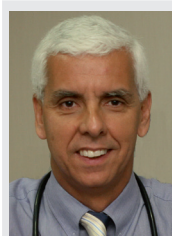


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# Sexual activity: an exercise to prevent cardiovascular morbidity and mortality?

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**“Since, to a certain extent, sexual activity almost always requires body movements, it can conceptually be considered a quite specific form of planned and intentional physical activity...”**

Sexual activity is an integral and relevant part of human life. Not only does it function to preserve the human species but it also has an impact on the mental, physical and social health, and on the quality of life. This editorial, written from a medical (cardiology and exercise/sports medicine) and physiological perspective, discusses the potential role of sexual activity in the domain of exercise and its relationship with cardiovascular morbidity and mortality. Benefits and risks of an active sexual life for both healthy subjects and cardiac patients, as well as the potential impact of drugs for treating erectile dysfunction in this scenario, are also briefly covered.

## Presenting terms & expressions

Physical activity, exercise and sports are terms that describe different concepts. However, they are often confused with one another, and the terms are sometimes used interchangeably. Correctly speaking, physical activity is defined as any bodily movement produced by skeletal muscles that result in energy expenditure and may be categorized into occupational, conditioning, household or other activities [1]. Exercise is a subset of physical activity that is planned, structured and repetitive and produces, as a final or an intermediate objective, the improvement or maintenance of physical fitness or health. Sport is more related to, but not always, participating in organized and competition-oriented forms of physical exercise. Sports competitors (athletes) are, depending on modality, often well above average in some or all components of physical fitness. Notwithstanding, the physical requirements considerably vary among modalities and some elite Olympic athletes could even

be quite physically unfit (e.g., those competing in archery or shooting) or present clear adverse clinical characteristics, such as the morbid obesity pattern typically seen in sumo wrestlers.

The expression ‘sexual activity’ comprises a number of actions, such as kissing, touching, masturbation and intercourse. Most sexual activities are performed either alone (primary masturbation or other forms of self-stimulation) or with another person. A sexual encounter can be divided, for practical purposes, into four phases: foreplay, penetration, orgasm and afterplay. Foreplay tends to be the longest phase, but the duration of phases is not by all means fixed, even among long-lasting married couples. Intercourse includes penetration or stimulation and orgasm phases. A typical range for the penile–vagina penetration-phase duration is somewhere between 2 and 7 min, with a stroke rate ranging from 10 to 30 penile thrusts per min. Orgasm is a very brief and complex physiological phenomena lasting a few seconds.

## Sexual activity as exercise

Since, to a certain extent, sexual activity almost always requires body movements, it can conceptually be considered a quite specific form of planned and intentional physical activity, that is, exercise. In addition, sexual activity is probably the most pleasant and enjoyable type of exercise available. Considering the health burden of sedentary life, it is remarkable that a large recent telephonic survey confirmed that among individuals aged 40–80 years, living in the USA, 80% of the men and 70% of women had engaged in intercourse during the preceding 12 months and

approximately a third of all individuals repeated it more than once a week [2]. With regards to the figures, considering a man or a woman starting a stable relationship at 30 years of age that lasts for 40–50 years, it is realistic to suppose that they will copulate on approximately 4000–5000 occasions, assuming intercourse performed twice a week on average (45 years × 52 weeks × two coitus occasions per week). In this sense, if we consider sexual activity as exercise, it is possible that, for the majority of individuals, this represents the most pleasant, relevant and intense activity regularly performed during their life.

On the other hand, if failure in obtaining a given sport result or exercise performance may be frustrating for some individuals, a similar incapacity in a sexual activity brings stronger feelings much more often and has both relevant health and social implications. Prevalences of different types of sexual dysfunctions vary according to age, gender and culture [3–5]; notwithstanding, the figures are typically quite high, starting from approximately 10% in young males and increasing to over 50% for those 60–70 years of age [6].

There is a substantial body of literature covering sexual activity; however, owing to equipment and observation interferences minimizing the chances to re-enact the normal intimacy observed in real-life conditions in the laboratory setting, the amount of *in vivo* scientific data taken during actual intercourse is very limited [7–10].

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Physiologically speaking, intercourse is the most demanding phase, especially per orgasm [11]. However, intercourse, *per se*, is a nonstandardized procedure, varying in body positions, rhythm of thrusts, depth of penetrations, and therefore, the energy expenditure of both partners vary. In this context, it is worthwhile to mention that the large majority of data come from male subjects [12]. Some studies with small samples of couples have proposed that energy requirements during coitus would range from two to four metabolic equivalents (one metabolic equivalent = resting energy expenditure or an oxygen uptake of 3.5 ml/kg·min), which are somewhat lower for women and equivalent to a brisk walk [13]. Peak values of heart rate and systolic blood pressure during sexual activity tend to be much lower than during maximal treadmill exercise testing [8]. Nevertheless, most of these physiological studies based on hemodynamic responses have missed the concept that intercourse is a non-steady-state exercise, so that the heart rate–oxygen uptake relationship would not remain linear. As an example of this nonlinearity, we have recently shown that arm or leg fast cycling under no resistance for just 4 s – a non-steady-state, sudden and brief exercise with minimal metabolic requirements – is sufficient to increase the heart rate for approximately 20–50 beats/min in healthy individuals [14], mainly by vagal withdrawal, similar to the cardiac acceleration seen during coitus. Therefore, it is truly possible that the energy requirements during a sexual relation have been overestimated by previous studies using heart rate data. Most likely,

the actual oxygen uptake during intercourse is much lower than previously thought and resembles a relaxed walk for a few blocks, interspaced by ascending one or two flights of stairs at moderate and, most importantly, at a very much individual pace.

### Sexual activity & risk of unfavorable cardiovascular & pulmonary events

Unfavorable clinical manifestations can be triggered by physical activity or exercise, including sexual activity [5,15,16]. Searching the medical literature, it is possible to find reports of hemoptysis [17], pulmonary embolism [18,19], stroke [20,21], myocardial ischemia [22] or infarction [23,24], Takotsubo syndrome [25], severe ventricular tachyarrhythmias [26] and sudden death [27], occurring, in the large majority of cases, in previously sick individuals. Comprehensive reviews of autopsy data were recently updated by authors from Germany [28] and showed that in over 32,000 forensic autopsies, only 68 cases (0.22% or 1.9 out of 1000) of natural deaths have occurred during sexual activity. It is worthwhile to comment that in this very large sample, except for five cases (7.4%), all subjects were men. Interestingly, an International Olympic Committee review paper on the sudden deaths of athletes has found an almost identical female:male ratio of 1:9 [29]. As also seen in similar reports from Asia [16], considering the statistical and methodological constraints to obtain reliable data, it seems that sudden deaths or major complications tend to be more common in those engaged in extramarital sex, especially when involving prostitutes.

Based on these reports, it has been pointed out that clinicians and other health professionals are quite often prone to overprotect their cardiac patients, especially female patients, by restricting sexual activity [30–33]. Looking more carefully at the available data – both prevalence and frequency of sexual relations among mature adults and the incidence of unfavorable events – it becomes clear that the absolute risk is still remarkably low, even for most chronically ill patients (<0.1%/year), despite a probable minor increase in relative risk (2–2.5) compared with resting conditions.

Since the energy requirements of sexual intercourse are quite low and are in the range of many daily activities, even for older individuals, the minor increase in relative risk cannot be fully explained by exercise intensity, but rather, other mechanisms may be involved. Exaggerated sympathetic [5,27] and uncommon sympathovagal interactions [34] have been proposed as contributing factors to potentially lethal cardiac arrhythmias induced by intercourse. While it is true that sympathetic stimulation unrelated to physical activity or exercise, as occurs during intense emotional situations [35], may induce complex arrhythmias, it does not seem to be a rule. Israeli researchers found that arrhythmias were slightly more frequent and common during coitus than in near-maximal cycling testing in coronary patients [36]; however, most of the sex-related ectopic beats were often simple and essentially similar to disturbances experienced in daily activities. Using another type of sudden and very brief exercise – the spirometry maneuver – in comparison with maximal exercise testing, we have also found similar results for arrhythmias in cardiac patients [37]. This suggests that, although sexual activity can often induce cardiac arrhythmias, for most individuals, they would be clinically irrelevant. On the other hand, coitus can induce

beneficial cardiovascular effects. Using an interesting approach, Brody found lower blood pressure reactivity to stress in adults who had recently performed a penile–vaginal intercourse [38].

Currently, there are good sources of advice regarding safe sexual activity [30,33,39–41], which will promote a healthier sex life for both healthy subjects and cardiac patients.

### Regular exercise promoting sexual activity

Being regularly active and/or having an above-average exercise capacity has been shown to substantially reduce cardiovascular and all-cause mortality [42] and, according to recent research, to favorably influence sex lifestyles [38,43–45]. Esposito *et al.* carried out a randomized, clinical trial and identified a favorable influence of intensive lifestyle changes (including exercise) in a large sample of men followed-up for 2 years [46]. Belardinelli *et al.* submitted 30 male patients with heart failure to 24 cycling exercise sessions in 8 weeks and found a significant beneficial effect in brachial artery endothelial dysfunction [45]. This finding was positively related to more favorable responses to a sexual-activity profile-assessment questionnaire. Kratzik *et al.*, in an observational study, showed an inverse relationship between exercise energy expenditure – between 1000 and 4000 kcal/week – and the prevalence of erectile dysfunction in a large sample of Viennese men [44].

Currently, partially based in preliminary evidences, it is reasonable to suggest that regular exercise and high exercise capacity are associated with less sexual dysfunctions in both apparently healthy and sick adults. Notwithstanding, it remains to be determined if any specific exercise intervention or program (i.e., aerobic or combined aerobic–strength–flexibility) will be more beneficial than other forms of activity in this regard.

### Conclusion

Nowadays, with the increasing life expectancy (and corresponding median population age), simultaneously accompanied by a higher prevalence of cardiovascular and metabolic diseases, to be able to maintain an active sexual life is becoming a challenge. Available evidence strongly corroborates a positive role for sexual activity in health. With the recent interest in drugs for treating erectile dysfunctions, clinicians will often be requested to advise, for example, a post-myocardial infarction, 80-year-old male patient regarding sexual activity and use of erectile dysfunction

drugs. Furthermore, recognizing the recently discovered beneficial effects of these drugs on hemodynamic aspects and exercise capacity [47,48], it is likely that the number of clinicians prescribing them will soon increase.

In addition, adult individuals will probably be motivated to participate and to adhere to regular exercise programs if they feel an improvement in their sexual performance as a positive side effect or bonus. While regular sexual activity itself will not be of sufficient intensity and duration to fully induce and optimize cardiovascular exercise-training adaptations and benefits, it should be incorporated as part of an exercise program or prescription aimed to improve and maintain physical and mental health. It is also possible that physically active and fit male and female individuals would appear more sexually attractive, which will encourage them to be sexually active. These facts and the possibility that higher levels of physical fitness – aerobic condition, joint flexibility, muscular strength/power, balance and low-fat body composition – are useful components for better sexual performances, will work as potent stimuli for engagement in regular physical exercise.

Physicians and other allied health professionals should inform patients that the health risks involved in sexual activity are very low, especially for women and when performed with partners in stable relationships, and should recommend regular sexual activity for most, if not all, of his/her patients as part of a healthy lifestyle. An active sexual life as part of a pro-exercise and healthy lifestyle could potentially contribute, mainly by indirect means (exercising regularly in order to have a better sexual performance), to reduce cardiovascular morbidity and mortality. The enormous health and social benefits of an active sexual activity will certainly outweigh the very minor risks of unfavorable events during this activity that could also be minimized and individually tailored by adequate professional advice, including use of specific drugs and prescription of regular exercise.

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