

## Evidence for Masturbation and Prostate Cancer Risk: Do We Have a Verdict?



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### ABSTRACT

**Introduction:** Prostate cancer (PCa) is one of the leading causes of cancer death in men and remains one of the most diagnosed malignancies worldwide. Ongoing public health efforts continue to promote protective factors, such as diet, physical activity, and other lifestyle modifications, against PCa development. Masturbation is a nearly universal safe sexual activity that transcends societal boundaries and geography yet continues to be met with stigma and controversy in contemporary society. Although previous studies have examined associations between sexual activity and PCa risk, anecdotal relations have been suggested regarding masturbation practice and PCa risk.

**Aim:** To provide a summary of the published literature and examine the contemporary evidence for relations between masturbation practice and PCa risk.

**Methods:** A survey of the current literature using seven academic electronic databases was conducted using search terms and key words associated with masturbation practice and PCa risk.

**Main Outcome Measures:** The practice of masturbation and its relation to PCa risk.

**Results:** The literature search identified study samples ( $n = 16$ ) published before October 2015. Sample inclusions varied by study type, sample size, and primary objective. Protective relations ( $n = 7$ ) between ejaculation through masturbation and PCa risk were reported by 44% of the study sample. Age range emerged as a significant variable in the relation between masturbation and PCa.

**Conclusion:** Findings included relations among masturbation, ejaculation frequency, and age range as individual factors of PCa risk. No universally accepted themes were identified across the study sample. Throughout the sample, there was insufficient agreement in survey design and data reporting. Potential avenues for new research include frequency of ejaculation and age range as covarying factors that could lead to more definitive statements about masturbation practice and PCa risk.

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**Key Words:** Masturbation; Prostate Cancer Risk; Sexual Activity; Ejaculation

### INTRODUCTION

Prostate cancer (PCa), a progressive chronic neoplasm, is among the leading causes of global cancer deaths in men.<sup>1</sup> An estimated 1.1 million cases of PCa were diagnosed and 307,000 deaths were reported in 2012.<sup>2</sup> Identified for its varied global geographic distribution,<sup>1,3</sup> age-standardized rates in 2012

were found to be highest in Australia and New Zealand, North America, and Western and Northern Europe (~112, 97, 95, and 85 per 100,000, respectively) owing mainly to the extensive practice of prostate-specific antigen screening and biopsy examination in those regions, and low in Eastern and South-Central Asia (~11 and 5 per 100,000 respectively).<sup>2</sup> PCa was among the most common non-skin cancers, representing more than 13% (~221,000 estimated new cases) of all new cancer cases in the United States in 2015<sup>4,5</sup> and the second most common cause of cancer deaths in men (~42,000 estimated new cases), after lung cancer, in the United Kingdom in 2011.<sup>6</sup> The global incidence of PCa has led ongoing efforts to focus on preventive strategies to decrease the economic and public health burden of the disease.<sup>7</sup> Currently, some risk factors for PCa have been firmly established and include older age,<sup>8</sup> race and ethnicity,<sup>9</sup> and a family history of the disease.<sup>10</sup> Continued public health

Received February 11, 2016. Accepted February 29, 2016.

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<http://dx.doi.org/10.1016/j.sxmr.2016.02.006>

efforts, such as prostate-specific antigen screening,<sup>11</sup> nutrition and dietary patterns,<sup>12,13</sup> physical activity,<sup>14</sup> and other lifestyle and behavior modifications,<sup>15</sup> continue to serve as protective factors against PCa development. Other risk factors suggested in the literature include obesity,<sup>16</sup> occupational exposures,<sup>17</sup> sexually transmitted infections (STIs),<sup>18</sup> practice of male circumcision,<sup>19</sup> vasectomy,<sup>20</sup> multiple sexual partners, and sexual activity.<sup>21</sup>

Masturbation is a common sexual activity that continues to be met with apprehension and has been misunderstood and mislabeled by societies since ancient times.<sup>22,23</sup> Contrary to progressive health standards and healthy sexual development,<sup>24–26</sup> some studies continue to suggest masturbation is a spiritual, ethical, mental, and physical health threat to society.<sup>27,28</sup> Masturbation has become a research topic of growing interest as it relates to physical, mental, and public health wellness.<sup>25,29,30</sup> From a public health perspective, masturbation is considered a safe sexual activity and preventive approach similar to condom use, partner limitation, male circumcision, and abstinence, which carry no risk of pregnancy or STIs. Masturbation has been suggested to have potential benefits to emotional and sexual health.<sup>31,32</sup>

The common and nearly universal prevalence of masturbation continues to be well documented in several studies,<sup>29,31,33–35</sup> suggesting masturbation is an integral sexual practice that is part of the dynamics of sexual development, particularly during adolescence. A stratified sample survey ( $n = 11,161$ ) of the general British population 16 to 44 years of age found that 73% and 36.8% of men and women, respectively, reported masturbating in the 4 weeks before the study.<sup>29</sup> Similarly, a cross-sectional survey ( $n = 820$ ) in the United States found that, across age groups, more men (73.8%) reported masturbating than women (48.1%), with masturbation occurrences increasing with age in men.<sup>31</sup>

## AIMS

Although previous studies have examined associations between sexual activity and PCa risk,<sup>21,36,37</sup> no specific review has examined the current literature and evidence linking masturbation practice and PCa risk.

## METHODS

A survey of the literature before October 2015 was carried out to examine the association between masturbation practice and PCa risk. Relevant articles were identified by applying search strategies to seven academic electronic databases—PubMed, Scopus, EBSCOhost, SpringerLink, Taylor & Francis Online, Wiley Online, and ScienceDirect—using a combination of search terms and key words: *masturbation* and *prostatic carcinoma* or *prostate cancer risk*. All retrieved titles, abstracts, and full-text publications were reviewed and screened for relevance to the topic.

## Inclusion Criteria

Inclusion criteria for refereed study samples included case-control studies, cohort studies, case reports, case series studies, literature reviews, meta-analyses, conference abstracts, communications, commentaries, editorials, brief reports, position, practice, policy, and hypothesis-generating statements. Furthermore, references from retrieved articles were reviewed and screened to identify additional applicable publications.

## Exclusion Criteria

Publications were excluded if study samples described cancer risks other than PCa, benign prostatic hypertrophy, prostatitis, or other prostatic diseases. Non-refereed publications also were excluded. No language or study quality restrictions were imposed.

## MAIN OUTCOME MEASURES

Main outcome measures were the practice of masturbation and its relation to PCa risk.

## RESULTS

The literature search progressed through three stages of identification and analysis (Figure 1). An analysis of the literature yielded 16 relevant articles published before October 2015 that rendered conclusions about the relation between masturbation and PCa risk (Table 1). Seven articles reported a protective effect linked to masturbation or higher incidence of ejaculation per month and PCa risk. Three articles suggested a causal effect by reporting a moderate or higher correlation between masturbation and PCa risk. Six articles reported no significant relations (protective or causal) between masturbation and PCa risk. No significant trends with respect to population location or study methodology were found. Among articles that reported protective or causal conclusions, age range and type of ejaculation emerged as unintentional yet potentially significant variables.

Of seven sample articles reporting a protective relation between masturbation and PCa risk, four used large samples ( $n > 100$ ) that yielded methodologically controlled and statistically significant results,<sup>36–39</sup> one used a small sample ( $n < 100$ ) that yielded methodologically controlled and statistically significant results,<sup>40</sup> and two reviewed large longitudinal studies in comparative analyses. All protective findings were expressed as relations; three of the seven articles reported contradictory findings in their study populations related to controlled variables (eg, age range). Three articles suggested a positive causal relation between masturbation and PCa risk. One article used a small case-control study ( $n < 100$ ) and two reviewed other articles included in this research sample<sup>36,41</sup> and reported anecdotal positive causal associations with PCa risk.

Age range and ejaculation type were prevalent in articles suggesting a protective or causal effect. Research suggested a

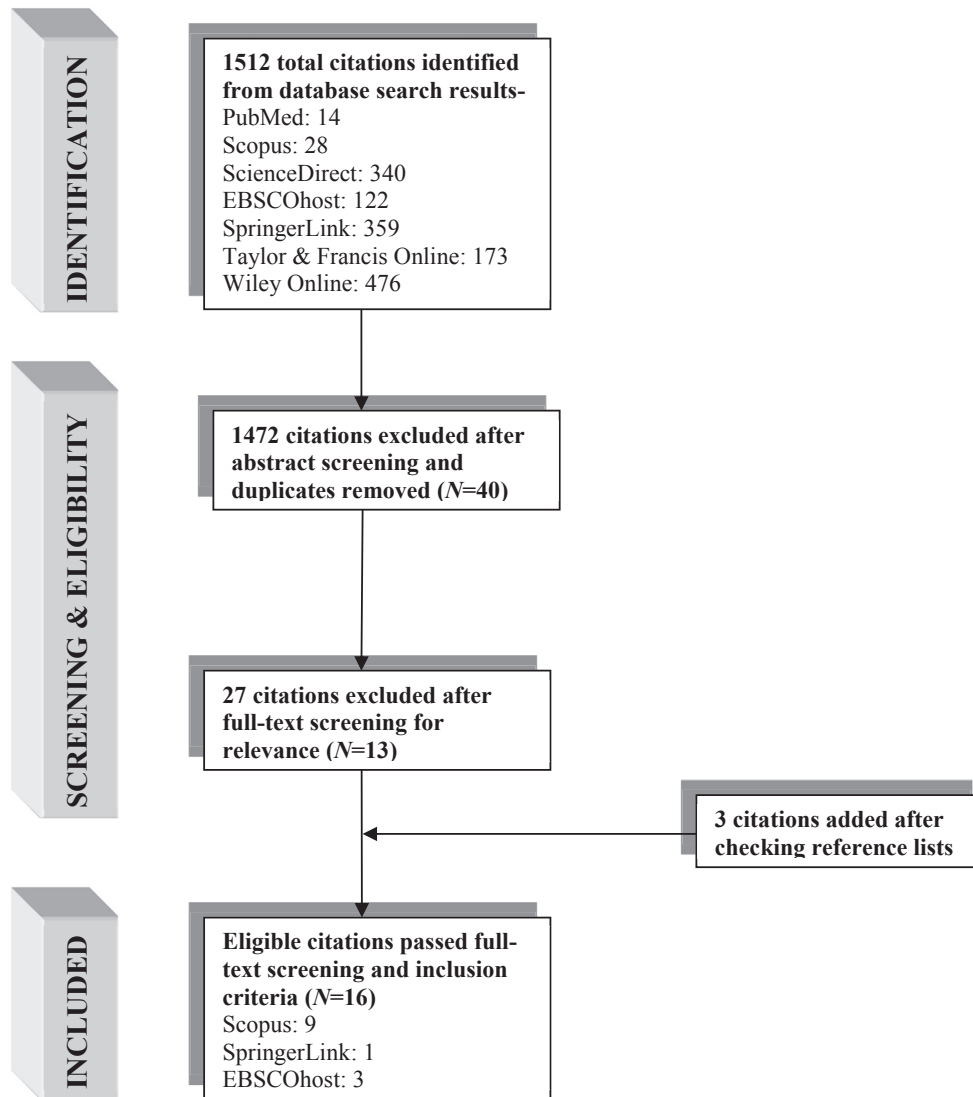


Figure 1. Flow diagram of literature search process.

protective relation between masturbation and PCa risk and highlighted age ranges of 40 to 49 years,<sup>36,42,43</sup> 50 to 59 years,<sup>39,42</sup> and 60 to 69 years.<sup>42</sup> Causal relations associated with younger age ranges included 20 to 29 years<sup>36</sup> and 30 to 39 years.<sup>36</sup> Incremental increases in ejaculation frequency per week analyzed by age range across a longitudinal lifespan in a multivariate model were associated with decreased risk for PCa.<sup>38,39,43</sup> Sample results were inconsistent in distinguishing ejaculation with penile-vaginal intercourse (PVI) from masturbation. Study location was not a significant finding.

## DISCUSSION

No direct cause-effect relations were noted in the seven sample articles reporting a protective relation between masturbation and PCa. The most common theme among these protective relations was age range<sup>36,38,39</sup> and ejaculation frequency.<sup>37,39,42,43</sup> All studies reporting a protective relation viewed life stages in

self-reported 10-year age ranges (eg, 40–49 years) and none accounted for an age range beyond 70 years. Ejaculation frequency was self-reported inconsistently across the sample; some used ejaculations per week and others used per-month models. Accounting for age range and ejaculation frequency as potentially codependent variables, there was some agreement across studies that frequent ejaculations later in life could lower the risk for PCa. To control for advantages that married or coupled men enjoy through regular sexual activity, masturbation could be a significant variable in the PCa risk equation later in life. No study in the sample controlled for the number of nocturnal emissions, which usually would be considered an ejaculation in the per-week and per-month models. As Leitzmann et al<sup>39</sup> suggested in their longitudinal study, the protective relation that exists between ejaculation frequency and PCa could come from different sources linked to more frequent ejaculation such as PVI, other sexual activity involving penetration, masturbation, pre-ejaculation arousal, and nocturnal emission.

**Table 1.** Summary of Literature Search

| Study reference (year)     | Study design | Effect | Location*                |
|----------------------------|--------------|--------|--------------------------|
| Dimitropoulou et al (2009) | Case-control | Pr     | United Kingdom           |
| Leitzmann et al (2004)     | Longitudinal | Pr     | United States            |
| Brody (2004)               | Review       | Ne     | United Kingdom           |
| Oishi et al (1990)         | Case-control | Pr     | Kyoto, Japan             |
| Rotkin (1977)              | Case-control | Ne     | United States            |
| Giles et al (2003)         | Case-control | Pr     | Melbourne, Australia     |
| Oliver (2004)              | Review       | Ne     | United Kingdom           |
| No authors listed (2005)   | Review       | Pr     | Australia, United States |
| Levin (2007)               | Review       | Ne     | United Kingdom           |
| Liu et al (2007)           | Case-control | Cu     | Hubei, China             |
| Brody (2010)               | Review       | Ne     | United Kingdom           |
| Jannini et al (2009)       | Review       | Ne     | L'Aquila, Italy          |
| Yavaşcaoğlu et al (1998)   | Case-control | Pr     | Bursa, Turkey            |
| Fox (2003)                 | Review       | Pr     | Melbourne, Australia     |
| Costa (2012)               | Review       | Cu     | Lisbon, Portugal         |
| Hoseini (2013)             | Review       | Cu     | Hannover, Germany        |

Cu = causal; Ne = no effect; Pr = protective.

\*Location not provided for sample articles that did not collect primary data.

Two studies in the research sample found potential causal relations between ejaculations at younger age ranges and PCa.<sup>44,45</sup> Although these findings appear contradictory to other sample findings, there is potential for a confounding relation between type of early ejaculation and PCa risk. PVI and masturbation data were not recorded and analyzed uniformly across the research sample. In addition, protected vs unprotected PVI was not clearly defined throughout the sample and could represent a significant mitigating variable when linking ejaculation frequency to PCa. The association between age range and type of PVI (protected vs unprotected) also could adversely affect sample findings. An assumption in this study is older men engaging in unprotected PVI would report being married or exclusively coupled vs younger men. This assumption further suggests low STI prevalence in this population subgroup would decrease PCa risk. Therefore, unprotected PVI in younger men outside exclusive relationships or marriage could significantly affect the strength of the relation between ejaculation frequency and PCa risk.

Isaacs<sup>46</sup> and Banerjee<sup>47</sup> suggested that infrequent ejaculation could be a risk factor for PCa in otherwise healthy men. This proposition is based on a biological plausibility that infrequent ejaculation increases retention of carcinogenic secretions in the prostatic acini and a recurring emptying and draining of stored prostatic fluid might decrease this retention.<sup>46–48</sup> Fox<sup>43</sup> speculated more frequent ejaculation produces more therapeutic amounts of biologic protective agents in addition to a flushing of potential carcinogens. Fox<sup>43</sup> suggested biologic protective agents found in lactating women could represent an interesting parallel to frequent male ejaculation. One small study (n = 25) in this sample measured serum prostate-specific antigen levels just before ejaculation, 24 hours later, and 5 days later in men

23 to 25 years old.<sup>40</sup> A significant decrease in serum level was noted in 65% of participants at the 24-hour mark yet no significant decreases were found at the 5-day mark. These findings might corroborate protective findings that include ejaculation frequency yet contradict causal relations at younger age ranges.

Throughout the study sample, there was insufficient agreement in survey design. Examples of inconsistencies included number of sexual partners, protected vs unprotected intercourse, type of partnered sexual contact, definition of ejaculation, and types of ejaculation (some research did not distinguish between PVI and masturbation). Within these variations are new avenues for research. High frequency of ejaculation is a common protective theme for PCa risk. Type of ejaculation (masturbation vs sexual intercourse vs nocturnal emission), protected vs unprotected intercourse, and age range present as covarying factors that could lead to more definitive statements with less controversy across the research continuum. In addition, the effect of sexual behavior early in life is not clearly understood as a risk factor for PCa later in life. Similar to childhood sun exposure as a risk factor for malignancies in adulthood, early sexual activity independent of STI could present as a predictive factor for PCa risk.

## LIMITATIONS

Some limitations of this review are worth noting. This review was limited to seven electronic databases that were selected because of their collective academic rigor, biomedical scope, and accessibility. In consequence, additional databases might have added to the review in complexity and additional sample articles. The extent of this review was limited to publication samples that included masturbation as the main topic or a component of the article's overall aim and scope, which limited the sample to 16

articles. As a result, article samples discussing sexually related factors such as ejaculation with vaginal, anal, or oral sex, ejaculation frequency, sexual orientation, number of sex partners, history of STIs, nocturnal emissions, contraceptive use, or other forms of autoeroticism that did not specify the practice of masturbation as a significant variable were not included in this review. The authors acknowledge that valuable and applicable data might have been excluded because of these delimitations. Furthermore, future efforts along this line of inquiry might consider removing masturbation as a delimitation and include publications that investigate all types of ejaculation.

## CONCLUSIONS

Data in the study sample provided numerous avenues for investigation supported by statistically significant research. These findings included relations among masturbation, ejaculation frequency, and age range of ejaculation frequency as individual functions of PCa risk. However, no universally accepted themes were identified across the study sample. Some articles reported protective relations between masturbation and ejaculation variables and PCa risk, some reported causal relations or no statistically significant relation, and still other articles reported multiple findings such as causal or no relation early in life and protective relations later in life. In addition, no themes emerged with respect to study location or sample size.

All findings considered as results and subsequently discussed were correlational relations; no direct outcomes were specifically caused by individual study variables. The possibilities for contributing variables are many and might include differentiating ejaculation types, differentiating between masturbatory ejaculation and all other forms, defining type of ejaculation in age categories, and sexual risk behaviors such as prophylactic use, number of partners, frequency, and STI history. Age range emerged as an important third variable in addition to masturbation and PCa risk. Within this new variable, differences in ejaculation frequency and age range (early life vs late life) emerged as a potential research direction for future investigation.

Effects associated with a single ejaculation and change in the chemical composition of seminal fluid positively linked to PCa were found in the sample. Although not the primary focus of this study, change in the chemical composition of seminal fluid as a function of ejaculation frequency and age range could be an important avenue for future research. Potential for cause-effect clinical findings were highlighted in the case-control samples included in this study.

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*Conflict of Interest:* The authors report no conflicts of interest.

*Funding:* None.

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## REFERENCES

1. Center MM, Jemal A, Lortet-Tieulent J, et al. International variation in prostate cancer incidence and mortality rates. *Eur Urol* 2012;61:1079-1092.
2. Ferlay J, Soerjomataram I, Dikshit R, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer* 2015;136:E359-E386.
3. Bray F, Lortet-Tieulent J, Ferlay J, et al. Prostate cancer incidence and mortality trends in 37 European countries: an overview. *Eur J Cancer* 2010;46:3040-3052.
4. National Cancer Institute. SEER stat fact sheets: prostate cancer. Available at: <http://seer.cancer.gov/statfacts/html/prost.html>. Published 2015. Accessed September 15, 2015.
5. Brawley OW. Trends in prostate cancer in the United States. *J Natl Cancer Inst Monogr* 2012;45:152-156.
6. Cancer Research UK. Prostate cancer statistics. Available at: <http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/prostate-cancer>. Published 2015. Accessed September 12, 2015.
7. Roehrborn CG, Black LK. The economic burden of prostate cancer. *BJU Int* 2011;108:806-813.
8. Leitzmann MF, Rohrmann S. Risk factors for the onset of prostatic cancer: age, location, and behavioral correlates. *Clin Epidemiol* 2012;4:1-11.
9. Kheirandish P, Chingwundoh F. Ethnic differences in prostate cancer. *Br J Cancer* 2011;105:481-485.
10. Colloca G, Venturino A. The evolving role of familial history for prostate cancer. *Acta Oncol* 2011;50:14-24.
11. Garg V, Gu NY, Borrego ME, et al. A literature review of cost-effectiveness analyses of prostate-specific antigen test in prostate cancer screening. *Expert Rev Pharmacoecon Outcomes Res* 2013;13:327-342.
12. Ma RWL, Chapman K. A systematic review of the effect of diet in prostate cancer prevention and treatment. *J Hum Nutr Diet* 2009;22:187-199.



13. Schwingshackl L, Hoffmann G. Adherence to Mediterranean diet and risk of cancer: a systematic review and meta-analysis of observational studies. *Int J Cancer* 2014;135:1884-1897.
14. Liu Y, Hu F, Li D, et al. Does physical activity reduce the risk of prostate cancer? A systematic review and meta-analysis. *Eur Urol* 2011;60:1029-1044.
15. De Nunzio C, Andriole GL, Thompson IM, et al. Smoking and prostate cancer: a systematic review. *Eur Urol Focus* 2015;1:28-38.
16. Allott EH, Masko EM, Freedland SJ. Obesity and prostate cancer: weighing the evidence. *Eur Urol* 2013;63:800-809.
17. Doolan G, Benke G, Giles G. An update on occupation and prostate cancer. *Asian Pac J Cancer Prev* 2014;15:501-516.
18. Caini S, Gandini S, Dudas M, et al. Sexually transmitted infections and prostate cancer risk: a systematic review and meta-analysis. *Cancer Epidemiol* 2014;38:329-338.
19. Pabalan N, Singian E, Jarjanazi H, et al. Association of male circumcision with risk of prostate cancer: a meta-analysis. *Prostate Cancer Prostatic Dis* 2015;18:352-357.
20. Liu LH, Kang R, He J, et al. Vasectomy and risk of prostate cancer: a systematic review and meta-analysis of cohort studies. *Andrology* 2015;3:643-649.
21. Spence AR, Rousseau MC, Parent MT. Sexual partners, sexually transmitted infections, and prostate cancer risk. *Cancer Epidemiol* 2014;38:700-707.
22. Bullough VL. Masturbation: a historical overview. *J Psychol Human Sex* 2003;14:17-33.
23. Kontula O, Haavio-Mannila E. Masturbation in a generational perspective. *J Psychol Hum Sex* 2003;14:49-83.
24. Coleman E. Masturbation as a means of achieving sexual health. *J Psychol Hum Sex* 2003;14:5-16.
25. Kaestle CE, Allen KR. The role of masturbation in healthy sexual development: perceptions of young adults. *Arch Sex Behav* 2011;40:983-994.
26. Bockting WO, Coleman EJ. Masturbation as a means of achieving sexual health. New York: Routledge; 2013.
27. Shekarey A, Rostami MS, Mazdai K, et al. Masturbation: prevention & treatment. *Procedia Soc Behav Sci* 2011;30:1641-1646.
28. Hoseini SS. Masturbation: scientific evidence and Islam's view. *J Relig Health* PMID:23609456. E-pub ahead of print.
29. Gerressu M, Mercer CH, Graham CA, et al. Prevalence of masturbation and associated factors in a British national probability survey. *Arch Sex Behav* 2008;37:266-278.
30. Das A. Masturbation in the United States. *J Sex Marital Ther* 2007;33:301-317.
31. Robbins CL, Schick V, Reece M, et al. Prevalence, frequency, and associations of masturbation with partnered sexual behaviors among US adolescents. *Arch Pediatr Adolesc Med* 2011;165:1087-1093.
32. Shelton JD. Masturbation: breaking the silence. *Int Perspect Sex Reprod Health* 2010;36:157-158.
33. Liu D, Jiang H, Hong K, et al. A survey on masturbation in the public in China. *Chin J Androl* 2010;24:26-29.
34. Herbenick D, Reece M, Schick V, et al. Sexual behavior in the United States: results from a national probability sample of men and women ages 14–94. *J Sex Med* 2010;7:255-265.
35. Smith AMA, Rosenthal DA, Reichler H. High schoolers' masturbatory practices: their relationship to sexual intercourse and personal characteristics. *Psychol Rep* 1996;79:499-509.
36. Dimitropoulou P, Lophatananon A, Easton D, et al. Sexual activity and prostate cancer risk in men diagnosed at a younger age. *BJU Int* 2009;103:178-185.
37. Giles GG, Severi G, English DR, et al. Sexual factors and prostate cancer. *BJU Int* 2003;92:211-216.
38. Oishi K, Okada K, Yoshida O, et al. A case-control study of prostatic cancer in Kyoto, Japan: sexual risk factors. *Prostate* 1990;17:269-279.
39. Leitzmann MF, Platz EA, Stampfer MJ, et al. Ejaculation frequency and subsequent risk of prostate cancer. *JAMA* 2004;291:1578-1586.
40. Yavascaoglu I, Savci V, Oktay B, et al. The effects of ejaculation on serum prostate-specific antigen (PSA). *Int Urol Nephrol* 1998;30:53-58.
41. Brody S. The relative health benefits of different sexual activities. *J Sex Med* 2010;7:1336-1361.
42. Ejaculation frequency and prostate cancer. *Harv Mens Health Watch* 2005;10:7.
43. Fox D. Can masturbating each day keep the doctor away? *New Sci* 2003;179:15.
44. Liu C, Yang Z, Li S. Prostate diseases, sexuality and prostate cancer: a case-control study. *Med J Wuhan Univ* 2007;28:219-222.
45. Costa RM. Masturbation is related to psychopathology and prostate dysfunction: comment on Quinsey (2012). *Arch Sex Behav* 2012;41:539-540.
46. Isaacs JT. Prostatic structure and function in relation to the etiology of prostatic cancer. *Prostate* 1983;4:351-366.
47. Banerjee AK. Carcinoma of prostate and sexual activity. *Urol* 1986;28:159.
48. Jannini EA, Fisher WA, Bitzer J, et al. Is sex just fun? How sexual activity improves health. *J Sex Med* 2009;6:2640-2648.