Journal of Education, Health and Sport. 2026;88:68345.
eISSN 2391-8306.

https://doi.org/10.12775/JEHS.2026.88.68345

Journal of Education, Health and Sport. eISSN 2450-3118

Journal Home Page
https://apcz.umk.pl/JEHS/index

SYNCERZ, Natalia, CZAJKA, Katarzyna, ZADROŻNA, Katarzyna, DRYŻAŁOWSKI, Piotr, STEĆ, Sara, WÓJCIK, Bartłomiej, BORODACZ, Julia, CZAMPIEL, Martyna, NAWRACAJ, Michał, and BORT, Michał. Effects on Physical Activity on Female and Male Fertility: A Literature Review. Journal of Education, Health and Sport. 2026;88:68345. eISSN 2391-8306.
https://doi.org/10.12775/JEHS.2026.88.68345

The journal has had 40 points in Minister of Science and Higher Education of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of 05.01.2024 No. 32318. Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical culture sciences (Field of medical and health sciences); Health Sciences (Field of medical and health sciences).
Punkty Ministerialne 40 punktów. Załącznik do komunikatu Ministra Nauki i Szkolnictwa Wyższego z dnia 05.01.2024 Lp. 32318. Posiada Unikatowy Identyfikator Czasopisma: 201159. Przypisane dyscypliny naukowe: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu).
The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 16.01.2026. Revised: 04.02.2026. Accepted: 02.02.2026. Published: 17.02.2026.

Effects of Physical Activity on Female and Male Fertility: A Literature Review

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Abstract

Introduction: Infertility affects an estimated 60–80 million couples globally and represents a growing public health concern [1]. Its etiology is multifactorial, with modifiable lifestyle and environmental factors playing a significant role. Among these, physical activity is increasingly recognized as a relevant contributor, although its precise impact on reproductive outcomes remains unclear [2]. Promoting balanced, evidence-based strategies—including appropriate physical activity during the periconceptional period—should be considered a shared responsibility in preconception care.

Objective: This review aims to synthesize current evidence on the role of physical activity in fertility, highlighting its relevance to both sexes. It discusses exercise types that support reproductive potential, contrasts them with potentially harmful modalities, and explores underlying physiological and cellular mechanisms.

Conclusion:

1. Couples planning pregnancy should appropriately adjust their lifestyle by engaging in moderate and regular physical activity suited to their individual capacity, while avoiding high-intensity or strenuous exercise [3].

2. Infertility arises from both female and male factors, with each contributing to roughly half of all cases [1].
3. High-intensity physical activity may impair fertility by contributing to menstrual cycle disturbances in women and reduced sperm quality in men. Both sexes have been shown to exhibit dysregulation of the hypothalamic–pituitary–gonadal axis under such conditions [4, 5].
4. Despite the abundance of literature on the subject, there is still a lack of conclusive evidence identifying the most beneficial type of physical activity for couples trying to conceive. Future research should focus on designing highly standardized studies that will serve as a foundation for clear and evidence-based lifestyle recommendations supporting reproductive health [6].

Keywords: infertility, physical activity, time to pregnancy, conception, female fertility, male fertility

Content

1. Introduction

According to the World Health Organization (WHO), about 60 to 80 million couples currently suffer from infertility worldwide [1]. It represents an increasingly prevalent global health concern, impacting millions of couples in modern society. Its etiology is complex and multifactorial, with a substantial contribution from modifiable lifestyle and environmental exposures. Among the various contributing factors, insufficient physical activity or inappropriate exercise modality is frequently cited [2]. The etiology of infertility is equally attributable to female and male factors, each accounting for approximately 50% of cases [1]. Despite growing awareness of infertility as a shared concern between partners, clinical and educational strategies continue to disproportionately emphasize female reproductive health. This longstanding bias in fertility care has contributed to the relative neglect of male-specific factors, leaving many men without adequate information or support to engage in evidence-based interventions aimed at improving their reproductive outcomes [6]. Preconception preparation should be regarded as a shared responsibility between both prospective parents. Lifestyle modification prior to conception constitutes a fundamental aspect of responsible parenthood. Among the factors warranting particular attention is appropriate physical activity during the periconceptional period [7]. Engaging in physical activity might contribute to fertility preservation by influencing the hypothalamic-pituitary-gonadal axis. The impact of physical activity on fertility may be either beneficial or harmful, depending on key characteristics of the exercise regimen—such as its type, intensity, duration, purpose, and structure [8]. Nevertheless, the extent to which physical activity directly impacts infertility risk remains uncertain [9].

2. Objective

The primary aim of this article is to present current evidence regarding the impact of physical activity on fertility in both women and men. The discussion emphasizes the dual relevance of this factor to both sexes, underscoring the notion that infertility should be approached as a shared concern between partners rather than an issue affecting only one individual.

This review outlines the types, modalities, and characteristics of physical activity that are most beneficial for couples attempting to conceive. For contrast, it also highlights forms of exercise that may adversely affect reproductive potential.

We also explore the multifaceted impact of physical activity on fertility, emphasizing both physiological and cellular mechanisms.

3. Methods

This review article was developed based on literature addressing fertility, time to conception, and infertility in both women and men. To identify relevant sources, a comprehensive search of the PubMed database was conducted between July and September 2025.

Various combinations of keywords were used during the search process, including: infertility, physical activity, time to pregnancy, conception, female fertility, and male fertility. The initial search yielded 267 publications, which were subsequently narrowed down to 25 articles. Selection criteria included: publications in English, published between 2015 and 2025, and freely accessible in full-text format online.

Studies were excluded if they focused on factors unrelated to physical activity or addressed physical activity only marginally. This article constitutes a narrative review. No meta-analytical techniques or formal methodological assessment tools were employed. The aim is to synthesize current evidence and provide a unified perspective on fertility in both sexes, a topic that is often addressed separately in the literature.

Limitations of this analysis include restricted access to certain full-text articles and the lack of consistent classification of physical activity types across studies. Moreover, many publications examined multiple lifestyle factors simultaneously, without isolating physical activity as an independent variable. Despite the limitations, a sufficiently robust body of literature was identified to enable a comprehensive presentation and analysis of the proposed topic.

4. Results

4.1. Effects of Physical Activity on Female Fertility

4.1.1. Negative impact of physical activity on female fertility

The relationship between physical activity and female fertility remains inconclusive, with studies reporting both beneficial and adverse effects [10]. Evidence indicates that regular physical activity exerts a beneficial influence on female fertility; however, the magnitude and direction of this effect appear to be modulated by the intensity of exercise [11]. Successful natural conception requires precise hormonal regulation to support ovulation, a process that can be disrupted by physiological stress. Intense physical exertion, particularly when compounded by psychosocial or metabolic stressors, may suppress the synthesis of estrogen and progesterone—hormones essential for reproductive function [12]. Excessive training or energy imbalance has been also associated with ovulatory dysfunction and reduced fertility potential [13]. Women engaged in high-intensity physical training are more likely to experience disruptions in menstrual function [11]. Reports indicate that the prevalence of functional hypothalamic amenorrhea in athletic populations may reach up to 40%, while oligo-amenorrhea affects between 9% and 40% of female athletes. These rates markedly exceed those observed in non-athletic women, where prevalence typically ranges from 5% to 11% [8]. Research indicates that hypothalamic amenorrhea may result from an energy deficit induced by excessive physical exertion, which disrupts the hypothalamic–pituitary–ovarian axis and subsequently lowers estrogen production. This hormonal imbalance contributes to a sustained reduction in circulating estradiol and diminished ovarian responsiveness [3]. Furthermore, ovulatory disturbances such as anovulation and luteal phase insufficiency appear to be more common among physically active women compared to those leading sedentary lifestyles [8]. A retrospective case-control study found that engaging in vigorous physical activity for at least one hour per day was associated with a 6.2-fold increase in infertility risk, indicating that strenuous exercise may negatively influence female reproductive health [3]. While discussing the potential adverse effects of vigorous physical activity on female fertility, it is important to note that some studies have reported a positive association between fecundability and engaging in vigorous exercise for more than four hours per week compared to no activity [14]. Data from a population-based survey involving 3,887 women indicated that higher levels of exercise—characterized by increased frequency, duration, and intensity—were linked to a greater risk of

subfertility. Notably, physical activity performed to the point of exhaustion was associated with a twofold increase in fertility-related issues compared to low-intensity exercise [8].

Additional studies emphasize the critical role of negative energy balance in disrupting female reproductive function. When energy intake fails to meet physiological demands, compensatory mechanisms are activated, ultimately leading to suppression of the hypothalamic–pituitary–ovarian (HPO) axis [13]. More specifically, energy availability falling below 30 kcal per kilogram of lean body mass per day has emerged as a key explanatory threshold for exercise-induced reproductive dysfunction, particularly among lean athletic women [11].

4.1.2. Positive impact of physical activity on female fertility

Conversely, consistent engagement in moderate physical activity appears to promote hormonal balance and regular ovulatory cycles, thereby supporting reproductive health [10]. Current recommendations for women planning pregnancy suggest a gradual increase in physical activity, targeting approximately 10,000 steps per day and/or engaging in moderate-intensity aerobic exercise for a total of 150 minutes per week [2]. Walking is frequently cited in the literature as a representative example of physical activity recommended for individuals attempting to conceive. Notably, its association with fecundability appears to be modulated by body mass index (BMI). Among women classified as overweight or obese, walking for at least 10 minutes at a time (median 3h/week) has been positively correlated with improved fecundability outcomes. No significant association has been observed between walking and fecundability among women in other BMI categories [13]. Evidence from a separate study indicates that pre-treatment physical activity, sustained over the year prior to IVF, was associated with improved pregnancy outcomes compared to inactivity [11]. Clinical and experimental evidence suggests that engaging in regular, moderate-intensity physical activity may support the preservation and enhancement of ovarian reserve, contributing to a more favorable reproductive profile [4,16].

In addition to its beneficial effects on hormonal regulation, regular physical activity also contributes to a reduced risk of obesity-related disorders. In parallel, obesity is a condition known to adversely affect reproductive outcomes by increasing the likelihood of miscarriage and obstetric complications, while simultaneously lowering the chances of achieving spontaneous conception [17]. While certain studies have identified elevated BMI as an independent predictor of reduced anti-Müllerian hormone (AMH) concentrations, other

findings have failed to demonstrate significant differences in AMH levels between women with high and normal BMI [18].

One of the studies also addressed a frequently overlooked aspect—core strengthening and the enhancement of blood circulation within the pelvic and ovarian regions, which contributes to improved vascularization in this area. The researchers designed an innovative and well-structured exercise regimen—a 70-minute full-body program referred to as "reproductive gymnastics." It integrates strength-building, flexibility-enhancing, and relaxation techniques, blending yoga-inspired movements with diaphragmatic breathing and meditative components aimed at stimulating the parasympathetic nervous system and promoting stress reduction. The authors emphasize that the effectiveness of the proposed approach requires more thorough investigation and analysis. At the same time, they note that three volunteer participants experienced encouraging shifts in their FSH and AMH levels following a three-month exercise regimen—an observation that lends preliminary support to the potential value of the intervention [4].

4.2. Effects of Physical Activity on Male Fertility

4.2.1. Negative impact of physical activity on female fertility

In men, engaging in overly intense or prolonged physical activity may disrupt the function of the hypothalamic-pituitary-gonadal axis, elevate oxidative stress levels, and promote chronic inflammation. These changes can negatively affect semen parameters and ultimately compromise male fertility [19]. Excessive physical activity has been linked to poorer semen quality [5]. Elevated levels of sperm DNA fragmentation are thought to negatively influence key reproductive processes—including fertilization, embryo viability, implantation, and the likelihood of a successful pregnancy [20]. Triathletes have been reported to exhibit poorer sperm morphology and lower concentration compared to individuals engaged in regular physical activity or sports like water polo. These findings imply that highly demanding endurance disciplines may adversely affect spermatogenesis, compromise sperm DNA integrity, and diminish the antioxidant potential of seminal fluid [21]. In addition to the previously noted observations, a 16-week period of intensive cycling training in humans has been associated with elevated production of reactive oxygen species (ROS) alongside a reduction in antioxidant defenses responsible for neutralizing these molecules. This imbalance may contribute to oxidative stress, potentially impacting sperm quality and overall reproductive health [21].

Studies have shown that cycling for more than five hours per week may be linked to a reduction in both sperm concentration and motility, suggesting that prolonged endurance training could negatively impact male reproductive parameters [21]. Exercise-induced hypoxia has been noted as a physiological consequence of intense training, particularly under high-altitude conditions, as is deep diving [21]. In such environments, diminished oxygen availability may contribute as another cause of testicular dysfunction. [21]. Scientific findings have demonstrated a clear association between elevated sperm DNA fragmentation and markers such as VO_2max, seminal 8-isoprostane, reactive oxygen species (ROS), and malondialdehyde (MDA). These results suggest that individuals undergoing intensive training regimens may be more susceptible to sperm dysfunction than those who participate in moderate physical activity or maintain a sedentary lifestyle [22]. Given the anatomical structure of the male reproductive system, particular caution should be exercised regarding factors that may elevate scrotal temperature. Such increases are known to disrupt spermatogenesis by inducing germ cell death through mechanisms such as autophagy, DNA damage, and apoptosis [23]. One contributing factor may be the use of tight-fitting sportswear—commonly seen in disciplines like cycling—which is believed to negatively affect sperm production. A similar pattern is observed in everyday settings [24], where tight under trousers generate significantly more heat around the testes compared to looser-fitting alternatives, potentially compromising testicular function [21]. For optimal sperm production, the temperature within the testes needs to remain about 2 °C lower than the body's core temperature. This cooler environment is essential for maintaining healthy spermatogenesis [6].

4.2.2. Positive impact of physical activity on female fertility

Engaging in regular physical activity may enhance male fertility by positively influencing key sperm characteristics such as concentration and motility—both essential for natural conception [10]. Regular physical activity not only improves semen quality, but also helps reduce oxidative stress and supports spermatogenesis by strengthening the antioxidant defense system within the testes and regulating immune function [6]. Moreover, it contributes to better cardiovascular function, which in turn enhances blood circulation to the testes and supports erectile performance—both of which play a vital role in maintaining male fertility [6]. Some findings suggest that exercise could act as a buffer in the relationship between psychological stress or anxiety and reproductive health. Elevated stress levels are known to suppress testosterone production, which in turn can interrupt the process of sperm development [10]. Since regular

exercise is known to alleviate symptoms of stress and anxiety, it may offer a beneficial pathway for men experiencing psychological strain. By engaging in physical activity, they could potentially reduce emotional distress, which in turn might support hormonal balance and enhance fertility outcomes [10]. Additionally, men who engage in regular physical activity tend to exhibit a higher percentage of motile sperm cells than those leading a sedentary lifestyle [22]. Research indicates that engaging in moderate physical exercise may help mitigate age-related inflammation and reduce DNA damage in sperm cells [22]. Notably, exercise interventions have been associated with improvements in semen characteristics, DNA stability, inflammatory markers, and oxidative balance, all of which appear to correlate with increased pregnancy rates among couples facing infertility [20]. A randomized trial conducted in 2017 explored the impact of a 24-week exercise regimen—combining aerobic and resistance training—on seminal indicators of oxidative stress and inflammation. The study also assessed markers of male reproductive health and fertility outcomes in men diagnosed with infertility. Out of 1,296 screened participants aged 25 to 40, individuals were divided into physically active and inactive groups. Semen samples were obtained both before and after the intervention. Notably, improvements in pregnancy rates were associated with exercise-induced shifts in inflammatory and oxidative profiles. These results underscore the potential of combined aerobic and strength training to support fertility in men [20]. Another network meta-analysis revealed that, among all evaluated strategies aimed at improving male factor infertility, the most promising intervention was a combination of aerobic and resistance exercise. This training approach showed the highest likelihood of delivering beneficial outcomes in terms of reproductive health [21].

Engaging in regular physical activity is particularly important for men planning to conceive. A growing body of evidence suggests that sedentary lifestyles are associated with a higher risk of late-onset hypogonadism—a condition characterized by reduced testosterone levels and diminished libido—which may negatively affect reproductive health [5]. What is more, physically active individuals tend to exhibit relatively elevated concentrations of FSH, LH — within physiological norms—when compared to their sedentary subjects [21].

5. Discussion

Based on current literature, it can be concluded that recreational physical activity and well-structured exercise programs may positively influence both male and female fertility, whereas excessive training and competitive sports tend to have adverse effects [6]. Numerous sources

emphasize that couples trying to conceive should carefully select and tailor the type of physical activity to support reproductive goals. The most beneficial form of exercise for both men and women appears to be regular activity of moderate intensity.

Physical activity supports reproductive health through mechanisms at the cellular, hormonal, and psychological levels. This includes regulation of the hypothalamic–pituitary–gonadal axis in both sexes, modulation of immune function, and improvement of mental well-being through stress reduction. Additionally, physical activity exerts sex-specific effects: in men, it improves semen parameters, while in women, it may enhance ovarian reserve.

Modern individuals are frequently exposed to environmental stressors such as air pollution, occupational heat or toxins, and harmful chemicals present in food, beverages, and industrial or agricultural products [25]. Given the unavoidable nature of these exposures, it becomes crucial to optimize controllable factors—such as physical activity—that may improve the chances of conception.

Undeniably, physical activity represents a cost-effective and highly efficient strategy for both the prevention and management of a wide spectrum of conditions—from somatic disorders such as obesity and diabetes to mental health challenges including anxiety and depression—while exerting a significant impact on reproductive health in both sexes [21].

Unfortunately, the available studies are heterogeneous, with significant variation in the types of physical activity analysed across study groups. Moreover, many studies did not account for other potential health-related risk factors (e.g., diabetes, smoking) or genetic predispositions [6]. The current body of evidence remains inconclusive, partly due to the lack of standardized assessment tools and research protocols [22].

Therefore, future studies should be designed with methodological consistency and clearly defined exercise parameters to allow for reliable comparisons between study populations. In summary, further research is essential to confirm the beneficial effects of moderate physical activity on reproductive potential and to develop safe, transparent lifestyle recommendations that support couples in achieving pregnancy [22].

6. Conclusions

1. Couples planning pregnancy should appropriately adjust their lifestyle by engaging in moderate and regular physical activity suited to their individual capacity, while avoiding high-intensity or strenuous exercise [3].

2. Infertility arises from both female and male factors, with each contributing to roughly half of all cases [1].
3. High-intensity physical activity may impair fertility by contributing to menstrual cycle disturbances in women and reduced sperm quality in men. Both sexes have been shown to exhibit dysregulation of the hypothalamic–pituitary–gonadal axis under such conditions [4, 5].
4. Despite the abundance of literature on the subject, there is still a lack of conclusive evidence identifying the most beneficial type of physical activity for couples trying to conceive. Future research should focus on designing highly standardized studies that will serve as a foundation for clear and evidence-based lifestyle recommendations supporting reproductive health [6].

Disclosure section

Authors' contributions: Conceptualization: N.S. and K.C.; Writing—Abstract: N.S. and K.C.; Writing—review and editing: N.S., K.C. and K.Z.; Writing - Results: Effects of Physical Activity on Female Fertility: S.S., J.Boro., J.Bort; Writing - Results: Effects of Physical Activity on Male Fertility: P.D., B.W., J.Bort; Writing - Discussion: M.C. and M.W.; Writing - Conclusions: M.C. and M.W.
All authors have read and agreed to the published version of the manuscript.

Funding Statement

This research received no external funding.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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