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Self-Confidence and Hormonal Contraceptive Use

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Abstract

Hormonal contraceptives are widely used to regulate menstrual cycles, alleviate certain symptoms linked to reproductive hormones, and prevent pregnancy. However, women who take hormonal contraceptives may experience significant physical and psychological side effects such as increased rates of depression and changes in self-image. The current study examined self-confidence in women before beginning hormonal contraceptives and two months after using them. These participants were compared to a control group of naturally cycling women who were also assessed twice. I hypothesized that women would experience decreased feelings of self-confidence in several domains of their lives, compared to the naturally cycling women. Results did not support this hypothesis; there was not a significant difference between groups or in self-confidence levels from Time 1 to Time 2 in women. Markedly, the sample size was very small and further research is needed to examine the psychological effects of hormonal contraceptives to better inform women about their reproductive decisions.

Self-Confidence and Hormonal Contraceptive Use

Hormonal contraceptives are a common method women use to control the menstrual cycle and prevent pregnancy (National Cancer Institute, 2023). However, hormonal contraceptives also intervene with the body's natural hormonal balance and therefore have a multitude of side effects. The majority of researched side effects are physical ones, while the psychological effects are yet to be entirely understood. Given that HCs (Hormonal Contraceptives) are interventional medicines and are used by many people, it is important to educate both medical providers and patients about the extent of their psychological influence. One of these psychological effects may be changes in a woman's self-confidence, tied to the physical changes HCs can cause. Self-confidence is an important aspect of one's personality; it is a driving factor for performance, attitude, emotion, competence, and much more (Shrauger & Schohn, 1995). The use of HCs may influence feelings of self-confidence in women by altering hormone levels and psychological states.

Hormonal Contraceptives

Hormonal contraceptives (HCs) are a type of birth control that uses hormones to prevent pregnancy. The Centers for Disease Control and Prevention (CDC) reports that around 23% of women in the United States use HCs. HCs come in many forms, such as pills, implants, shots, vaginal rings, and intrauterine devices. Each of these modalities works by introducing synthetic versions of progesterone and estrogen into the body, which can prevent ovulation and alter the menstrual cycle (Lisofsky et al., 2016). In a naturally cycling woman, the hormones estrogen and progesterone help drive the menstrual cycle and prepare the body for a potential pregnancy. HCs, however, contain synthetic versions of these hormones (Ray, 2019). The induction of these exogenous HCs interferes with the body's natural levels (Medline Plus, 2016). That is, HCs work to interrupt the menstrual cycle by stopping or reducing ovulation, thickening the cervical mucus

to prevent sperm from entering, and thinning the lining of the uterus so a fertilized egg is less able to attach. Hormonal contraceptives inhibit the release of an egg from the ovaries, preventing fertilization and, thus, pregnancy (Contraception, 2017).

As mentioned, there are several distinct types of hormonal contraceptive options. The two most widespread methods are oral contraceptives and hormonal IUDs (intrauterine devices) (Parenthood, 2023). While both these methods are used for similar purposes, to prevent pregnancy or treat symptoms associated with the menstrual cycle, they vary in important ways. Birth control pills work by containing small doses of hormones that help prevent ovulation. Therefore, no egg would be present for the sperm to fertilize, and subsequently fertilization and pregnancy are prevented. The hormones in pills also thicken the cervical mucus, which blocks sperm from reaching an egg. Combination pills contain both estrogen and progestin, while "mini" pills only contain progestin. Pills become effective after ingested and broken down by the digestive system. This releases the hormones into the body and allows them to act to prevent pregnancy and alleviate symptoms of pre-menstrual syndrome. Pills can be up to 91% effective, taking them on a consistent schedule is essential. In addition, the effectiveness of pills can also be altered by certain medications, like antibiotics, which interfere with the hormones they release and could make pregnancy possible (Parenthood, 2016; Indus Healthcare, 2023).

Intrauterine devices (IUDs) are small implants inserted into the uterus. They are generally more effective than oral contraceptives, up to 99%, since they are not dependent on consistent dosage and are not rendered ineffective by other medications. The two main types of IUDs are hormonal IUDs and copper IUDs. Hormonal IUDs use progestin to thicken cervical mucus and prevent ovulation. Copper IUDs create an inflammatory response that makes the uterus inhospitable to sperm (Parenthood, 2020; Indus Healthcare, 2023). The extent of IUD

effectiveness varies based on the type and brand, but their pregnancy prevention can last for 3-4 years.

The hormonal IUD releases its hormones directly into the uterus, in contrast to the pill being digested to release its hormones. This makes the absorption of hormones from the IUD a more localized process, while the digestion of the pill is a more widespread process (Wieder & Pattimakiel, 2010). Localized hormonal release and subsequent absorption essentially means that the hormones are released very close to the cells meant to absorb them, i.e., in the vaginal wall. Since the IUD is placed in the uterus; it releases its hormones in that area which are then directly absorbed into the bloodstream to affect cells near the uterus and cause cervical mucus to thicken. The pill acts in a less direct way. It is taken orally, broken down in the digestive system, and then its hormones enter the bloodstream. Since these hormones are released further away from the reproductive system, they must pass through more of the bloodstream and past more systems to reach their target destination (Informed Health, 2006). These opposing methods of hormonal release and absorption, have implications in past research. Studies such as the one conducted by Skovlund et al. (2016) have found that the IUD has a stronger positive association with antidepressant use and a diagnosis of depression in women than other HC types. This finding was discussed in the context of dosage rather than method of administration; meaning that the constant and direct dosage of hormones provided by the IUD may lead to more magnified side effects than oral contraceptives (Skovlund et al., 2016).

Effects of Hormonal Contraceptives

Due to the significant impact HCs have on fertility, it is imperative to acknowledge all potential effects that may arise from their use. By modulating the release of natural estrogen and progesterone, which are responsible for triggering cramping and ovulation, using HCs as medical

interventions can mitigate some of the negative symptoms of the menstrual cycle. Some benefits of using HCs include lessened symptoms of endometriosis, dysmenorrhea, and pre-menstrual syndrome (Hogue et al., 2017). HCs can also be used to alleviate acne, menstrual pain, and menstrual bleeding (Davtyan, 2000).

Despite their effectiveness in preventing pregnancy and regulating menstruation, there are also adverse side effects that are often overlooked. These physiological side effects include acne, nausea, irregular menstruation, headaches, sore breasts, and weight gain, as reported by Contraception (2017). There is also the risk of blood clotting, dizziness, and decreased libido (Kingsberg et al., 2022). These side effects are due to the hormonal changes associated with HC use altering the body's natural function. Many women still choose to use hormonal contraceptives despite the risk of these adverse physical effects, and are often informed of them before beginning use.

However, HC side effects are not limited to physical manifestations but also have psychological implications. Rarely, the psychological side effects are fully explained, despite available empirical evidence to support their existence (Skovlund et al., 2016). The use of synthetic hormones in HCs has been found to have crucial psychological effects (Kulkarni, 2007). Hormonal contraceptive use has been empirically related to clinical diagnoses of depression and anxiety as well as other mental health problems such as increased stress. Research done by Lewis et al. (2019), found that hormonal contraceptive use can affect both stress and mood. Another study saw oral contraceptive users display more symptoms of depression, mood swings, and fatigue than naturally cycling women (Klaus & Cortés, 2015). Skovlund et al. (2016) showed that all types of HCs were positively correlated with depression diagnoses and antidepressant use within the first 2-4 months of beginning birth control. One

study found that HC use altered circulating cortisol levels and was associated with increased psychological stress and depressive symptoms (Hertel et al., 2017). The research also suggests that the use of HCs may increase the risk of developing depression, potentially relating to the side effects such as mood and weight gain (Skovlund et al., 2016).

The underlying mechanism behind these effects can be attributed to altering certain neurotransmitter levels in the brain, which regulate mood and behavior. Specifically, monoamine oxidase, an enzyme responsible for removing neurotransmitters such as norepinephrine, serotonin, and dopamine from the brain, has been found to increase during HC use. This increase in monoamine oxidase subsequently leads to decreased serotonin levels, resulting in symptoms such as depression, anxiety, and sleep disturbances (Skovlund et al., 2016). In addition, studies have also linked oral contraceptive use with elevated cortisol levels, a steroid hormone released from the adrenal cortex that mediates the body's stress response, metabolism, inflammatory, and immune function (Thau et al., 2021).

This research attempts to shed light on the range of side effects that women may experience upon initiating hormonal contraceptive use, and how these may affect their social psychology, particularly self-confidence. Being fully aware of how medications, including HCs, may impact a woman is imperative. Women rarely fully know how many changes they may undergo when suppressing their hormones using these methods. Therefore, women seeking to initiate hormonal contraceptive use for any reason, including pregnancy prevention or acne treatment, should be informed of the possible changes they could experience to make informed decisions. Hormonal contraceptive use has been empirically related to clinical diagnoses of depression and anxiety as well as other mental health problems such as increased stress. The multitude of side effects, both physical and psychological, that have been related to HC use

warrant further investigation. The possibly intense changes a woman may go through after taking HCs are important to understand, and it can be inferred that these aforementioned changes could have far reaching effects on a woman's thoughts and perceptions. This evidence altogether implies that women may also experience subclinical yet also protentially detrimental changes in psychological processess, such as their self-confidence.

Self-Confidence

Self-confidence is a multidimensional construct that plays a key role within an individual's self-concept (i.e., how they feel about themselves), exerting a substantial impact on their everyday activities as well as major accomplishments (Shrauger, 1995). The literature portrays self-confidence and positive self-perceptions as essential determinants of favorable and healthy conduct, as well as psychological well-being (Shrauger, 1995). Studies have shown that self-confidence generates positive emotions, facilitates concentration, stimulates goal-setting, enhances the intensity of mental processes, and positively influences the level of effort dedicated to a task (Hays et al., 2007; Weinbeg & Goud, 2011; Vicar, 2018; Harwood et al., 2004). Conversely, individuals who experience higher levels of stress and depression are likely to have lower levels of self-confidence (Zietlow et al., 2014). Therefore, it can be inferred that an individual's self-confidence can influence their emotional well-being and mental state.

Furthermore, the potential impact of self-confidence on psychology is not limited to emotion and mental well-being. For example, Greenacre et al. (2014) conducted a series of studies and found a positive association between social self-confidence and interpersonal influence. Specifically, as social self-confidence increases, individuals tend to perceive themselves as having a greater influence on others. The authors utilized a scale that allowed them to measure an individual's general feelings of self-confidence. Their findings demonstrated that

higher levels of self-confidence were linked to greater social skills and influence. Similarly, Bénabou et al. (2000) found that higher self-confidence is associated with increased motivation and a more positive self-concept. Research has also shown that self-confidence is linked to cognitive processes. Kleitman and Stankov (2007) assessed different components of intellectual confidence and found that individual levels of self-confidence can significantly impact thinking and memory. These studies underscore the importance of self-confidence, as it influences several areas of life, such as learning, thought, and social interactions.

These influences have been broken down into different domains to adequately assess feelings of self-confidence in different areas of life. Specifically, Shrauger & Schohn (1995), studied self-confidence in college students by assessing areas found to be most important to them. These areas were: Academic, Appearance, Athletics, Romantic, Social, and Speaking, as well as two general scales, General Confidence Level and Mood. The findings indicated that though people's general self-confidence indicates important things such as how positively they view their futures, their confidence level varies significantly across different areas of function. Furthermore, the six subscales studied were independent of one another, each one related to general confidence level, and each one contributed significantly to overall confidence. Therefore, assessing general self-confidence alone may not be as indicative of a person's entire perspective as accounting for confidence in specific areas.

Levels of self-confidence may vary according to situational factors (i.e., emotional or mental state) (Bleidorn et al., 2016; Chusmir and Koberg, 1991). For example, people diagnosed with depression or anxiety have displayed diminished feelings of self-confidence compared to those without these diagnoses. For example, a study of new mothers concluded that post-partum depression was strongly negatively correlated with maternal self-confidence (Aydemir & Onan,

2020). In addition, many psychological disorders can contribute to altered feelings of self-confidence, either through hormonal or neurological changes (Horrell et al., 2014).

Given the interconnectedness of the endocrine system throughout the body, it may be inferred that hormones play a role in feelings of self-confidence in individuals. These hormones may be cortisol, dopamine, serotonin, or others, that control emotion and feelings of self-confidence (Baixauli Gallego, 2017). Endocrinology explains that self-confidence is increased when serotonin, dopamine, and oxytocin levels are heightened, hormones that influence mood and behavior. Spiking estrogen levels increase the production of hormones and chemicals that boost mood and, in turn, self-confidence and self-esteem (Albert & Newhouse, 2019). Research suggests that estrogen levels are positively correlated with serotonin, and perhaps, consequently, higher self-confidence; therefore, women with suppressed estrogen may experience increased emotional sensitivity and lower self-confidence (Lokuge et al., 2011). Inadequate (suppressed or altered) estrogen levels have been linked to negative mood, anxiety, and depression, all of which could subsequently alter one's self-confidence levels (Zhang et al., 2021). HCs act by inhibiting women's endogenous reproductive hormone production and replacing them with synthetic hormones, interfering with normal estrogen levels and possibly feelings of self-confidence associated with additional hormonal changes.

Primary side effects associated with oral HCs include mood alterations, reduced sex drive, and weight gain, driven by this interference with natural processes and introduction of synthetic hormones into the body. All of these side effects, can be linked in some way to altered self-confidence or perceptions. It has been found that women using HCs exhibit more symptoms of borderline personality disorder, including problems with impulse control, interpersonal relationships, and self-image (DeSoto et al., 2003; Welling, 2013). HC users also reported higher

rates of depression, psychological stress responses, and altered social behavior and confidence, which could adversely affect mood (Kulkarni, 2007; Roche et al., 2013; Henderson & Shively, 2004). Sex drive and sexual behavior are also influenced by the hormonal changes associated with HC use. HC users display reduced sexual interest and functioning and report decreased libido (Caruso et al., 2004). This finding may be related to the reported self-image issues found in previous studies, since there is a significant association between low libido and depressive symptoms in women (Reed et al., 2007).

All of this evidence creates a clear connection between hormonal contraceptive use and individual self-confidence. Not only do HCs come with a myriad of side effects that could negatively impact both the physical and psychological well-being of women, but they also make critical changes to hormone levels that directly mediate feelings of self-confidence. The multitude of implications that the hormonal changes accompanying HCs have given backing to the intent of the current study.

Current Research

The evidence reviewed above suggests that there may be a link between HC use and women's self-confidence, which has yet to be tested empirically. In this research, I hypothesized that the hormonal changes associated with hormonal contraceptive use may impact women's self-confidence in various areas of their lives. Specifically, I hypothesized that the hormonal changes induced by initiating oral hormonal contraceptive use would influence women's self-confidence, particularly in social, romantic, and physical domains. Because oral HC use is linked to depression, weight gain, and mood changes, I also hypothesized that self confidence in social and romantic situations, as well as confidence in physique, would decrease in women after they begin using oral HCs. This research intended to examine women's self-confidence before

starting to use oral contraceptives and IUDs and looking at the change after 2-3 months of use. This was then compared to self-confidence in women not taking HCs also surveyed 2-3 months apart as a control.

Method

Participants

Participants were women starting hormonal contraceptive use (hormonal IUDs, Nexplanon implant, or oral contraceptives). Women were eligible if they were initiating hormonal contraceptive use for the first time or switching between forms of hormonal contraceptives. Women who were naturally cycling were eligible to enroll in the control group. The recruitment process involved various channels, including the Pat Walker Health Center, and the distribution of graphics via email and social media platforms to target potential participants. Naturally cycling (NC) women specifically were recruited via a pre-screener survey that documented gender and hormonal contraceptive use.

A total of thirteen women participated in and successfully completed both parts of the study (M_{age} = 20.85 years, SD = 3.67): 7 women were in the Oral Contraceptive group (one woman discontinued the use of the pill before the second survey, so her data was not included), 3 women were in the Naturally Cycling group, and 3 women were in the IUD group. Participants rated their political views ($M_{politics}$= 4.69, SD= 2.59) and religion ($M_{religion}$= 5.38, SD= 2.72) on a scale of 1-10, with 1 being very liberal and not religious at all, and 10 being very conservative and very religious. These results indicated that most participants were near the middle of the scale for both political and religious orientations. One participant reported their race as Black/African American; one reported their race as Asian, and eleven reported their race as White. Three women described themselves as mostly heterosexual, nine as only heterosexual,

and one as asexual. The sample was relatively evenly split for relationship status, six women were not in a relationship, and seven were. None of the participants had children.

Procedure

To determine the eligibility of the participants for the study, an interest form was administered. This form collected various pieces of information, including the participant's age, use of hormonal contraceptives, and the intended date of starting or changing their contraceptive method. After assessing the eligibility of the participants, those who were eligible were provided with a link to the first survey. This survey was required to be completed one week prior to the commencement of their birth control method, and a $20 gift card was given as an incentive for completing it. Women switching from one form of birth control to another (ex. Pill to IUD) were also eligible to complete the study. The second survey was completed by the participants two months after the start of their new contraceptive plan, for which they received a $25 gift card. Therefore, the participants completed the survey both before starting or switching to a birth control method (T1) and 2-3 months after (T2). If a participant was naturally cycling, she was also required to follow the same steps as those who started or switched to hormonal contraceptives.

Materials

To measure self-confidence, I used the Personality Evaluation Inventory (PEI; Shrauger, 1995). The PEI consists of six specific content scales, including Academic, Appearance, Athletics, Romantic, Social, and Speaking, as well as two general scales, General Confidence Level and Mood. The scale includes seven-item subscales for each category, with scores ranging from 1 (*Disagree strongly)* to 7 (*Agree strongly)*. Examples of the survey questions for each category are displayed below in Table 1.

Table 1

Example items for each subscale on PEI Self-Confidence Inventory

Subscale	Example Item
Academic	"Academic performance is an area in which I can show my competence and be recognized for my achievement."
Appearance	"It bothers me that I am not better looking"
Athletics	"Athletics is an area in which I excel."
Romantic	"I have no difficulty maintaining a satisfying romantic relationship"
Social	"I am comfortable mingling in social settings"
Speaking	"Talking in front of a group makes me uncomfortable."
General Confidence	"I often feel unsure of myself even in situations I have successfully dealt with in the past."
Mood	"I am happier right now than I have been in weeks."

Table 2

Cronbach's Alpha Values for Each Subscale at T1 and T2

Subscale	T1	T2
Academic	0.74	0.85
Appearance	0.83	0.81
Athletics	0.65	0.67
Romantic	0.84	0.88
Social	0.64	0.78
Speaking	0.70	0.60
General Confidence	0.78	0.71
Mood	0.73	0.88

Lower scores on the subscales indicated a lack of confidence, whereas higher scores indicated higher levels of confidence. Each subscale was scored at T1 and T2 for each participant, and then a difference was calculated to determine if there was a change over time. In addition to the PEI, participants were asked to report any side effects they experienced after

using hormonal contraceptives for 2-3 months, such as weight gain, acne, and depressive symptoms.

Results

A one-way ANOVA was performed to compare the means between the three groups (NC, pill, and IUD) and to test the hypothesis that women who began using hormonal contraceptives would experience a decreased level of self-confidence between Time 1 (before starting hormonal contraceptives) and Time 2 (two to three months after HC use) compared to the naturally cycling women. Results did not support the hypothesis. There was not a significant difference between participants' reported feelings of self-confidence from T1 to T2. Women among the three groups did not experience changes in general self-confidence from Time 1 to Time 2, $F(2,9) = 0.212$, $p = 0.813$. They also did not experience changes in the subscales of romantic self-confidence $F(2,9) = 0.119$, $p = 0.889$, appearance $F(2,9) = 0.414$, $p = 0.673$, or social self-confidence $F(2,9) = 1.04$, $p = .394$. There was also not a significant difference between any of the groups (pill, IUD, and naturally cycling women). There were some insignificant differences between groups, most notably in Figures 6, 7, and 8, where the differences are apparent. There was a small decrease in self-confidence seen in Figure 2 for the pill group from Time 1 to Time 2, and an overall decrease shown in Figures 6 and 8 by negative values. The small increases experienced by the IUD group in Figures 1, 3, 4, 5, 7, and 8 were also noted. All the data in the Figures is statistically insignificant, but these small differences seen in the Figures were noted.

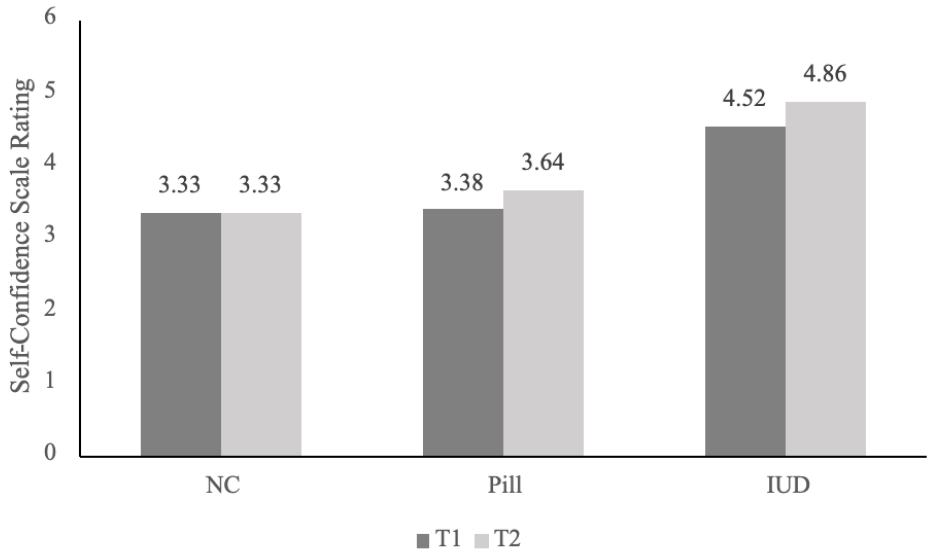

Figure 1. General Self-Confidence Subscale Ratings from Time 1 to Time 2 for Naturally Cycling (NC) group, Oral Contraceptive group (Pill), and Intrauterine Device (IUD) group.

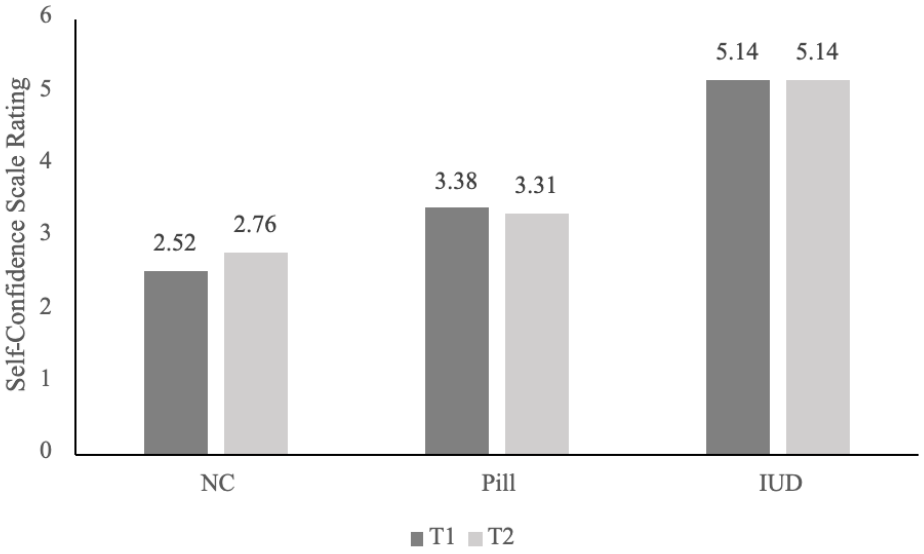

Figure 2. Romantic Self-Confidence Subscale Ratings from Time 1 to Time 2 for Naturally Cycling (NC) group, Oral Contraceptive group (Pill), and Intrauterine Device (IUD) group.

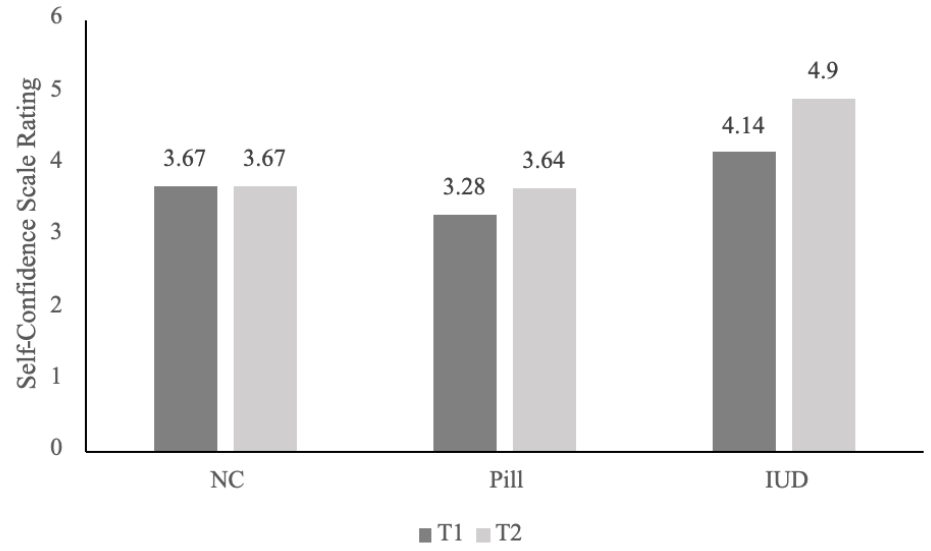

Figure 3. Appearance Self-Confidence Subscale Ratings from Time 1 to Time 2 for Naturally Cycling (NC) group, Oral Contraceptive group (Pill), and Intrauterine Device (IUD) group.

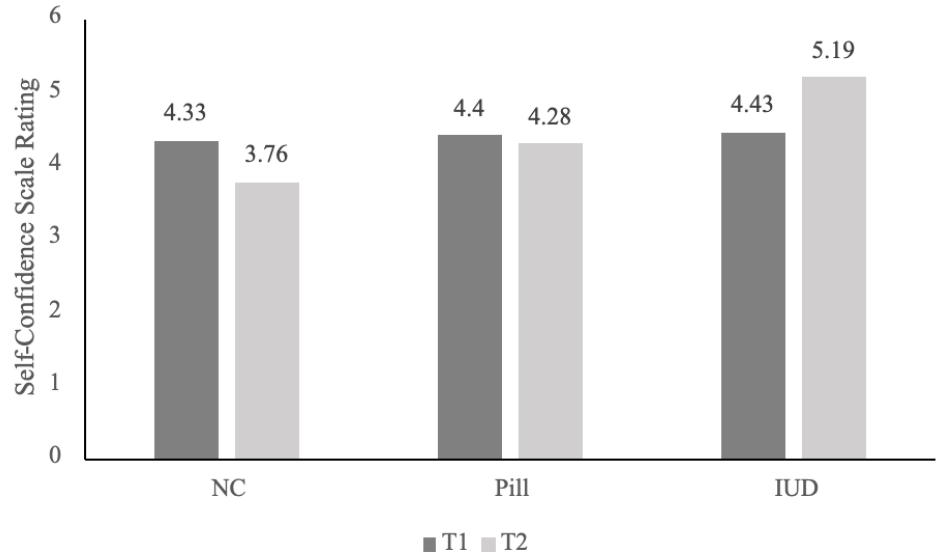

Figure 4. Social Self-Confidence Subscale Ratings from Time 1 to Time 2 for Naturally Cycling (NC) group, Oral Contraceptive group (Pill), and Intrauterine Device (IUD) group.

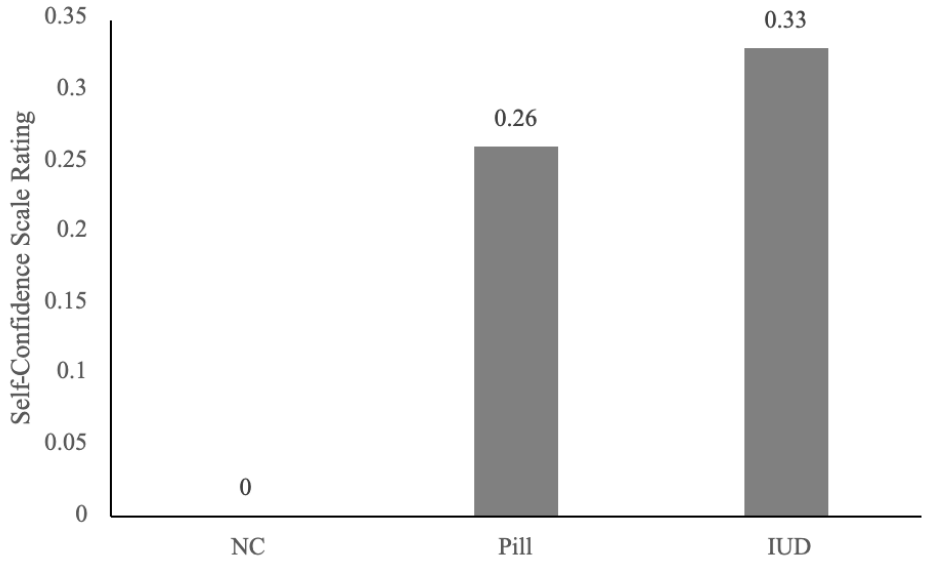

Figure 5. General Self-Confidence Subscale Mean Scores from Time 1 and Time 2 for Naturally Cycling (NC) group, Oral Contraceptive group (Pill), and Intrauterine Device (IUD) group.

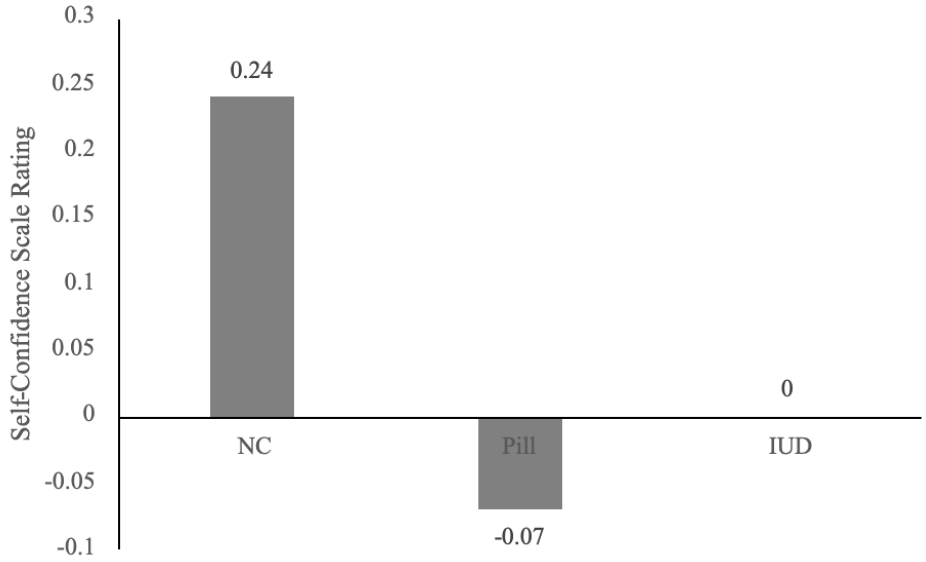

Figure 6. Romantic Self-Confidence Subscale Mean Scores from Time 1 and Time 2 for Naturally Cycling (NC) group, Oral Contraceptive group (Pill), and Intrauterine Device (IUD) group.

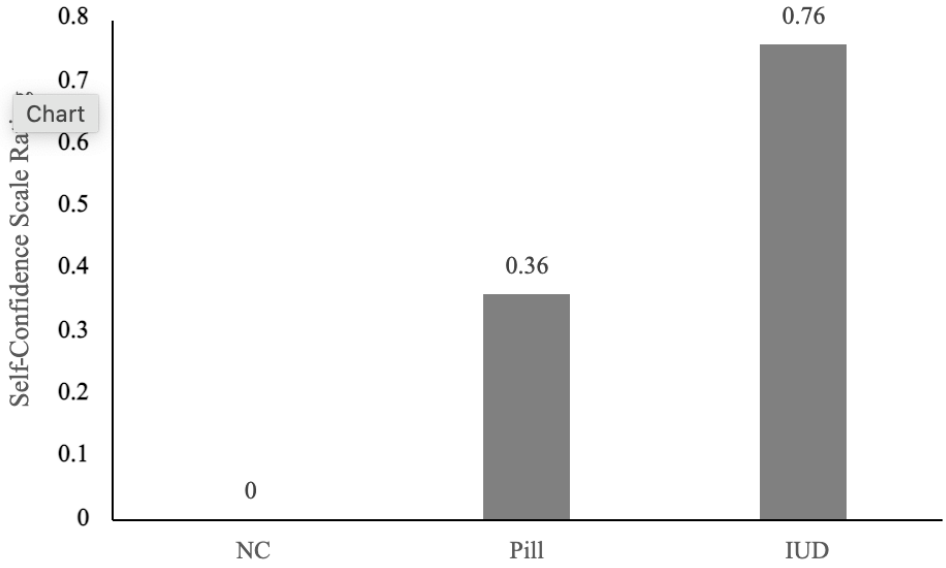

Figure 7. Appearance Self-Confidence Subscale Mean Scores from Time 1 and Time 2 for Naturally Cycling (NC) group, Oral Contraceptive group (Pill), and Intrauterine Device (IUD) group.

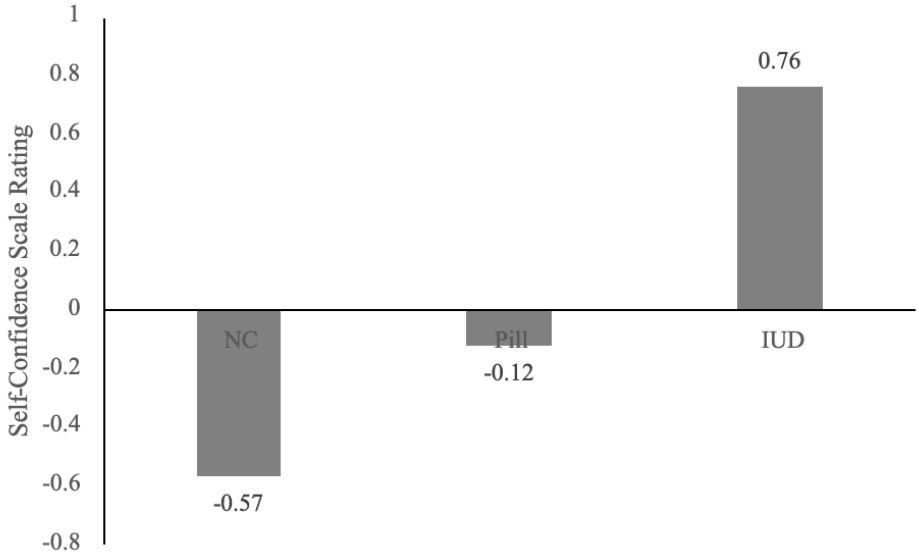

Figure 8. Social Self-Confidence Subscale Mean Scores from Time 1 and Time 2 for Naturally Cycling (NC) group, Oral Contraceptive group (Pill), and Intrauterine Device (IUD) group.

I also analyzed participant-reported symptoms after starting birth control, looking for the highest reported side effects. Due to the small sample size, participant responses were not significant. However, they did show experiences of fatigue (*M*= 56.67, *SD*= 29.92) bloating (*M*= 49.58, *SD*= 25.05), period-related mood changes (*M*= 52.67, *SD*= 31.57), acne (*M*= 49.91,

SD= 29.81), anxiety (*M*= 54.17, *SD*= 29.7), depressed mood (*M*= 47.83, *SD*= 31.76), and mood swings (*M*= 45.83, *SD*= 30.91). These mean scores being the largest out of all symptoms surveyed on a scale of 0-100. The IUD participants had the highest mean scores of the HC users for the symptoms of period-related mood changes (*M*= 58.67, *SD*= 9.45), fatigue (*M*= 62.33, *SD*= 17.62), acne (*M*= 63.0, *SD*= 5.66), anxiety (*M*= 43.33, *SD*= 22.19), depressed mood (*M*= 39.0, *SD*= 18.52), and highest overall (including the NC group) for bloating (*M*= 51.0, *SD*= 12.12). Pill users experienced the higher score of HC users on mood swings (*M*= 45.83, *SD*= 32.25). Naturally cycling women reported the greatest overall mean scores for period-related mood changes, acne, anxiety, and depressed mood. The highest scores being depressed mood (*M*= 80.67, *SD*= 17.47), Anxiety (*M*= 91.33, *SD*= 13.32), and period-related mood changes (*M*= 67.0, *SD*= 42.53). One participant did show some significant negative symptoms after starting hormonal contraceptives, but her data is not included in the means above because she stopped taking her HC before taking the Time 2 survey.

Discussion

This study intended to expand knowledge about the possible psychological effects of hormonal contraceptives and the implications these effects may have for women seeking out birth control methods. Specifically, this study's goal was to understand if and how hormonal contraceptive use affected self-confidence in women before and after starting birth control. It was a within-subject design that surveyed women both before and after beginning hormonal contraceptive use. The studied sample included three women who had the IUD inserted and six women who began taking the pill. These women completed the survey before beginning their respective HC method (Time 1) and two months afterward (Time 2). A group of three naturally cycling women acted as the control; each one completed the survey twice, two months apart.

Based on previous research, I hypothesized that the side effects associated with HC use would cause women to experience diminished self-confidence after beginning birth control. Because oral HC use is linked to depression, weight gain, and mood changes, I also hypothesized that self-confidence in social and romantic situations, as well as confidence in their physique, would decrease in women after they began using HCs. The results failed to support these hypotheses. There were no significant decreases in any of the self-confidence subscales surveyed for women before and after they began taking hormonal contraceptives. Furthermore, participant-reported symptoms did not yield any significant results.

Previous studies have found that using hormonal contraceptives can introduce symptoms of anxiety and depression in women. Oral contraceptive users displayed more symptoms of depression, mood swings, and fatigue than naturally cycling women (Klaus & Cortés, 2015). Furthermore, research has shown that estrogen is positively correlated with serotonin and implies that women with suppressed or altered estrogen levels (women using HCs) may experience more emotional sensitivity and lower self-confidence (Guerrieri, 2014). This evidence inspired the hypothesis that women beginning hormonal contraceptives would experience diminished feelings of self-confidence over time. Despite the support past findings may have given to this hypothesis, no significant change in self-confidence ratings from T1 to T2 was detected. The results indicated that hormonal contraceptives did not have a negative effect on feelings of self-confidence in women after two months of use. The results also showed no significant difference in self-confidence ratings or changes in ratings between the IUD women and women taking the pill. These results may differ from previous evidence due to the small sample size tested.

The findings of this research imply there is much more that can be done to study the effect hormonal contraceptives have on women. Though the data was not statistically significant,

there were some small decreases in participant-rated self-confidence seen and some small differences between groups (IUD vs. Pill vs. NC). This suggests the possibility of changes seen in a much larger sample size that could yield more significant results.

The participant reported side effects though statistically insignificant, can suggest possible trends in future research. The highest total means of all symptoms surveyed were fatigue, bloating, period-related mood changes, acne, anxiety, depressed mood, and mood swings. These symptoms are consistent with the conclusions past research on how hormonal contraceptives can affect those taking them. The IUD participants had higher mean scores than oral contraceptive users for all the symptoms besides mood swings. This may relate to findings from Skovlund et al. (2016) that indicated IUD users may experience stronger side effects from the hormones released, due to their dosage and location. The finding that naturally cycling women scored highest overall on all symptom categories except bloating, may be explained in the context of hormonal contraceptives alleviating some symptoms of the menstrual cycle. Some women take HCs to help lessen the side effects of the menstrual cycle (acne, bloating, irregular periods, etc.) (Hogue et al., 2017). The NC women in this study were not taking hormonal contraceptives, and therefore may have experienced more magnified pre-menstrual symptoms that lead to their responses.

Limitations and Future Directions

Study limitations can be attributed to the small sample size of participants that successfully completed both parts of the study. Participants were mainly recruited via online advertisement and through the Pat Walker Health Center at the University of Arkansas. These recruitment methods may have limited the number of eligible women who knew about the study. One participant completed her T1 survey before beginning the oral contraceptive use- but then

stopped taking the pill by the time she took T2. Because of this, her data was omitted. The largest group in the study were women taking the pill; we struggled to get an equal number of pill and IUD users, since the pill is generally more popular (Parenthood, 2016). Women getting the Nexplanon implant were also eligible for the study, but none were able to be recruited. The small participant groups made it difficult to collect any significant data.

Furthermore, the study could have been limited due to a lack of timing control. Though participants were instructed to complete Survey 1 a week before beginning their birth control method and Survey 2 was meant to be taken two months after their start date, there were instances where this did not occur. Some participants completed Survey 1 late, even up to three days after beginning their HC method, and some took Survey 2 at a later time. Participants were sent the surveys at the correct time and also sent reminders to complete them, but a grace period was given for Survey 1, where participants could still complete it up to three days after beginning their HC method. This may have lead to inaccurate ratings of initial self-confidence. Not all participants completed both Survey 1 and 2 in a timely manner after recieving them. Response time could be improved by creating more strict deadlines and perhaps incentivisiting on-time survey completion. In the future, researchers should try to exert more control over survey distrubution and participant response time in order to increase internal validity.

Future studies should try to recruit more participants, a larger sample to represent each group. Obtaining more participants can be done by adding new recruitment strategies such as expanding to more doctors offices, making flyers for women's clinics in hospitals, and having more people help distribute information about the study. They could also expand the inclusion criteria to non-college women or send the survey outside a specific region (i.e. sending it throughout Arkansas and not just the Northwest Area). This may also make any results more

applicable to the general population, increasing external validity. A larger sample size could also help researchers see if there are different side effects and changes seen between groups (Pill vs. IUD vs. Implant).

Future studies could also benefit from the implications of the side-effect results. They may attempt to understand side-effects of hormonal contraceptives further, as well as compare the difference in magnitude of the side effect experienced in IUD users versus oral contraceptive users. It would be interesting to study if there is a significant difference in side effects experienced in the same woman, taking different types of HCs. For example, testing participant symptoms before they switch HC type and again afterwards. This might give more insight into whether different HC types are associated with different or stronger side effects.

This study attempted to analyze the effect of hormonal contraceptive use on self-confidence in women. Past research has shown how hormonal contraceptives can come with both physical and psychological side effects, but none have specifically looked into self-confidence. Results indicated that there was no significant change in women's self-confidence from before starting to two months after taking hormonal contraceptives and that they may experience a variety of other symptoms.

Hormonal contraceptives are a widely used type of medical treatment. As such, it is essential their influences on people taking them is fully understood. The variety of negative side-effects previously researched, implies that there could be an impact on the self-confidence women feel in various areas of life. Despite the lack of statistical significance in this study, it is essential that researchers continue to pursue knowledge in this realm. Future studies should continue to explore the psychological effects of hormonal contraceptive use so as to better inform both patients and their providers.

References

Albert, K. M., & Newhouse, P. A. (2019). Estrogen, stress, and depression: cognitive and biological interactions. *Annual review of clinical psychology*, *15*, 399-423.

Aydemir, S., & Onan, N. (2020). The relationship between maternal self-confidence and postpartum depression in primipara mothers: a follow-up study. *Community mental health journal*, *56*, 1449-1456.

Baixauli Gallego, E. (2017). Happiness: role of dopamine and serotonin on mood and negative

emotions. *Emergency Medicine (Los Angeles), 2017, vol. 6, num. 2, p. 33-51.*

Bénabou, Roland and Tirole, Jean, Self Confidence: Intrapersonal Strategies (February 2000). Woodrow Wilson School Working Paper No. 209, Available at SSRN: https://ssrn.com/abstract=220788 or http://dx.doi.org/10.2139/ssrn.220788

Bleidorn, W., Arslan, R. C., Denissen, J. J., Rentfrow, P. J., Gebauer, J. E., Potter, J., & Gosling, S. D. (2016). Age and gender differences in self-esteem—A cross-cultural window. *Journal of personality and social psychology*, *111*(3), 396.

Caruso, S., Agnello, C., Intelisano, G., Farina, M., Di Mari, L., and Ciancia, A. (2004). Sexual behavior of women taking low-dose oral contraceptive containing 15 µg ethinylestradiol/60 µg gestodene. Contraception, 69, 237-240.

Chusmir, L. H., & Koberg, C. S. (1991). Relationship between self-confidence and sex role identity among managerial women and men. *The Journal of Social Psychology*, *131*(6), 781-790.

Davtyan C. (2000). Evidence-based case review. Contraception for adolescents. *The Western Journal of Medicine, 172*(3), 166–171. https://doi.org/10.1136/ewjm.172.3.166

DeSoto, M. C., Geary, D. C., Hoard, M. K., Sheldon, M. S., and Cooper, L. (2003). Estrogen fluctuations, oral contraceptives, and borderline personality. Psychoneuroendocrinology, 28, 751-766.

Greenacre, L., Tung, N. M., & Chapman, T. (2014). Self-confidence, and the ability to influence. *Academy of Marketing Studies Journal*, *18*(2), 169.

Henderson, J. A., and Shively, C. A. (2004). Triphasic oral contraceptive treatment alters the behavior and neurobiology of female cynomolgus monkeys. Psychoneuroendocrinology,

29, 21-34.

Harwood, C., Cumming, J., & Fletcher, D. (2004). Motivational profiles and psychological skills use within elite youth sport. *Journal of applied sport psychology*, *16*(4), 318-332.

Hays, K., Maynard, I., Thomas, O., & Bawden, M. (2007). Sources and types of confidence identified by world class sport performers. *Journal of applied sport psychology*, *19*(4), 434-456.

Hertel, J., König, J., Homuth, G., Van der Auwera, S., Wittfeld, K., Pietzner, M., . . . Grabe, H. J. (2017). Evidence for stress-like alterations in the hpa-axis in women taking oral contraceptives. *Scientific Reports*, *7*(1). doi:10.1038/s41598-017-13927-

Hogue, C. J., Hall, K. S., & Kottke, M. (2017). Hormonal Contraceptives Improve Women's Health and Should Continue to Be Covered by Health Insurance Plans. *Annals of Internal Medicine*, *167*(9), 666–667. https://doi.org/10.7326/M17-2011

Horrell, L., Goldsmith, K., Tylee, A., Schmidt, U., Murphy, C., Bonin, E., . . . Brown, J. (2014). One-day cognitive–behavioural therapy self-confidence workshops for people with depression: Randomized controlled trial. *The British Journal of Psychiatry*, *204*(3), 222-233. doi:10.1192/bjp.bp.112.121855

InformedHealth.org [Internet]. Cologne, Germany: Institute for Quality and Efficiency in Health Care (IQWiG); 2006-. Contraception: Hormonal contraceptives. [Updated 2017 Jun 29]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK441576/

IUD vs. The Birth Control Pill: Understanding the differences. IUD vs. the Birth Control Pill: Understanding the Differences: Indus Healthcare: Family and Internal Medicine Practice. (2023). Retrieved April 1, 2023, from https://www.indushealthcare.org/blog/iud-vs-the-

birth-control-pill-understanding-the-differences

Kingsberg, S., Loving, J., Alex, H., Bernick, B., & Graham, S. (2022). Women and Healthcare Professionals' Understanding of their Concerns of Birth Control Side Effects. *The Journal of Sexual Medicine*, *19*(8), S9.

Klaus, H., & Cortés, M. E. (2015). Psychological, social, and spiritual effects of contraceptive steroid hormones. *The Linacre Quarterly*, *82*(3), 283–300. https://doi.org/10.1179/2050854915Y.0000000009

Kleitman, S., & Stankov, L. (2007). Self-confidence and metacognitive processes. *Learning and individual differences*, *17*(2), 161-173.

Kulkarni, J. (2007). Depression as a side effect of the contraceptive pill. Expert Opinion on Drug Safety, 6, 371-374.

Lewis, C. A., Kimmig, A. S., Zsido, R. G., Jank, A., Derntl, B., & Sacher, J. (2019). Effects of hormonal contraceptives on mood: A focus on emotion recognition and reactivity, reward processing, and stress response. *Current Psychiatry Reports*, *21*(11). doi:10.1007/s11920-019-1095-z

Lisofsky, N., Riediger, M., Gallinat, J., Lindenberger, U., & Kühn, S. (2016). Hormonal contraceptive use is associated with neural and affective changes in healthy young women. *Neuroimage*, *134*, 597-606.

Lokuge, S., Frey, B. N., Foster, J. A., Soares, C. N., & Steiner, M. (2011). Depression in women: windows of vulnerability and new insights into the link between estrogen and serotonin. *The Journal of clinical psychiatry*, *72*(11), 3297.

Medline Plus. (2016). *Birth control pills - overview: MedlinePlus Medical Encyclopedia*.

Medlineplus.gov. https://medlineplus.gov/ency/article/007460.htm

NCI Dictionary of Cancer terms. National Cancer Institute. (n.d.). Retrieved March 14, 2023, from https://www.cancer.gov/publications/dictionaries/cancer-terms/def/hormonal-contraception

Parenthood, P. (2016). *Birth control pills: The pill: Contraceptive Pills*. Planned Parenthood. Retrieved April 1, 2023, from https://www.plannedparenthood.org/learn/birth-control/birth-control-pill#:~:text=The%20hormones%20in%20the%20pill,like%20a%20sticky%20security%20guard.

Parenthood, P. (2020). *Iud Birth Control: Info about Mirena & Paragard iuds*. Planned Parenthood. Retrieved April 1, 2023, from https://www.plannedparenthood.org/learn/birth-control/iud

Parenthood, P. (n.d.). Birth Control Methods and Options: Types of birth control. Retrieved January 15, 2023, from https://www.plannedparenthood.org/learn/birth-control

Ray, L. (2019). *What is the menstrual cycle? More than just your period.* Helloclue.com; Clue. https://helloclue.com/articles/cycle-a-z/the-menstrual-cycle-more-than-just-the-period

Reed, S. D., Newton, K. M., LaCroix, A. Z., Grothaus, L. C., & Ehrlich, K. (2007). Night sweats, sleep disturbance, and depression associated with diminished libido in late menopausal transition and early postmenopause: baseline data from the Herbal Alternatives for Menopause Trial (HALT). *American journal of obstetrics and gynecology*, *196*(6), 593-e1.

Roche, D. J. O., King, A. C., Cohoon, A. J., and Lovallo, W. R. (2013). Hormonal contraceptive use diminishes salivary cortisol response to psychosocial stress and naltrexone in healthy women. Pharmacology Biochemistry and Behavior, 109, 84- 90.

Shrauger, J. S., & Schohn, M. (1995). Self-confidence in college students: Conceptualization, measurement, and behavioral implications. *Assessment*, *2*(3), 255-278.

Skovlund, C. W., Mørch, L. S., Kessing, L. V., & Lidegaard, Ø. (2016). Association of Hormonal Contraception with Depression. *JAMA Psychiatry*, *73*(11), 1154–1162. https://doi.org/10.1001/jamapsychiatry.2016.2387

Thau, L., Gandhi, J., & Sharma, S. (2021). Physiology, cortisol. In *StatPearls [Internet]*. StatPearls Publishing.

Vičar, M. (2018). Self-confidence, commitment and goal-setting in Czech athletes at different performance levels. *Acta Gymnica*, *48*(3), 130-137.

Weinberg, R. S., & Gould, D. (2011). Foundations of sport and exercise psychology. Champaign, Human Kinetics.

Welling, L. L. (2013). Psychobehavioral effects of hormonal contraceptive use. *Evolutionary Psychology*, *11*(3), 147470491301100315.

Wieder, D. R., & Pattimakiel, L. (2010). Examining the efficacy, safety, and patient acceptability of the combined contraceptive vaginal ring (NuvaRing). *International journal of women's health*, *2*, 401–409. https://doi.org/10.2147/IJWH.S6162

Zhang, J., Shao, S., Ye, C., & Jiang, B. (2021). A clinical study of the effect of estradiol valerate on sleep disorders, negative emotions, and quality of life in perimenopausal women. *Evidence-Based Complementary and Alternative Medicine*, *2021*.

Zietlow, A. L., Schlüter, M. K., Nonnenmacher, N., Müller, M., & Reck, C. (2014). Maternal self-confidence postpartum and at pre-school age: the role of depression, anxiety disorders, maternal attachment insecurity. *Maternal and Child Health Journal*, *18*, 1873-

1880.