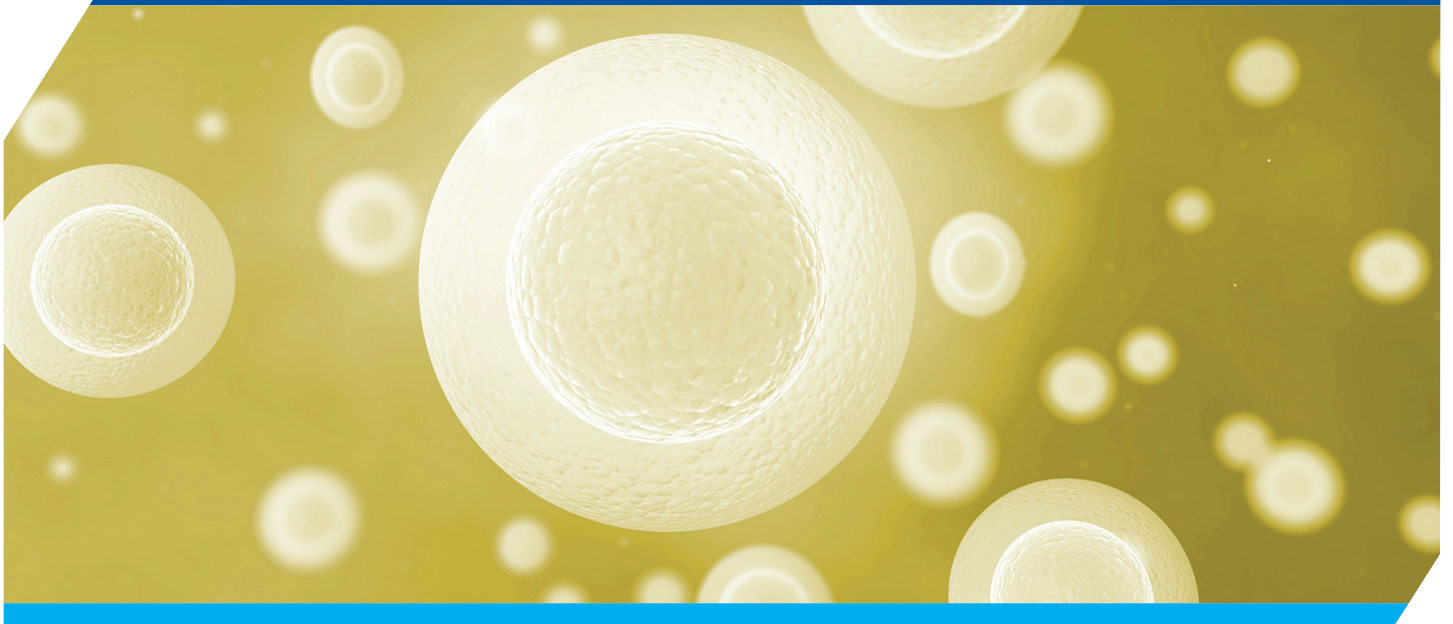




The  
Fertility Society  
of Australia

## Pre-Conception Health Special Interest Group



# The role of exercise and physical activity in improving fertility, quality of life and emotional well-being

Overweight and obesity impair male and female fertility and reduce the chance of spontaneous and assisted conception. Weight management (preventing weight gain, achieving weight loss and maintaining a reduced weight) is crucial in preventing and treating infertility. Both physical activity (any movement by the body over the day) and exercise (planned or structured physical activity) are key components of weight management.





# The role of exercise and physical activity in improving fertility, quality of life and emotional well-being

## Evidence review

### Exercise and female fertility

Evidence suggests that moderate regular exercise positively influences fertility and ART outcomes. In 26,955 women, vigorous activity (70-89 per cent of maximum heart rate or a rate of perceived intensity of 14-16 on the BORG 6-20 scale [1]) was associated with reduced risk of ovulatory infertility [2]. Among 216 obese women undergoing ART, those who exercised regularly had better outcomes than their sedentary counterparts, independent of weight loss. Exercisers' pregnancy and live birth rates were 39 per cent and 16 per cent respectively compared with non-exercisers' 16 per cent pregnancy and 7.4 per cent live birth rates [3]. A systematic review of eight studies in 3,683 couples assessed the relationship between maternal physical activity before IVF/ICSI cycles and ART outcomes. Women who were physically active (variously defined) had higher clinical pregnancy (OR 1.96, 95% CI 1.40, 2.73) and live birth rates (OR 1.95, 95% CI 1.06, 3.59) compared to physically inactive women [4].

However, high volume or intensity exercise regimes appear to reduce fertility. A systematic review of 14 studies reported an increased risk of anovulation in women exercising >60 minutes/day while those undertaking vigorous activity for 30-60 minutes/day had a reduced risk of ovulatory infertility [5]. A case-control study of 346 women reported that  $\geq 60$  minutes/daily exercise in the year prior to attempting conception was associated with an increased risk of infertility compared to never exercising [6]. A population-based health survey found that subfertility was associated with vigorous (exercising daily or to exhaustion) but not with lower intensity or frequent exercise [7].

There are few studies of the effects of exercise interventions prior to assisted or spontaneous conception. A systematic review identified three exercise intervention studies in infertile women or women undergoing fertility treatment. Pooled data showed that the physical activity intervention groups had higher pregnancy (RR 2.10 95% CI 1.32, 3.35) and live birth (RR 2.11 95% CI 1.02, 4.39) rates compared to no treatment controls [8]. However, the interventions were very variable and ranged from health-promoting lifestyle education, aiming for 10,000 steps/day to structured programs of up to six times/week walking or resistance training. Furthermore, two of the interventions also achieved differences in weight loss (3.3-5 kg) between intervention and controls. It is therefore difficult to draw any conclusions regarding the amount or type of exercise required or if exercise independent of weight loss would also achieve reproductive benefits.

A systematic review identified seven studies examining the effect of exercise (ranging from low impact aerobics, cycling and combined aerobic/resistance training either in isolation or in combination with dietary changes) on fertility in overweight and obese women with polycystic ovary syndrome (PCOS) or anovulatory infertility [5]. The interventions improved reproductive outcomes including ovulation, menstrual patterns, pregnancy and fertility. While one study reported that exercise resulted in greater improvements in menses and ovulation frequency compared to diet alone [9], another reported that diet was as effective as aerobic or combined aerobic and resistance training in improving menstrual regularity [10]. Most studies also report reproductive improvements associated with weight loss. For example, studies of the effects of 12-24-week lifestyle interventions comprising diet, exercise and/or behavioural change in overweight infertile women with or without PCOS report modest weight loss, improved ovulatory and menstrual regularity and reduced risk of miscarriage compared to pre-intervention [11-14]. Most participants in these studies conceived and gave birth after spontaneous or assisted conception [11,12].

### Exercise and male fertility

Being physically inactive is associated with idiopathic infertility in men [15]. This may be through altering semen quality. A systematic review investigated the effect of physical activity on semen parameters and identified 32 papers which overall reported recreational exercise (moderate or high intensity) was associated with improved semen quality in both men from the general population and men with infertility [16]. The review also found that very high levels of exercise (for example in elite athletes) or specific exercises (such as cycling) may have detrimental effects on some aspects of sperm quality [16]. This is also shown in a randomised controlled trial, where semen parameters declined in men in the high but not in those in the moderate intensity exercise group [17]. Other studies found no relationship between sperm quality and exercise in men attending an infertility clinic [18,19] except for bicycling  $\geq$  five hours/week being associated with reduced sperm concentration and motility [18]. This supports that the potential negative effect of exercise on semen quality relates to intensive training or specific exercise modalities [20]. The beneficial effect of exercise on sperm quality may relate to total or abdominal adiposity. One study found that waist circumference, independent of exercise, was inversely correlated with sperm count [21] and in another a 16-week exercise intervention in obese men from the general population improved sperm parameters and reduced abdominal obesity [22]. There is limited research examining the effect of exercise prior to assisted or spontaneous conception in men. In 556 infertile men randomised to resistance and aerobic exercise (60 minutes three times/week) compared to no exercise for 24 weeks, exercise resulted in improvements in weight, abdominal fat, semen parameters, sperm DNA fragmentation, oxidative stress, proinflammatory cytokines, and pregnancy and live birth rates [23].

### The effect of exercise on quality of life and emotional well-being

Exercise improves psychological parameters. From a systematic review of 56 studies in healthy males and females, 3-6 months of light or moderate intensity exercise improved quality of life related to physical health (effect size (ES) 0.22, 95% confidence interval (CI) 0.07, 0.37,  $p < 0.05$ ) and psychological health (ES 0.21 95% CI 0.06, 0.36,  $p < 0.05$ ) compared to no exercise [24]. In infertile women with or without PCOS undergoing a six-month lifestyle intervention (diet, exercise and behavioural intervention) prior to assisted reproduction, improvements in self-esteem and symptoms of depression and anxiety were observed [11, 12]. In women with PCOS, three RCTs [27-29], a case control study [30] and one single-arm case series [31] assessed quality of life following exercise interventions and reported improvements in depression scores, body image distress and health related quality of life. The interventions varied in time from 16-24 weeks and types of exercise which included self-directed walking programs, continuous or intermittent aerobic exercise, resistance training and diet in conjunction with aerobic or resistance exercise interventions. It is therefore not possible to determine the optimal amount or type of exercise for improving psychological health and emotional well-being. Furthermore, quality of life was equally improved for diet alone, diet and aerobic exercise, or diet, aerobic and resistance exercise. Psychological improvements were associated with weight loss in some of the studies, indicating that improvements in quality of life may also be related to positive changes in weight or diet.

## Summary

There is some evidence that moderate exercise benefits fertility and that high volume or high intensity exercise may adversely affect fertility. There is conflicting evidence about whether exercise is more effective in improving menstrual function, ovulation or quality of life compared to



The  
Fertility Society  
of Australia

## The role of exercise and physical activity in improving fertility, quality of life and emotional well-being

diet in overweight women with PCOS. There is high quality evidence in the general population and moderate quality evidence in infertile women with or without PCOS for the effect of exercise on improving quality of life. As many studies prescribe exercise as part of a multidisciplinary lifestyle program, it is difficult to separate the effects of exercise from other dietary and behavioural components. It is often not possible from the interventions to determine the type, intensity or duration of exercise needed to achieve optimal reproductive benefits or if exercise benefits outcomes independent of weight loss. Further research is required to determine the optimal intensity and modality of exercise prior to pregnancy in fertile and infertile couples, the effect of exercise in combination with and independent of other lifestyle or weight changes and the effect of exercise on quality of life in infertile men.

### Recommendations

National and international evidence-based physical activity guidelines exist for the general population and are relevant to men and women preconception. These should be highlighted to all couples seeking ART by the medical team and accrediting bodies. Australia's Physical Activity & Sedentary Behaviour Guidelines for Adults recommend a minimum of 150 to 300 minutes per week moderate intensity or 75 to 150 minutes per week vigorous intensity or an equivalent combination of moderate and vigorous intensity aerobic activity. In addition, they recommend incorporating muscle strengthening exercises on two or more days of the week, to minimise the amount of time spent in prolonged sitting, and to break up long periods of sitting as often as possible [31]. These recommendations are consistent with international evidence-based guidelines for PCOS management which also apply to infertility management in PCOS [32]. For men and women who are overweight and obese, achieving and maintaining a modest weight loss may improve fertility and will improve other obesity-related morbidities. Exercise is an important component of obesity management. International guidelines for obesity management recommend 225 to 300 minutes per week of moderate intensity physical activity for overweight or obese adults [33].

### For more information about pre-conception health visit



The  
Fertility Society  
of Australia



[www.yourfertility.org.au](http://www.yourfertility.org.au)

Written by Lisa Moran on behalf of PCHSIG [lisa.moran@monash.edu](mailto:lisa.moran@monash.edu)

# The role of exercise in improving fertility, quality of life and emotional well-being

## References

1. Hordern MD, et al. Exercise prescription for patients with type 2 diabetes and pre diabetes: a position statement from Exercise and Sport Science Australia. *J Sci Med Sport*. 2012;15:25-31.
2. Rich-Edwards J, et al. Physical activity, body mass index, and ovulatory disorder infertility. *Epidemiology*. 2002;13:184-190.
3. Palomba S, et al. Physical activity before IVF and ICSI cycles in infertile obese women: an observational cohort study. *Reprod Biomed Online*. 2014;29:72-9.
4. Rao M, Zeng Z, Tang L. Maternal physical activity before IVF/ICSI cycles improves clinical pregnancy rate and live birth rate: a systematic review and meta-analysis. *Reprod Biol Endocrinol*. 2018;16, doi:10.1186/s12958-018-0328-z
5. Hakimi O, Cameron LC. Effect of Exercise on Ovulation: A Systematic Review. *Sports Med*. 2017;47:1555-67.
6. Green BB, et al. Exercise as a risk factor for infertility with ovulatory dysfunction. *Am J Public Health*, 1986;76:1432-6.
7. Gudmundsdottir SL, et al. Physical activity and fertility in women: the North-Trondelag Health Study. *Hum Reprod*. 2009;24:3196-204.
8. Mena GP, et al. The effect of physical activity on reproductive health outcomes in young women: a systematic review and meta-analysis. *Hum Reprod Update*. 2019;25:541-63.
9. Palomba S, et al. Structured exercise training programme versus hypocaloric hyperproteic diet in obese polycystic ovary syndrome patients with anovulatory infertility: a 24-week pilot study. *Hum Reprod*. 2008;23:642-650.
10. Thomson RL, et al. The effect of a hypocaloric diet with and without exercise training on body composition, cardiometabolic risk profile, and reproductive function in overweight and obese women with polycystic ovary syndrome. *J Clin Endocrinol Metab*. 2008;93:3373-80.
11. Clark AM, et al. Weight loss results in significant improvement in pregnancy and ovulation rates in anovulatory obese women. *Hum Reprod*. 1995;10:2705-12.
12. Clark AM, et al. Weight loss in obese infertile women results in improvement in reproductive outcome for all forms of fertility treatment. *Hum Reprod*, 1998;13:1502-1505.
13. Huber-Buchholz MM, et al. Restoration of reproductive potential by lifestyle modification in obese polycystic ovary syndrome: role of insulin sensitivity and luteinizing hormone. *J Clin Endocrinol Metab*. 1999;84:1470-4.
14. Miller PB, et al. Effect of short-term diet and exercise on hormone levels and menses in obese, infertile women. *J Reprod Med*. 2008;53: 315-9.
15. Foucaut AM, et al. Sedentary behavior, physical inactivity and body composition in relation to idiopathic infertility among men and women. *PLoS One*. 2019;14.
16. Ibanez-Perez J, et al. An update on the implication of physical activity on semen quality: a systematic review and meta-analysis. *Arch Gynecol Obstet*. 2019;299:901-21.
17. Safarinejad MR, et al. The effects of intensive, long-term treadmill running on reproductive hormones, hypothalamus-pituitary-testis axis, and semen quality: a randomized controlled study. *J Endocrinol*. 2009;200:259-71.
18. Wise LA, et al. Physical activity and semen quality among men attending an infertility clinic. *Fertil Steril*. 2011;95:1025-30.
19. Olderey N.B, et al. Life styles of men in barren couples and their relationship to sperm quality. *Int J Fertil*. 1992;37:343-9.
20. Redman LM. Physical activity and its effects on reproduction. *Reprod Biomed Online*, 2006;12:579-86.
21. Eisenberg ML, et al. The relationship between male BMI and waist circumference on semen quality: data from the LIFE study. *Hum Reprod*, 2015;30:493-4.
22. Rosety MA, et al. Exercise improved semen quality and reproductive hormone levels in sedentary obese adults. *Nutr Hosp*. 2017;34:603-7.
23. Hajizadeh Maleki B, Tartibian B. Combined aerobic and resistance exercise training for improving reproductive function in infertile men: a randomized controlled trial. *Appl Physiol Nutr Metab*. 2017;42:1293-306.
24. Gillison F et al., The effects of exercise interventions on quality of life in clinical and healthy populations; a meta-analysis. *Soc Sci Med*. 2009;68:1700-10.
25. Galletly C, et al. A group program for obese, infertile women: weight loss and improved psychological health. *J Psychosom Obstet Gynaecol*. 1996;17:125-8.
26. Ribeiro VB, et al. Continuous versus intermittent aerobic exercise in the improvement of quality of life for women with polycystic ovary syndrome: A randomized controlled trial. *J Health Psychol*. 2019. DOI: 10.1177/1359105319869806.
27. Thomson RL, et al. Lifestyle management improves quality of life and depression in overweight and obese women with polycystic ovary syndrome. *Fertil Steril*. 2010;94:1812-6.
28. Kazemi M, et al. A pulse-based diet and the Therapeutic Lifestyle Changes diet in combination with health counseling and exercise improve health-related quality of life in women with polycystic ovary syndrome: secondary analysis of a randomized controlled trial. *J Psychosom Obstet Gynaecol*. 2020;41:144-153.
29. Ramos FK, et al. Quality of Life in Women with Polycystic Ovary Syndrome after a Program of Resistance Exercise Training. *Rev Bras Ginecol Obstet*. 2016;38:340-7.
30. Lia L.M, et al. Exercise and body image distress in overweight and obese women with polycystic ovary syndrome: a pilot investigation. *Gynecol Endocrinol*. 2008;24:555-61.
31. Australia's Physical Activity and Sedentary Behaviour Guidelines and the Australian 24-Hour Movement Guidelines <https://www1.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-strateg-phys-act-guidelines>
32. Teede HJ, et al. Recommendations from the international evidence-based guideline for the assessment and management of polycystic ovary syndrome. *Hum Reprod* 2018;33:1602-1618.
33. SIGN Management of Obesity: A national clinical guideline. 2010: Edinburgh, Scotland.