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REVIEW

Health-Related Lifestyle Factors and Sexual Dysfunction: A Meta-Analysis of Population-Based Research

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ABSTRACT

Background: Sexual dysfunction is a common problem among men and women and is associated with negative individual functioning, relationship difficulties, and lower quality of life.

Aim: To determine the magnitude of associations between 6 health-related lifestyle factors (cigarette smoking, alcohol intake, physical activity, diet, caffeine, and cannabis use) and 3 common sexual dysfunctions (erectile dysfunction, premature ejaculation, and female sexual dysfunction).

Methods: A comprehensive literature search of 10 electronic databases identified 89 studies that met the inclusion criteria (452 effect sizes; N = 348,865). Pooled mean effects (for univariate, age-adjusted, and multivariable-adjusted estimates) were computed using inverse-variance weighted random-effects meta-analysis and moderation by study and population characteristics were tested using random-effects meta-regression.

Results: Mean effect sizes from 92 separate meta-analyses provided evidence that health-related lifestyle factors are important for sexual dysfunction. Cigarette smoking (past and current), alcohol intake, and physical activity had dose-dependent associations with erectile dysfunction. Risk of erectile dysfunction increased with greater cigarette smoking and decreased with greater physical activity. Alcohol had a curvilinear association such that moderate intake was associated with a lower risk of erectile dysfunction. Participation in physical activity was associated with a lower risk of female sexual dysfunction. There was some evidence that a healthy diet was related to a lower risk of erectile dysfunction and female sexual dysfunction, and caffeine intake was unrelated to erectile dysfunction. Publication bias appeared minimal and findings were similar for clinical and non-clinical samples.

Clinical Translation: Modification of lifestyle factors would appear to be a useful low-risk approach to decreasing the risk of erectile dysfunction and female sexual dysfunction.

Strengths and Limitations: Strengths include the testing of age-adjusted and multivariable-adjusted models and tests of potential moderators using meta-regression. Limitations include low statistical power in models testing diet, caffeine, and cannabis use as risk factors.

Conclusion: Results provide compelling evidence that cigarette smoking, alcohol, and physical activity are important for sexual dysfunction. Insufficient research was available to draw conclusions regarding risk factors for premature ejaculation or for cannabis use as a risk factor. These findings should be of interest to clinicians treating men and women with complaints relating to symptoms of sexual dysfunction. **Allen MS, Walter EE. Health-Related Lifestyle Factors and Sexual Dysfunction: A Meta-Analysis of Population-Based Research. J Sex Med 2018;XX:XXX–XXX.**

Key Words: Alcohol; Caffeine; Cannabis; Cigarette Smoking; Diet; Erectile Dysfunction; Exercise; Female Sexual Dysfunction; Physical Activity; Premature Ejaculation

INTRODUCTION

Improving sexual and reproductive health in poor and high-income nations is a leading public health priority of the World Health Organization.[1] Sexual dysfunction broadly refers to frequent and persistent problems within normal sexual functioning and is associated with lower quality of life for sufferers and their partners and families.[2,3] Normal sexual function has been described as a biopsychosocial process that involves an interaction of psychological, endocrine, vascular, and neurologic systems,[4–7] and these systems are susceptible to disruption from health-related lifestyle choices.[8–13] The focus of this meta-analysis is on the relation between health-related lifestyle choices (cigarette smoking, alcohol, diet, physical activity, caffeine, and cannabis use) and reported incidence of sexual

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dysfunction. The findings of this research synthesis might be used to improve prognostic capabilities that could be extremely valuable to health care professionals treating men and women with complaints relating to symptoms of sexual dysfunction.

The most common sexual complaint in male sexual medicine is erectile dysfunction.[14] Erectile dysfunction is defined as a consistent inability to obtain or maintain an erection that is sufficient for sexual activity.[15] Erectile dysfunction primarily affects men older than 40 years (with prevalence rates increasing across the adult lifespan)[6] and the worldwide prevalence of erectile dysfunction is predicted to reach 322 million cases by 2025.[16] Premature ejaculation refers to ejaculation that occurs within approximately 1 minute of vaginal penetration, the inability to delay ejaculation during most vaginal penetrations, and the negative personal consequences including distress.[15] Premature ejaculation is unrelated to age and affects approximately 20% to 30% of men worldwide.[6,17] Female sexual dysfunction is the name given to the collection of sexual difficulties experienced by women. These include a loss of interest or desire for sexual activity, sexual arousal disorders (eg, minimal vaginal lubrication from sexual stimulation; pain from vaginal penetration), and an absence of feelings of sexual arousal (for major categories of female sexual dysfunction, see[18]). The worldwide prevalence of female sexual dysfunction in premenopausal women is estimated to be 41%.[19]

To date, at least 15 narrative (non-systematic) reviews have concluded that lifestyle factors, including cigarette smoking, alcohol, physical inactivity, poor diet, and cannabis use, are associated with an increased risk of sexual dysfunction.[6,15,20–32] Research synthesis has been less common but lifestyle factors have featured in previous meta-analytic reviews.[33–37] A meta-analysis of alcohol consumption and erectile dysfunction in 11 cross-sectional studies[33] found that regular consumption of alcohol was associated with a lower risk of erectile dysfunction (odds ratio [OR] = 0.79, 99% CI = 0.67−0.92), and a meta-analysis of 7 cross-sectional studies[34] found that moderate (k = 4, OR = 0.63, 95% CI = 0.43−0.93) and high (k = 4, OR = 0.42, 95% CI = 0.22−0.82) levels of physical activity were associated with a lower risk of erectile dysfunction. 3 meta-analyses also explored cigarette smoking and erectile dysfunction. The 1st, a meta-analysis of 19 studies,[35] found that smokers had an increased risk of erectile dysfunction compared with non-smokers (relative risk = 12.4%, 95% CI = 10.8−13.9). The 2nd, a meta-analysis of 3 to 4 prospective cohort studies,[36] found that, compared with non-smokers, past smokers (OR = 1.20, 95% CI = 1.11−1.30) and current smokers (OR = 1.51, 95% CI = 1.34−1.71) had an increased risk of erectile dysfunction. The 3rd, a dose-response meta-analysis of 10 studies,[37] found that the number of cigarettes smoked per day was associated with an increased risk of erectile dysfunction (OR for 10 cigarettes = 1.14, 95% CI = 1.09−1.18).

The present meta-analysis builds on this foundation of research evidence and extends the focus to other health behaviors and other common sexual dysfunctions in men and women. In addition, we explore non-adjusted, age-adjusted, and multivariable-adjusted associations. This is important because risk factors might change across the lifespan[33] and health behaviors are known to be confounded.[38,39] For instance, people who exercise more tend to be more social and often report a greater alcohol intake.[39] The connection between alcohol and lower risk of erectile dysfunction might be a manifestation of other (positive) health outcomes that accompany a moderate alcohol intake. Multivariable-adjusted models provide a better indication of the independent contributions of the health behavior of interest and can provide important information on whether multimodal interventions might be more effective than unimodal interventions in treating sexual dysfunction. The present research aimed to investigate these associations through quantitative analysis of published data.

METHODS

This research synthesis was prepared in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement for the reporting of systematic reviews and meta-analyses[40] (Supplementary File S1).

Eligibility Criteria

Studies assessing the relation between sexual dysfunction and health-related lifestyle factors were included if the following criteria were met: (i) the study was published in a peer-reviewed scientific journal; (ii) the sample was representative of the population under study—representativeness was established using standard criteria[41] and was considered met if recruitment procedures were outlined and characteristics of the study population were sufficiently described—and excluded convenience samples (eg, undergraduate students); (iii) the study included a measure of sexual dysfunction; (iv) the study included a measure of cigarette smoking, alcohol, physical activity, diet, caffeine, or cannabis use; (v) the study did not involve experimental manipulation of independent variables (ie, the study was observational in nature); and (vi) the study used human participants.

Search Strategy

A systematic search of 10 electronic databases from 2000 to the search date was conducted in April 2017. The databases searched were PubMed; Science Direct; Scopus; SPORTdiscus; Proquest; Web of Science; and psycINFO, psycARTICLES, MEDLINE, and CINAHL through EBSCO. The search terms used were sexual dysfunction [or sexual function*/ or erectile dysfunction/ or erectile function*/ or erectile/ or erection/ or impotence/ or impoten*/ or orgasm*/ or sex* drive*] and alcohol* [or exercis*/ or physical activity/ or cigarette/ or smoking/ or smok*/ or cannabis/ or drug abus*/ or drug use/ or marijuana/ or nutrition/ or caffeine*/ or diet*/ or fruit/ or