

Prevalence and Characteristics of Vibrator Use by Women in the United States: Results from a Nationally Representative Study

Debra Herbenick, PhD, MPH,* Michael Reece, PhD, MPH,* Stephanie Sanders, PhD,†
Brian Dodge, PhD,* Annahita Ghassemi, PhD,‡ and J. Dennis Fortenberry, MD, MS§

*Center for Sexual Health Promotion, Indiana University, Bloomington, IN, USA; †The Kinsey Institute for Research in Sex, Gender, and Reproduction and the Department of Gender Studies, Indiana University, Bloomington, IN, USA; ‡Church & Dwight Co., Inc., Princeton, NJ, USA; §School of Medicine, Indiana University, Indianapolis, IN, USA

DOI: 10.1111/j.1743-6109.2009.01318.x

ABSTRACT

Introduction. Although vibrators are commonly recommended by clinicians as adjunct to treatment for female sexual dysfunction, and for sexual enhancement, little is known about their prevalence or correlates of use.

Aim. The aim of this study was to determine the lifetime and recent prevalence of women's vibrator use during masturbation and partnered sex, and the correlates of use related to sociodemographic variables, health behaviors, and sexual function.

Methods. A nationally representative sample of 3,800 women aged 18–60 years were invited to participate in a cross-sectional Internet-based survey; 2,056 (54.1%) participated.

Main Outcome Measures. The prevalence of vibrator use, the relationship between vibrator use and physical and psychological well-being (as assessed by the Centers for Disease Control and Prevention [CDC] Healthy Days measure) and health-promoting behaviors, the relationship between vibrator use and women's scores on the Female Sexual Function Index, and an assessment of the frequency and severity of side effects potentially associated with vibrator use.

Results. The prevalence of women's vibrator use was found to be 52.5% (95% CI 50.3–54.7%). Vibrator users were significantly more likely to have had a gynecologic exam during the past year ($P < 0.001$) and to have performed genital self-examination during the previous month ($P < 0.001$). Vibrator use was significantly related to several aspects of sexual function (i.e., desire, arousal, lubrication, orgasm, pain, overall function) with recent vibrator users scoring higher on most sexual function domains, indicating more positive sexual function. Most women (71.5%) reported having never experienced genital symptoms associated with vibrator use. There were no significant associations between vibrator use and participants' scores on the CDC Healthy Days Measures.

Conclusions. Vibrator use among women is common, associated with health-promoting behaviors and positive sexual function, and rarely associated with side effects. Clinicians may find these data useful in responding to patients' sexual issues and recommending vibrator use to improve sexual function. Further research on the relationships between vibrator use and sexual health is warranted. **Herbenick D, Reece M, Sanders S, Dodge B, Ghassemi A, and Fortenberry JD. Prevalence and characteristics of vibrator use by women in the United States: Results from a nationally representative study. J Sex Med 2009;6:1857–1866.**

Key Words. Vibrator; Female Sexual Function; Masturbation; Quality of Life; Orgasm; Sex Toy

Introduction

Vibrators are handheld electrical devices that produce pulses of variable amplitude and frequency, and enhance sexual arousal and latency to orgasm in both women and men [1–4]. Vibrators

are widely marketed to women through the Internet, women's magazines, boutiques, in-home sex toy parties, and mainstream retail channels such as drugstores and merchandisers [5–8]. Clinically, vibrators may be recommended as an adjunct to treatment for female sexual dysfunction (e.g.,

anorgasmia, female sexual arousal disorder, and persistent sexual arousal syndrome), erectile dysfunction, and sexual problems experienced as a result of cancer treatments [9–13].

The prevalence of vibrator use appears to have markedly increased over the past 50 years; however, estimates of use vary greatly—ranging from 1% to 47% of women—because of differences in time frame, sampling, and data collection methodologies. In addition, no studies have addressed vibrator use and its correlates in a nationally representative sample in the United States, and none have addressed the frequency and severity of side effects potentially associated with vibrator use.

Kinsey et al. (in 1953) and Hite (in 1976) described women's vibrator use as rare—“appreciable” and less than 1%, respectively [14,15]. However, a 1979 convenience sample of 286 lesbian-identified women found that 47% indicated that they had ever used a vibrator [16]. Interview-based data from the 1992 National Health and Social Life Survey indicated that only 2% of women aged 18–59 years had purchased a vibrator or dildo in the previous 12 months, and 17% found the idea of using a dildo or vibrator to be somewhat or very appealing [17]. More recently in 2003, a clinic-based study found that 16.1% of patients with vulvar dysesthesia had used a vibrator in the previous month—a rate nearly identical to that of controls (15.8%) [18]. In addition, an unpublished 2004 report found that 44% of American women had ever used a vibrator [19], and a 2006 random-digit dial survey of young adults (ages 18–39 years) in the Seattle area found that 33.1% of women had used a sexual enrichment aid (more broadly defined) at least once during a typical 4-week period [20].

Laws in the United States that prohibit the sale of such devices in some states have been severely contested [21]. Efforts to remove or ease restrictions on the sale of vibrators and other sexual enhancement products have often focused on medical and therapeutic uses of vibrators. In fact, the therapeutic history of the vibrator is complicated with the origins of the electric vibrator attributed to clinical treatment of hysteria [22]. Even with this history, a 1974 article indicated that physicians warned of potential harms of vibrator use “on both physical and psychological grounds,” and noted that vibrators were likely used only by a small number of “sexually dysfunctional females” [23]. A book published in the same year by pioneering sex therapist Helen Singer Kaplan dis-

cussed the therapeutic use of vibrators for anorgasmic women, but expressed concerns about women becoming too dependent upon, “hooked” on, or habituated to vibrator use [24]. Thus, both perspectives reflected concerns with the possibility that vibrator use would render women unable to experience pleasure or possibly orgasm in response to vaginal intercourse.

Vibrators may be used by women for internal or external stimulation, and although some sexual aids have approval by the Food and Drug Administration, most are sold as novelty items [25]. Given the widespread availability and use of vibrators, and the fact that their use is recommended by clinicians through books and Web sites related to sexual health and enhancement, as well as in office visits, empirical data on the prevalence and correlates of use are needed.

Aims

The objectives of this study were, in a nationally representative sample of women aged 18–60 years in the United States, to determine the lifetime and recent prevalence of women's vibrator use during masturbation and partnered sex; to document the characteristics of women who use vibrators; to examine relationships between vibrator use and physical and psychological well-being as well as health-promoting behaviors; to examine the relationship between vibrator use and female sexual function; and to assess the prevalence and severity of side effects of vibrator use.

Methods

All study protocols were approved by the Institutional Review Board at the author's home institution. During April 2008, data were collected from a nationally representative sample of 2,056 women aged 18–60 years in the United States via an existing research panel of Knowledge Networks (Menlo Park, CA, USA). Knowledge Networks establishes research panels based on random digit dialing methods resulting in a nonzero probability selection of U.S. households with a telephone and that are statistically adjusted monthly based on updates from the U.S. Census Bureau. All data were collected via the Internet; all participants in the Knowledge Networks panel are provided with access to the Internet and hardware if needed. Research panels of Knowledge Networks have been used in numerous health-related studies, each of which has substantiated the validity of such

methods for obtaining nationally representative sample of the U.S. population [26–30].

A total of 3,800 female panel members were invited to participate in the study. These individuals received an e-mail indicating that this was a study related to sexual health and sexual behavior. Up to three e-mail reminders and one telephone reminder were sent to panel members, and the women received \$5 as an incentive for participation. Of those invited to participate, 2,338 (61.5%) responded to the recruitment message, with 2,056 of those (87.9%) consenting to participate and completing the study instrument. This resulted in a response rate of 54.1%. During analyses, post-stratification data weights were used to reduce variance and minimize bias caused by non-sampling error. Distributions for age, race, gender, Hispanic ethnicity, education, and U.S. census region were used in the post-stratification adjustment.

Main Outcome Measures

The participants completed a comprehensive range of items related to sociodemographics, health status, sexual behaviors and vibrator use, sexual function, and side effects of vibrator use. Sociodemographic measures included those related to age, gender, ethnicity, geographic location, marital and relationship status, household income, having children at home, religiosity, and political orientation. Health status measures included those related to physical and mental quality of life using the four-item Healthy Days Core Module from the Centers for Disease Control and Prevention health-related quality of life measure [31], a widely validated set of survey measures used to assess a person's sense of well-being [32–37]. In addition, the women were asked whether they had had a gynecologic exam in the past year, performed breast self-examination during the previous month, and performed genital self-examination during the previous month.

Sexual behavior was assessed through a series of questions about partnered sexual activities and self-masturbation during the 4 weeks prior to the study. The women were asked to describe the extent to which they had used vibrators during the past month, past year, and lifetime, and whether they had used vibrators while masturbating alone, during foreplay with a partner, and during sexual intercourse with a partner. The women who had used vibrators in their lifetime were asked to indicate where they had used the vibrator (e.g., on the

clitoris or inside the vagina), whether they had used condoms with vibrators, and patterns of cleaning vibrators before and after use.

To assess sexual function, the women completed the Female Sexual Function Index (FSFI) [38], a 19-item measure with established reliability and validity that has been widely used to assess five domains of sexual functioning (desire, arousal, lubrication, pain, and orgasm), sexual satisfaction, and to provide a total sexual function score [39–45]. The FSFI has a high degree of internal consistency and test-retest reliability, and has been used to discriminate between women who meet clinical criteria for sexual dysfunction and those who do not [39,46].

The women who had ever used a vibrator also reported the extent to which they had ever experienced, as a result of vibrator use, any of five possible side effects including genital numbness, pain, irritation, inflammation/swelling, and tears/cuts. The women who indicated any side effect were asked to describe its frequency (once, a few times, every time), duration (≤ 5 minutes, < 1 hour, ≥ 1 hour, > 1 day, or < 1 day; > 1 day for tears/cuts), and perceived severity (range 1–10; 10 being most severe).

SPSS version 16.0 (SPSS Inc., Chicago, IL, USA) was used for analyses. Descriptive statistics were used to report sample characteristics and vibrator side effects. Chi-square analyses and analysis of variance (ANOVA) were used to assess the relationship between vibrator use and demographic variables, health items, and sexual function. The participants were placed into four groups based on their patterns of vibrator use (past month users, past year users, 1+ year ago users, and never users), and FSFI scores were compared across these four groups using ANOVA. As age has been shown to be related to sexual function [47], these analyses were conducted within each of the following age groups: 18–22, 23–44, and 45–60. This age stratification was used as analysis of covariance is not appropriate when the potential covariate (age) is significantly associated with both the independent (vibrator use categories) and dependent variables (sexual function) [48], as it was in this sample. In constructing age groups, it was found that these three groups worked best statistically in that within each age category, women in each vibrator use category were not statistically different by age. Also, the authors felt that these age groupings made sense conceptually in that the youngest age group (18–22) was composed of women who were relatively new to sexual experi-

Table 1 Participant characteristics (unweighted and weighted) by vibrator use history

Participant characteristics	Total sample		Vibrator use history		P
	Total (unweighted) (n = 2,056)	Total (weighted) (n = 2,056)	Never users (n = 959)	Ever users (n = 1,059)	
Mean age (SD)	41.8 (11.7)	39.9 (12.02)	40.3 (12.7)	39.4 (11.4)	0.09
Marital status % (n)					<0.001
Single	25.7 (519)	28.5 (586)	31.5 (302)	25.4 (269)	
In a relationship	7.8 (157)	9.0 (184)	9.5 (91)	8.3 (88)	
Cohabiting	10.7 (216)	12.4 (255)	9.5 (91)	15.4 (163)	
Married	55.8 (1,124)	50.1 (1,030)	49.5 (475)	50.9 (539)	
Sexual orientation % (n)					<0.001
Heterosexual	94.6 (1,906)	94.1 (1,921)	97.0 (924)	91.3 (968)	
Homosexual	1.4 (28)	1.8 (37)	1.2 (11)	2.5 (26)	
Bisexual	3.4 (69)	3.4 (70)	1.5 (14)	5.2 (55)	
Other	0.5 (11)	0.7 (15)	0.4 (4)	1.0 (11)	
Race % (n)					<0.001
White, non-Hispanic	75.5 (1,522)	66.3 (1,363)	61.9 (593)	70.6 (748)	
Black, non-Hispanic	9.5 (192)	13.1 (268)	15.1 (145)	11.1 (118)	
Other, non-Hispanic	3.4 (68)	5.8 (119)	8.0 (77)	3.6 (38)	
Hispanic	7.8 (157)	13.7 (282)	13.9 (133)	13.4 (142)	
Two or more races	3.9 (78)	1.2 (24)	1.0 (10)	1.3 (14)	
Education % (n)					<0.01
Less than high school	7.9 (160)	10.9 (223)	12.7 (122)	9.2 (98)	
High school	29.3 (591)	28.1 (578)	30.0 (287)	26.4 (280)	
Some college	30.6 (618)	31.4 (646)	28.1 (269)	34.7 (368)	
Bachelor's degree or higher	32.1 (648)	29.6 (608)	29.2 (280)	29.6 (314)	
Children < 18 in home % (n)	34.0 (685)	33.7 (693)	33.3 (319)	34.6 (367)	0.53
Religiosity % (n)					<0.001
More than once per week	11.8 (206)	11.8 (210)	16.2 (137)	7.4 (67)	
1–4 times per month	35.5 (620)	35.7 (636)	40.3 (340)	31.5 (285)	
A few times per year	23.6 (413)	23.5 (417)	20.5 (173)	25.9 (234)	
Once a year or less	17.7 (309)	17.1 (305)	14.3 (121)	20.1 (182)	
Never	11.4 (200)	11.9 (211)	8.6 (73)	15.0 (136)	

ence, the middle age group (23–44) was of reproductive age, and the oldest age group (45–60) was likely peri- or postmenopausal. Thus, each group would be likely to be similar in regard to the dependent variables of sexual function scores, thus elucidating differences related to the independent variable (vibrator use). Tukey post hoc comparisons were used to examine differences between vibrator use groups within age categories.

Results

Participants

Table 1 shows the unweighted sample sizes for sociodemographic characteristics, as well as the weighted population estimates for these characteristics.

Characteristics of Vibrator Users

A total of 52.5% (95% CI 50.3–54.7%) indicated that they had used a vibrator (“ever users”), and 47.5% (95% CI 45.3–49.7%) had never used a vibrator (“never users”) (Table 1). The mean age of the weighted sample was 39.9 years. Ever users

were approximately 1 year younger than never users ($P = 0.09$). Significant differences were noted for marital status ($P < 0.001$), with the groups differing most on cohabitation. Significant differences were also noted for sexual orientation ($P < 0.001$), with greater sexual diversity among vibrator users. In addition, significant differences were found in regard to race/ethnicity ($P < 0.001$), with proportionately more white non-Hispanics as ever users. Significant differences were found for education with more individuals with a high school education or less in the never user group ($P < 0.01$). There were no significant differences between groups in regard to those who lived in households with children younger than 18. Those who attended religious services more frequently (at least once per month) were less likely to be vibrator users ($P < 0.001$).

Vibrator Use and Health

As shown in Table 2, there were no significant group differences in participants’ responses to the Healthy Days measures or their reports of performing breast self-examination in the previous

Table 2 Health status and health-promoting behaviors (weighted) by vibrator use history

Participant characteristics	Total	Vibrator use history		P
		Never users	Ever users	
Healthy days measure				
% (95% CI) Generally good to excellent health (n = 2,018)	89.9 (88.6–91.2)	89.6 (88.3–90.9)	90.3 (89.0–91.6)	0.59
Mean (SD) number of physically and/or mentally days in the past month (n = 2,033)	7.6 (9.5)	7.3 (9.8, 945)	7.8 (9.1, 1,051)	0.32
Mean (SD) number of days limited activity (n = 2,056)	2.2 (5.3)	2.1 (5.3, 958)	2.3 (5.2, 1,060)	0.37
% (95% CI) who experience frequent mental distress (n = 2,004)	13.8 (12.3–15.3)	13.3 (11.8–14.8)	14.3 (12.8–15.8)	0.49
Health-promoting behaviors				
% (95% CI) Gynecologic exam in past year (n = 2,048)	67.8 (65.8–69.8)	62.3 (60.2–64.4)	72.4 (70.5–74.3)	<0.001
% (95% CI) Breast self-exam in past month (n = 2,054)	60.3 (58.2–62.4)	59.1 (57.0–61.2)	61.2 (59.1–63.3)	0.33
% (95% CI) Genital self-exam in past month (n = 2,042)	26.0 (24.1–27.9)	20.8 (19.0–22.6)	30.7 (28.7–32.7)	<0.001

month. However, ever users were significantly more likely to have had a gynecologic exam in the previous year ($P < 0.001$) and to have performed genital self-examination in the previous month ($P < 0.001$).

How Vibrators Are Used

Table 3 shows that nearly half (46.3%) of women had ever used a vibrator during masturbation alone, and one-fifth (20.1%) had done so during the previous month. More than a third of women (37.3%) had used a vibrator during intercourse, and 40.9% had used a vibrator during foreplay or sex play with a partner.

The vast majority of vibrator users (83.8%, $n = 888$) had used a vibrator to stimulate their clitoris, and 64.0% ($n = 679$) had used one inside their vagina. A total of 41.0% ($n = 435$) of ever users had used a lubricant with a vibrator. Few (7.4%, $n = 79$) had put a condom over a vibrator before using it. More than half (60.0%, $n = 636$) had ever cleaned a vibrator both before and after use, one-fourth (21.6%, $n = 229$) had cleaned it only after using it, 4.6% ($n = 48$) had cleaned a vibrator before use but never after use. The remaining ever users (13.8%, $n = 147$) had never cleaned a vibrator before or after use.

Vibrator Use and Sexual Function

Estimates of internal consistency (Cronbach's α) were calculated for each FSFI subscale, and the

total scale and indicated strong reliability in this sample (0.85–0.98, see Table 4). FSFI scores were compared across the four groups of vibrator use (past month, past year, 1+ year ago, never) within age groups. There were significant differences in each age group on the domains of desire, arousal, lubrication, orgasm, and pain, generally indicating significantly higher FSFI scores for recent (past month) vibrator users compared to less recent users or never users. For the FSFI total score, vibrator use was significantly related to sexual function only for women in the 23- to 44- and 45- to 60-year-old age groups.

Side Effects of Vibrator Use

Of the ever users, 71.5% (95% CI, 68.8–74.2%) reported that they had never experienced any of the listed side effects from vibrator use. As shown in Table 5, a total of 16.5% (95% CI, 14.3–18.7%) had ever experienced genital numbness, with 0.5% (95% CI, 0.1–0.9%) reporting that the numbness lasted for a day or longer. Among those reporting numbness, the median severity score was 4.0 (on a 10-point scale). A total of 3.0% (95% CI, 2.0–4.0%) reported ever having experienced genital pain resulting from vibrator use, with 0.6% (95% CI, 0.1–1.1%) reporting pain lasting for a day or longer. Among those reporting pain, the median severity score was 3.0. A total of 9.9% (95% CI, 8.1–11.7%) of users reported having experienced genital irritation from vibrator use, with 2.6%

Table 3 Proportion of participants (weighted) who used vibrators in solo and partnered sexual activities

Used vibrator during . . .	History of use in this context		When used in this context		
	Never used in this context	Ever used in this context	Past month	Past year	More than 1 year ago
Masturbation alone, % (95% CI), n = 2,024	53.7 (51.5–55.9)	46.3 (44.1–48.5)	20.1 (18.4–21.8)	11.4 (10.0–12.8)	14.8 (13.3–16.3)
Intercourse, %, (95% CI), n = 2,018	62.7 (60.6–64.8)	37.3 (35.2–39.4)	9.9 (8.6–11.2)	9.8 (8.5–11.1)	17.6 (15.9–19.3)
Sexual play/foreplay with a partner, %, (95% CI), n = 2,019	59.1 (57.0–61.2)	40.9 (38.8–43.0)	10.2 (8.9–11.5)	10.6 (9.3–11.9)	20.1 (18.4–21.8)

Table 4 Relationship (weighted) of sexual function and vibrator use history, stratified by age

Sexual function domains						
	n	Past month mean (SD)	Past year mean (SD)	>1 Year ago mean (SD)	Never used mean (SD)	P
Desire (range 1.2–6; alpha* = 0.88)						
18–22	156	4.34 (0.9) _a	3.71 (0.7) _{a,b}	4.37 (1.0) _{a,b}	3.70 (1.4) _b	<0.05
23–44	1,140	4.02 (1.1) _a	3.80 (1.2) _a	3.27 (1.2) _b	3.19 (1.2) _b	<0.001
45–60	750	3.66 (1.3) _a	2.89 (1.1) _b	3.00 (1.2) _b	2.73 (1.3) _b	<0.001
Arousal (range 0–6; alpha = 0.98)						
18–22	155	4.57 (1.2) _a	3.33 (2.3) _{a,b}	4.37 (2.0) _{a,b}	2.84 (2.5) _b	<0.01
23–44	1,139	4.70 (1.1) _a	4.45 (1.6) _a	3.73 (2.0) _b	3.24 (2.2) _c	<0.001
45–60	743	4.26 (1.5) _a	2.56 (2.3) _{b,c}	3.31 (2.2) _b	2.23 (2.2) _c	<0.001
Lubrication (range 0–6; alpha = 0.98)						
18–22	155	5.31 (1.1) _a	3.3 (2.3) _{a,b}	4.63 (2.1) _{a,b}	3.21 (2.8) _b	<0.001
23–44	1,129	5.16 (1.1) _a	4.90 (1.7) _a	4.26 (2.1) _b	3.77 (2.5) _c	<0.001
45–60	734	4.57 (1.5) _a	2.83 (2.5) _{b,c}	3.58 (2.4) _b	2.63 (2.5) _c	<0.001
Orgasm (range 0–6; alpha = 0.97)						
18–22	155	4.20 (1.2) _a	2.80 (1.5) _{a,b}	3.77 (1.1) _{a,b}	2.95 (0.9) _b	<0.05
23–44	1,128	4.83 (1.2) _a	4.41 (1.3) _a	3.86 (1.3) _b	3.37 (1.4) _c	<0.001
45–60	746	4.73 (1.3) _a	2.69 (1.3) _b	3.61 (1.4) _c	2.58 (1.5) _b	<0.001
Satisfaction (range 0–6; alpha = 0.85)						
18–22	110	4.72 (1.4)	4.62 (1.0)	4.91 (1.2)	5.1 (1.1)	0.4
23–44	954	4.49 (1.3)	4.68 (1.3)	4.40 (1.5)	4.59 (1.4)	0.28
45–60	544	4.43 (1.5) _a	3.62 (1.6) _b	4.25 (1.5) _a	4.25 (1.6) _a	<0.02
Pain (range 0–6; alpha = 0.96)						
18–22	154	4.63 (2.3)	2.95 (2.6)	5.66 (0.6)	3.47 (2.5)	<0.02
23–44	1,129	5.0 (1.7) _a	4.78 (1.8) _a	4.58 (2.0) _{a,b}	4.13 (2.4) _b	<0.001
45–60	741	4.20 (2.1) _a	3.38 (2.7) _{a,b}	3.45 (2.6) _{a,b}	3.32 (2.7) _b	<0.02
Total Score (range 2–36; alpha = 0.96)						
18–22	109	28.00 (5.5)	23.61 (6.0)	27.71 (5.1)	26.07 (8.1)	0.39
23–44	925	28.47 (5.0) _a	27.57 (6.6) _a	25.43 (7.3) _b	25.06 (8.1) _b	<0.001
45–60	522	27.31 (5.9) _a	19.52 (9.9) _b	24.22 (8.9) _a	20.79 (10.1) _b	<0.001

*Cronbach's alpha presented is calculated for each scale in the total sample. Cells whose subscripts differ indicate significant differences, $P < 0.05$.

(95% CI, 1.6–3.6%) reporting irritation lasting for a day or longer. Among those reporting irritation, the median severity score was 4.0. Inflammation/Swelling was reported by 8.0% of users (95% CI,

6.4–9.6%) with 1.5% (95% CI, 0.8–2.0%) reporting inflammation/swelling for a day or longer. The median severity score for inflammation/swelling was 4.0. A total of 1.1% of users (95% CI, 0.5–

Table 5 Women's reported side effects to vibrator use (n = 1,059)

Side effect frequency and duration	Reported side effects				
	Numbness	Pain	Irritation	Inflammation/Swelling	Tears or cuts
Frequency of side effect, % (95% CI)					
Never	83.5 (81.3–85.7)	97.0 (96.0–98.0)	90.1 (88.3–91.9)	92 (90.4–93.6)	98.9 (98.3–99.5)
Once	2.1 (1.2–3.0)	0.3 (0–0.6)	1.5 (0.8–2.2)	1.9 (1.1–2.7)	0.3 (0–0.6)
A few times	11.0 (9.1–12.9)	1.8 (1.0–2.6)	7.5 (5.9–9.1)	4.9 (3.6–6.2)	0.8 (0.3–1.3)
Every time	3.4 (2.3–4.5)	0.9 (0.3–1.5)	0.9 (0.3–1.5)	1.2 (0.5–1.9)	0
Duration of side effect, % (95% CI)					
Not applicable	83.5 (81.3–85.7)	97.0 (96.0–98.0)	90.1 (88.3–91.9)	92 (90.4–93.6)	98.9 (98.3–99.5)
<5 minutes	9.0 (7.3–10.7)	1.0 (0.4–1.6)	1.1 (0.5–1.7)	0.9 (0.3–1.5)	
<1 hour	6.4 (4.9–7.9)	0.6 (0.1–1.1)	4.6 (3.3–5.9)	3.9 (2.7–5.1)	*0.1 (0–0.3)
≥1 hour	0.6 (0.1–1.1)	0.8 (0.3–1.3)	1.6 (0.8–2.4)	1.7 (0.9–2.5)	†0.9 (0.3–1.5)
>1 day	0.5 (0.1–0.9)	0.6 (0.1–1.1)	2.6 (1.6–3.6)	1.5 (0.8–2.2)	†0.1 (0–0.3)
Severity rating (range 1–10)					
Mean (sd) score	4.04 (2.1)	3.65 (1.5)	3.91 (2.1)	3.96 (2.2)	2.36 (2.0)
Median score	4	3	4	4	1

*<1 day.

†>1 day.

‡About 1 week.

Note: Duration scale different for tears and cuts.

1.7%) reported experiencing tears or cuts in relation to vibrator use, with a median severity score of 1.0.

Discussion

Findings from this study are significant in that they demonstrate, for the first time among a scientific and nationally representative sample of women in the United States, that vibrator use is: (i) common among diverse groups of women; (ii) associated with health-promoting behaviors; (iii) associated with positive sexual function; and (iv) rarely related to negative side effects. Far from supporting historical cautions of physical or psychological harm associated with vibrator use, the data demonstrate that women who use vibrators are as generally healthy, mentally and physically, as women who do not use vibrators. That said, vibrator users were significantly more likely to engage in two specific health-promoting behaviors as compared to nonusers: (i) having had a gynecologic exam in the previous year; and (ii) having looked closely at their genitals in the previous month. However, vibrator use was not related to having performed breast self-examination during the previous month.

Routine self-care practices such as monthly breast and genital self-examination were included as markers of comfort or experience with touching or looking at these body parts. Monthly genital (vulvar) self-examination has been suggested as an important early detection tool for vulvar skin abnormalities, as well as vulvar cancer [49,50]. Although the relationships between vibrator use and having had a gynecologic exam in the previous year or performed a genital self-examination in the previous month are significant, the direction of these relationships is not known and it is possible that, rather than being causal, a third variable not measured in this study (such as erotophilia) influences both. It may be that women who are comfortable using vibrators are also women who are comfortable looking at or touching their genitals for health reasons, or having their genitals viewed and touched as part of gynecologic exam. Alternatively, it may be that novelty or sexual pleasure motivates women to use a vibrator and that the experience of using a vibrator helps women to feel more comfortable with their genitals and gynecologic exams.

Vibrators are used in various ways. In addition to being used alone or with a partner, the women varied in terms of where they used vibrators (e.g.,

inside the vagina or on the clitoris), whether they used a lubricant (less than half did so), and their vibrator cleaning behaviors. Few women applied a condom to their vibrator. Data were not collected about whether women shared sex toys with a partner; however, given the possible risk of transmitting infections through sharing toys, clinicians and educators might discuss options for safe toy use with their patients or clients including toy cleaning, condom use, and not sharing toys. In this study, the women were asked only if they had used a vibrator “with a partner” during intercourse, or during sexual play or foreplay with a partner. More detailed study is warranted in regard to how vibrators are used during partnered sex. It would be important to know not only the extent to which partners may share toys, but also the extent to which vibrators are used on women’s own bodies, their partner’s bodies, or on both bodies simultaneously during partnered sex.

Data related to vibrator use and sexual function have significant practice implications for clinicians who may have hesitated to recommend vibrator use for the treatment of sexual problems in the absence of data. Although this study cannot address causation, the data indicate that the women who have used vibrators—and particularly those who have done so most recently—experience more positive sexual function in terms of desire, arousal, lubrication, orgasm, and pain. Satisfaction (a more nuanced sexual function domain that is perhaps more subject to the influence of relationship and interpersonal factors) varied little by vibrator use for women aged 45–60 years, and not at all for younger women. It may be that using a vibrator facilitates orgasm and arousal (and, consequently, facilitates sufficient vaginal lubrication), and that having a more comfortable, pleasurable sexual experience thus helps a woman to feel more desirous of subsequent sexual activity. Alternatively, it may be that women who are more comfortable with their sexuality, or have more positive sexual function, are women who are also more comfortable with the use of vibrators. Given that previous research has suggested that personality factors may be related to ease of orgasm, it is also possible that personality factors (such as openness to experience) influence both vibrator use and orgasmic function [51].

That past month users aged 23 and older scored the highest on the FSFI pain domain (indicating fewer problems) may reflect the sexual challenges that vulvovaginal pain poses in women’s lives. Women who experience significant pain related to

vulvodynia, dyspareunia, or other conditions may be less likely to use vibrators or more likely to stop using them (and, as such, be past year or 1+ year ago users), just as these women may reduce or stop other forms of sexual activity in response to pain. This finding may also build on previous research that has demonstrated an increased threshold of pain in association with orgasm and the utility of vulvar vibration therapy for vulvar pain [52]. Perhaps as vibrator use facilitates arousal and orgasm, vibration applied to the genitals may in turn alleviate or minimize pain.

Finally, the majority of women did not experience any side effects from vibrator use. Of those women who had experienced side effects, those that were most common were mild and transient experiences of genital numbness, irritation, or inflammation. There were very few cases of side effects of long duration or severity. The data suggest that under normal conditions, vibrator use is a safe activity that is or has been a part of the sexual lives of more than half of American women (and, in many cases, their partners' sexual lives too). However, given the historical belief that vibrator use may habituate women to particular ways of sexual response (i.e., experiencing orgasm more easily with a vibrator and less so with a partner), future research should consider assessing to what extent women's sexual response becomes habituated—or, alternatively, enhanced—in relation to vibrator use.

A strength of this study is that it used a nationally representative sampling method, thus improving the ability to generalize findings to other women ages 18–60 years in the United States. In addition, widely used reliable and valid measures were used to assess women's health-related quality of life and sexual function. To enhance the validity of findings, the women were provided with a specific definition of a "vibrator," and only vibrators (rather than dildos, massage creams, or other sexual enhancement aids) were the focus of this study so as to maximize its specificity.

Although this study provides substantial and informative data on vibrator use among women ages 18 through 60, a limitation is that adults older than 60 were not recruited, and thus, the prevalence of vibrator use and its correlates among this age group remains unknown. In addition, although we had the advantage of using validated methods for the collection of nationally representative data, it remains possible that participants may have self-selected, resulting in more women who were com-

fortable with, or who were more adamantly (or vociferously) opposed to describing their sexual behaviors and vibrator use. Fortunately, an advantage of this type of research is that the use of post-stratification data weights helps to minimize selection bias on as many characteristics as possible given the other types of data available on the U.S. population (e.g., ethnicity, age, gender), but without a sufficient number of nationally representative reports that are based on nationally representative data, we feel it necessary to point out that such bias was possible and may be better understood as more research in the area of sexuality has the opportunity to use such samples.

Another limitation is that we did not ask more detailed questions about the number of times women had ever used vibrators, which would have provided the already low prevalence of side effects with greater context and should be taken into account in future research. Finally, given that our sample was representative of women aged 18–60 years living in the United States, our sample reflected the overall homogeneity of the population (i.e., largely white and identifying as heterosexual). As such, patterns related to vibrator use, sexual function, and health-promoting behaviors may benefit from further study in more targeted groups of women of racial/ethnic and sexual minority samples, as well as within clinical populations.

Conclusion

Based on this nationally representative sample of women aged 18–60 years, the prevalence of vibrator use among women was found to be 52.5%, and to be associated with health-promoting behaviors and positive sexual function. Additionally, use was rarely associated with side effects. Clearly, experimental or event-specific studies would be needed to examine causal relationships. Nonetheless, health care providers may find these data useful in terms of: (i) elucidating the prevalence of vibrator use and the need to consider this activity when dealing with patients' sexual issues; and (ii) supporting existing recommendations of vibrator use to improve sexual function. Further research on the relationships between vibrator use and sexual health is warranted.

Acknowledgment

This study was funded by Church & Dwight Co., Inc, the maker of Trojan-brand condoms.

Corresponding Author: Debra Herbenick, PhD, MPH, Center for Sexual Health Promotion, Indiana University, Bloomington, IN, USA. Tel: (812) 855-0364; Fax: (812) 855-3936; E-mail: debby@indiana.edu

Conflict of Interest: Annahita Ghassemi is an employee of Church & Dwight Co., Inc., the entity that funded this research study.

Statement of Authorship

Category 1

(a) Conception and Design

Debra Herbenick; Michael Reece; Stephanie Sanders; Dennis Fortenberry; Brian Dodge; Annahita Ghassemi

(b) Acquisition of Data

Debra Herbenick; Michael Reece; Stephanie Sanders

(c) Analysis and Interpretation of Data

Debra Herbenick; Stephanie Sanders; Michael Reece

Category 2

(a) Drafting the Article

Debra Herbenick; Stephanie Sanders

(b) Revising It for Intellectual Content

Michael Reece; Dennis Fortenberry; Brian Dodge; Annahita Ghassemi

Category 3

(a) Final Approval of the Completed Article

Debra Herbenick; Stephanie Sanders; Michael Reece; Dennis Fortenberry; Brian Dodge; Annahita Ghassemi

References

- Vandenbroucke H. Ejaculation latency times and their relationship to penile sensitivity in men with normal sexual function. *J Urol* 2007;177:237-40.
- Nelson CJ, Ahmed A, Valenzuela R, Parker M, Mulhall J. Assessment of penile vibratory stimulation as a management strategy in men with secondary retarded orgasm. *Urology* 2007;69:552-5.
- Courtois F, Charvier K, Leriche A, Vezina JG, Cote I, Raymond D, Jacquemin G, Fournier C, Belanger M. Perceived physiological and orgasmic sensations at ejaculation in spinal cord injured men. *J Sex Med* 2008;5:2419-30.
- Wylie K. Assessment and management of sexual problems in women. *J R Soc Med* 2007;100:547-50.
- Leiblum S. Women, sex and the Internet. *Sex Relat Ther* 2001;16:389-404.
- Loe M. Feminism for sale: Case study of a pro-sex feminist business. *Gend Soc* 1999;13:705-32.
- Curtis D. Commodities and sexual subjectivities: A look at capitalism and its desires. *Cult Anthropol* 2004;19:95-121.
- Reece M, Herbenick D, Sherwood-Puzzello C. Sexual health promotion and adult retail stores. *J Sex Res* 2004;41:173-80.
- LoPiccolo J, Lobitz C. The role of masturbation in the treatment of orgasmic dysfunction. *Arch Sex Behav* 1972;2:163-71.
- Phillips NA. Female sexual dysfunction: Evaluation and treatment. *Am Fam Physician* 2000;62:127-36.
- Leiblum S, Brown C, Wan J, Rawlinson L. Persistent sexual arousal syndrome: A descriptive study. *J Sex Med* 2005;2:331-7.
- Rowland DL, den Ouden AH, Slob AK. The use of vibrotactile stimulation for determining sexual potency in the laboratory in men with erectile problems: Methodological considerations. *Int J Impot Res* 1994;6:153-61.
- Brotto LA, Heiman JR, Goff B, Greer B, Lentz GM, Swisher E, Tamimi H, Van Blaricom A. A psychoeducational intervention for sexual dysfunction in women with gynecologic cancer. *Arch Sexual Behav* 2008;37:317-29.
- Kinsey AC, Pomeroy WB, Martin CE, Gebhard PH. *Sexual behavior in the human female*. Philadelphia, PA: Saunders; 1953.
- Hite S. *The Hite report*. New York, NY: Macmillan; 1976.
- Califa P. Lesbian sexuality. *J Homosex* 1979;4:255-66.
- Michael RT, Gagnon J, Laumann E, Kolata G. *Sex in America: A definitive survey*. Boston, MA: Little, Brown; 1994.
- Reed BD, Advincula AP, Fonde KR, Gorenflo DW, Haefner HK. Sexual activities and attitudes of women with vulvar dysesthesia. *Obstet Gynecol* 2003;102:325-31.
- Berman Center. *The health benefits of sexual aids and devices: A comprehensive study of their relationship to satisfaction and quality of life*. Chicago, IL: Berman Center and Drugstore.com; 2004.
- Foxman B, Aral SO, Holmes KK. Common use in the general population of sexual enrichment aids and drugs to enhance sexual experience. *Sex Transm Dis* 2006;33:156-62.
- Lindemann DJ. Pathology full circle: A history of anti-vibrator legislation in the United States. *Columbia J Gend Law* 2006;15:326-246.
- Maines R. *The technology of orgasm: "Hysteria," the vibrator, and women's sexual satisfaction*. Baltimore, MD: Johns Hopkins University Press; 1999.
- Kelly E. A new image for the naughty dildo? *J Pop Cult* 1974;7:804-9.
- Kaplan HS. *The new sex therapy*. New York, NY: Brunner/Mazel; 1974.
- Billups KL, Berman L, Berman J, Metz ME, Glennon ME, Goldstein I. A new non-pharmacological vacuum therapy for female sexual dysfunction. *J Sex Marital Ther* 2001;27:435-41.
- Baker L, Wagner TH, Singer S, Bundorf MK. Use of the Internet and e-mail for health care

- information: Results from a national survey. *JAMA* 2003;289:2400–6.
- 27 Heiss F, McFadden D, Winter J. Who failed to enroll in Medicare Part D, and why? Early results. *Health Aff (Millwood)* 2006;25:w344–54.
 - 28 Holman EA, Silver RC, Poulin M, Andersen J, Gil-Rivas V, McIntosh DN. Terrorism, acute stress, and cardiovascular health: A 3-year national study following the September 11th attacks. *Arch Gen Psychiatry* 2008;65:73–80.
 - 29 Silver RC, Holman EA, McIntosh DN, Poulin M, Gil-Rivas V. Nationwide longitudinal study of psychological responses to September 11. *JAMA* 2002;288:1235.
 - 30 Baker LC, Bundorf MK, Singer S, Wagner TH. Validity of the survey of health and Internet and Knowledge Network's panel and sampling. Stanford, CA: Stanford University; 2003:1–30.
 - 31 Centers for Disease Control and Prevention. Measuring healthy days. Atlanta, GA: Centers for Disease Control and Prevention; 2000.
 - 32 Ahluwalia IB, Holtzman D, Mack KA, Mokdad A. Health-related quality of life among women of reproductive age: Behavioral Risk Factor Surveillance System (BRFSS), 1998–2001. *J Womens Health* 2003;12:5–10.
 - 33 Andresen EM, Catlin TK, Wyrwich KW, Jackson-Thompson J. Retest reliability of surveillance questions on health related quality of life. *J Epidemiol Community Health* 2003;57:339–43.
 - 34 Centers for Disease Control and Prevention. State differences in reported Healthy Days among adults—United States, 1993–1996. *MMWR CDC* 1998;47:239–44.
 - 35 Centers for Disease Control and Prevention. Community indicators of health-related quality of life—United States, 1993–1997. *MMWR CDC* 2000;49:281–5.
 - 36 Centers for Disease Control and Prevention. Health-related quality of life among persons with epilepsy—Texas 1998. *MMWR CDC* 2001;50:24–6.
 - 37 Moriarty D, Zack M, Kobau R. The Centers for Disease Control and Prevention's Healthy Days Measures—population tracking of perceived physical and mental health over time. *Health Qual Life Outcomes* 2003;1:1–8.
 - 38 Rosen R, Brown C, Heiman J, Leiblum S, Meston C, Shabsigh R, Ferguson D, D'agostino R. The Female Sexual Function Index (FSFI): A multidimensional self-report instrument for the assessment of female sexual function. *J Sex Marital Ther* 2000;26:191–208.
 - 39 Ter Kuile MM, Brauer M, Laan E. The Female Sexual Function Index (FSFI) and the Female Sexual Distress Scale (FSDS): Psychometric properties within a Dutch population. *J Sex Marital Ther* 2006;32:289–304.
 - 40 Verit FF, Verit A. Validation of the Female Sexual Function Index in women with chronic pelvic pain. *J Sex Med* 2007;4:1635–41.
 - 41 Wiegel M, Meston C, Rosen R. The Female Sexual Function Index (FSFI): Cross-validation and development of clinical cutoff scores. *J Sex Marital Ther* 2005;31:1–20.
 - 42 Witting K, Santtila P, Jem P, Varjonen M, Wager I, Högglund M, Johansson A, Vikström N, Sandnabba NK. Evaluation of the Female Sexual Function Index in a population based sample from Finland. *Arch Sex Behav* 2008;37:912–24.
 - 43 Nelson CJ, Shindel AW, Naughto CK, Ohebshalom M, Mulhall JP. Prevalence and predictors of sexual problems, relationship stress, and depression in female partners of infertile couples. *J Sex Med* 2008;5:1907–14.
 - 44 Shindel AW, Ferguson GG, Nelson CJ, Brandes SB. The sexual lives of medical students: A single institution survey. *J Sex Med* 2008;5:796–803.
 - 45 Lombardi G, Mondaini N, Macchiarella A, Cilotti A, Del Popolo G. Clinical female sexual outcome after sacral neuromodulation implant for lower urinary tract symptom (LUTS). *J Sex Med* 2008;5:1411–7.
 - 46 Meston CM. Validations of the Female Sexual Function Index (FSFI) in women with female orgasmic disorder and in women with hypoactive sexual desire disorder. *J Sex Marital Ther* 2003;29:39–46.
 - 47 Hayes R, Dennerstein L. The impact of aging on sexual function and sexual dysfunction in women: A review of population-based studies. *J Sex Med* 2005;2:317–30.
 - 48 Miller GA, Chapman JP. Misunderstanding analysis of covariance. *J Abnorm Psychol* 2001;110:40–8.
 - 49 American Cancer Society. Detailed guide: Vulvar cancer. (Revised). Available at: http://www.cancer.org/docroot/CRI/content/CRI_2_4_2X_Can_vulvar_cancer_be_prevented_45.asp?sitearea= (accessed March 5, 2009).
 - 50 Lawhead RA, Majmudar B. Early diagnosis of vulvar neoplasia as a result of vulvar self-examination. *J Reprod Med* 1990;35:1134–7.
 - 51 Harris JM, Cherkas LF, Kato BS, Heiman JR, Spector TD. Normal variations in personality are associated with coital orgasmic infrequency in heterosexual women: A population-based study. *J Sex Med* 2008;5:1177–83.
 - 52 Zolnoun D, Lamvu G, Steege J. Patient perceptions of vulvar vibration therapy for refractory vulvar pain. *Sex Relat Ther* 2008;23:1–9.