. In contrast to studies in which researchers ask clinicians or patients to report on the quality of communication, our study employs reliable and valid measures to directly examine the quality of patient-provider interactions during prenatal care. This approach reduces concern about social desirability common to most studies using self-reported outcomes data.

The study of patient-centered interviewing strategies integrates clinicians' actual communication with their ratings of patient-provider interaction. By integrating actual communication with clinicians' ratings of individual patient interactions this research provides two distinct lenses through which to examine the effects of weight bias in routine prenatal care.

While studies in primary care have described the content of behavioral counseling on weight control, this dissertation is the first description of such counseling during routine prenatal care. Such a description is valuable because the majority of interventions to promote recommended gestational weight gain have been conducted outside of routine prenatal care by health professionals with special training in nutrition and physical activity (Hill et al., 2013; Phelan et al., 2011; Thangaratinam et al., 2012). Understanding the content and quality of routine counseling may provide insight into the strategies necessary to improve counseling

on nutrition, physical activity and recommended weight gain. While some women may need more intensive interventions, this routine counseling may serve as an opportunity for screening and reinforcement of behavioral messages (Kreuter et al., 2000; Phelan et al., 2011; Whitlock et al., 2002).

This dissertation also adds to the small number of studies that apply the 5A's behavioral counseling framework to evaluate the quality of behavioral counseling and is likely the first to do so in the context of routine prenatal care (S. C. Alexander et al., 2011; Jay et al., 2010). The 5A's framework provides a simple heuristic that may be readily integrated into the rapid pace of clinical care (Wadden, Butryn, Hong, & Tsai, 2014; Whitlock et al., 2002). Additionally, the use of the 5A's across multiple prenatal visits may provide a structured way to take advantage of women's increased contact with the healthcare system during pregnancy. Each of the evidence-based strategies is a touch point to which patients and their providers can return to at each subsequent prenatal visit.

A small number of studies in the patient-provider communication literature examine the association between patient initiation and other communication outcomes (Flocke et al., 2005; Nakash et al., 2009; Tai-Seale et al., 2007), and this dissertation is the first to do so in an analysis of prenatal visit communication outcomes. In particular, the analysis of clinician and patient use of socioemotional communication in behavioral counseling is suggestive of a mechanism whereby clinicians recognize and respond to patient interest in healthy weight gain during pregnancy. Furthermore, the results in this dissertation corroborate previous studies that suggest patient initiation of counseling topics results in more extensive and higher quality counseling (Flocke et al., 2005; Stotland et al., 2010).

This dissertation examines two distinct approaches to communication assessment: 1)

behavioral counseling as assessed using the 5A's and 2) patient-centered interviewing strategies. These are complementary perspectives on the relationship between maternal body weight and patient provider communication during prenatal care. While many researchers have studied the role of health professional counseling and intervention for weight control in pregnant and non-pregnant patients, only a small number of studies consider how weight bias may mediate or moderate the effectiveness of behavioral counseling and interventions (Carels et al., 2014; Carels et al., 2009; Gudzune, Bennett, Cooper, & Bleich, 2014). This dissertation suggests that it is not possible to separate patient-provider communication from implicit and explicit weight bias in the healthcare system.

**3.0 Study limitations**

There are several limitations that are important to consider. First, the data were collected from a convenience sample of clinicians and patients, and the findings may not be generalizable to other samples and populations. The majority of patients were African American and the clinicians were predominately White, female resident physicians providing prenatal care in the outpatient center of an urban, teaching hospital. The teaching environment for this group of clinicians may differ greatly from routine prenatal care in other healthcare settings, especially in community-based settings.

Moreover, we recorded a single prenatal visit for each patient participant. Almost all participants had several visits with prenatal providers, and inferences related to communication measures may not be reflective of the structure and content of medical dialogue throughout participants' pregnancies. Nevertheless, this sample of prenatal visits included women with varied body weight at a number of different stages of pregnancy.

Therefore, while our data represent only a cross-section of prenatal visits in a specific healthcare context, it is possible that the findings reflect a range of prenatal care experiences.

Another limitation of this research is the inability to examine the attitudes that mediate differences in patient-centered interviewing skills. While findings show an association between patient body weight and patient-centered interviewing strategies, it is not completely clear that these differences are the result of weight bias. Based on the previous literature, it can be assumed that differences in clinicians' use of patient-centered interviewing strategies may be mediated by implicit bias or negative attitudes towards patients with overweight and obesity (Foster et al., 2003; Schwartz et al., 2003; Teachman & Brownell, 2001). This assumption is supported by the observation of no difference in biomedical data gathering, information giving or counseling. Furthermore, the study findings are consistent with observed patterns of communication that have been directly linked to measures of implicit bias in primary care contexts (Cooper et al., 2012).

The findings may also be affected by unmeasured confounding of the associations examined in this dissertation. Patient or clinician characteristics that were not included in our models may explain the relationships between the independent and dependent variables. Nonetheless, the analysis in all three studies included adjustments for a number of patient and clinician characteristics previously linked to patient-provider communication in weight gain. Furthermore, the findings in this dissertation are consistent with previous research on behavioral counseling and the health care experiences of patients with overweight and obesity, which suggests that the results in this dissertation reflect true phenomena (S. C. Alexander et al., 2011; Gudzune, Beach, et al., 2013).

The findings in this dissertation may also be limited by the small sample for the

analyses. Anywhere from 66 – 120 prenatal visits were used in these analyses, which are secondary analyses of data collected for another purposes. While it might be expected that this small number prenatal visits would not have adequate power to test the associations of interest in this study. This does not appear to be the case in this dissertation. However, additional analysis of a larger sample using primary data may reveal a more nuanced perspective of the associations in this dissertation (e.g. subgroup and mediation analyses).

Because this is an observational study, it is also not possible to evaluate the possible causal association between the exposures and outcomes. Attention to actual communication practices provides insight into the prenatal care experiences of women, with particular attention to difference by patient body weight. However, the statistical inferences and conclusions of this dissertation provide insight into the associations, rather than causal relationships between exposures and outcomes.

**4.0 Future research**

This dissertation raises a number of important questions for future research. Future studies should consider other maternal and infant health outcomes in addition to weight gain (e.g. gestational diabetes, pregnancy-induced hypertension, large for pregnancy duration infants, etc.). Additionally, it could be valuable to elucidate mediating and moderating mechanisms between the exposures and outcomes explored in this dissertation. For example, it would be valuable to determine if clinician or patient implicit or explicit weight bias is associated with communication measures (both patient-centered interviewing and behavioral counseling). Previous research has shown an association between implicit weight bias and measures of actual communication during medical visits (Cooper et al., 2012). Separately, it

may also be valuable to elucidate the mediating pathways between brief behavioral counseling and gestational weight gain during pregnancy. Specifically, future research should determine if differences in gestational weight gain, comparing patients who receive counseling using 5A's and those who do not, are mediated by differences in behavior between the two groups.

Finally, a study with a larger sample size might allow researchers to determine if behavioral counseling leads to weight gain within clinical guidelines, rather than mean weight gain or weight gain in excess of guidelines. It may also be valuable to complete a longitudinal study to examine all of the behavioral counseling women receive and the rate of gestational weight gain in at different points throughout the pregnancy.

**5.0 Policy and practice implications**

This dissertation has a number of different implications for policy and practice. First, our findings raise questions about the dissemination and implementation of recommendations for clinicians to provide counseling during routine prenatal care. Some researchers have recommended interventions that may improve the uptake of behavioral counseling in routine care (Heslehurst et al., 2014; Osunlana et al., 2015). Additionally, in 2013, the Institute of Medicine released two reports on implementation and dissemination strategies to accompany the revised guidelines that were released in 2009 (Institute of Medicine, 2013a, 2013b) . The findings in this dissertation suggest that such interventions will be necessary in order to activate patients to raise their concerns about nutrition, physical activity and weight and to ensure that all clinicians are equipped with strategies to provide pregnant women with high quality behavioral counseling, irrespective of pre-pregnancy body

weight, patient interest in counseling or other factors. These interventions should include specific, effective behavioral messages that clinicians can deliver efficiently and with high fidelity and self-efficacy.

Additionally, negative attitudes towards overweight and obesity are important to consider in designing interventions for treatment and prevention. A small number of studies have explored the ways in which weight bias moderates the efficacy of behavioral counseling and interventions for weight control (Carels et al., 2014; Carels et al., 2009; Gudzune et al., 2014). Moreover, given that patient body weight appears to affect the quality of prenatal care women receive, it is critical to identify strategies to create non-judgmental, compassionate healthcare settings that are responsive to the needs and preferences of all pregnant women(American College of Obstetricians and Gynecologists, 2014b).

# APPENDICES

Appendix A: Detailed methods

**Approach**

This dissertation was an extension of a larger study, previously funded by NIH grant R01 HD050437 (2006 – 2009; NIHCD) under the supervision of the advisor, Dr. Debra Roter. Study participants for the proposed analysis were recruited between 2009 and 2011 from the Johns Hopkins Hospital obstetrics clinic. Johns Hopkins School of Public Health Institutional Review Board approved the study procedures, and the dissertation author was added to the protocol as a student investigator (See "Protection of Human Subjects.")

**Patient recruitment**

The parent study included two patient groups. The first group of participants enrolled prior to the randomized trial and informed intervention development (n = 50). The second group of participants was randomly assigned into a comparative effectiveness trial of two patient communication interventions (n = 80). Evaluation of this intervention is beyond the scope of the current dissertation. However, treatment group assignment (baseline, treatment, comparison group) was considered as a covariate for all analyses (see Statistical Analysis).

Women were recruited at various points throughout pregnancy and all pregnant women –regardless of age and ethnicity – were eligible for participation in the study. The receptionist responsible for scheduling visits informed women about the study purpose and activities over the phone. If a woman expressed interest in participation in the study after this point of contact, a member of the research team met with her in the waiting room an hour before the scheduled visit. The research staff obtained informed consent and formally enrolled consenting women in the study. During the informed consent process, women were asked for permission to record their prenatal visits with their physicians. Women were also

asked to sign a separate medical records release in order for study team members to access information about the progress of their pregnancies. After informed consent was obtained, women completed a baseline questionnaire, with basic demographic information.

In cases where both the clinician (see "Clinician Recruitment") and the patient consented to audiotaping, a member of the research staff team set up the tape recorder in the examination room, started the recording and then left the room. Both patient and clinician study participants were told that that they could stop the audio recording of the visit at any time during the prenatal visit. After completing the prenatal visit with the clinicians, patients completed a 30-minute survey with questions about their demographic characteristics, health status, concerns, the quality of communication during the prenatal visit.

**Prenatal provider recruitment**

Twenty-three prenatal providers seeing patients in the Johns Hopkins Hospital OB/Gyn clinic were recruited to participate in the parent study. After obtaining consent to record prenatal visits, providers were asked to complete a brief questionnaire including demographic information (e.g., age, race, sex) and questions about level of experience (e.g., years in practice, number of patients seen per week). Participating providers also completed a 1-minute, written questionnaire after each visit with a patient in enrolled in the study. In this follow-up questionnaire, providers were asked about their perceptions of patients' health status and health behaviors, how well she or he knew the patient, and satisfaction with communication.

**Data sources and data management** There are four sources of data in this study (**Appendix B; Table B.1**).

A. **Medical chart review** The dissertation author reviewed electronic medical records for each study participant to obtain clinical data (Table B.1). Prepregnancy height, weight, and pregnancy duration at recorded visit were recorded for each study participant. Electronic medical records were available for all study participants, which expedited data abstraction. These data were matched to other data sources in Stata 13 (StataCorp, 2014).

B. **Audio recordings of prenatal visits** Audio recordings allowed for observation of actual patient and provider communication for subsequent analysis. This research included the collection and analysis of two classes of communication data: 1) behavioral counseling on weight, nutrition and physical activity, and 2) overall prenatal visit communication style using the Roter Interaction Analysis System (RIAS).

    1. **RIAS Coding and Analysis** Two trained research staff coded each of the recordings using Roter Interaction Analysis System (RIAS; Appendix C; Table C.1). The coders were not aware of the study hypotheses or group assignment for the parent study. RIAS is a widely used system for analysis of medical dialogue with demonstrated reliability and predictive and concurrent validity (Roter & Larson, 2002). Each complete thought (also known as an utterance) is assigned to one of 37 mutually exclusive and exhaustive categories, which reflect socio-emotional and task-focused communication behaviors. Task-focused communication behaviors include question asking, data gathering, information giving, recommendations for tests and procedures and patient education and counseling. Socio-emotional communication includes content related to rapport building (e.g. social chit-chat, laughter and joking) and

expressions of empathy and concern. Each of the RIAS categories were used to construct variables that reflect the functions of the prenatal visit: 1) gathering data, 2) educating and counseling, 3) building a relationship, and 4) patient activation and partnership building.

2. **Behavioral counseling episodes** – The dissertation author transcribed episodes of behavioral of counseling from the audio recordings. RIAS codes indicating lifestyle communication (both patient and clinician lifestyle questions and information and clinician lifestyle counseling) facilitated rapid identification of behavioral counseling episodes (see "RIAS Coding and Analysis"). The dissertation author listened to all lifestyle dialogue and transcribed those discussions that included relevant behavioral counseling (e.g. weight gain, diet/nutrition, exercise). The author then listened to the full recordings of a 20% random sample of all prenatal visits to verify that RIAS codes captured all relevant behavioral counseling. Each behavioral counseling episode was then coded for the 5A's and other characteristics (Appendix D; Table D.1)

C. **Patient questionnaires** A research assistant collected participant responses, in-person, prior to and after the prenatal visit.

D. **Clinician questionnaires** were collected using hard copy forms and then subsequently entered into an electronic SPSS database by research team staff. Clinicians were asked to report basic demographic data at the beginning of the study. After each recorded prenatal visit, clinicians completed additional attitudinal measures.

**Statistical Analyses**

**Exploratory Data Analysis** To characterize the study sample, exploratory analyses included descriptive statistics for all outcome variables and covariates. Unadjusted analyses are presented in Appendix F.

**Specific Aim 1: To examine the relationship between behavioral counseling – using the 5A's – and gestational weight gain.** Transcripts of behavioral counseling episodes were identified using RIAS lifestyle codes as described above. The 5A's were coded from these transcripts, using a codebook developed *a priori*, based on the literature (S. C. Alexander et al., 2011; Jay et al., 2010). A version of the 5A's codebook is included in Appendix D (Table D.1). Other features of the behavioral counseling episodes (e.g. patient or clinician initiation, prenatal visit segment and total number of behavioral counseling episodes/prenatal visit) were also coded. Transcripts were analyzed using Atlas.ti.

- *Objective 1a: To describe clinicians' use of the 5A's behavioral counseling strategies – Assess, Advise, Agree, Assist and Arrange – in discussion of weight, nutrition and physical activity during prenatal care.* The 5A's analysis was used to characterize each behavioral counseling episodes across all visits that included counseling with at least one of the 5A's. The results of this analysis are summarized in Chapter 2.
- *Objective 1b: To examine the relationship between behavioral counseling (using the 5A's strategies) and gestational weight gain (mean weight gain and probability of gaining in excess of Institute of Medicine guidelines).* The outcome for this aim was gestational weight gain, which was operationalized in two ways. First, I used a continuous variable for gestational weight gain at the prenatal visit prior to delivery. Second, a binary variable for excess weight gain was implemented based on the IOM

guidelines (Institute of Medicine, 2009). The independent variable was implemented using indicator variables for level of behavioral counseling for three different groups: 1) no behavioral counseling, 2) counseling with 1 of the 5 A's strategies, or 3) counseling with ≥ 2 of the 5 A's strategies.

Because some providers in the sample had recorded prenatal visits with several different patients, the outcome of this analysis may be correlated within providers. This type of clustering violates the assumption of independent observations because the residuals of a standard regression model will likely be correlated within provider. Regression models with generalized estimating equations (GEE) will be implemented because these models appropriately account for clustering.

Both models for weight gain were a multilevel models with GEE to account for clustering of clinicians within patients. A linear model was implemented for continuous weight gain using the *xtmixed* command. A logistic model was implemented for the excess weight gain binary variable using the *xtlogit* command. The Stata *margins* command was used to calculate the predicted probability of excess weight gain for each level of behavioral counseling intensity. Confounders included in all models were defined *a priori,* based on the literature, and included gestation age, patient age, pre-pregnancy body mass index, parent study intervention assignment comorbidities and number of prenatal visits at recorded visit. The results of this analysis are summarized in Chapter 2. All models were fit with an exchangeable correlation with robust variances as the produce reliable estimates of the mean, even if the correlation structure is mis-specified.

**Specific Aim 2: To examine the relationship between patient initiation of behavioral counseling discussions and measures of prenatal visit communication.**

- *Objective 2a: To describe the use of socioemotional communication in behavioral counseling discussions initiated by patients compared to those initiated by clinicians.* Transcripts of behavioral counseling episodes were matched to the matching sections of RIAS coding logs. Each episode was classified as having socioemotional content based on the presence (or absence) of at least one RIAS socioemotional statements (e.g. empathy, shows worry or concern, legitimizes, clinician self-disclosure, reassures, encourages, or shows partnership). Each behavioral counseling episode was also categorized based on who (clinician, patient or both) expressed the socioemotional content. Chi-square tests were then used to determine if the distribution of socioemotional content differed between patient vs. clinician initiated counseling episodes.
- *Objective 2b: To examine the relationship between patient initiation of behavioral counseling discussions and the overall patient-centeredness of prenatal visits.* As in a number of other RIAS-based studies (Johnson, Roter, Powe, & Cooper, 2004; Roter, 2000), patient-engagement was assessed as clinician verbal dominance, calculated as the total number of clinician statements relative to the total number of patient statements in the prenatal visit. Second, patient-centeredness was operationalized as a ratio of the psychosocial and socioemotional focus of the prenatal visit relative to the biomedical focus of the prenatal visit. The numerator included psychosocial and lifestyle disclosure, all patient questions and emotional statements plus the clinician's

psychosocial questions, psychosocial and lifestyle information and counseling and facilitation statements.

The denominator included clinician medical questions, clinician orientations, and both patient and clinician biomedical information. The dependent variable for this analysis was patient vs. clinician initiation of behavioral counseling in those prenatal visits that included any counseling. Similar to objective 1b, some providers in the sample had recorded prenatal visits with several different patients, and the outcome of this analysis may be correlated within providers. Linear GEE models were used to assess the difference in the mean patient centeredness and clinician verbal dominance. Covariates in each of these models included patient age, pregnancy duration, prepregnancy BMI, number of prenatal visits, comorbidities, clinician type and parent study intervention assignment.

- *Objective 2c: To examine the relationship between patient initiation and the quality of behavioral counseling discussions as measured by the 5A's behavioral counseling framework.* Behavioral counseling quality and quantity was assessed in 3 ways. Because of patient clustering within clinician, as described above, GEE models were implemented for all 3 models. First, the total number of behavioral counseling episodes per prenatal visit was operationalized as a count variable and modeled using Poisson regression. Second, total time spent on counseling (in seconds) was modeled using a linear regression model. Finally, the odds of receiving counseling with 2 or more of the 5A's strategies (vs. only 1 strategy) were modeled using logistic regression. Confounders included in each of these models included patient age, pregnancy duration, pre-pregnancy BMI, number of prenatal visits, comorbidities,

clinician type and parent study intervention arm. The model for the count of behavioral counseling episodes was also adjusted for prenatal visit length.

**Specific Aim 3 To examine the relationship between maternal pre-pregnancy body weight and clinician communication throughout prenatal visits.** The hypotheses tested in Specific Aim 3 are fundamentally a test of differences in provider communication behaviors (as measured using RIAS communication indicators) and ratings of patient attributes, comparing women with overweight and obesity to women with average weight. Patient body weight was operationalized using indicators for each of three groups: average, normal and obese BMI. Similar to Specific Aims 1 & 2, clustering of patients within clinicians may violate the independence assumption. For clinician communication (objectives 3a and 3b), multilevel models with GEE were implemented using the *xtpoisson* command. In this case, Poisson regression modeling is superior to standard linear regression methods because RIAS communication indicators are count variables, which are typically zero-inflated, in violation of the assumption of normally distributed residuals. Additionally, Poisson regression models account for "exposure" or prenatal visit duration, which may influence the number of statements that occur during a particular prenatal visit.

For model of clinician ratings of patient attributes, the outcomes were clinician responses to several Likert items recoded into binary variables for Strongly agree/agree vs. Neutral/Disagree/Strongly disagree. Logistic GEE models were implemented using the *xtlogit command.* Confounders in these models included depressive symptoms, pregnancy duration, parent study intervention assignment, comorbidities, clinician type and patient age.

Within this general framework, the dissertation author completed the following research objectives:

- *Objective 3a: To examine the relationship patient body weight and biomedical, psychosocial and lifestyle communication during prenatal care.* As described above, categorical variables for prepregnancy BMI will be implemented as the independent variable. Outcome variables of interest in this research objective include the number of clinician questions as well as informative and counseling statements in the biomedical, psychosocial and lifestyle domains. Incidence rate ratios (IRRs) for the rates of each of these communication behaviors in patients with overweight and obesity compared to patients with average weight were obtained using fully adjusted Poisson regression models.
- *Objective 3b: To examine the relationship between patient body weight and patient-centered interviewing strategies (activating, partnering and rapport building communication).* As described above, categorical variables for prepregnancy BMI will be implemented as the independent variable. Outcome variables of interest in this research objective include the number of activating, partnering and relationship building statements. Incidence rate ratios (IRRs) for the rates of each of these communication behaviors in patients with overweight and obesity compared to patients with average weight were obtained using fully adjusted Poisson regression models.
- *Objective 3c: To examine the relationship between patient body weight and clinician ratings of the interpersonal aspects of the patient-provider relationship.* As described above, categorical variables for prepregnancy BMI will be implemented as the

independent variable. Outcome variables of interest in this research objective include the number of activating, partnering and relationship building statements. Predicted probabilities of reporting Strongly Agree/Agree were calculated for each body weight group on each item using fully adjusted logistic regression models and the *margins* command in Stata.

**Appendix B**

**Table B.1 Data and Sources Measures** (IV = Independent Variable, DV = Dependent Variable; SA = Specific Aim)

| Data Source | Measures | Variable Type |
|---|---|---|
| A) Medical Chart Review | Height (m) | Used to construct pre-pregnancy BMI. Covariate in SA1 and SA2. IV in SA3. Final weight also used to construct DV in SA1. |
| | Weight (pre-pregnancy and at prenatal visits; kg) | |
| | Pregnancy duration (weeks) | Covariate |
| B) Audio recordings of prenatal visits (detailed description in Appendices C&D) | Behavioral counseling communication indicators<br>• Use of the 5A's strategies (*Assess, Advise, Agree, Assist* and *Arrange*)<br>• Who introduced the topic<br>• Why the topic was introduced<br>• When did the discussion occur<br>• How long did the discussion last<br>• What behavioral counseling strategies were used by providers, and 6) | 5A's are IV in SA1 and DV in SA2. Patient initiation is IV in SA2. Duration of counseling is DV in SA2. All other indicators used to characterize counseling in SA1. |
| | RIAS Communication Indicators<br>• Psychosocial, biomedical and lifestyle statements (questions and counseling)<br>• Activating, partnering and relationship building statements | DV in SA3. |
| C) Patient Questionnaires | Basic demographic information (age, race, ethnicity, marital status, insurance status, employment) | Potential covariate |
| | Edinburgh Depression Scale (Murray & Cox, 1990) | Potential covariate |
| D) Clinician Questionnaires | • Demographic information (age, race, ethnicity, experience)<br>• Ratings of patient attributes | Potential covariate. Clinician ratings are DV in SA3. |

**Appendix C**

**Table C.1 Roter Interaction Analysis System (RIAS) coding schema. (Roter & Hall, 2006; Roter & Larson, 2002)**

| **CONTENT INDICATORS** | **Functional Group** | **Type of Utterance – 37 mutually exclusive and exhaustive categories.** |
|---|---|---|
| | Building a relationship | 1. Social talk (personal remarks, social conversation)<br>2. Positive talk (laughs, tells jokes, shows approval-direct, gives compliment-general, shows agreement or understanding)<br>3. Negative talk (shows disapproval-direct, shows criticism-general)<br>4. Emotional talk (empathy, shows concern or worry, reassures, encourages or shows optimism, partnership, legitimizes, self disclosure) |
| | Activating and partnering | 1. Participatory facilitators (paraphrases/ checks for understanding, asks for understanding, asks for opinion, back-channel responses, bids for repetition)<br>2. Procedural talk (transition words, gives orientation, instructions) |
| | Data gathering | 1. Asks open ended questions (medical condition, therapeutic regimen)<br>2. Asks open questions (psychosocial feelings, lifestyle)<br>3. Asks closed questions (medical condition, therapeutic regimen)<br>4. Asks closed questions (psychosocial feelings, lifestyle) |
| | Patient education and counseling | 1. Information giving (medical condition, therapeutic regimen)<br>2. Information giving (lifestyle, psycho-social)<br>3. Counsels or directs behavior (medical condition, therapeutic regimen)<br>4. Counsels or directs behavior (lifestyle, psychosocial) |
| **AFFECTIVE INDICATORS** | | Patient and clinician – friendliness, dominance anxiety; Patient Only – Distress; Clinician Only – hurriedness, sympathy. Coders rate on a 1 – 5 scale where 1 is low/none and 5 is high.) |

**Appendix D**

**Table D.1 Codebook for 5A's framework for episodes of behavioral counseling (S. C. Alexander et al., 2011; Jay et al., 2010)**

| | Code No. | Mnemonic or "brief" code | Full description of code | When to use and when not to use the code. Example of use of the code to assist others. |
|---|---|---|---|---|
| **INITIATION** | 1.1 | Clinician | Clinician initiates discussion of nutrition or physical activity. | Use this code anytime the clinician starts the discussion of nutrition or physical activity. |
| | 1.2 | Patient | Patient initiates discussion of nutrition or physical activity. | Use this code anytime the patient starts the discussion of nutrition or physical activity. |
| | 1.2.1 | Patient no clinician response | Patient initiates discussion of nutrition or physical activity and clinician provides limited response | Use this code if the patient initiates the discussion, and the clinician does not provide a complete response. |
| **TEMPORAL ORDERING** | 2.1 | Opening | Nutrition and physical activity discussion during opening | Use this code if discussion occurs during the opening of the visit. |
| | 2.2 | History | Nutrition and physical activity discussion during history | Use this code if discussion occurs during the history taking. |
| | 2.3 | Exam | Nutrition and physical activity discussion during physical exam | Use this code if discussion occurs during the physical exam. |
| | 2.4 | Counseling | Nutrition and physical activity discussion during counseling | Use this code if discussion occurs during the education and counseling portion of the prenatal visit. |
| | 2.5 | Closing | Nutrition and physical activity | Use this code if discussion occurs during the closing. |
| **REASON FOR DISCUSSION** | 3 | *Weight* | *Nutrition and physical activity recommended because of weight* | Use this code if pre-pregnancy weight or weight gain during pregnancy is the reason the clinician or patient initiates a conversation about nutrition or physical activity. |
| | 4 | *Medical concerns* | *Nutrition and physical activity recommended because of medical concerns* | Use this code anytime disease or illness is the reason the clinician or patient initiates a conversation about nutrition and physical activity. Don't use this code if more specific codes apply (3.1 – 3.3)<br><br>"It is important for you to eat more protein to make sure that you stay healthy" |
| | 4.1 | Medical - Premature | Premature contractions are the reason patient and clinician | Use this code when premature contractions are the reason that the clinician and patient are discussing nutrition and physical activity. |

| | | | | |
|---|---|---|---|---|
| | | contractions | discuss behavior/weight | "You've been having premature contractions. Are you drinking enough water?" |
| | 4.2 | Medical - Nausea and vomiting | Nausea and/or vomiting are the reason patient and clinician discuss behavior/weight. | Use this code when nausea and vomiting are the reason that the clinician and patient are discussing nutrition and physical activity.<br><br>"Are you having nausea and vomiting? Have you been able to keep food down?" |
| | 4.3 | Medical – Constipation | Constipation is the reason patient and clinician discuss behavior/weight | Use this code when constipation is the reason that the clinician and patient are discussing nutrition and physical activity.<br>"Have you been dealing with constipation?" |
| | 4.4 | Medical – Heartburn | Heartburn is the reason patient and clinician discuss behavior/weight | Use this code when heartburn is the reason that the clinician and patient are discussing nutrition and physical activity. |
| | 4.5 | Medical – diabetes/blood sugar | Diabetes is the reason patient and clinician discuss behavior/weight | Use this code when diabetes is the reason that the clinician and patient are discussing nutrition and physical activity |
| | 4.6 | Medical – blood pressure | Blood pressure is the reason patient and clinician discuss behavior/weight | Use this code when blood pressure is the reason that the clinician and patient are discussing nutrition and physical activity. |
| | 4.7 | Medical – Dizziness | Dizziness is the reason the patient and clinician discuss behavior/weight | Use this code when dizziness is the reason that the clinician and patient are discussing nutrition and physical activity. |
| | 4.8 | Medical – Fetus size | Fetus size is the reason patient and clinician discuss behavior/weight | Use this code when the size of the fetus is the reason that the clinician and patient are discussing nutrition and physical activity.<br><br>"Your baby is getting too big so you should really watch your weight" |
| **ASSESS** | *5* | *Assess* | *Clinician asks patient about weight management behaviors* | Use this code when clinician asks about weight management behaviors in general. Don't use this code if the more specific codes apply (4.1 – 4.5).<br><br>"How are you doing with your weight?" |
| | 5.1 | Assess Manage Weight | Clinician asks patient if she is trying to manage her weight | Use this code if the clinician asks about patient efforts to manage their weight. |

| | | | | |
|---|---|---|---|---|
| | | | | "Are you trying to maintain your weight?" |
| | 5.2 | Assess Importance | Clinician asks patient if it is important to manage weight | Use this code if the clinician asks the patient if weight management is an important goal for her.<br><br>"How important is it for you to gain the an appropriate amount of weight during this pregnancy?" |
| | 5.3 | Assess Confidence | Clinician asks patient how confident she is in her ability to manage her weight | Use this code if the clinician asks the patient how confident she is in managing her weight.<br><br>"How confident are you that you can maintain your current weight for the rest of this pregnancy. |
| | 5.4 | Assess Nutrition and Fluids | Clinician asks patient about her diet | Use this code if the clinician asks about the patient's diet.<br><br>"How is your diet?" |
| | 5.5 | Assess Exercise | Clinician asks about exercise | Use this code if clinician asks the patient about exercise.<br><br>"Have you been walking everyday?" |
| **ADVISE** | *6* | *Advise* | *Patient advised to manage weight* | Use this code if clinician advises patient about weight management. Don't use this code if the more specific codes apply (5.1 – 5.6)<br><br>"You really need to watch your weight gain." |
| | 6.1 | Advise how much weight | Patient advised how much weight to gain | Use this code if clinician advises the patient to gain a specific amount of weight.<br><br>"You should gain between 10 – 25 pounds" |
| | 6.2 | Advise nutrition | Patient advised about nutrition | Use this code if clinician gives specific advice about food, diet and nutrition.<br><br>"You should eat more lean protein" |
| | 6.2.1 | Advise nutrition – fluids | Patient advised about fluid intake | Use this code if clinician gives specific advice about fluid intake.<br><br>"You should drink fewer sodas and more water throughout your pregnancy. |
| | 6.3 | Advise exercise | Patient advised about exercise | Use this code if clinician gives specific advice about exercise. |

| | | | | |
|---|---|---|---|---|
| | | | | "You should exercise during pregnancy" |
| | 6.4 | Advise benefits | Patient advised about benefits of weight management behaviors | Use this code if clinician discusses the benefits of weight management behaviors.<br><br>"If you maintain your weight, you'll have an easier time with delivery" |
| **AGREE** | *7* | *Agree* | *Clinician and patient agree about weight management behaviors in general* | Use this code if there is generic agreement about weight management behaviors. Don't use this code if the more specific codes apply (6.1 – 6.3)<br><br>"I know that I need to work on this" |
| | 7.1 | Agree set goals | Clinician and patient agree about weight management and set goals | Use this code if patient agrees to a goal that the clinician recommended.<br><br>"I will work to drink fewer sodas" |
| | 7.2 | Agree involve patient | Patient participates in setting goals | Use this code if the patient agrees to a goal that she helped to identify.<br><br>"I eat too many fried foods, so I will stop doing that" |
| | 7.3 | Agree realistic | Patient and clinician set SMART goal | Use this code if patient agrees to a SMART goal.<br>Specific, Measurable, Attainable, Relevant, Time-Bound<br><br>"Between now and my next appointment, I will walk 3 times per week" |
| **ASSIST** | *8* | *Assist* | *Clinician offers generic guidance about barriers and supports to patient* | Use this code if the clinician provides generic assistance related to barriers and supports for nutrition and physical activity. Don't use this code if the more specific codes apply (7.1 – 7.2)<br><br>"You should get help with your diet" |
| | 8.1 | Assist barriers | Clinician helps patient to identify specific barriers to weight management behaviors | Use this code if the clinician asks about or helps to identify specific barriers to nutrition and physical activity.<br><br>"Do you have access to a grocery store?" |
| | 8.2 | Assist supports | Clinician helps patient to identify | Use this code if the clinician asks about or helps to identify specific |

| | | | | |
|---|---|---|---|---|
| | | | specific supports for weight management behaviors | supports for nutrition and physical activity<br><br>"Is there anyone at home who can help you with cooking?" |
| **ARRANGE** | *9* | *Arrange* | *Clinician and patient discuss talking about weight management in the future* | Use this code if clinician and patient agree to a generic plan for follow up. Don't use this code if the more specific codes apply.<br><br>"We will talk about this later" |
| | 9.1 | Arrange follow up | Clinician and patient make specific plan for follow up | Use this code if clinician and patient agree to a specific plan for follow up.<br><br>"I would like to talk to you about your progress in 3 weeks at your next appointment" |
| | 9.2 | Arrange nutritionist | Clinician offers meeting with nutritionist | Use this code if the clinician and patient agree to set up a meeting with the nutritionist.<br><br>"Would you like to talk with our nutritionist? She will help you to come up wit a plan for your meals." |
| | 9.3 | Arrange social work | Clinician offers meeting with social worker | Use this code if the clinician and patient agree to set up a meeting with the social worker.<br><br>"If you are having difficulty accessing healthy foods, our social worker can help with that. |
| | 10 | Breastfeeding | Clinician discusses breastfeeding and weight | Use this code if clinician or patient discuss weight and breastfeeding. |
| | 11 | Third party | Third-party involved in discussion | Use this code if a 3rd party is involved in the discussion. |

## Appendix E

### Protection of Human Subjects

The JHSPH Institutional Review Board approved the parent study procedures (IRB No. 00000042) including the medical chart review that was conducted as part of the dissertation. The dissertation author was added as a student investigator for the study on April 3, 2013.

### Risks to Human Subjects

a. Human Subjects Involvement and Characteristics—Prenatal patients. One hundred thirty prenatal patients were recruited from the Johns Hopkins Women's Health Center. All pregnant patients, regardless of age or ethnicity, were approached by the scheduling receptionist to participate in the study. Before the randomized trial, participants were recruited from June – December 2009 to inform intervention development (n = 50). Participants for the randomized comparative effectiveness trial were recruited from June 2010 – January 2011 (n = 80). Prenatal providers. Twenty-three residents who worked in the Johns Hopkins Women's Health Center were also research participants, as their visits with patients were audio recorded. These clinicians were also asked to provide ratings of the visits and the patients.

b. Sources of Materials Research materials collected during the parent study included responses to a variety of pre- and post-visit questionnaire items (depression, satisfaction with communication, and literacy skills), recordings of prenatal visits. For the dissertation, additional information was collected as part of a review of participants' medical records (including number of prenatal visits, pregnancy duration at delivery,

height, pre-pregnancy weight, weight at each follow-up visit). Each research participant (prenatal patients and residents) was assigned a unique research ID number. A password-protected file containing the link between the ID code number and the woman's name and contact information will be kept on the main study computer. Once all data were collected as part of the medical chart review for the dissertation, this file was deleted.

c. Potential Risks The procedures involved in the dissertation were expected to expose participants to no more than minimal risks. Risks to pregnant women involved in the proposed research include possible breaches of confidentiality. In the parent study, additional risks included anxiety due to recording of the prenatal visit. Participants may have also experienced anxiety related to information in the interactive communication intervention. There was also some risk that the intervention would have an adverse effect on communication processes within the prenatal visit. However, the clinicians enrolled in the study were masked to patient participants' randomization status, and were expected to provide patients with the same information. Any changes in communication processes were expected to occur as a result of changes in patient participants' communication behaviors.

**Adequacy of Protection Against Risk**

*A) Recruitment and informed consent* – Prenatal providers Residents who see prenatal patients at the Johns Hopkins Women's Health Center were individually invited to participate through a phone conversation with research staff. Prior to this phone call, study flyers were provided to clinicians, with an opt-out number for those who do not wish to be contacted.

For providers who did not call to opt out of the study within one week from the flyer distribution, a member of the study team called to explain the study, answer questions, organize delivery of the consent form, and schedule a time to pick up the signed consent form. After this enrollment period, the clinic receptionist was asked not to offer study participation to women who are scheduled to see any provider who does not wish to participate.

Providers were asked to provide written informed consent, starting with a phone conversation with research staff. Prior to obtaining the signed consent document, research staff highlighted the goals of the study. Residents were given the option not to participate, even if other members of the clinic agree to participate. Residents were also told that they were permitted to withdraw from the study at any time. They were informed that their participation would involve audiotaping of the first prenatal visit with participating patients. Their voices may be recognizable in such tapes, although study numbers rather than names are used to label the tapes and all other study materials. Providers were also informed that all tapes will be reviewed by coders responsible for applying communication indicators, and that all tapes will be destroyed at the completion of the study. Providers were told that all patients will receive an intervention prior to the visit, but they won't know which ones received the experimental intervention. Research staff obtaining informed consent highlighted benefits to prenatal care, especially for the patients.

Prenatal patients All pregnant women seeking prenatal care at the Johns Hopkins Women's Health Center were invited to participate prior to their prenatal visits. Eligible women were invited to participate in the study by the clinic's receptionist upon scheduling appointment for a prenatal visit. All women who expressed an interest and whose provider consented to

participate were asked to come an hour early to their first prenatal visit. The receptionist notified research staff about times when they should attend the clinic, but, in keeping with HIPAA, receptionists did not provide names of women to the researchers. Research staff waited for the interested patient to approach them in the waiting room at the appropriate time. Once the woman arrived, staff read through the consent form and answerer study-related questions.

Written informed consent was obtained from participating prenatal patients. Because many of the women had limited literacy skills, the consent process emphasized verbal discussions of the study procedures, risks, benefits, and voluntariness. Consent discussions occurred in the waiting room on the day of the clinic appointment. Consent processes for participants enrolled before and during the trial were similar, however, participants enrolled prior to the start of the trial were not told that they would be randomly assigned to an intervention. The consent process highlighted the following information: The purpose of the research is to evaluate an intervention that is meant to help women gain more from their prenatal visit; participants will be randomized (like flipping a coin) to work through a 20 minute interactive computer-based communication intervention prior to seeing their doctor OR to review relevant sections of a book about pregnancy with research staff; participants will receive the same quality care regardless of randomization status and regardless of participation in the study; participants' visits with the doctor will be audio recorded and analyzed by the study team; participants will be asked to fill out a variety of measures both before and after the visit for a total of about 30 minutes and during four 20 minute follow-up phone conversations throughout the pregnancy and after the birth of their baby; participants will be asked to sign a medical records release to provide consent for the research team to

review their medical records; risks are related to confidentiality and added anxiety; benefits are to future patients; participation is voluntary and she may withdraw from the study at any time. Participants were offered $25 after the completion of their post-visit measures, $10 after each completed phone interview, and a $10 bonus at the end of the study in order to compensate them for their time (for a total of $75).

*B) Protection against risk.* Referral information was available for anyone who became distressed or confused during pre- or post-visit questionnaires, including follow-up phone calls with pregnant women. Confidentiality for all participants is protected by the use of study ID numbers instead of personal identifying information. Recordings are kept in locked drawers within the study office and will be destroyed after the completion of the study. Once all study measures have been completed, personal identifying information for participants will be destroyed. Participants who interacted with interventions were reminded that the information is not intended as a replacement for personal discussions with a healthcare provider. All data will be presented in aggregate form only.

**Potential Benefits of the Proposed Research to the Subjects and Others**

Clinicians involved in the study may have benefitted from having more active patients, while patients randomized to receive the intervention may have benefited from learning strategies to be more active participants in their medical care. All participants may have benefitted from the knowledge that they may contribute to future work that will help future prenatal patients in navigating the healthcare system.

**Importance of the Knowledge to be Gained**

Given the minimal risk involved with this study along with associated harms, this research has the potential to provide valuable information about the care provided to pregnant women, especially those who are classified as overweight and obese. This work may also provide insight into improvements in behavioral counseling for all women during and after pregnancy. This study has the potential to identify strategies that help to ameliorate the effects of weight bias and stigma in the healthcare system.

**Data Safety and Monitoring Plan**

Because the parent study procedures included a randomized comparative effectiveness trial, research staff kept track of adverse events such as the need to refer participants for emotional support. The parent study PI (sponsor for the current application) monitored the following differences between the intervention and control groups every three months: study withdrawal rates, needs for referrals and prenatal visit keeping.

No additional enrollment occured for the purpose of the dissertation. The dissertation advisor for the proposed research will report any known breaches of confidentiality to the fellowship sponsor and to the Committee on Human Research. All data obtained from the medical record were linked to participants through the unique research ID, rather than identifying information. All files will be password protected and kept on a secure hard drive.

## Appendix F

Table F.1 Unadjusted weight gain among patient receiving counseling with 1 or ≥ 2 5A's strategies compared to those receiving no counseling (Chapter 2).

| | **Number of 5A's strategies** | | | |
|---|---|---|---|---|
| | **0 (n = 38)** | **1 (n = 26)** | **≥ 2 (n = 17)** | p |
| **Mean weight gain;** median (IQR) | 38 (11) | 31 (20) | 21 (18) | 0.02 |
| **Excess weight gain;** n (%) | 30 (79.0) | 15 (57.7) | 7 (42.2) | 0.01 |

Table F.2 Unadjusted differences between clinician- and patient-initiated behavioral counseling episodes (Chapter 3)

| | **Clinician-initiated (n = 36)** | **Patient-initiated (n = 30)** | **p** |
|---|---|---|---|
| **Number of behavioral counseling episodes;** Mean (SD) | 1.36 | | 0.002 |
| Total duration of counseling Mean (SD) | 53.0 (46.9) | 79.2 (60.2) | 0.05 |
| Proportion receiving 2 or more 5A's strategies N (%) | 12 (33.3) | 15 (50.0) | 0.17 |

Table F.3 Unadjusted differences in overall communication in prenatal visits with clinician- vs. patient-initiated behavioral counseling episodes (Chapter 3)

| | Clinician-initiated (n = 36) | Patient-initiated (n = 30) | p |
|---|---|---|---|
| **Patient centeredness;** mean (SD) | 0.65 (0.27) | 0.77 (0.24) | 0.08 |
| **Clinician verbal dominance;** mean (SD) | 2.9 (1.4) | 2.1 (0.83) | 0.01 |

Table F.4 Unadjusted means of clinician communication – patients with overweight and obesity compared to patients with average weight (Chapter 4)

| **Clinician Communication** | **Average (n = 39)** Mean (95% CI) | **Overweight (n = 37)** Mean (95% CI) | **p** | **Obese (n=44)** Mean (95% CI) | **p** |
|---|---|---|---|---|---|
| **All clinician statements** | 359 (311.9 – 406.2) | 268.3 (219.9 – 316.7) | 0.01 | 310.6 (264.6 – 356.5) | 0.15 |
| **Data Gathering** | | | | | |
| Medical Questions | 35.3 (29.4 – 41.3) | 23.8 (17.7 – 29.9) | 0.01 | 29.3 (23.5 – 35.1) | 0.15 |
| Lifestyle Questions | 9.9 (7.6 – 12.1) | 5.1 (2.8 – 7.4) | 0.004 | 7.7 (5.4 – 9.9) | 0.17 |
| Psychosocial Questions | 4.5 (3.2 – 5.7) | 2.6 (1.3 – 3.9) | 0.04 | 3.2 (2.0 – 4.4) | 0.16 |
| **Education and Counseling** | | | | | |
| Medical information and counseling | 87.0 (73.4 – 100.5) | 70.7 (56.8 – 84.6) | 0.10 | 80.0 (66.8 – 93.2) | 0.47 |
| Lifestyle information | 4.8 (3.4 – 6.3) | 3.1 (1.6 – 4.6) | 0.11 | 2.6 (1.2 – 4.0) | 0.04 |
| Psychosocial information | 0.7 (-0.3 – 1.79) | 1.5 (0.5 – 2.6) | 0.30 | 0.5 (-0.6 – 1.5) | 0.71 |
| Psychosocial and lifestyle counseling | 10.5 (7.2 – 13.7) | 8.8 (5.5 – 12.1) | 0.48 | 8.3 (5.2 – 11.5) | 0.35 |
| **Activating and partnering** | | | | | |
| Check for understanding, clarification | 23.7 (20.0 – 27.4) | 16.0 (12.2 – 19.8) | 0.01 | 17.6 (13.9 – 21.2) | 0.02 |
| Asks permission | 0.18 (0.02 – 0.34) | 0.22 (0.05 – 0.38) | 0.76 | 0.19 (0.04 – 0.36) | 0.89 |
| Asks opinion | 4.0 (3.3 – 4.6) | 3.5 (2.8 – 4.2) | 0.32 | 3.5 (2.8 – 4.1) | 0.31 |
| **Relationship building** | | | | | |
| Laughter and joking | 6.4 (4.2 – 8.6) | 3.8 (1.5 – 6.0) | 0.10 | 4.3 (2.1 – 6.4) | 0.18 |
| Approval statements | 7.2 (5.6 – 8.9) | 3.9 (2.1 – 5.6) | 0.01 | 5.4 (3.7 – 7.0) | 0.12 |
| Empathy statements | 0.5 (0.2 – 0.8) | 0.3 (0.03 – 0.6) | 0.36 | 0.4 (0.2 – 0.7) | 0.71 |
| Legitimizing statements | 0.3 (0.1 – 0.6) | 0.3 (0.04 – 0.6) | 0.96 | 0.4 (0.2 – 0.7) | 0.58 |
| Concern statements | 9.2 (7.2 – 11.1) | 5.6 (3.6 – 7.6) | 0.01 | 7.3 (5.5 – 9.2) | 0.18 |
| Reassurance statements | 18.9 (15.3 – 22.6) | 14.0 (10.3 – 17.7) | 0.06 | 15.0 (11.4 – 18.5) | 0.12 |
| Self-disclosure statements | 0.8 (0.4 – 1.2) | 0.4 (-0.1 – 0.8) | 0.15 | 0.5 (0.1 – 0.9) | 0.26 |

Table F.5 Unadjusted odds ratios of clinician reporting “Strongly Agree” or “Agree” in rating patient-clinician interaction – patients with overweight and obesity compared to patients with average weight (Chapter 4)

| | **Average (ref)** OR (CI) | **Overweight** OR (CI) | **p** | **Obese** OR (CI) | **p** |
|---|---|---|---|---|---|
| The patient provided an accurate history of her medical condition. | 1.00 (ref) | 0.64 (0.20 – 2.05) | 0.46 | 0.34 (0.12 – 1.00) | 0.05 |
| This patient trusts me a great deal. | 1.00 (ref) | 1.53 (0.52 – 4.49) | 0.44 | 0.76 (0.29 – 2.05) | 0.59 |
| I understood what the patient wanted to know. | 1.00 (ref) | 3.43 (0.82 – 14.4) | 0.10 | 2.00 (6.15 – 6.50) | 0.25 |
| The patient had a good understanding of the most important information I gave to her. | 1.00 (ref) | 3.06 (0.96 – 9.74) | 0.06 | 1.60 (0.59 – 4.38) | 0.36 |
| All in all, I like the patient a lot. | 1.00 (ref) | 1.75 (0.45 – 6.80) | 0.42 | 0.70 (0.23 – 2.16) | 0.54 |

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**CURRICULUM VITAE**
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CURRENT POSITION: MD/PhD Candidate
Johns Hopkins University School of Medicine
Johns Hopkins University Bloomberg School of Public Health
Department of Health, Behavior and Society

FIELDS OF INTEREST Pediatrics, maternal and child health
Community-Based Public Health
Social and behavioral determinants of health
Multilevel data analysis

EDUCATION:

2018 MD/PhD (in progress) 3.96/4.00
Social & Behavioral Sciences
Certificate in Community-Based Public Health PhD GPA:
Certificate in Maternal and Child Health
Department of Health, Behavior and Society Bloomberg School of Public Health Advisor: Debra Roter, DrPH

2010 B. S.
GPA 4.0/4.0
Summa Cum Laude
Biological Sciences, Minor: Catholic Social Tradition
University of Notre Dame Valedictorian

HONORS AND AWARDS

| | |
|---|---|
| 2015 | Top Health Services Research Abstract, The Obesity Society |
| 2015 | Top Early Career Presentation, The Obesity Society |
| 2015 | Graduate Student of the Year for Service Learning and Civic Engagement, DC-MD Campus Compact |
| 2015 | Student of the Year for Community Engagement, Johns Hopkins University Student Outreach Resource Center |
| 2014 | Doctoral Distinguished Research Award, Department of Health, Behavior and Society, Johns Hopkins University Bloomberg School of Public Health |
| 2012 | Frazier Thompson Pioneer Award, University of Notre Dame Alumni Association |
| 2010 | Phi Beta Kappa Society |
| 2010 | College of Science Deans Award, University of Notre Dame |
| 2010 | B. S. awarded summa cum laude, valedictorian |
| 2013 | Invited Attendee, Lindau Nobel Laureate Meeting |

PUBLICATIONS († indicates equal contribution to authorship)

1. Showell NN, KA Johnson, **KO Washington Cole**, RLJ Thornton (in progress). Understanding the Impact of Neighborhood Characteristics on Parental Preferences and Diet and Physical Activity Behaviors. *Pediatrics.*
2. **KO Washington Cole** (in progress). "What is worthwhile is to have more": Examining the conflict between Freirean educational philosophy and the neoliberal construction of the health literacy movement. *Journal of Medical Humanities.*
3. Roter, Debra L., Lori H. Erby, Rajiv N. Rimal, Katherine C. Smith, Susan Larson, Ian M. Bennett, **Katie Washington Cole**, Yue Guan, Matthew Molloy, and Jessica Bienstock. "Empowering Women's Prenatal Communication: Does Literacy Matter?." *Journal of health communication* 20, no. sup2 (2015): 60-68.
4. Lovin DD. †, **KO Washington†**, B DeBruyn, RR Hemme, A Mori, SR Epstein, BW Harker, TG Streit, and DW Severson (2009). Genome-based polymorphic microsatellite development and validation in the mosquito Aedes aegypti and application to population genetics in Haiti. *BMC Genomics* 10: 590 – 599

RESEARCH PRESENTATIONS

| | |
|---|---|
| November 2015 | Influence of the 5A's Counseling Strategy on Weight Gain During Pregnancy: An Observational Study<br>Poster Presentation<br>The Obesity Society |
| October 2015 | Caring for patients with overweight and obesity: weight bias and consequences for communication<br>Oral Symposium Presentation<br>International Conference on Communication in Healthcare |

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| April 2015 | Understanding the Impact of Neighborhood Characteristics on Parental Preferences and Diet and Physical Activity Behaviors in Low-Income Minority Preschoolers<br>Poster Presentation Co-Author Pediatric Academic Societies |
| November 2014 | Empowering women's prenatal communication: does literacy matter?<br>Oral Presentation Co-Author<br>Health Literacy Research Conference Boston University Medical Center |
| August 2009 | "Molecular Mechanism of EGFR Addiction in H4006 Non-Small Cell Lung Carcinoma"<br>Oral Presentation, Undergraduate Research Program Cold Spring Harbor Laboratory |
| April 2009 | "Population genetics analysis of Haitian *Aedes aegypti* using novel microsatellite markers"<br>Poster Presentation, Spring Symposium<br>Center for Undergraduate Scholarly Engagement University of Notre Dame |
| July 2008 | "Development of novel microsatellite markers for genetic analysis in *Aedes aegypti*"<br>Oral Presentation, McNair Scholars Program University of Notre Dame |

FUNDING

| | |
|---|---|
| Spring 2015 | Public Health Practice Fellowship<br>Health Resources and Services Administration |
| Fall 2010 | MSTP Fellowship<br>National Institutes of Health |

PREVIOUS RESEARCH POSITIONS

| | |
|---|---|
| June 2013 – Present<br>Research Assistant | Johns Hopkins Bloomberg School of Medicine<br>Department of General Pediatrics and Adolescent Medicine<br>Advisors: Rachel Johnson Thorton MD, PhD Nakiya Showell MD, MPH, Kamila Mistry, PhD |
| June 2011 – August 2011<br>Summer Student | Johns Hopkins Bloomberg School of Public Health<br>Department of Epidemiology (Infectious Diseases)<br>Advisor: Kelly Gebo, MD, MPH |

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|---|---|
| June 2011 – August 2011<br>Summer Student | Johns Hopkins School of Medicine<br>Department of Medicine (Infectious Diseases)<br>Advisor: Robert Siliciano, MD, PhD |
| June 2009 – August 2009<br>Undergraduate Research Fellow | Cold Spring Harbor Laboratory<br>Cancer Research<br>Advisor: Rafaella Sordella, PhD |
| August 2008 – May 2010<br>Undergraduate Research Fellow | University of Notre Dame<br>Eck Institute for Global Health<br>Advisor: David Severson, PhD |
| January 2007 – May 2007<br>Undergraduate Research Fellow | University of Notre Dame<br>Department of Chemistry and Biochemistry<br>Advisor: W. Robert Scheidt, PhD |

TEACHING

| | |
|---|---|
| Teaching Assistant<br>Spring 2015 | Interpersonal Influence in Medical Care<br>Johns Hopkins University Bloomberg School of Public Health |
| Teaching Assistant<br>Spring 2015 | Health Literacy: Challenges and Strategies for Spring 2014<br>Effective Communication<br>Johns Hopkins University Bloomberg School of Public Health |
| Teaching Assistant<br>Fall 2014 | Fundamentals of Health, Behavior, and Society<br>Johns Hopkins University Bloomberg School of Public Health |
| Teaching Assistant<br>Spring 2012 | Psychosocial Factors in Health and Illness<br>Johns Hopkins University Bloomberg School of Public Health |
| Lecturer<br>August 2011 | Health Disparities Intersession Course,<br>Johns Hopkins School of Medicine |
| Teaching Assistant<br>May 2010 | Department for Chemistry and Biochemistry August 2009 –<br>University of Notre Dame |

PROFESSIONAL SERVICE ACTIVITIES

| | |
|---|---|
| Trustee<br>July 2014 – Present | University of Notre Dame Board of Trustees<br>Notre Dame, Indiana |
| Advisory Board Member<br>July 2014 | University of Notre Dame College of Science January 2013 –<br>Notre Dame, Indiana |

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|---|---|
| Student Coordinator<br>July 2012 – present | Medical Educational Perspectives – Medical Design Initiative<br>Johns Hopkins University |
| Governing Board Member | Student Outreach Resource Center September 2010 – present<br>Johns Hopkins School of Medicine |
| Community Service<br>2012 - 2013 | Student National Medical Association, Region Liaison 6<br>(DC, Maryland, Virginia) |
| Student Coordinator<br>January 2009 – May 2010 | CST, ND and Poverty in SB Seminar<br>University of Notre Dame |
| Student Coordinator<br>August 2009 – Dec 2009 | Lives in the Balance: Youth, Violence and Society Seminar<br>University of Notre Dame |