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State of the Field Analysis: Contraceptive Methods & Research

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## **Introduction**

In the United States, contraceptive medications and devices are widely used by women to prevent pregnancy. In fact, 99% of women in the United States who have had sexual intercourse have used a form of contraception at some point (Daniels, 2016, p.6). Considering this is so universal, there is still a great need for education about the contraceptive methods available. Contraception is key in giving women agency to maintain sexual relationships while also preventing unintended pregnancies. However, very little prospective research has been conducted in this field, and patients deserve to be better informed about the efficacy, safety and potential side effects of different contraceptive options, especially regarding their effects on mental health.

Contraceptive methods are widely used in the United States, ranging from hormonal medications, single-use barrier methods and long-acting reversible methods to prevent pregnancy. In an extensive survey conducted by the Center for Disease Control (CDC), researchers deduced that between 2011 and 2013, 61.7% of Americans used some form of contraception (Daniels, 2016, p. 9). From personal interviews, researchers revealed that the most common method of contraception between 2011-2013 was the pill, with 25.9%, followed by 25.1% using female sterilization, 15.3% only using male condoms and 11.6% using long-acting reversible contraception, or LARCs (Daniels, 2016, p. 1). Additionally, Daniels compared this data with data from 2002 and 2006-2010 to show recent contraceptive trends. Most notably, from the 2006-2010 to the 2011-2013 time period, LARC usage increased from 3.8% to 7.2% (Daniels, 2016, p. 4). LARC prevalence has increased in recent years as more patients learn about their high efficacy and safety.

## **Analysis**

The prevalence of contraception in the United States is important when analyzing the effects of hormonal birth control on a woman's health because many people are implicated by contraceptive medicine. There is a huge market for contraceptive medicines and devices in the United States. Pharmaceutical and medical device companies should have more incentive to develop safe, effective contraceptives with minimal side effects because the market for this type of product is so extensive in the United States. Because some forms of birth control are significantly more effective and have fewer side effects than others, researchers may want to look into the factors that drive patients to choose each method of birth control (Bitzer, 2017, p. 2).

Although it is widely used, hormonal birth control methods may be detrimental to patients, especially with regards to mental health. In 2016, Schaffir conducted a research analysis of MEDLINE studies over the past 30 years focusing on how combined hormonal contraception (CHC) impact mood. CHCs use a mix of both estrogen and progesterone to regulate women's menstrual cycles and prevent pregnancy (Bastianelli, 2016, p. 315). Interestingly, both estrogen and progesterone are hormones hypothesized to increase susceptibility to depression (Skovlund, 2016, p. 1155). Fluctuations in estrogen levels are thought to trigger depressive symptoms, and patients with major depression generally have low levels of estradiol compared to healthy patients (Skovlund, 2016, p. 1155). Hormones regulate emotions. Considering many contraceptives release synthetic hormones directly into the woman's body to impact her endocrine system and prevent pregnancy, more research should be done on how exactly these impact women's mental health.

In his review, Schaffir (2016) noted correlations between CHCs and mood, but was too limited by the lack of prospective studies on this matter to make causal statements about the relationship (p. 347). Often, patients who discontinue use of CHCs reportedly do so because of adverse changes in their mood and mental wellbeing. Interestingly, women who received lower doses in their CHC pills reported pointedly better premenstrual moods compared to those prescribed higher doses. (Schaffir, 2016, p. 351) CHCs with high androgenic progestin levels were most clearly linked with negative changes in mood (Schaffir, 2016, p. 351). However, these changes were often so subtle they were not reflected in depression rating scores collected by researchers. While Schaffir deduced that most women using CHCs do not experience adverse mood changes, a subset of the population consistently do. Because of this particularly sensitive subset of the population, Schaffir focused on what distinct features distinguish this group of women. In a randomized study of women who previously had CHC induced mood changes, patients prescribed CHC were consistently more depressed than those administered the placebo (Schaffir, 2016, p. 353). Furthermore, fMRI results showed they exhibited greater reactivity in brain regions involved with mood (Schaffir, 2016, p. 353). Although this points to a physiological cause of CHC-linked depression, researchers have not yet deciphered what this is exactly.

This points to a need for more prospective studies to test the direct affect of CHCs on patient mood. Although Schaffir analyzed three decades of studies conducted by other researchers, he was only able to make correlations, but not causal claims from his analysis. Also, because each study analyzed by Schaffir was conducted differently and

there were no consistent criteria for depression ratings across each study, it was impossible for him to accurately make comparisons.

Some researchers have published articles regarding the negative side effects associated with taking hormonal birth control pills. In 2004, Stephen Robinson analyzed the data from seven studies conducted in the early 2000s and noted the increased rates of depression, anxiety, fatigue, neurotic symptoms, divorce, tranquilizer use, sexual dysfunction, compulsion, anger and negative menstrual effects in women taking hormonal contraceptives (p. 268). Robinson found it “reasonable to hypothesize, given the present data, that contraceptive activity itself is inherently damaging to women,” but was unsure if this should be attributed to physiological or psychological mechanisms (p. 268). Since some of the comparisons of the effects of hormonal contraceptives and placebo pills did not result in statistically significant differences, Robinson could not conclude that the negative side effects were pharmacological. Like Schaffir, Robinson ultimately called for more research to be conducted on the topic.

Directly in response to the lack of prospective, random, controlled studies on the impact of combined oral contraceptives, COCs, on mood, in 2016 researcher Cecilia Lundin conducted a multi-center, double-blind, randomized, placebo-controlled study involving 202 women (p. 135). Lundin conducted this study because, since its inception, significant numbers of patients have discontinued use of birth control pills due to adverse side effects impacting mood and depression. Lundin utilized the DRSP, or the Daily Record of Severity of Problems, to study the impact of COCs on mood and found that COC use was associated with small, but statistically significant, increases in anxiety,

irritability and mood swings during intramenstrual phase. Surprisingly, Lundin also noted a distinct improvement in mood for patients during the premenstrual phase.

Furthermore, similar to Schaffir's findings about some women being predisposed to issues while on COCs, Lundin found that women with previous adverse hormonal contraceptive experience reported a significantly greater worsening of mood in the intramenstrual phase compared to normal women. Consistently, about 4-10% of women taking COCs report increased anxiety, irritability and mood swings (Lundin, 2016, p. 136). Lundin's research is interesting, as it is one of the few prospective studies about the impact of hormonal contraceptives on mood. Again, although she noted just a small subgroup of women who responded particularly negatively to the COCs, this statistically significant change is worth studying. This distinct and persistent subset of about 4-10% of women on combined hormonal birth control medication begs the question of what is causing these issues. As Lundin (2017) discussed, since the worsening mood was noted in the intermenstrual phase, this may be due to "lower endogenous estradiol levels in the oral contraceptive users," which would be another topic to study in future research (p. 141). Estradiol is known to be associated with positive mood changes, so a deficiency could likely be the cause of this mood worsening. Again, this is an area that could be expanded upon by researchers in the coming years. With a greater understanding of the exact process or mechanism causing depression, researchers could potentially learn how to prevent these detrimental side effects.

In 2016, Skovlund conducted a prospective cohort study to analyze whether there is a positive correlation between hormonal birth control and future antidepressant use and diagnosis of depression. Over the course of 13 years, Skovlund studied over 1 million

women between 15-34 years of age to test for a relationship. Ultimately, Skovlund and her associates discovered that there is a positive correlation between hormonal contraceptives and depression, with adolescents being extremely vulnerable to depressive symptoms. In fact, “compared with nonusers, users of combined oral contraceptives experienced a 1.8-fold higher rate (95% CI, 1.75-1.84) of first use of antidepressants; users of progestin-only pills experienced a 2.2-fold higher rate (95% CI, 1.99-2.52) (Skovlund, 2016, p. 1157). These statistically significant increases in antidepressant use suggest a correlation between contraceptives and depression.

Millions of women take CHCs in the United States, and further research should be done to expose more about the impact of hormonal birth control on mental health. This impact is important to consider not solely for the well being of the patients, but also for its impact on the efficacy of the contraceptive method. If patients are displeased with the medication due to adverse side effects, they are more likely to not take the medication as often as they should, which can lead to unplanned pregnancies (Ehsanpour, 2012, p. 235). Furthermore, mood issues and depression will impact many aspects of patients’ lives, likely leading to decreased affectivity and productivity.

As an alternative option to combined hormonal contraceptive medications, there are non-hormonal, reversible forms of birth control that are extremely effective. Long-Acting Reversible Contraceptives include both intrauterine devices (IUDs) and subdermal implants (SDIs) and are “recommended as first-line contraception for the majority of women by the American College of Obstetrics and Gynecology” according to Dickerson in her 2013 article analyzing satisfaction rates of LARCs (Dickerson, 2013, p. 701). Despite this fact, IUDs are used significantly less than other forms of birth control

in the US. IUDs are over 99% effective, likely in large part because they do not rely on user input (Lopes da Silva-Filho, 2016, p. 213). Unlike other forms of birth control that rely heavily on user participation, such as taking a daily pill or using a barrier method during sex, IUDs hardly require any effort after placement (Paragard). According to Dickerson's (2013) research, 90% of pregnancies that occur despite the use of some form of contraception are the result of user error (p. 701). Along with this increased efficacy, non-hormonal IUDs are desirable because they can be used for up to 10 years.

IUDs are highly effective and also well received by the women who choose to utilize the device. Dickerson (2013) found that nearly 73% of women using an LARC were somewhat or very satisfied with their contraceptive choice and only a quarter of women opted for early device removal (p. 704). This rate of 73% approval is much higher than most other forms of contraceptive methods, with the continuation rates for short-acting reversible contraceptives and hormonal patches being only 10.9% and 32.7% respectively (Dickerson, 2013, p. 704).

## **Discussion**

IUDs are a great option for women wanting to prevent unplanned pregnancies, being the most effective method of reversible contraception available today, but they are not widely accepted yet. Some women have concerns about the side effects that resulted from intrauterine devices in the past, but these issues have since been improved (Doyle, 2008, 990). The lack of acceptance of IUDs, despite their safety and efficacy, points towards a need for more contraceptive education in the United States.

As studied by Chang in 2016, the patient's attitude going into their intrauterine device (IUD) placement significantly impacted their satisfaction rate. In a retrospective

chart review, Chang et al. (2016) studied the duration of IUD use in patients who initiated discussions about IUDs compared to patients whose physicians suggested the devices. Interestingly, “74% of clinician-initiated IUDs and only 28% of patient-initiated IUDs were removed before 6 months” (p. 25). This huge difference points towards the notion that patient education and attitude significantly impacts the acceptance of the device. Patients who sought IUDs on their own also kept the devices for an average of 473 days longer than patients who were advised to use the device by their physicians (Chang, 2016, p. 26). Since IUDs are not widely used yet, patients are likely to be uninformed about their efficacy and safety and instead look towards other methods of contraception for their first form of birth control. Currently, only 6% of American women using contraception are using IUDs (Chang, 2016, p. 4). This may be due to a number of cultural and educational reasons, as these significantly impact patients’ interest in treatment options.

By focusing on who suggested the IUD placement, this research highlights the significance of patient education, attitude and expectations. This is important to note because “although safe and effective, IUDs are underutilized in the United States” (Chang, 2016, p. 24). The findings of this report suggest that if patients went into their IUD placement with more knowledge about the safety and efficacy of the product, as well as knowledge of possible side effects, they would be more likely to use the device longer.

However, one valid concern for patients is the risk of adverse side effects such as device expulsion, uterine perforation, infection or heavy bleeding resulting from the IUD (Jatlaoui, 2017, p. 17). Although the chance of each of these occurring is extremely low,

the risks involved with the IUDs do likely influence patients' willingness to get the device. However, without women doing extensive research on their options, the general population may not realize that the risk of these adverse events "may not [even] be clinically meaningful," since so few patients are implicated (Jatlauoi, 2017, p. 17). If more of the population were aware of how safe and effective IUDs have proven to be, it is more likely that patients would switch to this method of birth control. This suggests the need for more education in the United States regarding contraceptive options. Cultural beliefs and social norms significantly impact the way people choose contraceptive methods (Yiu, 2017, p.7).

All in all, the lack of prospective studies and knowledge about how contraceptives impact mental health is surprising considering the widespread use of contraceptive medicine in the United States. Millions of women take hormonal contraceptives each year, and many are likely impacted by negative mood changes. These patients deserve further research to be conducted on how these drugs are impacting their brains and emotions. Furthermore, patients should have easy, accurate access to information about different contraceptive methods available. The lack of current knowledge on the topic should be seen as an opportunity for growth and future research.

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