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THE IMPACT OF HORMONAL ORAL CONTRACEPTION ON MENTAL HEALTH

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ABSTRACT

Background: Combined oral contraceptives (COCs) are widely used for contraception and the treatment of several gynecological disorders. However, their potential effects on women's mental health remain controversial.

Objective: To review current evidence regarding the association between COC use and mental health outcomes, including depression, anxiety, mood changes, suicidal behavior, and cognitive function.

Methods: A narrative review of the literature was conducted using the PubMed/MEDLINE database. Systematic reviews, meta-analyses, randomized controlled trials, and large observational studies published predominantly between 2015 and 2026 were included.

Results: Current evidence does not support a universal association between COC use and adverse psychiatric outcomes. Randomized trials generally report neutral effects on depression and anxiety, whereas some observational studies suggest a modest increase in the risk of depressive symptoms and suicidal behavior, particularly among adolescents and during the first months of use. Psychological responses appear to be influenced by age, psychiatric history, hormonal sensitivity, contraceptive formulation, and duration of treatment.

Conclusions: The effects of combined oral contraceptives on mental health are complex and highly individualized. Most women tolerate COCs without clinically significant psychiatric adverse effects; however, some may be more susceptible to mood-related symptoms. Individualized contraceptive counseling and careful monitoring, particularly during treatment initiation, are recommended. Further prospective studies are needed to clarify the effects of specific contraceptive formulations on mental health.

KEYWORDS

Oral Contraceptives, Hormonal Contraception, Mental Health, Depression, Anxiety, Mood

CITATION

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1. Introduction

Oral hormonal contraception is one of the most widely used methods of pregnancy prevention worldwide. The prevalence of oral contraceptive use among women of reproductive age varies substantially across regions, ranging from approximately 5% to over 20%, depending on the population studied. Combined oral contraceptives (COCs) have remained the most frequently prescribed form of hormonal contraception for over 60 years. [(1)] [(2)]

Despite their high contraceptive efficacy, COCs are associated with adverse effects. Population-based studies indicate that approximately 20-40% of users report adverse symptoms within the first months of use, and around 5-10% discontinue therapy within the first year, most commonly because of side effects involving both somatic symptoms and psychological tolerability. [(3)]

COCs are widely used not only for contraception, but also for the treatment of hormone-dependent disorders such as polycystic ovary syndrome (PCOS), endometriosis, dysmenorrhea, and manifestations of hyperandrogenism, including hormonally mediated acne. At the same time, long-term use has been associated with well-documented protective effects, including a reduced risk of ovarian and endometrial cancer. [(4)]

From a clinical safety perspective, the most well-established serious adverse effect of COCs is an increased risk of venous thromboembolism. [(5)] Beyond these somatic effects, growing attention has been directed toward the potential impact of exogenous hormones on the central nervous system, including mood regulation, stress reactivity, and emotional functioning. [(6)]

Depressive and anxiety disorders are among the most common psychiatric conditions in women of reproductive age and coincide with the period of highest exposure to hormonal contraception. Symptoms such as low mood, irritability, and emotional lability are among the most frequently reported reasons for discontinuation of COCs, underscoring their potential clinical relevance. Nevertheless, findings regarding the association between COC use and mental health outcomes remain inconsistent. [(7)]

An additional source of variability may be the heterogeneity of contraceptive formulations, including different types of estrogens and progestogens with distinct receptor-binding profiles and neurobiological effects. In recent years, increasing attention has been paid to the possibility that hormonal composition, rather than COC exposure itself, may be a key determinant of individual susceptibility to mood-related adverse effects. [(8)] [(9)]

The aim of this review is to summarize current evidence on the impact of combined oral contraceptives on women's mental health, including depression, anxiety disorders, cognitive function, and suicidal behavior, and to discuss potential neurobiological mechanisms and clinical modifiers of response.

2. Methodology

This narrative review was conducted to summarize current evidence on the effects of combined oral hormonal contraception on women's mental health. The review focused on the association between combined oral contraceptives (COCs) and depression, anxiety disorders, mood changes, suicidal behavior, and cognitive functioning, as well as potential neurobiological mechanisms and factors influencing individual susceptibility to psychiatric adverse effects.

A literature search was performed using the PubMed/MEDLINE database. Additional relevant publications were identified through the reference lists of eligible articles. The search included combinations of the following keywords: oral contraceptives, combined oral contraceptives, hormonal contraception, mental health, depression, anxiety, mood, suicide, cognition, neurobiology, progestins, estrogen, and women's health.

Priority was given to systematic reviews, meta-analyses, randomized controlled trials, large prospective cohort studies, and high-quality observational studies published predominantly between 2015 and 2026. Earlier landmark publications were included when considered essential for understanding physiological mechanisms or providing historical context.

3. Mechanism of action of combined oral hormonal contraception

Combined oral contraceptives (COCs) are biphasic hormonal preparations containing a synthetic estrogen, most commonly ethinyl estradiol (EE), and less frequently 17 β -estradiol or estetrol, together with a progestogen characterized by heterogeneous chemical structure and receptor-binding profile. Progestogens are classified, among others, as 19-nortestosterone derivatives (e.g., levonorgestrel, desogestrel, gestodene), progesterone derivatives (e.g., chlormadinone acetate, dienogest), and spironolactone derivatives (e.g., drospirenone). They differ in affinity for progesterone receptors (PR-A/PR-B), androgen receptors (AR), and, indirectly, estrogen receptors, as well as glucocorticoid (GR) and mineralocorticoid receptors (MR), which determines their clinical and systemic pharmacological profile. [(10)] [(11)]

The primary contraceptive mechanism of COCs is suppression of the hypothalamic-pituitary-ovarian (HPO) axis through inhibition of the physiological pulsatility of gonadotropin-releasing hormone (GnRH) secretion in the hypothalamus. Under normal physiological conditions, pulsatile GnRH release drives rhythmic secretion of pituitary gonadotropins, namely follicle-stimulating hormone (FSH) and luteinizing hormone (LH). Exogenous administration of estrogen and progestogen induces negative feedback at both hypothalamic and pituitary levels, resulting in reduced amplitude and frequency of GnRH pulses and subsequent suppression of FSH and LH secretion. [(12)]

FSH suppression prevents recruitment and selection of the dominant ovarian follicle, whereas inhibition of the mid-cycle LH surge blocks ovulation. [(13)] This results in functional anovulation, which represents the primary mechanism of contraceptive efficacy. In parallel, ovarian steroidogenesis is substantially reduced, including decreased aromatase activity in granulosa cells, leading to markedly lower endogenous estradiol production. The absence of corpus luteum formation results in suppression of the luteal phase and near-complete elimination of endogenous progesterone secretion. [(14)]

COCs also exert important peripheral effects that are independent of central hypothalamic-pituitary regulation. Progestogens alter cervical gland function by modulating mucin gene expression, including MUC4 and MUC5B, resulting in increased viscosity, decreased hydration, and altered structural properties of cervical mucus. This impairs sperm penetration and survival within the cervical canal. [(15)] In the endometrium, COCs suppress estrogen-dependent proliferation through downregulation of estrogen receptor expression (ER α /ER β), reduced VEGF expression, and impaired angiogenesis, leading to a thin, atrophic, and decidualized endometrial lining with reduced receptivity for implantation. [(16)]

In addition, COCs may influence fallopian tube function by modulating smooth muscle contractility and altering prostaglandin receptor expression, potentially affecting gamete transport. Consequently, their contraceptive efficacy is based on a multi-level mechanism involving inhibition of ovulation, impairment of sperm transport, and reduction of endometrial receptivity. [(17)] [(15)]

A key pharmacodynamic consequence of COC use is the complete reorganization of ovarian steroidogenesis. Physiological cyclical fluctuations of estradiol and progesterone are replaced by relatively stable exogenous hormone levels, resulting in a pharmacologically induced “pseudo-follicular state.” This elimination of endogenous hormonal cycling represents a fundamental deviation from the natural endocrine rhythm and may have systemic neuroendocrine implications. [(18)]

From a neuroendocrine perspective, COCs may modulate the hypothalamic-pituitary-adrenal (HPA) axis. Estrogens and progestogens influence corticotropin-releasing hormone (CRH) expression in the paraventricular nucleus of the hypothalamus and alter glucocorticoid receptor (GR) sensitivity in the hippocampus and prefrontal cortex. These changes may affect HPA axis feedback regulation and cortisol stress responsivity. In parallel, sex steroids modulate GABAergic, glutamatergic, and monoaminergic neurotransmission, providing a biological basis for potential effects on emotional regulation. [(19)]

In the central nervous system, estrogen receptors (ER α and ER β) and progesterone receptors are widely expressed in regions involved in mood and cognition, including the hippocampus, amygdala, prefrontal cortex, and hypothalamus. Estrogens regulate serotonin transporter (SERT) expression, modulate tryptophan hydroxylase (TPH2) and tyrosine hydroxylase activity, and influence monoamine oxidase A (MAO-A) activity. Progesterone and its neuroactive metabolites, particularly allopregnanolone, act as positive allosteric modulators of the GABA-A receptor, enhancing tonic inhibitory neurotransmission. Suppression of endogenous hormonal fluctuations during COC use may therefore alter the dynamic regulation of these neurotransmitter systems. [(20)] [(21)]

It is important to emphasize that COCs represent a pharmacologically heterogeneous class. Differences in estrogen dose and, more importantly, in the receptor-binding and functional profile of progestogens, including androgenic, anti-androgenic, glucocorticoid, and mineralocorticoid activity, may translate into distinct central nervous system effects. [(22)] This heterogeneity is particularly relevant when considering potential associations between COC use and mental health outcomes, which are discussed in the following sections.

4. Results

The potential effects of oral hormonal contraception on mental health have attracted increasing scientific attention in recent years. Although most women use oral contraceptives without experiencing clinically significant psychiatric symptoms, a subset of users may develop mood-related adverse effects. The available evidence remains heterogeneous, with findings varying according to study design, contraceptive formulation, age, and individual susceptibility. The following sections summarize current evidence regarding the association between oral hormonal contraception and depression, anxiety disorders, mood changes, suicidal behavior, and cognitive functioning.

4.1 Depression

Depression is one of the most prevalent psychiatric disorders worldwide and a leading cause of disability, substantially affecting quality of life, social functioning, and overall health. According to current diagnostic criteria, it is characterized by persistent low mood and/or loss of interest or pleasure, accompanied by symptoms such as sleep and appetite disturbances, impaired concentration, fatigue, feelings of worthlessness or excessive guilt, psychomotor changes, and recurrent thoughts of death or suicide. Given its multifactorial etiology, involving genetic, neurobiological, hormonal, psychological, and environmental factors, depression has become one of the principal psychiatric outcomes investigated in studies evaluating the safety of hormonal contraception. [(23)]

The study "Hormonal contraceptive use and depressive symptoms: systematic review and network meta-analysis of randomised trials" evaluated the effect of hormonal contraceptive use on the severity of depressive symptoms in women. Its primary aim was to determine whether the association between hormonal contraception and mood deterioration observed in observational studies could be confirmed in randomized controlled trials, which provide stronger evidence for causal inference. The analysis included randomized studies comparing different hormonal contraceptive methods with placebo, non-hormonal contraceptive

methods, or other hormonal preparations. The primary outcome was the change in depressive symptom severity after approximately three treatment cycles. The authors found no evidence that hormonal contraceptive use was associated with a significant increase in depressive symptoms compared with placebo or non-hormonal methods. The findings were consistent regardless of contraceptive formulation, estrogen dose, or type of progestogen. However, the authors emphasized that randomized trials predominantly enrolled healthy women, whereas individuals with a history of mood disorders were generally excluded, limiting the generalizability of the findings to women with pre-existing psychiatric conditions. They concluded that the available evidence from randomized controlled trials does not support a causal relationship between hormonal contraceptive use and increased depressive symptoms during short-term follow-up. Nevertheless, they highlighted the need for further studies with longer follow-up periods and inclusion of women at increased risk of psychiatric disorders. [(24)]

Kraft et al., in their systematic review and meta-analysis entitled "Symptoms of Mental Disorders and Oral Contraception Use", primarily evaluated the occurrence of depressive symptoms, anxiety disorders, and other clinically relevant psychopathological symptoms. Most included studies did not demonstrate a significant association between oral contraceptive use and deterioration of mental health in the general population. However, the authors noted that adolescents initiating hormonal contraception may represent a subgroup with increased susceptibility to depressive symptoms. Evidence regarding progestogen-only contraceptives remained inconclusive, although some studies suggested a higher risk of psychiatric symptoms compared with combined oral contraceptives. [(25)]

Another important study investigating the association between hormonal contraceptive use and depressive disorders was the recent systematic review by Jahanfar et al. This work included 43 studies evaluating the association between hormonal contraceptive use and mental health outcomes in women of reproductive age. Regarding depression, the authors reported a slight increase in the risk of depressive symptoms among women without a previous history of mental disorders, as demonstrated in both randomized controlled trials and observational cohort studies. In contrast, among women with pre-existing mental disorders, hormonal contraceptive use was associated with a modest reduction in depressive symptoms. The review also suggested that the risk of depression may vary according to contraceptive method, with higher risks reported for hormonal intrauterine devices, implants, and patch/ring methods, whereas evidence for oral contraceptives remained inconsistent. Overall, the authors concluded that the relationship between hormonal contraception and depression is complex and should be interpreted with caution because of substantial heterogeneity among the included studies and differences in study populations and contraceptive formulations. [(26)]

Overall, current evidence does not support a universal causal relationship between oral hormonal contraception and the development of depression. While randomized controlled trials have generally not demonstrated a clinically significant increase in depressive symptoms among healthy adult women, findings from observational studies and some systematic reviews suggest that certain subgroups, particularly adolescents and women with increased susceptibility to mood disorders, may be at greater risk of adverse mood effects. The heterogeneity of study populations, contraceptive formulations, outcome measures, and follow-up periods continues to limit the comparability of available evidence. Therefore, the relationship between oral hormonal contraception and depression should be considered complex and multifactorial rather than universally applicable. In clinical practice, individualized contraceptive counseling, careful assessment of psychiatric history, and close monitoring during the initial months of treatment remain essential to optimize both contraceptive efficacy and mental well-being.

4.2 Anxiety disorders

Anxiety disorders are among the most common mental health conditions worldwide and constitute a major cause of impaired psychosocial functioning and reduced quality of life. They comprise a heterogeneous group of disorders characterized by excessive, persistent, and disproportionate fear or anxiety accompanied by behavioral and physical symptoms, including restlessness, muscle tension, impaired concentration, sleep disturbances, palpitations, and autonomic hyperarousal. Similar to depression, anxiety disorders arise from a complex interaction of genetic, neurobiological, hormonal, psychological, and environmental factors. Given the recognized influence of sex hormones on emotional regulation and stress response, the potential association between hormonal contraception and anxiety disorders has become an area of increasing scientific interest. [(27)]

A systematic review by Ciritel et al. (2026), including 10 studies involving women with previously diagnosed anxiety and mood disorders, found that hormonal contraceptive use was not consistently associated

with worsening anxiety symptoms. In most cases, anxiety symptoms remained stable or showed slight improvement. However, the authors recommended increased caution when prescribing hormonal contraception to adolescents and women initiating combined oral contraceptive use. [(28)]

Kowalczyk et al. (2024) investigated the association between oral hormonal contraceptive use and the severity of anxiety symptoms, worry, and perceived stress in women. The findings suggested that the impact of hormonal contraception on emotional functioning is complex and depends on both contraceptive formulation and individual psychological susceptibility. No clear association was identified between hormonal contraceptive use and increased anxiety symptoms; however, some women appeared to experience differences in perceived anxiety and stress levels. The authors emphasized the importance of individualized patient assessment, particularly in women with a predisposition to anxiety disorders. [(29)]

Another noteworthy study was conducted by Graham et al., who reviewed the potential impact of hormonal contraceptives on anxiety-related mechanisms, with particular emphasis on fear extinction, a key process underlying exposure-based therapies for anxiety disorders. Fear extinction depends on neural circuits involving the prefrontal cortex, hippocampus, and amygdala, which are strongly regulated by ovarian hormones. The authors highlighted evidence from both animal models and human studies suggesting that hormonal contraceptive use may impair fear extinction learning by suppressing endogenous ovarian hormone fluctuations and altering hormonal and molecular pathways involved in emotional memory processing. These findings raise the possibility that hormonal contraception may influence not only vulnerability to anxiety symptoms but also responsiveness to psychological treatments such as exposure therapy. However, the authors emphasized that current evidence remains preliminary and that further clinical studies are required to determine the relevance of these mechanisms in women with diagnosed anxiety disorders. [(30)]

Overall, current evidence does not support a clear causal relationship between hormonal contraceptive use and the development or worsening of anxiety disorders. Available studies suggest that, in most women, hormonal contraceptives do not significantly increase anxiety symptoms, although individual variability in psychological response remains important. The potential effects of hormonal contraception may depend on contraceptive formulation, hormonal sensitivity, and pre-existing vulnerability to anxiety disorders. Emerging evidence also indicates that hormonal contraception may influence anxiety-related neurobiological mechanisms, including emotional memory processing and fear extinction pathways; however, these findings remain preliminary and require further investigation. Therefore, an individualized approach to contraceptive counseling, particularly among women with a history of anxiety disorders or increased psychiatric vulnerability, remains essential.

4.3 Suicidal behavior

The potential impact of hormonal contraception on women's mental health extends beyond depression and anxiety disorders to include more severe clinical outcomes, such as suicidal behavior. Given the complex interactions between sex hormones, emotional regulation, and vulnerability to psychiatric disorders, several studies have investigated the association between hormonal contraceptive use and the risk of suicide attempts and completed suicide.

In a large prospective cohort study, Skovlund et al. (2018) reported that hormonal contraceptive use was associated with an increased risk of a first suicide attempt, particularly during the first months after treatment initiation and among young women. These findings suggest that exogenous hormones may influence emotional regulation and susceptibility to psychiatric disorders. However, because of the observational design of the study, a direct causal relationship cannot be established. [(31)]

These findings highlight the importance of assessing patients' mental health status and monitoring for depressive and anxiety symptoms after initiation of hormonal contraception, particularly among adolescents and women with established risk factors for psychiatric disorders.

4.4 Mood changes

Another important aspect is the effect of hormonal contraception on mood regulation. Given the established role of sex hormones in modulating neurotransmission and emotional processing, numerous studies have investigated the association between hormonal contraceptive use and mood changes, including emotional lability.

One of the most relevant studies investigating the association between combined oral contraceptive (COC) use and mood changes was conducted by Lundin et al. (2017). This randomized, double-blind, placebo-controlled trial aimed to assess whether hormonal contraception was associated with clinically significant

changes in emotional functioning and mood symptoms. The study included 202 healthy women aged 18–35 years who were randomized to receive either a combined oral contraceptive containing 1.5 mg estradiol and 2.5 mg norgestrel acetate or placebo for three treatment cycles. Mood changes were assessed prospectively using the Daily Record of Severity of Problems (DRSP), completed daily during the baseline cycle and the final treatment cycle.

The results demonstrated that the effects of combined oral contraception on mood were not uniformly negative and appeared to vary depending on the phase of the menstrual cycle. COC use was associated with small but statistically significant increases in anxiety, irritability, and mood swings during the intermenstrual phase. However, a significant improvement in premenstrual depressive symptoms was also observed among COC users compared with placebo. Importantly, the proportion of women experiencing clinically relevant mood deterioration did not differ significantly between the COC and placebo groups, suggesting that although mild mood-related side effects may occur in some users, they do not represent a universal consequence of hormonal contraceptive exposure.

Further analysis indicated that adverse mood effects were particularly pronounced among women who had previously experienced negative psychological effects during hormonal contraceptive use, suggesting individual susceptibility to hormonal influences on emotional regulation. These findings support the hypothesis that hormonal contraception may affect mood in a subgroup of women rather than causing generalized deterioration of emotional well-being across all users. [(32)]

Another relevant publication addressing this topic was the recent rapid systematic review by Cirtel et al. (2026). This review evaluated the impact of hormonal contraception on mood and anxiety symptoms in women with pre-existing mental health conditions. The authors aimed to address an important gap in the literature, as women with diagnosed psychiatric disorders are frequently excluded from clinical studies investigating the psychological effects of hormonal contraception. The review included 10 studies published between 2015 and 2025 involving women with clinically diagnosed or self-reported anxiety and mood (affective) disorders. Various hormonal contraceptive methods were evaluated, including combined oral contraceptives (COCs), progestogen-only contraceptives, and levonorgestrel-releasing intrauterine systems.

The findings indicated that hormonal contraception was not consistently associated with worsening of mood or anxiety symptoms among women with pre-existing psychiatric disorders. Combined oral contraceptives demonstrated predominantly neutral effects, although some studies reported increased mood-related symptoms, particularly among adolescents and first-time users. In contrast, progestogen-only methods and levonorgestrel intrauterine devices were generally associated with stable or improved psychiatric symptoms. The authors emphasized that adverse psychological effects appear to occur only in a subgroup of susceptible individuals rather than representing a universal response to hormonal contraception. [(28)]

Overall, current evidence suggests that the relationship between hormonal contraception and mood changes is complex and highly individualized. Available randomized trials and systematic reviews do not support the assumption that hormonal contraceptive use universally leads to emotional deterioration. However, a subgroup of women may experience clinically relevant changes, including increased irritability, emotional lability, or worsening of mood symptoms, particularly during the initial period of use or in the presence of individual vulnerability to hormonal fluctuations. Further research is needed to better identify biological and psychological factors that predispose certain women to adverse mood responses. Therefore, contraceptive counseling should include consideration of individual psychiatric history, previous experiences with hormonal contraception, and monitoring of mood symptoms after treatment initiation.

4.5 Cognitive functions

Cognitive functioning represents an important but relatively less explored aspect of the potential neuropsychological effects of hormonal contraception. Sex hormones, particularly estrogens and progesterone, play a significant role in modulating brain activity, synaptic plasticity, neurotransmitter systems, and processes involved in memory, attention, and executive functioning. Since hormonal contraceptives alter endogenous fluctuations of ovarian hormones, increasing scientific interest has focused on whether these changes may influence cognitive performance. Current evidence remains heterogeneous, with studies reporting both potential beneficial and adverse effects depending on the cognitive domain assessed, contraceptive formulation, and individual characteristics of users.

In a study conducted by Noachtar et al. (2022), the duration of oral contraceptive use was associated with changes in cognitive function and activity in specific brain regions. The authors observed that longer use of oral hormonal contraceptives was associated with poorer performance on verbal fluency tasks, as well as

alterations in brain activation patterns and functional connectivity within regions involved in cognitive processing, including areas responsible for language processing and executive functions. Moreover, some of the observed neural changes were also present in former users of hormonal contraception, suggesting that exposure to synthetic sex hormones may have long-lasting effects on the functional organization of the brain. However, it should be emphasized that this was a cross-sectional study; therefore, the findings demonstrate an association rather than a direct causal relationship between hormonal contraceptive use and cognitive changes. [(33)]

An important contribution to understanding the relationship between hormonal contraception and cognitive functioning was also provided by Gurvich et al. (2023), who conducted a systematic review evaluating the effects of oral contraceptive (OC) use on different domains of cognition. The authors aimed to synthesize available evidence regarding the influence of hormonal contraception on neurocognitive performance, social cognition, and emotional processing. The review included studies involving premenopausal women using oral contraceptives, with comparisons made against naturally cycling women or OC users during the inactive pill phase. Cognitive domains assessed across studies included memory, attention, executive functions, and emotional processing.

The findings demonstrated that oral contraceptive use was associated with differences in performance across several cognitive domains; however, these effects were heterogeneous and depended on multiple factors, including contraceptive formulation, characteristics of the control group, and the specific cognitive task used for assessment. The authors did not identify evidence supporting generalized impairment of cognitive functioning among oral contraceptive users. Instead, available studies suggested that hormonal contraception may produce subtle changes in specific cognitive processes, with some studies reporting differences in memory performance, emotional processing, and executive functioning. Importantly, the direction and magnitude of these effects varied considerably between studies. [(34)]

Current evidence suggests that the influence of hormonal contraception on cognitive functioning is complex and remains incompletely understood. Available studies do not support the hypothesis that hormonal contraceptive use leads to generalized cognitive impairment; however, they indicate that exogenous sex hormones may modulate specific cognitive domains, including verbal fluency, memory, emotional processing, and executive functions. The observed effects appear to depend on multiple factors, such as type and duration of contraceptive use, hormonal formulation, individual sensitivity to sex hormones, and the characteristics of the cognitive processes assessed. Due to methodological limitations, including the predominance of cross-sectional studies and heterogeneity of cognitive assessment methods, further longitudinal research is required to determine whether observed neurocognitive differences represent transient adaptations or long-term effects of hormonal contraceptive exposure.

5. Factors influencing individual psychological response to hormonal contraception

The psychological effects of hormonal contraception appear to be highly heterogeneous, with substantial variability between individual users. Although population-based studies have not demonstrated a consistent association between hormonal contraceptive use and adverse psychiatric outcomes, a subgroup of women may experience clinically relevant changes in mood, anxiety, or emotional regulation. Increasing evidence suggests that the psychological response to hormonal contraception depends not only on the contraceptive method itself but also on individual biological, psychiatric, and developmental characteristics. Factors such as age, pre-existing mental health conditions, hormonal sensitivity, genetic predisposition, and the specific formulation of the contraceptive preparation may influence susceptibility to psychological effects.

5.1 Age and developmental stage

Age represents one of the most consistently identified factors influencing psychological response to hormonal contraception. Adolescents appear to constitute a particularly vulnerable group, with several observational studies reporting stronger associations between hormonal contraceptive initiation and mood-related outcomes in younger users than in adult women. This increased susceptibility may be related to ongoing neurodevelopmental processes, including maturation of the prefrontal cortex and limbic system, as well as greater hormonal sensitivity during adolescence. Furthermore, younger users are more likely to be initiating their first hormonal contraceptive method, which may coincide with important psychosocial changes and increased vulnerability to emotional disturbances. [(35)]

However, age-related differences should be interpreted cautiously, as adolescents may also differ from adult women in baseline risk factors for depression and anxiety, making causal interpretation challenging.

5.2 Pre-existing psychiatric disorders

Women with previous psychiatric disorders represent an important population when evaluating the psychological safety of hormonal contraception. Historically, many clinical trials excluded individuals with diagnosed psychiatric conditions, limiting the generalizability of findings. Current evidence suggests that hormonal contraception does not universally worsen psychiatric symptoms in women with pre-existing depression or anxiety disorders. Nevertheless, individual monitoring remains important, particularly during treatment initiation.

A recent rapid systematic review by Ciritel et al. (2026) specifically evaluated the effects of hormonal contraception in women with pre-existing psychiatric disorders. The authors found no consistent evidence that hormonal contraceptive use leads to worsening of depression or anxiety symptoms in this population. However, the available evidence remains limited because of heterogeneity in study designs and the frequent exclusion of psychiatric patients from clinical trials. The authors emphasized the importance of individualized assessment and monitoring, particularly during treatment initiation. [(28)]

In summary, psychiatric history should be considered during contraceptive counseling, while avoiding unnecessary restriction of hormonal contraceptive use in women with stable psychiatric conditions.

5.3 PMS and PMDD

Premenstrual syndrome (PMS) and premenstrual dysphoric disorder (PMDD) are characterized by emotional and physical symptoms occurring during the luteal phase of the menstrual cycle. Since these disorders are associated with increased sensitivity to normal fluctuations of ovarian hormones rather than abnormal hormone concentrations themselves, hormonal contraception may have variable effects depending on the individual response. [(36)]

Combined hormonal contraceptives, particularly preparations containing drospirenone, have demonstrated efficacy in reducing PMDD symptoms in some women by suppressing cyclical hormonal fluctuations. [(37)] These findings highlight the importance of considering individual hormonal sensitivity rather than assuming a uniform psychological effect of contraceptive use.

5.4 Influence of contraceptive formulation: estrogen dose and type of progestogen

The psychological effects of hormonal contraception may depend on the specific formulation used. Different progestogens exhibit varying degrees of androgenic, antiandrogenic, and glucocorticoid activity, which may influence emotional regulation and neurobiological pathways. [(38)]

Earlier generations of progestogens with higher androgenic activity have been suggested to have different psychological profiles compared with newer compounds. In addition, estrogen dose may influence tolerability, as estrogen interacts with serotonergic pathways and brain regions involved in mood regulation. [(39)] However, current evidence does not allow for definitive conclusions regarding the superiority of specific formulations in terms of psychiatric outcomes.

5.5 Duration of hormonal contraceptive use

The duration of contraceptive exposure may also influence psychological outcomes. Several studies suggest that adverse mood symptoms, when they occur, are most likely to emerge during the first months after initiation of hormonal contraception. [(35)] In some individuals, symptoms may diminish over time as physiological adaptation occurs, whereas others may discontinue treatment because of persistent adverse effects. [(40)]

Overall, current evidence indicates that the psychological response to hormonal contraception is determined by a complex interaction between contraceptive-related factors and individual vulnerability. Rather than representing a universal risk factor for psychiatric symptoms, hormonal contraception appears to influence mental health outcomes differently depending on age, psychiatric history, hormonal sensitivity, formulation characteristics, and duration of use. Recognition of these factors may facilitate individualized contraceptive counseling and improve clinical decision-making.

6. Discussion

The available evidence indicates that the relationship between combined oral contraceptive (COC) use and mental health is complex and cannot be explained by a simple cause-and-effect model. Although mood-related symptoms are among the most frequently reported reasons for discontinuing hormonal contraception, current research does not support a universal association between COC use and the development of psychiatric disorders.

One of the main findings of this review is the inconsistency between randomized controlled trials and observational studies. Randomized studies generally do not demonstrate clinically significant increases in depressive or anxiety symptoms among healthy women, whereas observational studies have reported a modest increase in the risk of depression and suicidal behavior, particularly among adolescents and during the first months after treatment initiation. These discrepancies may be explained by differences in study design, patient selection, and the frequent exclusion of women with pre-existing psychiatric disorders from clinical trials.

The reviewed literature also suggests that psychological responses to hormonal contraception are highly individualized. Factors such as age, previous psychiatric history, hormonal sensitivity, and contraceptive formulation appear to influence susceptibility to mood-related adverse effects. Importantly, most women tolerate combined oral contraceptives without clinically significant deterioration of mental health, while only a subgroup appears to be vulnerable to adverse psychological outcomes.

Several limitations of the available evidence should be acknowledged. The included studies differ substantially in design, duration of follow-up, contraceptive formulations, and methods used to assess mental health outcomes, making direct comparison difficult. In addition, many studies rely on self-reported symptoms rather than standardized psychiatric diagnoses, and relatively few directly compare different hormonal formulations.

From a clinical perspective, current evidence supports an individualized approach to contraceptive counseling rather than avoidance of hormonal contraception because of concerns about mental health. Clinicians should assess psychiatric history, discuss the possibility of mood-related side effects, and monitor women during the first months of treatment, particularly adolescents and individuals with previous negative experiences related to hormonal contraception.

7. Conclusions

Current evidence does not support a universal causal relationship between combined oral contraceptive use and adverse mental health outcomes. While most women tolerate COCs without clinically significant psychiatric effects, a subgroup of users - particularly adolescents and women with a history of mood disorders or increased hormonal sensitivity - may experience depressive symptoms, anxiety, or mood changes.

The available literature suggests that psychological responses to COCs are influenced by multiple factors, including age, individual susceptibility, treatment duration, and contraceptive formulation. Therefore, contraceptive counseling should be individualized, with particular attention to psychiatric history and monitoring during the first months of use.

Further high-quality, long-term studies directly comparing different COC formulations are needed to better identify women at increased risk of adverse psychological effects and to optimize personalized contraceptive care.

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REFERENCES

- De Leo, V., Musacchio, M. C., Cappelli, V., Piomboni, P., & Morgante, G. (2016). Hormonal contraceptives: Pharmacology tailored to women's health. *Human Reproduction Update*, 22(5), 634–646. <https://doi.org/10.1093/humupd/dmw016>
- Brynhildsen, J. (2014). Combined hormonal contraceptives: Prescribing patterns, compliance, and benefits versus risks. *Therapeutic Advances in Drug Safety*, 5(5), 201–213. <https://doi.org/10.1177/2042098614548857>
- Zimmerman, L. A., Sarnak, D. O., Karp, C., Wood, S. N., Ahmed, S., Makumbi, F., et al. (2021). Association between experience of specific side-effects and contraceptive switching and discontinuation in Uganda: Results from a longitudinal study. *Reproductive Health*, 18(1), Article 239. <https://doi.org/10.1186/s12978-021-01287-5>
- Coelingh Bennink, H. J. T., van Gennip, F. A. M., Gerrits, M. G. F., Egberts, J. F. M., Gemzell-Danielsson, K., & Kopp Kallner, H. (2024). Health benefits of combined oral contraceptives: A narrative review. *The European Journal of Contraception & Reproductive Health Care*, 29(2), 40–52. <https://doi.org/10.1080/13625187.2024.2317295>
- Van Vlijmen, E. F. W., Wiewel-Verschueren, S., Monster, T. B. M., & Meijer, K. (2016). Combined oral contraceptives, thrombophilia and the risk of venous thromboembolism: A systematic review and meta-analysis. *Journal of Thrombosis and Haemostasis*, 14(7), 1393–1403. <https://doi.org/10.1111/jth.13349>
- Ciarcia, J., & Huckins, L. M. (2024). Oral contraceptives and the risk of psychiatric side effects: A review. *Complex Psychiatry*, 10(1–4), 36–44. <https://doi.org/10.1159/000539515>
- Lundin, C., Danielsson, K. G., Bixo, M., Moby, L., Bengtsdotter, H., Jawad, I., Marions, L., Brynhildsen, J., Malmberg, A., Bäckström, T., & Sundström-Poromaa, I. (2017). Combined oral contraceptive use is associated with both improvement and worsening of mood in the different phases of the treatment cycle: A double-blind, placebo-controlled randomized trial. *Psychoneuroendocrinology*, 76, 135–143. <https://doi.org/10.1016/j.psyneuen.2016.11.033>
- Beltz, A. M. (2024). Hormonal contraceptives and behavior: Updating the potent state of the nascent science. *Hormones and Behavior*, 164, Article 105574. <https://doi.org/10.1016/j.yhbeh.2024.105574>
- Stanczyk, F. Z., Winer, S. A., Foidart, J. M., & Archer, D. F. (2024). Comparison of estrogenic components used for hormonal contraception. *Contraception*, 130, Article 110310. <https://doi.org/10.1016/j.contraception.2023.110310>
- Gaspard, U., Chatel, G., Douxfils, J., & Stanczyk, F. Z. (2026). A detailed review of pharmacokinetics/pharmacodynamics of progestogens in oral contraception. *Frontiers in Endocrinology*, 17, Article 1730768. <https://doi.org/10.3389/fendo.2026.1730768>
- Fruzzetti, F., Fidecicchi, T., & Gambacciani, M. (2024). Oestrogens in oral contraception: Considerations for tailoring prescription to women's needs. *The European Journal of Contraception & Reproductive Health Care*, 29(3), 93–102. <https://doi.org/10.1080/13625187.2024.2334350>
- Genazzani, A. D., Sponzilli, A., Mantovani, M., Fusilli, E., Ricciardiello, F., Semprini, E., & Simoncini, T. (2024). Modulatory effects of ethinyl estradiol plus drospirenone contraceptive pill on spontaneous and GnRH-induced LH secretion. *Endocrines*, 5(1), 36–45. <https://doi.org/10.3390/endocrines5010003>
- Young, K. A., Chaffin, C. L., Molskness, T. A., & Stouffer, R. L. (2003). Controlled ovulation of the dominant follicle: A critical role for LH in the late follicular phase of the menstrual cycle. *Human Reproduction*, 18(11), 2257–2263. <https://doi.org/10.1093/humrep/deg467>
- Das, N., & Kumar, T. R. (2018). Molecular regulation of follicle-stimulating hormone synthesis, secretion and action. *Journal of Molecular Endocrinology*, 60(3), R131–R155. <https://doi.org/10.1530/JME-17-0308>
- Steward, R., Melamed, A., Granat, A., & Mishell, D. R. (2012). Comparison of cervical mucus of 24/4 vs. 21/7 combined oral contraceptives. *Contraception*, 86(6), 710–715. <https://doi.org/10.1016/j.contraception.2012.05.004>
- Bastianelli, C., Farris, M., Bruni, V., Brosens, I., & Benagiano, G. (2020). Pharmacodynamics of combined estrogen–progestin oral contraceptives: 4. Effects on uterine and cervical epithelia. *Expert Review of Clinical Pharmacology*, 13(2), 163–182. <https://doi.org/10.1080/17512433.2020.1721280>
- Haverinen, A., Luiro, K., Kangasniemi, M. H., Piltunen, T. T., Hustad, S., Heikinheimo, O., & Mikkola, T. S. (2022). Estradiol valerate vs ethinylestradiol in combined oral contraceptives: Effects on the pituitary-ovarian axis. *The Journal of Clinical Endocrinology & Metabolism*, 107(7), e3008–e3017. <https://doi.org/10.1210/clinem/dgac150>
- Amiri, M., Tehrani, F. R., Nahidi, F., Kabir, A., & Azizi, F. (2018). Comparing the effects of combined oral contraceptives containing progestins with low androgenic and antiandrogenic activities on the hypothalamic-pituitary-gonadal axis in patients with polycystic ovary syndrome: Systematic review and meta-analysis. *JMIR Research Protocols*, 7(4), Article e9024. <https://doi.org/10.2196/resprot.9024>
- Herman, J. P., McKlveen, J. M., Ghosal, S., Kopp, B., Wulsin, A., Makinson, R., & Myers, B. (2016). Regulation of the hypothalamic-pituitary-adrenocortical stress response. *Comprehensive Physiology*, 6(2), 603–621. <https://doi.org/10.1002/j.2040-4603.2016.tb00694.x>
- Pletzer, B., Winkler-Crepaz, K., & Maria Hillerer, K. (2023). Progesterone and contraceptive progestin actions on the brain: A systematic review of animal studies and comparison to human neuroimaging studies. *Frontiers in Neuroendocrinology*, 69, Article 101060. <https://doi.org/10.1016/j.yfrne.2023.101060>
- Warfvinge, K., Krause, D. N., Maddahi, A., Edvinsson, J. C. A., Edvinsson, L., & Haanes, K. A. (2020). Estrogen receptors α , β and GPER in the CNS and trigeminal system: Molecular and functional aspects. *The Journal of Headache and Pain*, 21(1), Article 131. <https://doi.org/10.1186/s10194-020-01197-0>

22. Farris, M., Bastianelli, C., Habiba, M., & Benagiano, G. (2025). Hormonal contraception, past, present, and future part 2: Optimizing combined oral contraceptives to decrease risks for healthy women. *Expert Review of Clinical Pharmacology*, 18(6), 361–372. <https://doi.org/10.1080/17512433.2025.2517747>
23. Marx, W., Penninx, B. W. J. H., Solmi, M., Furukawa, T. A., Firth, J., Carvalho, A. F., & Berk, M. (2023). Major depressive disorder. *Nature Reviews Disease Primers*, 9(1), Article 44. <https://doi.org/10.1038/s41572-023-00454-1>
24. de Wit, A. E., de Vries, Y. A., de Boer, M. K., Scheper, C., Fokkema, A. A., Schoevers, R. A., & de Vries, C. (2021). Hormonal contraceptive use and depressive symptoms: Systematic review and network meta-analysis of randomised trials. *BJPsych Open*, 7(4), Article e110. <https://doi.org/10.1192/bjo.2021.64>
25. Kraft, M. Z., Rojczyk, P., Weiss, T., Derntl, B., Kikinis, Z., Croy, I., & Pletzer, B. (2024). Symptoms of mental disorders and oral contraception use: A systematic review and meta-analysis. *Frontiers in Neuroendocrinology*, 72, Article 101111. <https://doi.org/10.1016/j.yfrne.2023.101111>
26. Jahanfar, S., Mortazavi, J., Lapidow, A., Cu, C., Al Abosy, J., Morris, K., & Vlasisavljevich, E. (2024). Assessing the impact of contraceptive use on mental health among women of reproductive age: A systematic review. *BMC Pregnancy and Childbirth*, 24(1), Article 396. <https://doi.org/10.1186/s12884-024-06587-9>
27. Bandelow, B., & Michaelis, S. (2015). Epidemiology of anxiety disorders in the 21st century. *Dialogues in Clinical Neuroscience*, 17(3), 327–335. <https://doi.org/10.31887/DCNS.2015.17.3/bbandelow>
28. Cirtel, A. A., Boxer, B., Kelly, A., Quinn, J., Foster, K., & Strauss, R. (2026). Effect of hormonal contraception in individuals with anxiety and mood (affective) disorders: A rapid review. *BMJ Sexual & Reproductive Health*. Advance online publication. <https://doi.org/10.1136/bmjshr-2026-203256>
29. Kowalczyk, M., Kornacka, M., Kostrzewa, Z., & Krejtz, I. (2024). Differences in anxiety, worry, and perceived stress among naturally cycling women and oral contraceptive users: A cross-sectional study investigating the role of contraceptive types. *Archives of Women's Mental Health*, 27(2), 241–247. <https://doi.org/10.1007/s00737-023-01405-1>
30. Graham, B. M. (2022). The impact of hormonal contraceptives on anxiety treatments: From preclinical models to clinical settings. *Frontiers in Neuroendocrinology*, 67, Article 101030. <https://doi.org/10.1016/j.yfrne.2022.101030>
31. Skovlund, C. W., Mørch, L. S., Kessing, L. V., Lange, T., & Lidegaard, (2018). Association of hormonal contraception with suicide attempts and suicides. *American Journal of Psychiatry*, 175(4), 336–342. <https://doi.org/10.1176/appi.ajp.2017.17060616>
32. Lundin, C., Danielsson, K. G., Bixo, M., Moby, L., Bengtsdotter, H., Jawad, I., Marions, L., Brynhildsen, J., Malmborg, A., Bäckström, T., & Sundström-Poromaa, I. (2017). Combined oral contraceptive use is associated with both improvement and worsening of mood in the different phases of the treatment cycle: A double-blind, placebo-controlled randomized trial. *Psychoneuroendocrinology*, 76, 135–143. <https://doi.org/10.1016/j.psyneuen.2016.11.033>
33. Noachtar, I. A., Hidalgo-Lopez, E., & Pletzer, B. (2022). Duration of oral contraceptive use relates to cognitive performance and brain activation in current and past users. *Frontiers in Endocrinology*, 13, Article 885617. <https://doi.org/10.3389/fendo.2022.885617>
34. Gurvich, C., Nicholls, I., Lavale, A., & Kulkarni, J. (2023). Oral contraceptives and cognition: A systematic review. *Frontiers in Neuroendocrinology*, 69, Article 101052. <https://doi.org/10.1016/j.yfrne.2022.101052>
35. Skovlund, C. W., Mørch, L. S., Kessing, L. V., & Lidegaard, (2016). Association of hormonal contraception with depression. *JAMA Psychiatry*, 73(11), 1154–1162. <https://doi.org/10.1001/jamapsychiatry.2016.2387>
36. Naik, S. S., Nidhi, Y., Kumar, K., & Grover, S. (2023). Diagnostic validity of premenstrual dysphoric disorder: Revisited. *Frontiers in Global Women's Health*, 4, Article 1181583. <https://doi.org/10.3389/fgwh.2023.1181583>
37. Yonkers, K. A., Brown, C., Pearlstein, T. B., Foegh, M., Sampson-Landers, C., & Rapkin, A. (2005). Efficacy of a new low-dose oral contraceptive with drospirenone in premenstrual dysphoric disorder. *Obstetrics & Gynecology*, 106(3), 492–501. <https://doi.org/10.1097/01.AOG.0000175834.77215.2e>
38. Robakis, T., Williams, K. E., Nutkiewicz, L., & Rasgon, N. L. (2019). Hormonal contraceptives and mood: Review of the literature and implications for future research. *Current Psychiatry Reports*, 21(7), Article 57. <https://doi.org/10.1007/s11920-019-1034-z>
39. Poromaa, I. S., & Segebladh, B. (2012). Adverse mood symptoms with oral contraceptives. *Acta Obstetrica et Gynecologica Scandinavica*, 91(4), 420–427. <https://doi.org/10.1111/j.1600-0412.2011.01333.x>
40. Schaffir, J., Worly, B. L., & Gur, T. L. (2016). Combined hormonal contraception and its effects on mood: A critical review. *The European Journal of Contraception & Reproductive Health Care*, 21(5), 347–355. <https://doi.org/10.1080/13625187.2016.1217327>