

The Impact of Hormonal Contraceptive Use on the Voice of Female Singers: A Review
of Physiological Effects and Their Influence on Vocal Quality and Performance

Adriana S. Ramírez González

Student ID: 2316808

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Table of Contents

Portfolio.....	1
Introduction.....	1
Planned Programme of Study.....	1
Timescale and Review Dates.....	3
Methodology.....	3
Project Report: Review.....	5
Introduction.....	5
Literature Review.....	6
Conclusion.....	12
Critical Reflection.....	14
Reference.....	17

Portfolio

Introduction

The voice is a vital tool for singers, directly tied to their professional identity, artistic expression, and career longevity (Ekici, 2022). For female vocalists, hormonal fluctuations throughout the menstrual cycle are known to affect vocal quality, leading to symptoms such as reduced range, vocal fatigue, changes in tone, increased breathiness, and decreased vocal efficiency (Ryan and Kenny, 2009; Zamponi *et al.*, 2021). Hormonal contraceptives, particularly oral contraceptive pills (OCPs), are commonly used by women of reproductive age, including performers (Cooper and Patel, 2024). These medications regulate hormone levels (Cleveland Clinic, 2023), potentially mitigating or exacerbating vocal variability linked to natural hormonal shifts (Afsah, 2024).

Despite the widespread use of hormonal contraceptives among female singers, the physiological effects and self-reported vocal changes remain insufficiently documented in the literature and are still actively explored regarding their impact on vocal fold function, vocal stamina, and performance consistency within vocal pedagogy and professional practice (Lã, 2007; Ryan and Kenny, 2009). Studies suggest that some users experience decreased vocal flexibility or loss of upper range due to the effects of synthetic hormones on the vocal folds (Rodney and Sataloff, 2016). Understanding these effects is essential for vocal coaches, speech therapists, and singers in managing vocal health and performance expectations (Anthony, 2021).

This review aims to critically examine the current literature on the impact of hormonal contraceptives on the voices of female singers, with a focus on physiological mechanisms and self-reported changes in vocal performance. The findings aim to inform both clinical and educational practices in the vocal performance field.

Planned Programme of Study

Hormonal contraceptives, particularly combined oral contraceptive pills (COCPs), are used by millions of women worldwide, including vocal professionals and students. While research has long recognized the impact of menstrual cycle-related hormone shifts on the female voice (Çelik, 2013) the influence of synthetic hormonal regulation through contraceptives remains insufficiently understood within both academic literature and professional voice training. Research indicates that fluctuations in estrogen and progesterone levels can affect the vocal folds' mucosal lining, fluid retention, and tension, contributing to symptoms like vocal fatigue, diminished range, and altered timbre (Williams, Sataloff and Rubin, 2020; Gunjawate *et al.*, 2017). However, existing studies are limited in number, often with small sample sizes and inconsistent methodologies.

The vocal performance community is gradually becoming more aware of the potential implications of hormonal treatments on voice (Afsah, 2024). Despite this, current vocal pedagogy rarely integrates information about contraceptive-related vocal effects, leaving a gap between physiological understanding and applied voice training. This study situates itself with the ongoing conversation about vocal health and hormone regulation, drawing on

interdisciplinary frameworks from voice science, endocrinology, and performing arts medicine. It aims to synthesize the available literature and provide accessible insights for singers, educators, and clinicians.

The primary aim of this study is to critically evaluate existing literature on the effects of hormonal contraceptives on the vocal health and performance of female singers. The study seeks to bridge the gap between scientific research and practical application within vocal pedagogy and performance contexts by focusing on how these medications influence the voice.

Another key aim is to explore the physiological mechanisms that may explain changes in vocal function resulting from contraceptive use (Rodney and Sataloff, 2016). Understanding how synthetic hormonal regulation interacts with vocal fold tissue and related systems may offer valuable insight into common vocal complaints among female singers (Abitbol, 1989). Additionally, this study aims to raise awareness within the vocal community among educators, singers, and clinicians about the potential vocal implications of hormonal contraceptive use. This area remains underrepresented in current training and discussion.

To achieve these aims, the study will undertake several objectives. It will review scientific and clinical studies on the vocal effects of hormonal contraceptives, focusing on both physiological outcomes and perceptual or self-reported changes in vocal quality. Additionally, it will identify recurring symptoms or personal experiences described by singers who use hormonal contraceptives, such as vocal fatigue, reduced range, or tonal instability, as reported in the literature.

Further objectives include examining how hormonal regulation via contraceptives may influence vocal fold structure, function, and stamina based on existing medical literature. The study will also assess the extent to which current vocal pedagogy, clinical guidelines, and singer education address these hormonal influences. Finally, findings will be synthesized into actionable insights, or recommendations for singers, teachers, and voice health professionals to improve awareness and support for performers.

Through this study, I aim to gain a deeper understanding of the physiological relationship between hormone levels and vocal function. Gaining insight into this connection will support my academic growth and my practical understanding as a performer and educator, by informing more individualized vocal training approaches, promoting awareness of hormonal influences in lesson planning, and equipping me to better support students navigating voice changes linked to hormonal fluctuations (Stibi, 2024).

This research will also help me improve my ability to critically analyze and interpret scientific and clinical literature relevant to vocal health. It will enhance my capacity to take complex, technical information and apply it meaningfully to the real-world experiences of singers, particularly in areas such as vocal hygiene, performance reliability, and pedagogical support.

By the end of the project, I expect to be more informed about the unique health needs of female vocalists, especially those using hormonal contraceptives, and to be better prepared to discuss these issues with peers and professionals. Additionally, this study will enhance my academic

writing, research planning, and evidence synthesis skills, which are key competencies for any researcher or advanced practitioner in the performing arts (Bennett, 2016).

Timescales and Review Dates

Task	Timeframe	Review Date
Topic refinement and research question finalized.	Week 1	May 16, 2025
Literature search and source gathering	Week 2	May 23, 2025
Article analysis and note-taking	Week 3	May 30, 2025
Drafting key sections (Introduction, Context, etc.)	Week 4–5	June 8, 2025
First full draft complete	Week 6	June 16, 2025
Revisions and supervisor feedback	Week 7	June 24, 2025
Final edits and formatting	Week 8	June 30, 2025
Submission	Week 9	July 1, 2025

This timeline outlines a structured plan for completing a research project over nine weeks, starting with finalizing the topic and research question in Week 1. It includes phases for gathering and analyzing literature, followed by drafting key sections of the paper between Weeks 4 and 5. A complete first draft is scheduled for Week 6, with time allotted for revisions and supervisor feedback in Week 7. The final weeks focus on polishing, formatting, and submitting the completed work by July 1, 2025.

Methodology

This study conducts a systematic literature review as its primary methodological approach to investigate the effects of hormonal contraceptives on the vocal health and performance of female singers. This approach was chosen for its ability to synthesize and critically evaluate existing knowledge across disciplines, while providing a transparent and replicable framework for identifying and analyzing relevant studies (McNally, 2021). A literature-based methodology is also suitable given the scope of this study, which relies entirely on existing online academic and clinical sources (Snyder, 2019), making direct experimental research, such as hormonal testing or acoustic measurement, impractical and unethical within the project's limitations. While the review engages primarily with quantitative clinical data, it interprets this data through a qualitative lens, focusing on how researchers have framed their findings and how these findings translate into lived vocal experiences. This practice-led perspective allows for a narrative dimension to emerge, where the author's voice is present in interpreting implications for pedagogy and performance, aligning elements of both systematic and narrative review traditions. Systematic reviews are highly valued in the health and social sciences for their rigor and structured analysis, aiding in the identification of trends, gaps, and inconsistencies in the research (Uman, 2011). Moreover, similar approaches have been employed in vocal health

research to explore subjects like menstrual cycle-related voice changes, providing a precedent for this project's methodology (Gunjawate et al., 2017).

Alternative methods, such as qualitative interviews or clinical trials, were considered but ultimately excluded. Interviews with singers could have provided rich, subjective accounts, but gathering sufficient data across different contraceptive types and vocal contexts would have posed significant challenges without institutional ethical approval or access to a controlled participant pool. Similarly, acoustic or hormonal testing would require specialized equipment and clinical oversight that extend beyond the resources and scope of this study. A systematic review, therefore, emerged as the most suitable and ethical option for consolidating current knowledge and identifying areas for future exploration (Snyder, 2019).

To support this literature-based approach, the study primarily draws on peer-reviewed sources while also incorporating grey literature, reputable online clinical resources, and materials from professional health and voice organizations as needed to fill gaps in academic research. Emphasis is placed on identifying sources that explore both the physiological and experiential dimensions of hormonal influences on vocal function, particularly regarding singers and vocal health. Although the practitioner sources are not peer-reviewed, they provide valuable experiential insight, especially in emerging areas where formal research is limited (Adams, Smart and Huff, 2016). These sources help bridge gaps in existing scientific literature by offering lived experiences and contextual understanding of the issue (Concordia University Chicago, 2025). All selected sources are evaluated for quality and relevance, with peer-reviewed studies forming the core of the review. However, credible grey literature is included when it offers unique insights (Joseph, 2024), especially those related to pedagogical and clinical perspectives not yet fully explored in formal studies. For instance, practitioner-authored blogs such as Zoe Stibi's (2024) post on contraceptives and voice provide contextual examples that complement findings in empirical studies like Williams, Sataloff, and Rubin (2020), which examined vocal changes associated with hormonal contraceptive use from a medical standpoint. These diverse perspectives enrich the analysis and reflect the interdisciplinary nature of this research, which encompasses voice science, singing pedagogy, and women's health.

The research process involves identifying and screening relevant articles based on their quality, relevance, and methodological rigor (Shaheen *et al.*, 2023). The selected studies are analyzed to capture both physiological findings, such as changes in vocal fold tissue and underlying hormonal mechanisms, and perceptual or self-reported effects, including voice fatigue, reduced vocal range, and alterations in tone. A thematic mapping process is employed to uncover common symptoms and patterns (Angeliki Tsorlini *et al.*, 2015), which are, when applicable, grouped according to contraceptive type, distinguishing between combined hormonal contraceptives and progestin-only formulations, as well as specific hormone compositions. This methodology supports the research question by addressing both physiological mechanisms and singers' lived experiences. It facilitates the identification of recurring patterns and the development of evidence-based recommendations, ensuring that findings are academically rigorous and practically relevant to educators, clinicians, and performers. The goal is to provide accessible, evidence-informed insights that can help inform practice, improve vocal health awareness, and support the specific needs of female singers who use hormonal contraceptives.

Project Report: Review

Introduction

The voice is a crucial instrument for singers, and for female vocalists, it is influenced by a complex interplay of physiological, environmental, and psychological factors (Baum, 2023). Among these, hormonal fluctuations emerge as a particularly significant, yet often overlooked, component. Hormonal changes related to the menstrual cycle, pregnancy, menopause, and the use of hormonal contraceptives can significantly affect vocal performance (Afsah, 2024). Despite its importance, the potential impact of exogenous hormones, specifically those delivered through contraceptive methods, on the female voice remains a complicated and under-explored area. This literature review aims to investigate the physiological and functional effects of hormonal contraceptive use on female singers' voices, concentrating on how these changes might affect vocal quality and performance capacity.

The justification for this study arises from the widespread use of hormonal contraceptives among women of reproductive age, a significant proportion of whom are also engaged in musical performance at amateur or professional levels (Lă *et al.*, 2012). This analysis seeks to delve deeply into the physiological effects of hormonal contraceptives on female singers' vocal performance, examining their impact on voice quality and artistic execution. The topic is increasingly relevant given the extensive use of hormonal contraceptives among women of reproductive age. According to the World Health Organization (2023), among the 1.9 billion women of reproductive age worldwide (15–49 years), 1.1 billion are using some form of contraception, with 851 million relying on modern methods, many of which include hormonal options such as the combined oral contraceptive pill (COCP) and progestin-only contraceptives. Yet, the implications of these contraceptives for vocal health, particularly in a professional or performance-based context, remain under-investigated and often misunderstood.

Historically, various medical and vocal pedagogy texts have documented the connection between hormonal cycles and voice. The term "premenstrual vocal syndrome" has been coined to describe the constellation of symptoms some female singers experience before menstruation, including loss of high notes, vocal fatigue, and hoarseness (Kaye, 2020). These symptoms are attributed to fluctuating levels of estrogen and progesterone, which impact vocal fold thickness, mucosal hydration, and neuromuscular control (Çelik, 2013; Carelile, 2019). Hormonal contraceptives, by stabilizing or altering the endogenous hormonal environment, have the potential to either mitigate or exacerbate these effects (Rodney and Sataloff, 2016). However, the specific impact appears to vary depending on the formulation of the contraceptive, the singer's baseline physiology, and the demands of their vocal practice (Amir, Biron-Shental, Tzenker and Barer, 2005).

This literature review aims to synthesize existing studies across disciplines, including laryngology, endocrinology, speech-language pathology, and vocal performance science, to evaluate the current understanding of this topic. A critical analysis will be conducted to assess the quality and scope of existing research, define relevant terminology, compare differing methodologies, and discuss the implications of the findings for singers, teachers, and healthcare

providers. The review will also identify gaps in the literature and suggest directions for future research.

By drawing on a multidisciplinary body of evidence, this study seeks to clarify how hormonal contraceptives may affect vocal quality in female singers and inform best practices in vocal health management. In doing so, it hopes to support the development of personalized, evidence-based guidance for female vocalists navigating contraceptive choices within the context of their professional and artistic goals.

Literature Review

Hormonal Physiology and the Voice

To understand the effects of hormonal contraceptives on the voice, it is essential first to examine the role of endogenous hormones in vocal physiology (Zamponi *et al.*, 2021). Estrogen and progesterone are the primary ovarian hormones in the menstrual cycle, and both have systemic effects that extend beyond reproduction (Mihm, Gangooly and Muttukrishna, 2011). Estrogen is a steroid hormone vital for the female reproductive system and crucial for developing female sexual characteristics (Delgado and Lopez-Ojeda, 2019). Progesterone is a naturally occurring hormone that plays a key role in regulating the menstrual cycle and supporting pregnancy (Cleveland Clinic, 2022). Laboratory-produced progesterone, known as progestin, serves similar functions (Cleveland Clinic, 2022). Like many other tissues, the larynx is sensitive to hormonal changes due to the presence of estrogen and progesterone receptors in the vocal folds (Nacci *et al.*, 2011; Adachi, 2019).

Research has demonstrated that these receptors are expressed in the human larynx, specifically within the vocal fold tissues, suggesting that the larynx is a target organ for hormonal activity (Adachi, 2019). A study by Adachi (2019) examining benign vocal fold lesions confirmed the presence of these hormone receptors, reinforcing the idea that hormonal fluctuations can directly influence the structure and function of the vocal folds. These receptors mediate cellular responses that can alter vocal fold mass, elasticity, and vascularity, all of which influence phonation (Newman *et al.*, 2000; Brunings *et al.*, 2013). Hormonal changes, particularly fluctuations in estrogen and progesterone levels, can lead to significant alterations in vocal quality and function (Hamdan, 2018).

To understand these effects more accurately, it is essential to define key concepts related to voice and hormonal activity. Phonation refers to the process by which the vocal folds generate sound through their vibrations (Schneider and Sataloff, 2007). Hormonal fluctuations refer to the cyclical alterations in hormone concentrations, particularly estrogen and progesterone, that occur during the menstrual cycle (McLaughlin, 2018). The concept of vocal quality encompasses perceptual characteristics of voice, including pitch, timbre, and clarity (Pearsell and Pape, 2023). These definitions differ slightly across sources; in this study, we utilize physiological and acoustic criteria to delineate vocal quality.

These concepts become especially relevant when considering how the various phases of the menstrual cycle affect the voice. For example, during the first half of the menstrual cycle, called

the follicular phase, the pituitary gland releases follicle-stimulating hormone (FSH) (Monis and Tetrokalashvili, 2022). This hormone promotes the growth of ovarian follicles, increases estrogen levels, and prepares the egg for ovulation (Monis and Tetrokalashvili, 2022). The rising estrogen levels are linked to greater retention of fluid in the vocal folds, improved mucosal lubrication, and better neuromuscular control, all of which contribute to optimal vocal performance (Pavela Banai, 2017). Singers may feel a greater sense of vocal ease, agility, and brightness during this phase, often finding it easier to reach higher pitches and sustain long phrases without fatigue (Pavela Banai, 2017).

In contrast, the luteal phase, the second half of the menstrual cycle that begins after ovulation and lasts until the next period, brings a rise in progesterone, which has different effects on vocal physiology (Thiyagarajan, Basit and Jeanmonod, 2022). Elevated progesterone levels can lead to vocal fold edema, dryness, and reduced flexibility (Pavela Banai, 2017; Narasimhan and Pooja, 2022). These effects can be particularly disruptive for singers who depend on subtle vocal control and an extended vocal range (Narasimhan and Pooja, 2022). During this time, singers may notice increased vocal effort, slight swelling in the vocal mechanism, and difficulty accessing the upper range or maintaining vocal clarity (Kaufman *et al.*, 2025). These challenges can affect confidence and stamina, particularly during extended rehearsals or high-pressure situations (Kaufman *et al.*, 2025).

These symptoms often intensify during the premenstrual phase, the days just before menstruation, when progesterone levels remain elevated (Gudipally and Sharma, 2023). This hormonal state can lead to mucosal dryness and swelling in the vocal folds, resulting in noticeable changes in voice quality (Kaye, 2020). Singers may experience vocal fatigue, a reduced pitch range, and a huskier tone, symptoms that are particularly pronounced among professional voice users (Gunjawate, 2017). Many report feeling vocally “bloated” or less responsive, with a rougher vocal onset. These changes often require lighter vocal demands, increased hydration, and more intentional warm-up strategies to protect the voice during this especially vulnerable time (Shoffel-Havakuk *et al.*, 2018).

These findings support a hormonal model of vocal variation, suggesting that cyclical hormone levels directly influence laryngeal tissue behavior (Shoffel-Havakuk *et al.*, 2018). This perspective frames the voice as a hormonally responsive biological system (Zamponi *et al.*, 2021), with implications for clinical practice and vocal pedagogy. Studies using videostroboscopy and acoustic analysis have shown that the structure and vibratory behavior of the vocal folds vary throughout the menstrual cycle (Shoffel-Havakuk *et al.*, 2018; Kaye, 2020). For example, Shoffel-Havakuk *et al.* (2018) documented premenstrual vocal fold thickening, vascular congestion, and reduced mucosal wave amplitude in professional singers, changes that aligned with self-reported declines in vocal quality. These findings highlight the significant impact of hormonal fluctuations on vocal function. Consequently, any external modulation of hormone levels, such as through the use of hormonal contraceptives, may also have measurable effects on vocal physiology and performance.

Types of Hormonal Contraceptives and Their Mechanisms

Hormonal contraceptives can be broadly classified into combined hormonal contraceptives (CHCs), which contain both estrogen and progestin, and progestin-only contraceptives (POCs) (Cooper and Patel, 2024). CHCs are most delivered as oral contraceptive pills, but they also come in the form of patches and vaginal rings (Galzote *et al.*, 2017). POCs are available as pills, injectables, implants, and intrauterine systems (IUS) (Monterrosa-Castro, Redondo-Mendoza, and Monterrosa-Blanco, 2021). CHCs primarily function by inhibiting ovulation through suppressing hormonal signals in the body (Holmes, 2025). Ovulation is the process in which an ovary releases a mature egg, making it available for fertilization (Holesh, Hazhirkarzar, and Lord, 2023). By maintaining stable levels of synthetic estrogen and progestin, these contraceptives prevent the cyclical hormonal fluctuations that characterize the natural menstrual cycle (Wright *et al.*, 2020). Progestin-only contraceptives (POCs), such as the medroxyprogesterone acetate injection (DMPA) and the hormonal IUD, mainly work by altering the uterine lining and thickening cervical mucus, with some also partially suppressing ovulation (Edwards and Can, 2024).

The specific formulation of a contraceptive, particularly the type and dose of progestin, can influence its physiological effects (Shoupe and Mishell, 2013). Some progestins possess androgenic properties, meaning they can mimic or enhance the effects of male hormones like testosterone, which may worsen symptoms such as vocal roughness or fatigue (Louw-du Toit *et al.*, 2017). Others tend to be more anti-androgenic or neutral, potentially reducing such side effects (Louw-du Toit *et al.*, 2017). However, comprehensive studies comparing different contraceptive formulations in relation to vocal outcomes are rare, making it challenging to draw firm conclusions about best practices for singers.

Effects of Hormonal Contraceptives on Vocal Quality

The literature reveals mixed findings regarding the impact of hormonal contraceptives on vocal quality. Several studies have reported beneficial effects, particularly in reducing vocal variability associated with the natural menstrual cycle (Amir and Rabin, 2004; Rodney and Sataloff, 2016). For instance, Amir and Rabin (2004) found that singers using combined hormonal contraceptives (CHCs) reported fewer premenstrual vocal complaints than their non-using counterparts, suggesting that stabilizing hormone levels through contraceptive use may prevent cyclical declines in vocal function. Operating within a physiological-acoustic framework, their study focused on how hormonal contraceptives influence vocal function through measurable biological changes in vocal fold vibration and acoustic output. Similarly, Rodney and Sataloff (2016) highlighted that oral contraceptive pills (OCPs) appear to be safer for vocalists. Their physiological-acoustic review framework integrated objective acoustic and aerodynamic findings across multiple studies to assess the effects of hormonal contraception on vocal stability and quality, with a focus on methodological consistency and underlying biological mechanisms. These results suggest that stabilizing hormone levels through contraceptive use may prevent cyclical declines in vocal function.

However, other studies describe adverse outcomes. Some singers on CHCs have reported persistent vocal fatigue, diminished range, or loss of vocal agility, even without observable

cyclical voice shifts (Afsah, 2024). These symptoms may be attributed to the progestin component of CHCs, especially formulations with high androgenic activity, which may induce vocal fold thickening and reduce mucosal pliability (Nygren, 2014).

Progestin-only contraceptives have shown more variable results. Anecdotal evidence links long-acting injectable forms like depot medroxyprogesterone acetate (DMPA) to vocal deepening and loss of upper register capability (Romano, 2021). While controlled data are scarce, one hypothesized mechanism is estrogen suppression, which induces a hormonal state similar to menopause (April *et al.*, 2016). Menopause has long been associated with vocal changes such as reduced pitch range and increased vocal roughness (Mendes-Laureano *et al.*, 2006).

Interpreting these findings is complicated by the wide variability in individual responses. Factors such as vocal training, baseline hormone sensitivity, voice use demands, and general health can modulate how hormonal contraceptives affect the voice (NIDCD, 2015; Pavela Banai, 2017). As a result, some singers may experience enhanced vocal steadiness with contraceptive use (Rodney and Sataloff, 2016), while others may suffer disruptions to their vocal function (Romano, 2021).

Effects of Hormonal Contraceptives on Vocal Performance

In addition to vocal quality parameters like pitch, range, and timbre, hormonal contraceptives may also impact the broader scope of vocal performance (Cristol, 2019). Vocal performance includes not only the acoustic and physiological aspects of voice production but also the performer's ability to maintain vocal consistency, expressiveness, and stamina across various psychological and physical conditions (Cristol, 2019; Rider University, 2024).

Evidence suggests that hormonal contraceptives may stabilize vocal performance by dampening the hormonal fluctuations typical of the natural menstrual cycle (Rodney and Sataloff, 2019). Singers not using hormonal contraceptives frequently report difficulties such as vocal fatigue, decreased breath support, and challenges with dynamic control during the luteal and menstrual phases (Gunjawate *et al.*, 2017). These symptoms can lead to inconsistent rehearsal or performance quality. Hormonal regulation through CHCs may offer a performance advantage by minimizing these fluctuations (Edelman *et al.*, 2014; CDC, 2024).

Another aspect of vocal performance affected by hormonal contraceptives is psychological readiness (Hall *et al.*, 2015). Hormonal changes during the menstrual cycle can influence mood, anxiety, and concentration (Abrams, 2025), which significantly impact live performance. Some CHCs have been found to reduce premenstrual syndrome (PMS) symptoms, thus promoting greater emotional regulation and focus, which are essential for high-quality vocal performance (Yonkers *et al.*, 2017).

The dual impact of hormonal contraceptives on mood and vocal function supports a biopsychosocial model of vocal performance (Rodney and Sataloff, 2016). Hall *et al.* (2015) highlight that hormonal contraceptives can improve mood stability and reduce anxiety, thereby enhancing emotional resilience and performance confidence. These psychological benefits may help singers manage stage fright, maintain interpretive clarity, and perform consistently under pressure (Afsah, 2024; Bitzer, 2024). However, some users report experiencing emotional

flattening or a reduced affective range, which may limit expressive nuance in performance (Yonkers, 2017; Romano, 2021).

From a physiological standpoint, Lã (2007) and Sung *et al.* (2022) propose that hormonal modulation may induce subtle shifts in neuromuscular coordination, respiratory efficiency, and laryngeal adaptability, each of which plays a fundamental role in advanced vocal execution. For instance, fluctuations in breath regulation or muscular sensitivity can disrupt vocal phrasing and compromise dynamic control, particularly in musical styles that demand fine-tuned manipulation of timbre, tone, and sustained vocal effort (Yilmaz, 2025). These physiological elements highlight the conceptualization of the voice as a complex psychophysical instrument involving physical and mental processes (Betley, 2024), governed simultaneously by internal endocrine rhythms and external artistic intent (Czech, 2024). Endocrine rhythms refer to the cyclic patterns of hormone secretion and regulation in the body, which influence various physiological and psychological processes (Czech, 2024).

This integrated framework promotes a more refined interpretation of vocal performance as a result of dynamic interactions among biological, psychological, and behavioral domains (Kumar *et al.*, 2016; Herbst, 2023). For vocal coaches, voice specialists, and performers alike, this emphasizes the importance of considering not only the anatomical or hormonal effects of contraceptive use but also its impact on the singer's mental-emotional connection to their vocal output and interpretive identity.

At the same time, qualitative reports from some vocalists describe a diminished sense of expressivity or an unsettling "disconnect" from their voice while using hormonal contraceptives (Lã, 2007). While this experience remains only partially understood, it may arise from subtle modifications in neuromotor control (Sung *et al.*, 2022) or changes in the responsiveness of vocal fold tissues, both of which could interfere with the micro-adjustments essential for emotionally charged or technically demanding performance (Amir and Kishon-Rabin, 2004). For singers who depend on expressive nuance, vocal color, and interpretive detail, even minimal alterations in physical coordination can translate into perceptible shifts in artistic quality and communication.

Additionally, long-term contraceptive use may influence muscle tone and stamina (Sung *et al.*, 2022), which are relevant for maintaining vocal performance over extended periods (Yıldız, Özüdoğru and Ceylan, 2025). Androgenic progestins have been associated with alterations in muscle metabolism and fatigue resistance, particularly in athletic populations (Tassi *et al.*, 2025). Such changes could affect the muscular coordination required for breath support and sustained phonation in singers (Tassi *et al.*, 2025; Yilmaz, 2025).

Current research concerning the performance-related effects of hormonal contraceptives is notably limited. There exists a critical necessity for systematic, controlled investigations that examine how various contraceptive types (e.g., combined hormonal contraceptives versus progestin-only), routes of administration (oral, injectable, transdermal), and durations of use impact vocal performance. Optimal studies would incorporate acoustic analyses, video stroboscopic imaging, and subjective performance evaluations from vocalists.

In summary, while hormonal contraceptives may enhance vocal performance consistency by stabilizing hormone levels and improving psychological resilience, they can also introduce physiological changes that detract from vocal finesse (Rodney and Sataloff, 2015; Zalesska-Kręcicka *et al.*, 2023). The impact on performance is highly individualized, requiring a tailored approach in medical and vocal care for singers using hormonal contraceptives.

Methodologies Used in the Literature

The methodologies used in studies exploring the relationship between hormonal contraceptive use and vocal quality differ significantly in design, rigor, and scientific scope. Most existing research is observational and is often characterized by small sample sizes and a lack of control groups. These limitations diminish the generalizability of findings and hinder the ability to draw causal conclusions (Cao, Chen and Katz, 2024). While several studies report perceived vocal changes during hormonal contraceptive use, these are frequently based on self-reported data which, although valuable for capturing subjective experiences, are inherently limited due to vulnerability to psychological biases such as performance anxiety or psychosomatic attribution (Kormos and Gifford, 2014; Thomson and Jaque, 2017).

To address the limitations of self-reporting, some researchers have adopted objective methodologies. These methodologies include acoustic analysis, which quantifies vocal parameters such as fundamental frequency, jitter, shimmer, and harmonics-to-noise ratio, providing a more accurate and physiologically grounded representation of vocal function (Tatar *et al.*, 2016; Zalesska-Kręcicka *et al.*, 2023). Additionally, electroglottography (EGG) and video stroboscopy are used to assess vocal fold behavior and mucosal wave activity (Krausert *et al.*, 2011; Cleveland Clinic, 2022). However, the complexity, cost, and requirement for technical expertise associated with these tools limit their widespread use, particularly outside clinical settings (Tomaszewska and Georgakis, 2023). A few studies have incorporated hormone-level testing to correlate serum concentrations of estrogen, progesterone, and testosterone with vocal parameters. These studies are usually cross-sectional rather than longitudinal, making it difficult to capture dynamic hormonal fluctuations over time, an essential factor in understanding cyclical voice changes and long-term adaptations to hormonal contraceptive use (Arruda *et al.*, 2019; Bennett, 2021; Onyegbule and Ufearo, 2024).

Another significant methodological concern in this body of research is the inconsistent reporting of contraceptive formulations. Many studies fail to specify whether participants are using combined hormonal contraceptives (CHCs), progestin-only pills (POPs), patches, injections, or intrauterine systems. Even fewer details are provided regarding the specific dosages or the androgenic or anti-androgenic properties of the hormonal agents used. This lack of specificity hinders the determination of the relative impact of different formulations on vocal quality (Rodney and Sataloff, 2015).

Comparative findings across studies reveal mixed results. Some research suggests that CHCs may help stabilize vocal quality by minimizing hormonal fluctuations, potentially benefiting singers who experience voice deterioration during the luteal phase (Gunjawate *et al.*, 2017). In contrast, other studies report adverse effects such as reduced vocal range, increased fatigue, or a perceived dullness in vocal timbre (Morris, Gorham-Rowan and Harmon, 2011). These

inconsistencies highlight the multifactorial nature of vocal performance and emphasize the roles of individual variability, vocal training, health status, and genre-specific demands.

Evaluating the strengths and limitations of current methodologies highlights the need for more rigorous and integrated research approaches. Objective tools like acoustic analysis and video stroboscopy provide reproducible and physiologically informative data, but they are resource-intensive (Chao and Song, 2022). Conversely, subjective assessments such as surveys and interviews are more accessible and valuable for capturing lived experiences, although they lack reproducibility and clinical robustness (Cognitive FX Team, 2017).

To bridge the gap between measurable outcomes and personal experience, future studies should adopt a triangulated methodological framework that integrates hormonal testing, acoustic and physiological analysis, and subjective evaluation. This approach aligns with biopsychosocial models of voice, which account for the interaction between biological, emotional, and contextual factors (Marschall, 2023).

Methodologically, the field would benefit from a shift toward longitudinal, interdisciplinary studies. Longitudinal designs can track trends and adaptations in vocal parameters over time (Caruana *et al.*, 2015), while interdisciplinary collaborations among otolaryngologists, endocrinologists, speech-language pathologists, and vocal pedagogues can enhance both scientific rigor and clinical relevance (Warren and Warren, 2023). Furthermore, standardized protocols should be developed to ensure consistent reporting of contraceptive type, dosage, duration of use, and participant vocal classification, whether soprano, alto, or speech voice user. Research must also control for potential confounding variables such as smoking, hydration, vocal load, and psychological stress.

In conclusion, while the current methodologies in this field offer valuable insights, they remain fragmented and inconsistent. A strategic move toward more rigorous, standardized, and integrative research designs will improve the reliability and applicability of findings (Ferreria, Andrade and Almedia, 2020). Such advancements are critical for academic understanding and informing practical decision-making among female vocalists, clinicians, and educators navigating the complex interplay between hormonal health and professional voice use.

Conclusion

This review has examined the diverse and often inconsistent body of literature on the impact of hormonal contraceptive use on the vocal health and performance of female singers. Drawing from interdisciplinary research in endocrinology, voice science, and pedagogy, it is evident that hormonal contraceptives can affect the female voice, but the nature and degree of these effects remain inconclusive. Some studies suggest that combined hormonal contraceptives (CHCs) may help stabilize the voice by flattening hormonal fluctuations throughout the menstrual cycle, potentially mitigating premenstrual voice syndrome or luteal-phase deterioration in vocal quality (Rodney and Sataloff, 2016). In contrast, other studies have documented adverse outcomes, including reduced vocal range, increased vocal fatigue, and a perceived dullness or loss of brightness in timbre (Cristol, 2019). These conflicting findings can be partially attributed to individual physiological variability among singers, but they are also strongly linked to methodological weaknesses within existing literature. Many studies rely heavily on self-

reporting, which, while offering valuable insights into personal experiences, is inherently vulnerable to subjectivity, psychosomatic bias, and retrospective inaccuracies. Moreover, objective tools such as acoustic analysis, video stroboscopy, and hormonal level testing, which provide more reliable, physiologically grounded data, are underused due to their resource-intensive nature, further limiting the field's ability to draw definitive conclusions (Titze and Verdolini Abbott, 2012; Zalesska-Kręcicka, Pietruszewska and Kukwa, 2023).

A significant limitation in the current research is the lack of standardized methodologies (Ross and Zaidi, 2019). Few studies report key variables such as the type and dosage of contraceptives used, participant vocal classification, or even the duration of contraceptive use, making it difficult to compare or synthesize findings across studies. Additionally, most of the available research is cross-sectional rather than longitudinal, which restricts the ability to observe trends, adaptations, or long-term outcomes. Longitudinal studies that track singers over months or years would better illuminate whether vocal changes due to contraceptive use are transient, cumulative, or adaptive. It is also important to note that most participants in existing studies are not professional voice users, limiting the relevance of findings to trained singers who operate under specific vocal demands. Methodologically, this review supports a shift toward integrative, interdisciplinary approaches grounded in a biopsychosocial model of voice. The model emphasizes the interplay of biological factors, such as hormonal fluctuations, psychological aspects like performance anxiety, and behavioral patterns in vocal usage, all of which collectively shape vocal performance.

From the perspective of this desk-based study, the literature review process uncovered both significant insights and notable limitations. The lack of robust, current, and singer-specific research was a recurring challenge. Some cited studies were outdated or narrow in scope, while others lacked transparency regarding experimental controls or vocal assessment tools. The decision to employ both subjective and objective methodologies in the analysis was warranted by the need to capture the full range of vocal experience, including measurable changes and perceived impact. However, without access to primary data or participant interviews, the study could not provide firsthand perspectives or contextual nuance beyond what was already published. Despite these limitations, the findings suggest several actionable recommendations.

Future research should prioritize longitudinal designs that monitor hormonal and vocal fluctuations over time, particularly among professional voice users. Interdisciplinary collaborations among otolaryngologists, endocrinologists, voice scientists, and vocal pedagogues are essential to enhance the rigor, clinical relevance, and applicability of findings. Moreover, researchers should adopt standardized protocols for reporting contraceptive type, dosage, administration method, and participant vocal profiles to facilitate meaningful comparisons and meta-analysis. Triangulating objective data, such as hormone levels and vocal parameters, with subjective feedback from singers would provide a more holistic understanding of how hormonal contraceptives affect voice. Finally, the insights gained from this review emphasize the importance of individualized care. Vocal coaches and healthcare providers must work collaboratively to guide female singers in making informed choices about contraceptive use that consider both reproductive and vocal health needs. A more cohesive and methodologically sound body of research is essential not only for academic clarity but also for

the practical support of female vocalists navigating this complex intersection of physiology and performance.

Critical Reflection

Engaging in this literature review as part of my practice-led research project has been both academically enriching and personally transformative. The aim was to investigate the impact of hormonal contraceptive use on the voice of female singers, with particular emphasis on physiological mechanisms and vocal performance outcomes. At the outset, my motivation stemmed from both academic curiosity and real-world relevance, particularly given how under-researched and misunderstood this intersection is, despite its significant implications for female vocalists. What unfolded during the course of the study was not only a deepened understanding of the topic but also an awareness of the broader challenges in voice research, especially in fields that lie at the confluence of medicine, performance, and gendered health.

Initially, I assumed that the existing literature would offer relatively straightforward conclusions about the effects of hormonal contraceptives on vocal quality. However, I quickly discovered that the field is methodologically fragmented, and the research findings are inconsistent or even contradictory. For example, while some studies suggest hormonal contraceptives may stabilize vocal fluctuations by reducing cyclical hormonal variability (Gunjawate et al., 2017; Rodney and Sataloff, 2019), others link their use to adverse changes such as reduced vocal range or increased fatigue (Pavela Banai, 2017; Narasimhan and Pooja, 2022). These discrepancies pushed me to adopt a more critical lens, especially when evaluating the design, limitations, and generalizability of each study.

This reflective process also highlighted the limitations inherent in voice-related research more broadly. Most studies I encountered had small sample sizes, lacked control groups, and were often cross-sectional instead of longitudinal. There was also a lack of standardized protocols regarding the vocal tasks used, the specific contraceptive formulations examined, and how vocal changes were measured—whether through subjective self-report, objective acoustic analysis, or laryngeal imaging. Recognizing these gaps sharpened my evaluative skills, compelling me to interrogate how methodological choices directly affect the reliability and applicability of findings. This was particularly important in synthesizing the literature: I could no longer view studies in isolation but had to understand how their methodological context shaped their conclusions.

One of the most profound shifts in my thinking occurred when I began to explore the biopsychosocial dimensions of vocal performance. I had initially approached the project with a largely biomedical lens, focused on hormonal pathways and their effects on vocal fold physiology. Yet as I delved deeper, it became apparent that vocal performance cannot be separated from the emotional, psychological, and contextual dimensions of the singer's experience (Lv, 2018). For example, anxiety, stress, and hormonal fluctuations often influence vocal health and performance. This realization helped me appreciate the necessity of interdisciplinary approaches in vocal science, particularly those that integrate otolaryngology, endocrinology, psychology, and voice pedagogy. It also influenced how I framed my recommendations, emphasizing the need for more holistic and collaborative research designs.

Methodologically, the decision to focus on both objective and subjective forms of data analysis was validated through the review process. Objective tools such as acoustic analysis and video stroboscopy are valuable for quantifying changes in fundamental frequency, jitter, shimmer, and vocal fold behavior. However, they can be expensive and are not always accessible in non-clinical settings. In contrast, subjective tools like self-report surveys capture the singer's lived experience, which is essential for understanding how hormonal changes are perceived in performance contexts. This dual-method approach enabled a more nuanced understanding of vocal change, although it also introduced complexities in comparing studies that used different tools or lacked clear methodological rigor. This complexity highlighted a significant gap in the literature and further strengthened my argument for triangulated, multi-modal research frameworks.

In conducting this desk-based study, I confronted several challenges that affected the research process. Access to full-text journal articles was sometimes restricted, especially for older or more niche studies. I also faced difficulties locating studies that explicitly focused on trained singers as opposed to general voice users. Many studies grouped singers, teachers, and speech professionals, diluting the specificity needed for performance-focused research. These obstacles forced me to be both strategic and resourceful in sourcing credible literature. At times, I had to rely on grey literature data from speech science or adjacent disciplines, justifying their inclusion based on physiological overlap.

Another challenge was synthesizing a coherent narrative from such a wide array of perspectives. Some studies were heavily clinical and assumed a baseline familiarity with endocrinological terminology, while others were written from a pedagogical or performance-oriented standpoint. Bridging these academic silos required significant effort in translation, both literal—such as medical terminology—and conceptual. Nevertheless, this process improved my ability to identify thematic patterns, build critical comparisons, and situate findings within broader theoretical models. It also helped me appreciate the importance of academic literacy across disciplines and underscored the value of accessible, interdisciplinary communication.

Reflecting on my academic development, this project has significantly improved my skills in critical thinking, analytical synthesis, and methodological evaluation. I have developed a sharper eye for identifying research bias, flawed logic, and unjustified assumptions in published work. More importantly, I have gained confidence in making informed critiques and proposing evidence-based alternatives. Writing the conclusion of the study, in particular, was a moment of clarity; it allowed me to bring together multiple strands of evidence and propose a vision for future research that is more rigorous, equitable, and practically useful for singers.

This review also held personal meaning. As someone engaged in the arts and health sciences, I realized that this project emphasized how often female vocalists are underserved in both medical and academic settings. It underscored the importance of advocating for inclusive, high-quality research that addresses the specific needs of female performers, especially in areas related to reproductive health, a topic that remains under-discussed and under-funded. In doing so, the study reinforced the need to apply research to real-world problems and ensure that academic work meaningfully contributes to professional practice. In my future practice, I plan to use these insights to advocate more confidently for singer-specific health considerations when

working with healthcare providers and vocal coaches. I also aim to adopt a more interdisciplinary approach to vocal pedagogy and research, considering physiological, emotional, and contextual factors when supporting female singers.

Looking ahead, I recommend that future research in this field prioritize longitudinal, interdisciplinary studies with larger, singer-specific samples. Clearer categorization of contraceptive types, hormonal dosages, and vocal classifications is also essential. These methodological improvements will not only enhance data reliability but also make findings more relevant to voice professionals. Additionally, integrating qualitative elements such as interviews or diaries could offer valuable insights into how singers perceive and manage vocal changes. Lastly, researchers must remain critically aware of their methodological and epistemological biases, ensuring that studies do not unintentionally silence or overlook important aspects of female vocal health. I will carry these lessons into any future research projects I undertake, aiming to design them with both methodological rigor and practical usefulness.

In summary, this critical reflection has helped me articulate not only what I learned from the literature but also how engaging with it has shaped my academic and personal growth. The challenges faced, the intellectual changes experienced, and the skills developed will definitely influence my future work, both as a researcher and as an advocate for evidence-based practice in voice and health.

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