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Body Mass and Depression among Mississippi Women with Polycystic Ovarian Syndrome

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The University of Southern Mississippi

Body Mass and Depression among Mississippi Women with
Polycystic Ovarian Syndrome

by

Laurel Bruce

A Thesis
Submitted to the Honors College of
The University of Southern Mississippi
in Partial Fulfillment
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in the College of Nursing

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Abstract

Objective

The purpose of this study is to evaluate the relationship between body mass and depression among Mississippi women with polycystic ovarian syndrome (PCOS).

Methods

Ten women participated in this study. Data was collected by online survey. The survey was distributed to eligible participants on pcoschallenge.com, a support network for women with PCOS. The survey included the Center for Epidemiologic Studies Depression (CES-D) questionnaire as well as five additional questions that asked the participants to report their weight, height, comorbidities, age, and race. The CES-D score provided a measurement for depression while the participant's weight and height allowed the researcher to calculate body mass index (BMI), the measurement used for body mass. The participants' depression scores and BMI scores were analyzed using Pearson's correlation coefficient.

Results

With all 10 participants the BMI scores and CES-D scores were negatively correlated ($r = -0.173$). The maximum BMI score of 62.02 and the minimum CES-D score of 8 belonged to the same participant, participant 10. Because participant 10 possessed the maximum BMI and the minimum CES-D score, she could have affected standard deviation. For experimental purposes the data was analyzed again without participant 10's BMI score or CES-D score. Without participant 10's data, the BMI and CES-D scores for the remaining nine participants were positively correlated ($r = 0.294$).

Conclusion

With the inclusion of participant 10's data, the finding that body mass and depression were negatively correlated ($r = -0.173$) does not reflect the findings of past research. Without participant 10's data the results were positively correlated ($r = 0.294$), which is congruent with the findings of past research (Barry et al., 2011). The findings of this study are conflicting. In the current study $p > 0.05$. Therefore, the results are not clinically significant. Limitations to this study include a small sample size as well as a lack of representation of individuals without access to the Internet. Future research needs to be conducted with a larger sample to further examine the relationship between body mass and depression in women with PCOS.

Key Words: polycystic ovarian syndrome, depression, body mass, Mississippi

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PCOS   polycystic ovarian syndrome
BMI   body mass index
CES-D   Center for Epidemiologic Studies Depression scale
WHO   World Health Organization
SD   standard deviation

Chapter 1

Purpose of the Study

About 5-10% of women worldwide suffer from PCOS, a chronic endocrine disorder that affects metabolism and fertility. A diagnosis of PCOS includes 2 out of 3 criteria: (1) hyperandrogenism, (2) amenorrhea or oligomennorrhea, and (3) polycystic ovaries (Shannon & Wang, 2012). Because PCOS affects metabolism, it can cause distressing and unwanted symptoms such as weight-gain, abdominal obesity and hirsutism. In addition to causing psychologically disturbing symptoms, PCOS increases a woman's risk of developing depression (Coffey & Mason, 2003). To date, no study has examined a sample of women with PCOS from Mississippi. The aim of this study is to examine the relationship between body mass and depression among Mississippi women with PCOS.

PCOS and Depression

In 2000 it was estimated that about 70% of women with PCOS were obese (Lim, Norman, Davies & Moran, 2013). Ching, Burke, and Stuckey (2007) noted that women with PCOS not only suffered from obesity, but also from obesity related comorbidities such as insulin resistance, dyslipidemia, glucose intolerance, and depression. Women with PCOS did not have to be overweight or obese to experience these comorbidities. However, having a higher body mass increased the risk of comorbidities such as insulin resistance, dyslipdemia, glucose intolerance, and depression (Lim, et al., 2013). Body mass is important to address in women with PCOS because it not only threatens their physical health, but also their psychological health.

In addition to experiencing weight gain and obesity related comorbidities, women with PCOS experienced manifestations of hyperandrogenism including hirsutism, hair loss, and acne (Shannon & Wang, 2012). Women with PCOS were more often concerned with symptoms that affected appearance, such as weight-gain and hirsutism, than they were with symptoms such as menstrual irregularity or infertility. Furthermore, decreased health related quality of life was related to symptoms such as acne, hirsutism, and diabetes mellitus in women with PCOS. This finding suggests that PCOS is just as psychologically burdening as it is physically (Coffey & Mason, 2003).

The psychological implications of PCOS are evident from the findings of past research. Women with PCOS were more likely to suffer from depression, psychological morbidities, and an increased response to stress. Also, women with PCOS reported that they suffered from low self-esteem, decreased social activity, and decreased romantic contentment (Coffey & Mason, 2003).

Depression and Increased Body Mass

Being overweight or obese was associated with increased depression, especially in women with PCOS (Barry, Kuczmierczyk, and Hardiman, 2011). Even after receiving medical treatment for symptoms, psychological distress persisted in women with PCOS, causing decreased quality of life. For example, women who were treated for hirsutism did not experience a decrease in depression (Coffey & Mason, 2003). If these women were initially treated for depression instead of hirsutism exclusively, perhaps a decrease in depression would have resulted.

People with a medical illness who suffered from depression had more severe symptoms of depression and their medical illness. They were also less likely to adapt to

their medical illness (Cassano & Favo, 2002). Treating the depression improved the outcome of any concurrent medical illness (Katon & Ciechhanowski, 2002).

One type of depression, major depressive disorder (MDD) has been found to cause symptoms such as anhedonia, weight-gain or loss, insomnia or hyperinsomnia, fatigue or loss of energy, psychomotor retardation, and suicidal ideation. Assessing the risk of suicide in patients with depression was vital to safety, because a depressed individual was at an increased risk to harm her self or others (Greenberg, Tesfazion & Robinson, 2012).

Purpose

Mississippi has one of the highest obesity rates in the country. More than 30% of the population was classified as obese in 2010 (Majumdar, Morris, Gordon, Kermode, Forsythe, Herrington, & Iyer, 2010). Women living in Mississippi with PCOS could potentially be at a higher risk for becoming overweight or obese. Therefore, it is important to determine if there is a significant relationship between body mass and depression in Mississippi women with PCOS so that at-risk populations can be identified.

The psychological profile of women with PCOS needs to be further explored so that risk factors related to decreased psychological health can be identified. This will allow healthcare providers to develop a more comprehensive PCOS treatment plan that addresses both physical and psychological health.

Previous research has been inconsistent regarding the relationship between obesity and depression. No study found to date has evaluated the relationship between body mass and depression in Mississippi women with PCOS. This study will attempt to provide new knowledge that can be utilized by Mississippi healthcare providers when

assessing and treating women with PCOS. Therefore, this study attempts to answer the

question: What is the relationship between body mass and depression among Mississippi

women with PCOS?

Chapter II

Literature Review

Past researchers found that many women with PCOS experienced comorbid conditions related to obesity such as depression and cardiovascular disease (Zhao, Ford, Dhingra, Strine, & Mokdad, 2009). Studies done in the United States showed that in 2000-2002 about 74% of women with PCOS were obese (Yildiz, Knochenhauer, & Azziz, 2008). PCOS, while clearly a physiological disease, also affected psychological health, resulting in a decreased quality of life and a higher risk for depression (Deeks, Gibson-Helm, & Teede, 2010, Upadhya & Trent, 2003, Himelein & Thatcher, 2006, Li, Yu Ng, & Stener-Victorin, 2011). Being overweight or obese increased the risk of developing depression, especially among overweight and obese women with PCOS (Barry et al., 2011). Increased body mass should be addressed in women with PCOS because it has been found to affect not only psychological health, but metabolic and reproductive health as well (Lim et al., 2013).

Impact of Body Mass on PCOS Metabolic and Reproductive Features

Lim, et al. (2013) investigated the effect obesity had on the psychological, metabolic, and reproductive features of PCOS by extracting data from thirty studies and comparing the findings. Only three of the thirty studies were conducted in the Americas so findings may not be entirely representative of women in the United States. Findings about the effect of obesity on the psychological, metabolic, and reproductive features of PCOS have been inconsistent in the past, thus this study attempted to further explore the topic. Lim et al.'s (2013) study provided a better understanding of how increased body

mass affected the physical features of PCOS, which may have contributed to its psychological features.

Lim et al. (2013) defined being overweight as having a BMI score of $\geq$25 kg/m2 and being obese as having a BMI score of $\geq$30 kg/m2. Asians were considered overweight with a BMI score of $\geq$23 and obese with a BMI score of $\geq$25. Adolescent participants were measured for BMI using age and gender specific Centers for Disease Control growth charts (85th-95th percentile overweight and >95th percentile obese). BMI classifications for this study were well defined and accounted for variances in BMI classification criteria caused by race, gender, and age.

Compared to normal weight women, overweight women with PCOS were found to have decreased sex hormone binding globulin and increased fasting insulin, fasting glucose, and triglycerides. No difference was found in total testosterone, hirsutism, total cholesterol and LDL cholesterol between the two groups (Lim et al., 2013).

Compared to normal weight women, obese women had decreased sex hormone binding globulin and high-density lipoprotein (HDL) cholesterol, and increased total testosterone, fasting insulin, total cholesterol, LDL cholesterol, and triglycerides. Increased fasting insulin, blood glucose, and increased cholesterol levels contributed to type II diabetes and coronary heart disease, both of which were associated with PCOS (Ehrmann, Barnes, Rosenfield, Cavaghan, & Imperial, 1999, Legro, 2003). Type II diabetes and coronary artery disease negatively affected psychological health as well as contributed to the increased risk for stroke and coronary artery disease in women with PCOS (de Groot, Dekkers, Romijn, Dieben, & Helmerhorst, 2011, Zhao et al., 2009). While this study did explore the relationship of body mass and the metabolic,

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reproductive, and psychological features of PCOS, it did not explore the relationship between the metabolic, reproductive, and psychological features of PCOS.

Cinar, Kizilarslanoglu, Harmanci, Aksoy, Bozdag, Demir, and Yildiz (2011) conducted a study to explore the relationship between PCOS and depression as well as the metabolic aspect of PCOS and its effect on depression. This study included 226 participants with PCOS and 85 controls without PCOS who were matched for BMI. Participants did not take medications for 3 months prior to the test, which ensured more accurate results as some medications may affect depression (Barry, et al., 2011, Barnard, Ferriday, Guenther, Strauss, Balen, & Dye, 2007). The Beck Depression Inventory, a commonly used tool to measure depression, was used. Results concluded that 28.6% of women with PCOS scored as clinically depressed whereas 4.7% of women without PCOS scored the same (Cinar et al., 2011). Normal weight and overweight women with PCOS scored lower on the depression scale than obese women with PCOS.

Cinar et al. (2011) were able to identify a relationship between depression, postload glucose, insulin resistance and increased lipids. Past researchers had presented conflicted findings about the correlation between depression and cardiometabolic features of PCOS. Rasgon, Rao, Hwang, Altshuler, Elman, Zuckerbrow-Milller, & Korenman (2003) correlated only increased insulin resistance and increased body mass with depression. Further research needs to be conducted in order to determine the exact relationship between metabolic features of PCOS and depression. Cinar et al. (2011) concluded that depression and decreased quality of life in women with PCOS was related to increased body mass and cardiometabolic features of the disease. Little research has been done to explore the relationship between body mass and cardiac risk in PCOS.

Body Mass, Obesity-related Comorbidities and PCOS

De Groot et al. (2011) conducted research to evaluate whether or not obesity increased the risk of stroke and coronary heart disease in women with PCOS. Five articles published between 2000 and 2008 were evaluated. Each of the articles compared women with PCOS to a control group of women without PCOS. Obesity criteria for this study matched the criteria of the American Medical Association (2010) and WHO's (2006) classification of obesity (BMI >30 kg/m2 and a waist circumference of >88 cm). Results indicated that women with PCOS were twice as likely to develop coronary heart disease or stroke. After BMI scores were adjusted for demographic factors, there was an increased risk of 55% (De Groot et al., 2011). While increased body mass may not necessarily be the cause of coronary heart disease or stroke in a woman with PCOS, it is important to address increased body mass because it increases a woman's risk of depression and decreases her quality of life (Deeks et al., 2010, Himelein & Thatcher, 2006, Li et al., 2011, Upadhya &Trent, 2003, Zhao et al., 2009).

Body Mass and Depression

Zhao et al. (2009) used a telephone survey to involve 177,047 U.S. citizens, 18 years or older, in a study to measure anxiety and depression related to body mass. Participants were asked about their weight, depression level, possible chronic psychiatric diagnoses, obesity related comorbidities (diabetes, heart disease, etc.), demographics, lifestyle factors (smoking, drinking, leisure time, exercise, etc.), and overall general health. Few previous studies had been conducted to evaluate how obesity related comorbidities, lifestyle choices, and psychosocial factors affected mental health in obese individuals. Since weight was self-reported over the phone in this study, it is possible

that it was falsely self-reported. In fact, Zhao et al. (2009) reported a 26.0% obesity rate, which is less than the national obesity rate of 32.2% reported by Ogden, Carroll, Curtin, McDowell, Tabak, and Flegal (2006). Thus, the relationship between obesity and depression may be underreported in this study.

In this study BMI scores were categorized as <18.5 kg/m2 (underweight), 18.5-<25 kg/m2 (normal weight), 25-<30 kg/m2 (overweight), 30-<35 kg/m2 (class I obesity), 34-<40 kg/m2 (class II obesity) and $\geq$40 kg/m2 (class III obesity), thus this study used standard categorization of BMI. Demographics including gender were analyzed in this study. Women who were underweight (<18.5 kg/m2) or overweight or obese (>25) were more likely to experience depression or have a diagnosis of chronic depression or anxiety (Zhao et al., 2009).

Results correlating body mass and mental health were determined after adjustment for other demographic variables, obesity related comorbidities, lifestyle factors, and overall general health. Even after adjustment results supported the established finding that increased body mass is a significant predictor of depression as well as anxiety (Zhao et al., 2009).

Previous studies have shown that people with diabetes or coronary heart disease were more likely to suffer from depression (Chiung-Yu, Shu-Ching, Sousa, Chao-Ping, & Kuei-Ching, 2011). Zhao et al. (2009) found that people with obesity comorbidities such as diabetes, myocardial infarction, angina pectoris, stroke or asthma were more likely to have anxiety and depression than those without obesity comorbidities. Zhao et al.'s study was limited due to the fact that it only evaluated five obesity-related comorbidities while excluding others (hypertension, gallbladder disease, osteoarthritis, etc.).

PCOS could be considered an obesity-related comorbidity as up to 74% of women with PCOS are considered overweight or obese (Yildiz, Knochenhauer, & Azziz, 2008). Furthermore, PCOS has been linked to obesity-related comorbidities such as stroke, coronary heart disease and depression (de Groot et al., 2011).

PCOS and Depression

Barry, et al.'s (2011) systematic review and meta-analysis of 12 previous studies supported former research findings that suggested depression was more common in women with PCOS than women without PCOS. About 2257 participants were included in this research (910 with PCOS and 1347 without). Participants were recruited from a variety of places (med school, friends and family, internet) so the results may have been influenced by biases (Barry et al., 2011).

Women with PCOS had statistically significant higher rates of depression than women without PCOS. Barry et al. (2011) suggested that, in clinical terms, this was comparable to finding that women with PCOS experienced mild depression whereas women without PCOS experienced no depression. While a difference was found in depression rates among women who had PCOS versus women who did not have PCOS, the difference had limited clinical significance. However, 15% of women with PCOS scored in the moderate to severe depression range (Barry et al., 2011). The psychological implications of PCOS need to be further addressed as this study showed that some woman with PCOS might be at higher risk than others.

Barry et al. (2011) also suggested that women with PCOS in their twenties and thirties were more likely to be depressed than adolescents with PCOS. More research on adolescents with PCOS needs to be conducted to further explore this finding. Barry et al.

(2011) did explore how medication, age, and increased body mass could increase the risk of depression, but it did not explore how lifestyle factors, comorbid conditions, and demographics affected risk for depression in women with PCOS.

Possible Link Between Decreased Depression and Medication Use in PCOS

Barry et al. (2011) found that women with PCOS taking anti-androgen medications were less likely to be depressed than women not taking anti-androgen medications. These results supported the findings of Barnard et al. (2007) but conflicted with the findings of Rasgon et al. (2003). However, Barry et al. (2011) revealed that each study used different scales and defined medication use differently so these results should be carefully interpreted. The use of medications to treat PCOS and its effect on depression should be further explored in the future, or participants of studies should at least identify whether or not they are using medication.

PCOS, Increased Body Mass and Depression

Women with PCOS with increased BMI scores were found to experience higher rates of depression (Barry et al., 2011). Barry et al. (2011) found that studies that did not control for BMI had a greater difference of depression levels between the controlled matches for BMI scores of the PCOS group and the control group. Barry et al. (2011) stated that this further signified the relationship between increased body mass and increased depression in women with PCOS.

Notable in reviewing these studies that examined the relationship between BMI, cardiac risk associated with PCOS, and depression, is the fact that all were conducted outside the state of Mississippi. To date, studies that sampled Mississippi women have not been found. Therefore, this research study seeks to address the question, what is the

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relationship between depression and body mass among Mississippi women with PCOS?

Chapter III

Methodology

Participants

Participant Inclusion Criteria:

      1. 21 years of age or older

      2. Diagnosis of PCOS from a gynecologist or endocrinologist

      3. Currently residing in Mississippi

All women surveyed were members of the online PCOS support group, pcoschallenge.com, a networking website that provides an online community for women with PCOS. Because only about 10% of women have PCOS, it was anticipated that participants would be difficult to encounter in person. With over 21,000 members, pcoschallenge.com provided access to the desired sample. About 106 women from Mississippi, who were members of pcoschallenge.com, were invited to participate in the study. Prospective participants were informed of the inclusion criteria, which was self-reported. Only 10 women chose to participate. Women with chronic diseases were included in the study due to a low response rate. A control group of healthy individuals was not used for comparison because the relationship between BMI and depression in women with PCOS and women without PCOS has been previously compared and well documented by past research (Deeks et al., 2010, Himelein & Thatcher, 2006, Li et al., 2011, Upadhya &Trent, 2003, Zhao et al., 2009).

Informed Consent

Because the current study evaluated depression, participants were required to electronically sign their full name and provide an email address to signify informed

consent (see Appendix A). This was done to decrease possible risks associated with depression and to increase safety of the participants. Full disclosure of identity and contact information allowed the researcher to follow-up with a participant if she scored as depressed. Participants who scored as depressed were emailed by the researcher and advised to immediately seek psychological evaluation from a healthcare provider.

Design

This correlational study was conducted to compare BMI and depression in women with PCOS. Data was obtained by survey (see Appendix B). The study only involved a one-time data collection. The survey consisted of 25 questions, including the CES-D questionnaire. It was estimated that the survey would take about 20 minutes to complete. After the CES-D, five additional questions asked the participant to report her weight, height, comorbidities, age, and race. After taking the survey, the participant's involvement in the research was complete. Data was analyzed using Pearson's correlation coefficient to determine if there is a relationship between body mass and depression in Mississippi women with PCOS.

Depression Rating Questionnaire

In the current study the CES-D was used to measure depression. The CES-D is a valid and reliable 20 item questionnaire that scores depressive symptoms on a scale of 0-60, with a score of $\geq$ 16 indicating a risk for depressive episodes. The CES-D was created to evaluate depressive symptoms in the general population (Radloff, 1977). Using the coefficient alpha, the internal consistency is about .85 for the general population. In patient samples the internal consistency is about .90. Test reliability is moderate (.45-.70). The CES-D has been found to be useful in evaluating depressive

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symptoms in specific populations such as patients with spinal cord injuries (Miller, Anton, & Townson, 2008).

Body Mass Measurement

To measure body mass, BMI was used. BMI is a person's weight in relation to height. It is found by dividing weight in kilograms by the square of height in meters or by dividing weight in pounds by the square of height in inches multiplied by 703. Because the United States uses customary units, and because participants were asked to report their weight in pounds and their height in inches, the latter equation was used to calculate each participant's BMI. For the purpose of this study BMI scores are classified as follows: <18.5 kg/m2 (underweight), 18.5-24 kg/m2 (normal weight), 25-29 kg/m2 (overweight), 30-34 kg/m2 (class I obesity), 35-39 kg/m2 (class II obesity) and ≥40 kg/m2 (class III obesity). The American Medical Association (2010) and WHO (2006) established these BMI classifications.

Procedures

The survey was created and distributed using qualtrics.com, an online survey platform. The researcher created a password protected Qualtrics account through the University of Southern Mississippi to ensure that participant data would be kept secure and confidential.

Originally, an advertisement to recruit participants was posted to various PCOS support group websites. However, this strategy failed to attract participants. A modification form was then submitted to the Institutional Review Board of the University of Southern Mississippi asking if the researcher could individually contact members of

pcoschallenge.com. After receiving approval (Appendix C), the recruitment document (see Appendix D) containing a link to the survey was messaged to eligible participants.

The website, pcoschallenge.com allowed the researcher to identify members from Mississippi by conducting an advanced search by member location. These search results consisted of a list of members who chose to share their location with others. The terms "Mississippi" and "MS" were used to search member location. The term "Mississippi" yielded one search result. The term "MS" yielded 123 search results with only 106 of those results using "MS" as an abbreviation for "Mississippi". After eliminating 17 search results in which "MS" did not stand for "Mississippi," 106 members were invited to participate.

Survey distribution consisted of personally messaging about 106 members of the online PCOS support group, pcoschallenge.com. The personal message included a brief recruitment document, which provided a link to the survey. Participation was completely voluntary. Informed consent required that the participant disclose her full name as well as an email address for follow-up purposes. Over the course of four weeks, five participants completed the survey. At the fourth week mark, nonrespondents were messaged a reminder that the survey was still active. After this reminder five more participants completed the survey. The survey was available for four weeks and three days in total.

After data was collected, the researcher scored the participants' CES-D questionnaires and calculated the participants' BMI. If a participant scored as depressed, she received a follow-up email as previously discussed. Participants' BMI and CES-D scores were analyzed using Pearson's r.

Power

For the current study to have 75% power a minimum of 77 participants were needed. With only 10 participants the current study has 8% power.

Chapter IV

Results

The study included ten participants ranging from 21-54 years of age. Nine participants identified as white. One participant identified as Hispanic or Latino. Six of the ten participants reported having been diagnosed with a condition or conditions other than PCOS. Table 1 provides an overview of the demographics and characteristics of the participants (n = 10).

Table I

Participant Demographics and Characteristics

Age	Number of participants
21-34	8
35-44	1
45-54	1
Race	
White	9
Hispanic or Latino	1
Participants reporting having a condition(s) other than PCOS	
Participants reporting other conditions	6
Participants reporting no other conditions	4

Two participants were classified as normal weight, one participant was classified as overweight, four participants were classified as class I obese, two participants were

classified as class II obese, and one participant was classified as class III obese. Eight

participants were overweight or obese. Five of the ten participants scored $\geq$ 16 on the

CES-D, indicating that they are at risk for depressive episodes. Table II provides

descriptive statistics for all 10 participants (n = 10).

Table II

Descriptive Statistics (n = 10)

	n	Minimum	Maximum	Mean	Standard (Std.) Deviation
BMI	10	23.01	62.02	35.7640	11.40096
Depression	10	8.00	33.00	19.1000	9.55045

SD for depression (SD = 9.55045) and to a lesser extent SD for BMI (SD =

11.40096), indicated a large variation among participants. The mean for BMI was

calculated as 35.7640 while the mean for depression was calculated as 19.1000. Note

that the maximum BMI score of 62.02 and the minimum CES-D score of 8 belong to the

same participant, who for the purpose of discussion will be referred to as participant 10.

Because she possesses the maximum BMI score and the minimum CES-D score,

participant 10 could be classified as an outlier affecting SD in this small sample of

participants.

Table III provides results for Pearson's r correlation with BMI and CES-D scores

from all 10 participants (n = 10). With all 10 participants the BMI scores and CES-D

scores were negatively correlated (r = -0.173). An r of -0.173 indicates a low correlation

between body mass and depression.

Table III

Correlations (n = 10)

	BMI	Depression
BMI Pearson Correlation	1	-0.173
BMI Sig. (2-tailed)		0.633
Depression Pearson Correlation	-0.173	1
Depression Sig. (2-tailed)	.633	

For experimental purposes the data was analyzed again without participant 10's

BMI score or CES-D score. Table IV provides descriptive statistics excluding participant

10 (n = 9). Without participant 10 the maximum BMI changed to 46.80 and minimum

CES-D score changed to 10.00.

Table IV

Descriptive Statistics (n = 9)

	n	Minimum	Maximum	Mean	Std. Deviation
BMI	9	23.01	46.80	32.8467	7.10511
Depression	9	10.00	33.00	20.3333	9.24662

Without participant 10's data, the BMI and CES-D scores for the remaining nine participants were positively correlated (r = 0.294). An r of 0.294 indicates a low correlation between body mass and depression. Table V provides results for Pearson's r correlation excluding participant 10's BMI and CES-D scores (n = 9).

Table V

Correlations (n = 9)

	BMI	Depression
BMI Pearson Correlation	1	0.294
BMI Sig. (2-tailed)		0.442
Depression Pearson Correlation	0.294	1
Depression Sig. (2-tailed)	0.442	

Chapter V

Discussion

Findings

The current study found that five of the participants were experiencing clinically significant depressive symptoms (CES-D score $\geq$ 16), which indicates a prevalence of depression among participants. Previously, it has been reported that about 14–67% of women with PCOS suffer from depression (Dokras, Clifton, Futterweit, & Wild, 2011). Therefore, the 50% rate of depression among this sample was expected.

With the inclusion of participant 10's data, the finding that body mass and depression were negatively correlated does not reflect the findings of past research. In women with PCOS, body mass and depression have been found by researchers to be positively correlated (Barry et al., 2011). According to the current study's findings including participant 10, a woman with an obese body mass has a lesser risk of being depressed than a woman with a normal body mass. This finding also conflicts with the findings of studies that have evaluated the relationship between body mass and depression in the general population (Zhao et al., 2009).

Considering participant 10's outlier value for BMI (BMI = 62.02) as well as her outlier value for depression (CES-D = 8), she may have provided too much variability for such a small sample population (n = 10), thus skewing results. To test this conjecture, the data was analyzed without using participant 10's data.

Excluding participant 10's data, the results indicated a positive correlation between body mass and depression (r = 0.294). These results were congruent with the

findings of past research (Barry et al., 2011). Furthermore, the results indicated a moderate relationship between body mass and depression.

The findings of this study are conflicting. In the current study p > 0.05. Therefore, the results are not clinically significant. However, it is recommended that healthcare providers screen all women with PCOS from Mississippi for depression. Past research as well as the current study found that a correlation between body mass and depression does exist in women with PCOS so healthcare providers should not ignore patients' psychological health. If depression is identified and treated, a woman's PCOS outcome might be improved (Katon & Ciechhanowski, 2002).

Limitations and Cautions

Limitations to this study include a small sample size. The results and conclusions of this study may not be suitable for generalization. Because of the low response rate, women with chronic diseases other than PCOS were included in this study. Due to the fact that chronic disease contributes to depression, the results may have been skewed.

The current study is limited due to the fact that individuals without access to the Internet are not represented. Because personal information was requested over the Internet (full name and email address), the response rate may have been negatively affected (Jeavons, 2000).

Recommendations for Future Study

The current study aimed to evaluate the relationship between body mass and depression in Mississippi women with PCOS. Future research could be conducted to examine cause and effect. Other factors that might contribute to depression in Mississippi women with PCOS including less education, nonprofessional occupations,

smoking history, and taking hormones, could be investigated (Cipkala-Gaffin, Talbott, Song, Bromberger and Wilson, 2012). Future research needs to be conducted with a larger sample to further examine the relationship between body mass and depression in Mississippi women with PCOS.

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THE UNIVERSITY OF SOUTHERN MISSISSIPPI
AUTHORIZATION TO PARTICIPATE IN RESEARCH
PROJECT

Consent is hereby given to participate in the study titled:
Body Mass and Depression among Mississippi Women with PCOS

1. **Purpose:** Thank you for your interest in this research. This study is being done to investigate a possible relationship between body mass and depression among Mississippi women with polycystic ovarian syndrome (PCOS). This study is being performed to fulfill a thesis requirement for graduation from the Honors College of the Univeristy of Southern Mississippi. The results of this study will be published by the University of Southern Mississippi. The results may be published or presented elsewhere in an academic setting.

2. **Description of Study:** Participation involves filling out a 25 question survey that takes no more than 20 minutes to complete. 20 of the 25 questions are multiple choice and include questions about your emotions and lifestyle. The 5 remaining questions ask you to fill out demographic information as well as height and weight. The survey answers will be kept confidential and the answers will only be used for this thesis study. You do not have to answer questions that make you uncomfortable. If you change your mind about participation while taking the survey, you may exit the survey by closing the browser window.

3. **Benefits:** There is no compensation for completion of this study, but know that by participating in this study you will be contributing to existing and future research about PCOS and how it affects mental health.

4. **Risks:** Risks include an increased awareness of your mental state, particularly a state of depression. If this happens to you, you should immediately contact a national crisis hotline such as the United Way Helpline (1-800-233-HELP), or a national suicide crisis hotline such as the National Hopeline Center (1-800-784-2433), and/or your healthcare provider. If you are in a medical emergency or a suicidal crisis please call 911. The University of Southern Mississippi has no mechanism to provide compensation for participants who may incur injuries as a result of participating in research projects. However, efforts will be made to make available the facilities and professional skills at the University.

5. **Confidentiality:** The following steps will be taken to keep information about you confidential and to protect it from unauthorized disclosure: Survey answers will be password protected on the researcher's Qualtrics.com account.

Only the researcher can access this information. When transferring the survey answers to a spreadsheet for data analysis, any identifying information will be excluded (such as your full name). Any identifying information will only be accessible by the researcher through the password protected Qualtrics.com account. Only survey answers will be used in the written thesis. Any identifying information will not be used in the thesis. Answers will be kept confidential. Likewise, any identifying information will be kept confidential. If you choose to email the researcher or the researcher's supervisor, your identifying information will not be released to anyone, and the emails will be promptly deleted after each correspondence. After publication of the thesis all data will be deleted from the researcher's computer and the researcher's qualtrics.com account will be deactivated.

6. **Participant's Assurance:** Whereas no assurance can be made concerning results that may be obtained (since results from investigational studies cannot be predicted) the researcher will take every precaution consistent with the best scientific practice. Participation in this project is completely voluntary, and participants may withdraw from this study at any time without penalty, prejudice, or loss of benefits.

7. **Questions?** Questions concerning the research should be directed to the researcher, Laurel Bruce at laurel.bruce@eagles.usm.edu or to the researcher's supervisor at Elizabeth.Tinnon@.usm.edu. This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5116, Hattiesburg, MS 39406-0001, (601) 266-5997. A copy of this form will be given to the participant.

8. **Signatures:** In conformance with the federal guidelines, the signature of the participant must appear on all written consent documents.

_____   _____

Signature of Research Participant   Date

Please list an email address below so that you can receive a follow-up email from the researcher if you score as being at risk for depression:

Center for Epidemiologic Studies Depression Scale (CES-D), NIMH

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

	During the Past Week			
	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.	☐	☐	☐	☐
2. I did not feel like eating; my appetite was poor.	☐	☐	☐	☐
3. I felt that I could not shake off the blues even with help from my family or friends.	☐	☐	☐	☐
4. I felt I was just as good as other people.	☐	☐	☐	☐
5. I had trouble keeping my mind on what I was doing.	☐	☐	☐	☐
6. I felt depressed.	☐	☐	☐	☐
7. I felt that everything I did was an effort.	☐	☐	☐	☐
8. I felt hopeful about the future.	☐	☐	☐	☐
9. I thought my life had been a failure.	☐	☐	☐	☐
10. I felt fearful.	☐	☐	☐	☐
11. My sleep was restless.	☐	☐	☐	☐
12. I was happy.	☐	☐	☐	☐
13. I talked less than usual.	☐	☐	☐	☐
14. I felt lonely.	☐	☐	☐	☐
15. People were unfriendly.	☐	☐	☐	☐
16. I enjoyed life.	☐	☐	☐	☐
17. I had crying spells.	☐	☐	☐	☐
18. I felt sad.	☐	☐	☐	☐
19. I felt that people dislike me.	☐	☐	☐	☐
20. I could not get "going."	☐	☐	☐	☐

SCORING: zero for answers in the first column, 1 for answers in the second column, 2 for answers in the third column, 3 for answers in the fourth column. The scoring of positive items is reversed. Possible range of scores is zero to 60, with the higher scores indicating the presence of more symptomatology.

Additional Survey Questions

1. List your height:

2. List your weight:

3. Have you been diagnosed with a medical condition/conditions other than PCOS? If so please list it here:

4. Select your age:
a. 21-34 years
b. 35-44 years
c. 45-54 years
d. 54+ years

5. Select your race:
a. Hispanic or Latino
b. American Indian or Native Alaskan
c. Asian
d. Black or African American
e. Native Hawaiian or Other Pacific Islander
f. White or Caucasian

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI.

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.5997 | Fax: 601.266.4377 | www.usm.edu/research/institutional-review-board

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **CH13102803**
PROJECT TITLE: **Body Mass and Depression among Mississippi Woman with Polycystic Ovarian Syndrome**
PROJECT TYPE: **Change to a Previously Approved Project**
RESEARCHER(S): **Laurel Bruce**
COLLEGE/DIVISION: **College of Nursing**
DEPARTMENT: **Nursing**
FUNDING AGENCY/SPONSOR: **N/A**
IRB COMMITTEE ACTION: **Expedited Review Approval**
PERIOD OF APPROVAL: **02/11/2014 to 02/10/2015**

Lawrence A. Hosman, Ph.D.
Institutional Review Board

Appendix D

Recruitment Document

I, Laurel Bruce, am an undergraduate nursing student at the University of Southern Mississippi seeking participants for a thesis study investigating body mass and depression among Mississippi women with polycystic ovarian syndrome (PCOS).

Participation involves filling out a 25 question online survey that should take no more than 20 minutes of your time. To participate you must be 18 or older, you must have received a diagnosis of PCOS from a gynecologist or endocrinologist, and you must be a current resident of the state of Mississippi.

If you agree to participate you will complete the survey at: [hyperlink]. Your survey answers will be kept confidential, and the answers will only be used for this thesis study. Any identifying information will not be included in the thesis and will be kept confidential. You do not have to answer questions that make you uncomfortable. If you change your mind about participation while taking the survey, you may exit the survey.

The results of this study may be published and/or presented in the academic setting. If you have any questions or concerns about the study please contact the researcher, Laurel Bruce, at laurel.bruce@eagles.usm.edu. This research is being conducted under the supervision of Dr. Elizabeth Tinnon who can be contacted at elizabeth.tinnon@usm.edu.

This project has been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820.

Thank you for your consideration,
Laurel Bruce