THE ASSOCIATION BETWEEN RACE/ETHNICITY AND PERCEPTIONS OF
WEIGHT GAIN AMONG WOMEN USING ORAL CONTRACEPTIVES: A STUDY
OF FERTILITY AND ORAL CONTRACEPTIVE USE STUDY (FOCUS)
PARTICIPANTS


by

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# ABSTRACT

JATYRA MONE'T RIVERS. The association between race/ethnicity and perception of weight gain among women using oral contraceptives: a study of fertility and oral contraceptive use study (FOCUS) Participants. (Under the direction of DR. LARISSA R. BRUNNER HUBER)

According to the Centers for Disease Control and Prevention (CDC), oral contraceptives (OCs) are the most popular reversible method of contraception. However, side effects, including concerns about weight gain, may lead some women to discontinue the use of this contraceptive method.  This secondary data analysis was conducted to examine the relationship between race/ethnicity and perceptions of weight gain among 184 OC users aged 18-40 years who were enrolled in the Fertility and Oral Contraceptive Use Study (FOCUS).  Data on race/ethnicity as well as perceptions of weight gain were self-reported during the baseline interview. Logistic regression was used to obtain odds ratios (ORs) and 95% confidence intervals (CIs) to model the association between race/ethnicity and perceptions of weight gain. After adjusting for education level, marital status, income, and duration of OC use, Hispanic women had 1.16 times the odds of perceiving weight gain (95% CI: 0.73-4.24) and non-Hispanic Black women had 1.49 times the odds of perceiving weight (95% CI: 0.36-3.74) compared to non-Hispanic White women. In addition, women of other races had decreased odds of perceiving weight gain after adjustment (OR= 0.69; 95% CI: 0.12-3.92). Counseling women of all races on available reproductive services, nutrition, physical activity, and other factors affecting OCs users may assist in reducing perceptions of weight gain. By removing the misconception that OC use can cause weight gain, women may continue to use this

effective method of contraception rather than discontinuing its use and changing to a less

reliable method.

ACKNOWLEDGEMENTS

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CHAPTER 1: INTRODUCTION

According to the Centers for Disease Control and Prevention (CDC), 99% of sexually active women in the United States between the ages of 15-44 years have used some form of contraception (1). Currently, there are several forms of hormonal contraceptive methods on the market including injectable depot-medroxyprogesterone acetate (DMPA), vaginal ring, hormonal patch, and the more common oral contraceptive (OC). In 2008, OCs were reported to be the most popular method of reversible contraception with 10.7 million women in the United States currently using the method (1). OCs are the most widely used method of contraception among women who are white, younger, single or cohabiting, nulliparous, and college educated (2). Four in every five women who are sexually active have used OCs at some point in their lives (3).

OCs come in various types depending on the hormonal composition. For example, what is known as "the pill" actually refers to the combined pill, which includes two or more female reproductive hormones, usually estrogen and progesterone (4). Estrogen is a group of hormones that aid in the growth and development of female sexual characteristics and the reproductive system (5). This hormone is produced in the ovaries, adrenal gland, and adipose tissue. Estrogen circulates in the blood and binds to specific estrogen receptors in targeted tissues. Estrogen receptors are located in the brain, bone, liver, heart, breast, and other organs. Progesterone is a female hormone produced in the

ovaries during the release of a mature egg from an ovary (5). This hormone aids in preparing the lining of the uterus, which receives the egg if it becomes fertilized. If the egg does not become fertilized, progesterone levels will drop and signal the menstrual cycle to begin. The other OC type is known as the mini-pill. This pill contains only progesterone (6). The mini-pill is popular among women who are breastfeeding because the lack of estrogen allows lactation to take place without potential issues such as shortening the supply of milk (7). This pill is also an effective option for women who experience estrogen-related side effects when using combined OCs.

OCs were first used by women in the United States in the early 1960s (8). Margaret Sanger, advocate of women's rights and contraceptive use, found a method to prevent ovulation in rabbits in the 1930s (9). The method she used involved the hormones used in OCs today. Given her advanced age, she was unable to complete her research. Carl Djerassi, a scientist who studied steroids, greatly contributed to the success of OCs by incorporating the findings of Sanger with his own research. Djerassi synthesized a progestin, a derivative of progesterone, which has a stronger content than natural progesterone (8). Using this progestin, he was able to develop a 21-day regimen that suppressed ovulation; however, it caused excessive vaginal bleeding. Later it was discovered that mestranol, a derivative of estrogen, was effective in lessening the bleeding (8). After this discovery, mestranol was added to OCs.

This combined OC was approved by the Federal Drug Administration (FDA) in 1957 strictly to treat menstrual disorders (8). A few years later, the FDA approved this pill to be used as a form of contraception, which was known as Enovid. Enovid contained derivatives of both estrogen and progesterone, and had an elevated dose of

estrogen (approximately 150 µg).  During the first clinical trials, this drug was suggested

to be very efficacious; yet, there were a number of side effects including nausea,

dizziness, headaches, stomach aches, and vomiting. In addition, there were a few deaths

and non-fatal cases of thromboembolism in women who used this pill. After years of

lowering dosages and introducing different forms of estrogen and progesterone, the

combined OC was perfected (8).

There have been a number of studies conducted that have examined the

correlation between OC use and potential weight gain (10, 11, 12). While a number of

studies suggest OC use is not associated with weight gain, some studies have

demonstrated that women gain small amounts of weight during OC use (13). However,

little research has been done to evaluate how women perceive themselves to gain weight

while using OCs, specifically among different cultures and backgrounds. This study

investigated how race/ethnicity is related to perceptions of weight gain among a diverse

group of OC users.

CHAPTER 2: LITERATURE REVIEW

2.1 Combined Oral Contraceptive Pill

The combined oral contraceptive pill (COC), which refers to the combination of the hormones estrogen and progesterone, is a major accomplishment in public health. It has allowed many women an option to prevent an unplanned pregnancy. Along with pregnancy prevention, there are other benefits associated with COCs. When used correctly, COCs have been suggested to lessen menstrual pains as well as decrease the amount of blood flow (14). In addition, this form of contraception potentially lowers androgen levels, which is a hormone group associated with acne production (14). Use of COCs has also been correlated with improved bone density and prevention of ovarian, endometrial, and colorectal cancer in women (15).

While using COCs can be seen as beneficial, there are a few risks linked to using this contraceptive method. Side effects from COC use vary from woman to woman; however, in most cases they usually include nausea, dizziness, tenderness of the breast, and headaches (16). Experiencing abnormal bleeding patterns including spotting between menstruation is another documented side effect (17, 18, 19). This side effect usually stops a few months after initiation of COCs.

2.2 Hormonal Contraception and Perceived Weight Gain

Hormonal contraception use may possibly be associated with how women perceive changes in their weight. Using data from the Contraceptive CHOICE Project, a cross-sectional study was conducted to assess the perception of weight gain in women using long-acting reversible contraception, such as copper intrauterine devices (IUDs), implants, and injectable DMPA (20). Women included in this study were living in St. Louis, Missouri or surrounding areas, between the ages of 14 and 45, spoke English or Spanish, and met the following additional inclusion criteria: resided in the study's designated recruitment region, were willing to initiate a new method of reversible contraception or were currently not using a method, did not desire to become pregnant for at least one year, and were sexually active with a male partner or planning to become sexually active in the next six months. Women who had a history of tubal sterilization or a hysterectomy were excluded from the study. At baseline, investigators collected demographic and reproductive histories, screened participants for sexually transmitted infections, and measured height and weight for each participant. Telephone interviews were conducted at three and six months post-baseline and every six months for the duration of the follow-up. During these interviews, participants were asked to self-report any changes to their weight.

After exclusions, 4,133 women were included in the study. Of these women, 1,407 (34.0%) perceived weight gain, 1,634 (39.5%) perceived no weight change, and 1,092 (26.4%) perceived weight loss. Injectable DMPA (RR=1.37, 95% CI: 1.14-1.64) and implant users (RR=1.29, 95% CI: 1.10-1.51) were more likely to self-report perceived weight gain, as compared to copper IUD users. The majority of the women

who perceived weight gain did in fact have true weight gains. This study was limited in how perceived weight gain and loss were defined. Because participants reported weight changes in comparison to the previous interview and not compared to weight at baseline, it was difficult to adequately define self-reported weight change over the course of a year. This study was also limited as it pertains to my hypothesis in that OC users were not considered.

2.3 New Adolescent Contraceptive Users and Weight Change

Several studies have suggested that hormonal contraceptive methods are associated with weight gain in adolescents. A longitudinal study was conducted to investigate weight changes in adolescent females between the ages of 15 and 19 years from a family planning clinic in Durban, South Africa (21). Participants were non-hormonal contraceptive users or used injectable DMPA, norethisterone enanthate (NET-EN) (also an injectable contraceptive type), or COCs.  At initiation of the study, there were 115 DMPA users, 115 NET-EN users, 116 COC users, and 114 non-contraception users (DMPA, NET-EN, and COC users all began using their respective contraceptive methods for the first time at baseline). Participants were followed for four to five years, and reported if they had any changes in contraceptive method use every six months. Additionally, height, weight, and self-reported dieting were also documented at every six-month follow up visit.

There was no difference in mean weight or age between the groups at baseline. Yet, the injectable contraceptive group (participants who used DMPA or NET-EN) gained an average of 6.2 kg over the span of five years, which was higher than any of the other groups (COC group:  average increase of 2.3 kg, nonusers:  average increase of 2.8

kg, and discontinuers of any method: average increase of 2.8 kg). It is important to note that discontinuers of hormonal contraception (+2.8kgs) had higher weight gain than those who used COCs (+2.3kgs). However, small numbers in the study do limit the findings. Additionally, since this research was conducted in South Africa, results may not be generalizable to women in the United States.

2.4 Long Term Contraception Use and Weight Gain

When using OCs, time may be a confounding factor in overall weight gain. Lindh, Ellstrom, and Milsom (2011) conducted a prospective longitudinal study to investigate the long-term influence of COCs on body weight (22). Questionnaires were sent via postal mail to random samples of women who were 19 years of age in 1962 (n=656) and 1972 (n=780) and residents of the city of Gothenburg, Sweden in 1981 and 1991, respectively. Participants were followed and contacted every five years between the years of 1986-2006.The questionnaire contained approximately 40 questions pertaining to contraception, menstrual patterns, occurrence and severity of dysmenorrhea, reproductive history, and factors such as weight, height, exercise, and smoking. In 1981, the questionnaire was completed and returned by 94% of the 19 year-old women born in1962 (594 of 656), and in 1991 it was completed and returned by 91% of the women born in 1972 (641 of 780). No statistical difference in weight gain between COC users (+7.18 kg) and COC non-users (+6.72 kg) was detected. Because Swedish women having a high physical activity level and low sugar intake, this study may not be generalizable to other populations outside of Sweden (23). In addition, weight was self-reported by the participants, and may be an underestimation of their true weight.

Another study was performed to evaluate the effects of long-term use of injectable DMPA on weight gain in Navajo women between the ages of 18 and 40 years (24). This retrospective cohort study included 172 women who used injectable DMPA for one to two years and 134 women who used non-progestin contraception methods or no method for one to two years. Information on age, parity, height, weight after one year, and weight after two years was documented for each participant. There was a mean difference in weight of 6.2 pounds (p<.001) in participants who used injectable DMPA for the course of one year and 11.2 pounds (p<.001) for two years. A limitation of this study includes lack of generalizability to populations outside of Navajo women and no inclusion of women using OCs.

2.5 The Effect of Combination Contraceptives on Weight

An extensive systematic review was conducted to assess the possible association between combination contraceptive use and weight changes (13). The inclusion criterion, in general, for participants in these trials was women of reproductive age without any medical contraindications to combination contraceptives. Yet, six of the articles did not specify any inclusion or exclusion criteria. All trials were reported in English and compared combination contraceptive use to either a placebo, no intervention, or a combination contraceptive of a different drug, dosage, regimen, or study length. In order to be eligible for this review, trials had to have collected data on body weight changes.

There were a total of 49 randomized controlled trials included in this review, which were conducted in several different countries including Germany, the United States, Canada, Switzerland, France, and Austria, among others. Of these trials, only three considered OCs in comparison to a placebo group. This review also included 79

weight change comparisons evaluating two combination contraceptives. Sample sizes of the randomized trials ranged from 20 to 5,654 participants. The length of the randomized trials ranged between 3 to 24 treatment cycles, with the majority of trials lasting 6 to 12 treatment cycles. Of the trials that used a placebo or no hormonal group, there was no evidence of an association between OC use and weight changes. In one trial in particular, mean weight changes in the OC group (0.72kg ± 2.64) and the placebo group (0.56kg ± 2.64) were similar (16). However, due to the varying types of drugs, regimens, and dosages associated with hormonal contraceptive use, individual women may react differently in terms of potential fluctuations in weight. Of the 79 weight change comparisons, only seven revealed a statistically significant change in mean weight; generally, weight changes between comparison groups were small and of no clinical significance.

One key limitation of these randomized controlled trials was the reliability of the measurements. A few variables could have altered the weight measurements including use of calibrated scales, time of day measurements were taken, amount of clothing worn during measurements, and use of fasting before measurements. Another major limitation was failure to identify changes in weight from persons who discontinued or were lost to follow-up. Ten of the trials stated a few of the women claimed weight change was the main reason for discontinuation. The data from trials where women discontinued for that reason would have been strengthened if weight change data for those women were included. Finally, most of these trials lacked racial/ethnic diversity.

2.6 Perceptions of Weight Change among Difference Races/Ethnicities

There is a limited amount of data that examined perceptions of weight gain among diverse cultures. Within available data, the manner in which individuals perceive themselves may vary among different races/ethnicities. A retrospective cohort study was conducted to evaluate the accuracy of self-perceived weight gain and its correlates in multiethnic, reproductive-age women (25). This study took place in Galveston, Texas, and was comprised of 608 women having equal representation of two age groups (16-24 year and 25-33 years) and three races (Black, White, and Hispanic). Participants were also evenly distributed by contraceptive method, including non-hormonal, OCs, and DMPA injection. Participants self-reported their perceived weight changes at baseline and six-month intervals up to 36 months. Data on height, weight, education, marital status, and other covariates were included in the analyses. Because the investigators only included women who had at least two follow-up visits, the sample size was reduced to 466 women.

The results demonstrated that injectable DMPA users were more likely to report weight gain of at least 1, 2, 3, 4, and 5 kg (p<.05) as compared to both non-hormonal and OC users. Black women were more likely to report weight gain of at least 1, 2, 3, 4, and 5 kg (p <.05), in comparison to White women. Hispanic women revealed only one category [2 kg (p=.042)] where reported weight gain was statistically significantly higher than White women. The ability to accurately recognize weight gain of different amounts accurately did not vary among women of different body mass index (BMI) categories. It was concluded that race/ethnicity and contraception methods can influence the accuracy of self-perceiving weight gain in women. However, since this study did not include a

random sample nor did it assess other age groups outside of 16-33 years of age, the findings may not be generalizable to other populations of women.

Another retrospective cohort study was conducted to investigate the correlation between race/ethnicity and weight misperception (26). Data used in this study came from the National Health and Nutrition Examination Survey (NHANES) from 1999-2006. The sample consisted of 17,270 adults over the age of 20 years. BMI categories included underweight (BMI ≤18.5), healthy weight (BMI between 18.5 and 24.9), overweight (BMI between 25.0 and 29.9), and obese (BMI ≥30). Healthy weight participants self-reporting "underweight" or "overweight" were classified as having a weight misperception. Overweight or obese participants self-reporting "underweight" or "about the right weight" were classified as having a weight misperception. Race/ethnicity was self-reported, and investigators restricted analyses to non-Hispanic white, non-Hispanic black, and Mexican-Americans. Among obese women, the odds of misperceiving weight were higher among non-Hispanic blacks (OR=3.4, 95% CI: 1.4, 3.1) and Mexican-Americans (OR= 1.9, 95% CI: 1.2-3.2), compared to non-Hispanic whites. Similar results were found among overweight women. Overall, misperception of weight was a common theme among all BMI categories and minorities were more likely to misperceive their weight. While this study produced useful data, it is important to note that the study included both men and women, and was not specific to OC users.

2.7 Psychological Mechanism

Research has suggested relationships between race/ethnicity and perceived weight gain as well as hormonal contraceptive use and perceived weight gain. Yet, there is little to no research that specifically assesses racial/ethnic perceptions of weight gain among

women using OCs. Factors including self-esteem and depression could potentially influence how women perceive their weight, especially while using OCs (27). For instance, if a woman on OCs is experiencing depressive symptoms, she may overestimate or underestimate her weight change due to the feelings experienced from the issues with depression (27). Thus, the influence of feelings may serve as a possible mechanism behind how women using OCs perceive their weight.

2.8 Summary

The modern day OC pill has been utilized by many young adolescents and adults. This pill has evolved into not only preventing unwanted pregnancies, but also has been suggested to lower the risk for ovarian cancer (28). However, OC use may cause unfavorable side effects including depressive symptoms, low bone mineral density, true weight gain, and perceived weight gain (Dragoman, 2014). While a few studies suggest hormonal contraception is associated with weight gain (21, 24), other studies suggest no such association (20, 22, 16). The major limitation of prior studies is lack of generalizability due to where the studies were conducted or because of limited diversity since non-Hispanic White women accounted for the majority of the respective study populations.  Also, most studies did not consider OC users exclusively.  The purpose of this research study was to investigate the association between race/ethnicity and perceptions of weight gain among women using OCs.

CHAPTER 3:  RESEARCH QUESTIONS

The overall objective of this study was to evaluate whether race/ethnicity is associated with perceptions of weight gain during use of OCs.  Specifically, the following research questions were addressed:

(1) Do non-Hispanic Black women have increased odds of perceiving that they gained weight while using OCs as compared to non-Hispanic White women?

(2) Do Hispanic women have increased odds of perceiving that they gained weight while using OCs as compared to non-Hispanic White women?

(3) Do women of other races/ethnicities have increased odds of perceiving that they gained weight while using OCs as compared to non-Hispanic white women?

CHAPTER 4: METHODS

4.1 Study Population

This secondary analysis used data from the Fertility and Oral Contraceptive Use Study (FOCUS). FOCUS was a longitudinal, prospective cohort study designed to evaluate methodological issues associated with the conduct of a larger cohort study to investigate the role of obesity in OC failure (29). This feasibility study recruited women who received health care from the Carolinas HealthCare System (CHS), which is located in Charlotte, NC from 2009-2010. The two main medical facilities women were recruited from included Carolinas Medical Center (CMC) Myers Park Obstetrics/Gynecology Clinic and the CMC Eastland Family Medicine Clinic. CHS is the largest healthcare system within North Carolina and South Carolina. This system is comprised of over 900 healthcare facilities including academic medical centers, hospitals, and healthcare pavilions. CHS has more than 60,000 full-time and part-time employees, and roughly 7,500 licensed beds (Carolinas HealthCare System, 2014).

CMC Myers Park Obstetrics/Gynecology Clinic is an outpatient clinic located in Charlotte, NC, approximately two blocks from the CMC-Main hospital. Around 34,000 patients visit the clinics annually. An estimated 55% of its patients are between the ages of 18-40 years. Among the patients seeking care, minorities make up a little over half of

 the population: African Americans: 37% and Hispanics: 25%. While 40% of patients self-pay for their services, 44% use governmental assistance through Medicaid or Medicare.

CMC Eastland Family Practice Clinic was also a clinical site used for recruitment. This facility, also located in Charlotte, NC, provides comprehensive medical care from CMC family and resident physicians with a focus in family medicine. During the study, CMC Eastland Family Practice Clinic moved locations and became CMC Elizabeth Family Practice Clinic. CMC Eastland had nearly 25,000 active patients, where 70% were female and about 35% were between the ages of 18-40 years. A small percentage of its patients were of Hispanic descent (5%). The following summarizes the racial and ethnic distribution at this clinic: 65% African American or Black, 28% White, 5% Asian, and 2% American Indian or Alaskan native. Thirty percent of these patient population are self-pay and 40% are enrolled in Medicaid or Medicare.

A team of research assistants, which included graduate students from the Master of Science in Public Health (MSPH) program and PhD in Health Services Research program at UNC Charlotte, recruited 185 women who were OC users from these clinics. Research assistants used a standard script and approached women in the waiting rooms of the clinics and gave a brief description of the study and its significance to the patients. If women agreed to participate, they were taken to a nearby room to complete the necessary study materials. To avoid interference with participants' scheduled appointments, reception area workers were notified when women were taken to an adjacent room for the interviews.

Informed consent was obtained from all eligible participants who agreed to participate. During completion of these forms, participants were informed about the type of information that would be retrieved from medical records and the number of follow-up interviews anticipated.   The inclusion criteria for women who participated in the feasibility study included the following parameters: current OC user; 18 to 40 years of age; English or Spanish speaking; did not anticipate moving out of the area in the next year; no history of sterilization procedures for woman or her partner; and never been told by a physician that she or her partner would have difficulty conceiving a child.

At the baseline interview, which took approximately 15-20 minutes to complete, research assistants collected data on demographic, health behavior, and reproductive characteristics. Research assistants used standardized forms to obtain this information. Participants self-reported data about the following characteristics:  age, marital status, race/ethnicity, education, smoking, alcohol use, duration of OC use, reason(s) for using OCs, current or past side effects of OC use, dual method use (use of an additional contraceptive method), frequency of sexual intercourse, adherence to an OC regimen, parity, and future birth intention. Additionally, anthropometric measures (height, weight, waist, and hip measurements) were objectively obtained using stadiometers, scales, and measuring tapes. Women were asked to remove coats, shoes, hats and any hair ornaments to avoid inaccurate measures of height and weight; belts were also asked to be removed to ensure valid waist and hip measurements. Upon completion of the baseline interview, women were provided with a series of diaries along with instructions on how to properly complete them. Participants were assessed during follow-up visits every 3 months until the final 15 month post-baseline visit.

4.2 Assessment of Exposure

The main exposure for this secondary data analysis study was race/ethnicity. Participants self-reported this information during the baseline interview. The specific categories considered were: non-Hispanic White (referent), non-Hispanic Black, Hispanic, and other. Other included the following racial and ethnic categories: Asian, biracial/multiracial, Indian/American Indian, and women who selected "other" during the baseline assessment.

4.3 Assessment of Outcome

The main outcome of the analysis was perceptions of weight gain while using OCs. This item was assessed during the baseline interview when participants were asked the following question: "Have you ever had problems with gaining weight while using birth control pills?" Possible answer choices to this item were "yes" or "no." Women who indicated that they had had problems with gaining weight by choosing "yes" were considered to have the outcome.

4.4 Covariate Assessment

Data on demographic, health behavior, and reproductive characteristics collected during the baseline interview were considered as possible confounders. The possible confounders considered included the following: age, education, marital status, income, duration of OC use, dual contraceptive use, reason(s) for OC use, parity, endometriosis, depression, smoking status, and alcohol consumption (25, 20).

4.5 Data Analysis

## Univariate Analysis

Demographic, lifestyle, and reproductive characteristics of the sample population were summarized, and frequencies and percentages were reported (Table 1).

## Bivariate Analysis

Logistic regression was used to calculate unadjusted odds ratios (ORs) and 95% confidence intervals (CIs) to provide a crude association between the race/ethnicity and perceptions of weight gain (Table 2). In addition, other factors associated with perceptions of weight gain were identified.

## Multivariate Analysis

Multivariate logistic regression was utilized to produce adjusted ORs and 95% CIs to model the association between race/ethnicity and perceptions of weight gain while controlling for confounding. Potential confounders that were considered in this research were age, education, marital status, income, OC brand, duration of OC use, dual contraceptive use, reason(s) for OC use, parity, endometriosis, depression, smoking status, and alcohol consumption. If the crude and adjusted ORs differed by at least 10% when a potential confounder was included in a model, the variable was considered a confounder (30).

4.6 Power and Sample Size

A total of 184 women were included in the analysis. Setting alpha at 0.05, power at 80%, the ratio of unexposed to exposed at 1:1.6, and perceptions of weight gain among the unexposed at 27.8%, the smallest detectable OR is 2.41.

CHAPTER 5: RESULTS

5.1 Univariate Analysis

A total of 184 participants were included in this secondary data analysis; one participant was excluded for missing data for the outcome variable. Approximately one-third of the participants (31.89%) perceived themselves to gain weight while using OCs (Table 1). Nearly half of the women in the study were non-Hispanic Black (48.37%), followed by non-Hispanic White (29.35%), Hispanic (16.30%), and other (5.98%). The majority of the women were between the ages of 18-24 years (85.33%), had completed at least some college (61.95%), and were single (55.43%).

While 17.39% of women had initiated OC use at baseline, 36.96% had been using OCs between 1-11 months, 26.09% had been using between 12-35 months, and 19.57% used OCs for over 36 months. Nearly 40% of the women had no children, 25.54% had one child, 19.57% had two children, and 14.67% had three or more children. A little over one-third of women used more than one method of contraception (36.41%). With regards to reasons why women use OCs, 90.22% of women reported using OCs to prevent pregnancy, 34.24% used OCs to lessen cramps and pains from menstrual cycles, and 39.67% used OCs to lessen long/heavy menstrual flows. A small percentage of women had been diagnosed with endometriosis or depression by a physician (3.80% and 14.67% respectively).

5.2 Bivariate Analysis

Women who were non-Hispanic Black or Hispanic had nearly 1.6 times the odds of perceiving themselves to gain weight when using OCs compared to non-Hispanic White women (non-Hispanic Black: OR=1.65; 95% CI: 0.63-4.32 and Hispanic: OR=1.60; 95% CI: 0.76-3.39; Table 2). Women of other races/ethnicities had decreased odds of perceiving weight gain while using OCs (OR=0.64; 95% CI: 0.12-3.30). While women who had one child or three or more children had increased odds of perceiving weight gain (one child: OR=1.14; 95% CI: 0.53-2.49 and three or more: OR=1.53; 95% CI: 0.61-3.80), women who had two children had decreased odds of perceiving weight gain while using OCs (OR=0.74; 95% CI: 0.30-1.82).

Furthermore, there was a dose-response relationship between duration of OC use and perceiving weight gain. Specifically, as duration increased, the odds of perceiving weight gain increased as well (1-11 months: OR= 1.60; 95% CI: 0.60-4.27, 12-35 months: OR= 1.96; 95% CI: 0.70-5.46, and ≥36 months: OR= 2.27; 95% CI: 0.78-6.65). While women using OCs to prevent pregnancy (OR: 2.55; 95% CI: 0.71-9.16) and lessen long/heavy menstrual flows (OR= 1.45; 95% CI: 0.77-2.71) had increased odds of perceiving weight gain, there was no strong association between the use of OCs to lessen cramps/pain during menstrual cycles and perceiving weight gain (OR= 1.09; 95% CI: 0.57-2.09).

5.3 Multivariate Analysis

After adjusting for education level, marital status, income, and duration of OC use, the magnitude of the association for perceiving weight gain while using OCs increased for Hispanic women (OR=1.76; 95% CI: 0.73-4.24; Table 3). However, the

magnitude of the association for women of other races remained unchanged (OR=0.69; 95% CI: 0.12-3.92) and the magnitude of the association for non-Hispanic black women was attenuated (OR=1.16; 95% CI: 0.36-3.74).

CHAPTER 6: DISCUSSION

6.1 Summary of Findings

Among FOCUS participants, non-Hispanic Black women and Hispanic women had increased odds of perceiving weight gain while using OCs as compared to non-Hispanic White women; while women of other races had reduced odds of perceiving weight gain while using OCs. After adjusting for education level, marital status, income, and duration of OC use, the magnitude of the association increased for Hispanic women and decreased for non-Hispanic Black women. The "other" race-weight gain association remained largely unchanged after adjustment. None of the results were statistically significant, which is largely due to small sample size.

Few studies have examined the race/ethnicity-perceptions of weight gain association, among OC users. The yielded results were consistent with Rahman and Berenson whose results indicated that Black women were more likely to self-perceive weight gain, as compared to White women (25). Rahman and Berenson also found that Hispanic women were more likely to self-perceive weight gain in comparison to White women; yet, this was suggested only in the category of 2kgs (25). Furthermore, the results of this study may be consistent with the findings of Dorsey, Eberhardt, and Ogden (26). Dorsey, Eberhardt, and Ogden found that non-Hispanic Black women and Mexican-

American women were more likely to misperceive their weight, as compared to non-Hispanic White women (26). However, it should be noted that in the study a woman was defined as misperceiving her weight if she categorized herself as being heavier or lighter than she actually was.  Thus, the study did not truly assess misperceptions of just weight gain.

6.2 Strengths and Limitations

Data pertaining to race/ethnicity and perceptions of weight gain were collected during the baseline interview of the study. Since participants self-reported this information, it is possible that nondifferential misclassification occurred. However, it seems unlikely that women would not be able to accurately self-report their race/ethnicity.  If nondifferential misclassification of the exposure or outcome occurred it would most likely bias results towards the null.

Selection bias is possible in this study since women who chose to participate in FOCUS could potentially differ from women who did not choose to be in the study. For instance, women who chose to participate in the study may have had a positive attitude about OC use and thus be more willing to participate. If selection bias occurred, it would most likely bias the results away from the null.

Information bias is unlikely in this secondary analysis because the interviews were standardized and interviewers received extensive training and utilized scripts for the interview. However, if it were to occur the results would likely be biased away from the null.

Possible confounders were limited to the variables included in the FOCUS data set. There may be other confounders of the race/ethnicity-perceptions of weight gain

association such as previous contraceptive method or leisure time physical activity level. Failure to control for these confounders could result in an over or underestimate of the true association.

This study has several strengths. As previously mentioned, the use of trained interviewers limits the potential for information bias. Furthermore, this study had a racially/ethnically diverse population. Given this diversity, the results generated from this study are likely generalizable to women using OCs in the Southeast region. Finally, few studies have investigated the association between race/ethnicity and perceived weight gain among OC users.

6.3 Conclusion and Public Health Implications

In conclusion, this study demonstrated that race/ethnicity is associated with perceptions of weight gain among women using OCs, There is limited research pertaining to perceptions of weight gain among different racial/ethnic groups and even sparser data on this particular association among women using OCs. It is important for public health professionals to understand possible cultural differences associated with race/ethnicity and why women of different racial/ethnic backgrounds perceive weight gain in different ways. Taking into consideration how social, psychological, behavioral, and environmental factors differ among women of different races/ethnicities may assist health professionals in effectively educating women on reproductive and sexual health as it pertains to OC use. If women are concerned about potential side effects associated with OC use, including weight gain, public health and medical professionals may provide additional counseling on physical activity levels, eating habits, lifestyle changes, and other behaviors associated with maintaining a healthy weight. By providing additional

counseling on these topics, these professionals may assist women in continuing their use of OCs rather than switching to a less reliable and effective method due to concerns about weight gain.

Differences in perceptions of weight gain may also be due to inadequate reproductive health education in general. According to Craig et al., minorities are less likely to be aware of different reproductive services available (31). Likewise, these same women may not be aware of how various types of contraceptive methods work, including the potential side effects associated with various methods. Because of this disparity, it is important for physicians and clinicians to educate women of all races/ethnicities on their sexual and reproductive health to ensure they make informed decisions.

Future research should continue to evaluate the association between race/ethnicity and perceptions of weight gain among OC users using a larger sample size given that this study was underpowered to detect statistically significant associations. A longitudinal study of brand new OC users would provide the opportunity to compare baseline weights with measured weights collected during follow-up visits to determine if any perceptions of weight gain did in fact reflect true weight gains. In all, more conclusive research on the association between race/ethnicity and perceived weight gain needs to be conducted. Such research can assist public health and medical professionals in properly counseling OC users on ways to manage their weight so that women do not cease using this effective method of contraception due to concerns about weight gain.

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Table 1: Characteristics of women participating in study of race/ethnicity and perceptions of weight gain, FOCUS 2009-2010

| *Variable Name* | N | % |
|---|---|---|
| **Perceptions of Weight Gain** | | |
| Yes | 59 | 31.89 |
| No | 126 | 68.11 |
| **Race/Ethnicity** | | |
| Non-Hispanic White | 54 | 29.35 |
| Non-Hispanic Black | 89 | 48.37 |
| Hispanic | 30 | 16.30 |
| Other | 11 | 5.98 |
| **Age** | | |
| 18-24 years | 157 | 85.33 |
| ≥25 years | 27 | 14.67 |
| **Education** | | |
| < High School | 18 | 9.78 |
| High School | 52 | 28.26 |
| >High School | 114 | 61.96 |
| **Marital Status** | | |
| Single | 102 | 55.43 |
| Living with a partner | 37 | 20.11 |
| Married | 36 | 19.57 |
| Divorced/Separated/Widowed | 9 | 4.89 |
| **Income** | | |
| < $15,000 | 42 | 23.46 |
| $15,001 - $30,000 | 63 | 35.20 |
| $30,001 - $45,000 | 31 | 17.32 |
| >$45,000 | 43 | 24.02 |
| **Parity** | | |
| 0 | 74 | 40.22 |
| 1 | 47 | 25.54 |
| 2 | 36 | 19.57 |
| ≥3 | 27 | 14.67 |
| **Duration of OC Use** | | |
| <1 month | 32 | 17.39 |

| | | |
|---|---|---|
| 1-11 months | 68 | 36.96 |
| 12-35 months | 48 | 26.09 |
| >36 months | 36 | 19.57 |
| **Dual Contraceptive Use** | | |
| Yes | 67 | 36.41 |
| No | 117 | 63.59 |
| **Reason for OC Use** | | |
| Prevent pregnancy | | |
| Yes | 166 | 90.22 |
| No | 18 | 9.78 |
| Lessen cramps/Pain from periods | | |
| Yes | 63 | 34.24 |
| No | 121 | 65.76 |
| Lessen long/heavy periods | | |
| Yes | 73 | 39.67 |
| No | 111 | 60.33 |
| **Endometriosis** | | |
| Yes | 7 | 3.80 |
| No | 177 | 96.20 |
| **Depression** | | |
| Yes | 27 | 14.67 |
| No | 157 | 85.33 |
| **Smoking Status** | | |
| Yes | 32 | 17.39 |
| No | 152 | 82.61 |
| **Alcohol Consumption** | | |
| Yes | 83 | 45.11 |
| No | 101 | 54.89 |

Table 2: Unadjusted odds ratio for women participating in study of race/ethnicity and perceptions of weight gain, FOCUS 2009-2010

| Variable Name | Unadjusted Odds Ratio (OR) | 95% Confidence Intervals (CI) |
|---|---|---|
| **Race/Ethnicity** | | |
| Non-Hispanic White | (referent) | |
| Non-Hispanic Black | 1.65 | 0.63-4.32 |
| Hispanic | 1.60 | 0.76-3.39 |
| Other | 0.64 | 0.12-3.30 |
| **Age** | | |
| 18-24 years | (referent) | |
| ≥25 years | 1.14 | 0.47-2.79 |
| **Education** | | |
| <High School | (referent) | |
| High School | 0.91 | 0.30-2.73 |
| >High School | 0.64 | 0.23-1.79 |
| **Marital Status** | | |
| Married | (referent) | |
| Living with a partner | 0.68 | 0.26-1.74 |
| Single | 0.47 | 0.22-1.04 |
| Divorced/Separated/Widowed | 0.36 | 0.07-1.96 |
| **Income** | | |
| < $15,000 | (referent) | |
| $15,001 - $30,000 | 1.04 | 0.45-2.41 |
| $30,001 - $45,000 | 1.41 | 0.53-3.74 |
| > $45,000 | 0.97 | 0.38-2.43 |
| **Parity** | | |
| 0 | (referent) | |
| 1 | 1.14 | 0.53-2.49 |
| 2 | 0.74 | 0.30-1.82 |
| ≥3 | 1.53 | 0.61-3.80 |
| **Duration of OC Use** | | |
| < 1 month | (referent) | |
| 1-11 months | 1.60 | 0.60-4.27 |
| 12-35 months | 1.96 | 0.70-5.46 |
| ≥36 months | 2.27 | 0.78-6.65 |

| | | |
|---|---|---|
| **Dual Contraceptive Use** | | |
| Yes | 0.95 | 0.50-1.81 |
| No | (referent) | |
| **Reason for OC Use** | | |
| Prevent pregnancy | | |
| Yes | 2.55 | 0.71-9.16 |
| No | (referent) | |
| Lessen cramps/Pain from periods | | |
| Yes | 1.09 | 0.57-2.09 |
| No | (referent) | |
| Lessen long/heavy periods | | |
| Yes | 1.45 | 0.77-2.71 |
| No | (referent) | |
| **Endometriosis** | | |
| Yes | 0.84 | 0.16-4.47 |
| No | (referent) | |
| **Depression** | | |
| Yes | 0.88 | 0.36-2.13 |
| No | (referent) | |
| **Smoking Status** | | |
| Yes | 0.88 | 0.39-1.97 |
| No | (referent) | |
| **Alcohol Consumption** | | |
| Yes | 0.77 | 0.41-1.44 |
| No | (referent) | |

Table 3: Adjusted odds ratio for race/ethnicity-perceptions of weight gain association; FOCUS 2009-2010

| Variable Name | Adjusted Odds Ratio (OR) | 95% Confidence Intervals (CI) |
|---|---|---|
| **Race/Ethnicity** | | |
| Non-Hispanic White | (referent) | |
| Non-Hispanic Black | 1.16 | 0.36-3.74 |
| Hispanic | 1.76 | 0.73-4.24 |
| Other | 0.69 | 0.12-3.92 |

*Adjusted for the following variables: education level, marital status, income, and duration of OC use