



## Experiences With Diverse Sex Toys Among German Heterosexual Adults: Findings From a National Online Survey

Nicola Döring & Sandra Poeschl

To cite this article: Nicola Döring & Sandra Poeschl (2019): Experiences With Diverse Sex Toys Among German Heterosexual Adults: Findings From a National Online Survey, The Journal of Sex Research, DOI: [10.1080/00224499.2019.1578329](https://doi.org/10.1080/00224499.2019.1578329)

To link to this article: <https://doi.org/10.1080/00224499.2019.1578329>



Published online: 26 Feb 2019.



Submit your article to this journal [↗](#)



View Crossmark data [↗](#)



## Experiences With Diverse Sex Toys Among German Heterosexual Adults: Findings From a National Online Survey

Nicola Döring and Sandra Poeschl 

*Department of Economic Sciences and Media, Institute for Media and Communication Science, Research Group Media Psychology and Media Design, TU Ilmenau*

*Studies from English-speaking countries show that sex toy use is common in various populations and often associated with sexual well-being. Empirical data on sex toy use and perceived effects in other countries is still missing. Based on the Positive Sexuality framework and the Positive Technology framework, this study documented the prevalence of sex toy use in solo and partnered sex among heterosexual-identified women and men in Germany, as well as perceived positive and/or negative effects of sex toy use on sexual well-being. A survey was conducted with a national online sample of 1,723 heterosexual-identified adults in Germany ( $M_{age} = 42.71$ ,  $SD = 13.25$ , 49% women, 51% men). The majority (52%) reported sex toy use in partnered sex, and 45% reported sex toy use in solo sex. Stronger positive than negative perceived effects of sex toy use were reported by women and men alike. Findings indicate that professionals in sexual health/sexuality education should consider sex toy use as a common and beneficial sexual behavior. Future studies could explore specific effects of sex toy use and their predictors in more detail.*

Sex toy use is not a modern phenomenon. Archeology excavations have produced phallus-shaped artifacts seemingly used for sexual stimulation that reach back to the Upper Paleolithic Era (40,000–9,700 BC; Marshack, 1991). Today, sex toys are more visible and easier to acquire than ever (Crewe & Martin, 2016); they can be purchased in offline and online shops, the latter providing discreet and easy access anytime and anywhere. About 50% of female and male college students in Germany, Sweden, Canada, and the United States reported that they have used the Internet to browse for sex toys (Döring, Daneback, Shaughnessy, Grov, & Byers, 2017).

It is, however, not only online marketing (Attwood, 2005) that has led to the growing popularity of sex toys. Since the late 2000s, retailers have strived to change the image of sex toys. Modern marketing approaches sell sex toys as fashionable lifestyle products in elegant offline and online boutiques (Attwood, 2005; Crewe & Martin, 2016), as well as via in-home sex toy parties (Herbenick, Reece, & Hollub, 2009; Jozkowski, Schick, Herbenick, & Reece, 2012; Schick, Herbenick, Jozkowski, Jawed-Wessel, & Reece, 2013).

Despite the growing popularity of sex toys, these products have remained largely underresearched. There exists very little current data on the *prevalence of sex toy use* in both solo and partnered sex in different populations, with some notable exceptions addressed below. Furthermore, there is not much data available on the *perceived effects of sex toy use* on sexual well-being.

Eight empirical studies on the prevalence of sex toy use based on national samples from the United States and Australia have been published within the last 10 years. Some of them examined vibrator, dildo, and lubricant use (Herbenick et al., 2010; Herbenick, Reece, Sanders, et al., 2009; Herbenick, Reece, Schick, Sanders, & Fortenberry, 2014; Reece et al., 2009; Reece, Herbenick, et al., 2010; Richters et al., 2014) among heterosexual-, homosexual-, and bisexual-identified women and men. Further studies were conducted with homosexual- and bisexual-identified women and men on the prevalence of lubricant use (Hensel et al., 2015; Herbenick et al., 2014). The use of other sex toys, including anal beads, dildos/butt plugs, and masturbation sleeves, has been researched in studies using convenience samples (Rosenberger, Schick, Herbenick, Novak, & Reece, 2012; Satinsky, Rosenberger, Schick, Novak, & Reece, 2011). Previous studies from the United States showed that 45% of heterosexual-identified women used vibrators for solo sex, and 40% in partnered sex (Herbenick et al., 2010). Among heterosexual-identified men, 15% used a vibrator for solo sex and 41% in partnered sex (Reece, Herbenick, et al., 2010). However, most of these representative

---

Correspondence should be addressed to Nicola Döring, Department of Economic Sciences and Media, Institute for Media and Communication Science, Research Group Media Psychology and Media Design, TU Ilmenau, Ehrenbergstr. 29, Ilmenau 98693, Germany. E-mail: [nicola.doering@tu-ilmenau.de](mailto:nicola.doering@tu-ilmenau.de)

studies examined sex toy use among either women or men and did not make gender comparisons.

Exceptions are the Australian Studies of Health and Relationships, noting prevalence rates of sex toy use (e.g., vibrators and dildos) in the last 12 months of 14% among women and 12% among men in 2001–2002 (Richters, Grulich, Visser, de Smith, & Rissel, 2003) and prevalence rates of 24% among women and 16% among men in 2012–2013 (Richters et al., 2014). These prevalence data indicate not only an increase in sex toy use, but also gender differences. Although it is easy to explain why women would report higher use rates than men concerning dildos and vibrators, male usage is still noticeable and an interesting phenomenon in itself, especially against the background of incorporating sex toys into solo sex activities. We therefore included research questions regarding gender differences in sex toy use and perceived effects in our study.

### Prevalence of Sex Toy Use in Germany

Based on results from the *World Values Survey* ([www.worldvaluessurvey.org](http://www.worldvaluessurvey.org)), Germany is ranked as a country with a less traditional value system and a higher degree of *sexual liberalism* than the United States (Esmer & Pettersson, 2007; Inglehart & Baker, 2000). Sex-positive attitudes are quite prevalent in German society (Impett, Muise, & Breines, 2013), and German schools provide sexuality education for all age groups, following World Health Organization (WHO) standards that acknowledge sexual well-being as an important part of sexual health (WHO Regional Office for Europe and BZgA, 2010, p. 15). It is not unusual for school students in Germany to openly discuss questions regarding masturbation, pornography, or sex toys with trained sex educators and to try out condoms on dildos during sex education lessons. A sex-positive holistic sexuality education is assumed to be more effective in fostering responsible sexual behavior than abstinence only or comprehensive sex education programs (WHO Regional Office for Europe and BZgA, 2010); indeed, comparative data shows that adolescents and young adults in Germany are less affected by sexual health risks and problems (e.g., high numbers of sexual partners, unintended adolescent births and abortions, human immunodeficiency virus or other sexually transmitted disease infections) than young people in the United States (Kemp Huberman, 2009).

Another aspect of sexual liberalism, apart from holistic sex education, that influences the appropriation of sex toys in Germany is their marketing: In the middle of the twentieth century, German sex product mail-order companies like “Beate Uhse” and “Orion” became household names. Walk-in sex stores followed in the 1970s, appearing in many German cities (Heineman, 2006; Taylor, Timm, & Herrn, 2017).

Considering (a) a lack of current data on sex toy use in general and (b) a lack of data on sex toy use in different cultures, prevalence data on sex toy use in Germany are of interest. The present study, thus, aimed at examining the

current *prevalence of sex toy use among heterosexual-identified women and men in Germany*. Previous research has reported that homosexual- and bisexual-identified women and men show different patterns of sex toy use than heterosexual-identified persons, with bisexual-identified women and men showing the highest prevalence of sex toy use, followed by homosexual-identified women and men (Richters et al., 2003). Transgender-identified people of different sexual identities report specific patterns of sex toy use, including their appropriation as their own body parts (Bauer, 2015). As sexual and gender identities obviously shape patterns of sex toy use, these factors and their interplay need to be taken into careful consideration.

We therefore decided not to combine participants with different self-reported sexual and gender identities, but to explicitly focus on heterosexual-identified cisgender women and men. If it had been the aim of the study to investigate non-heterosexual-identified women, men, and gender-diverse individuals and their sex toy use in detail, a different and much more expensive sampling strategy would have been necessary from the beginning to ensure adequate subsample sizes to provide sufficient statistical power for all relevant group comparisons. Furthermore, to discuss the different meanings and uses of sex toys in different non-heterosexual-identified subgroups (and related subcultures) would dramatically alter the scope of the literature review, and hence would be beyond the scope of this article. Considering the theoretical and analytical rationale for researching heterosexual-identified people and their relation to sex toys led to the following research questions:

RQ1: How prevalent is acquisition of sex toys for heterosexual-identified women and men in Germany?

RQ2: How prevalent is sex toy use in solo sex among heterosexual-identified women and men in Germany?

RQ3: How prevalent is sex toy use in partnered sex among heterosexual-identified women and men in Germany?

To date, there still exists no academic classification and labeling system for sex toys. We therefore included a variety of sexual products marketed as “sex toys” in our study. We define *sex toys* as sexual enhancement products with the intent of improving the nature and quality of sexual experiences (Rosenberger et al., 2012). Sex toys are, thus, exclusively material objects (unlike pornography). Some resemble human body parts (e.g., dildos in the form of male human genitals; masturbators in the form of female human genitals), while others have non-human forms (e.g., vibrators in the form of a dolphin or a banana). Sex toys are used directly on the body during sexual activities, and are designed to stimulate different body parts (e.g., female/male genitalia, anus; Döring & Pöschl, 2018).

Additionally, toys used in bondage or S&M play and erotic lingerie and costumes fall under this definition, as well as – in a wider sense – lubricants and remedies for enhancing sexual arousal. The latter could also be

considered “sexual aids,” although this term would be associated more within the context of medical applications (e.g., pharmaceutical interventions in the case of sexual dysfunction). Most prior studies on sex toys have examined their prevalence separately from lubricants (Herbenick et al., 2010; Herbenick, Reece, Sanders, et al., 2009; Reece et al., 2009; Reece, Herbenick, et al., 2010; Richters et al., 2014; Satinsky et al., 2011). However, lubricants and sexual remedies (e.g., over-the-counter aphrodisiacs) are commonly used (Hassali et al., 2012; Herbenick et al., 2014; Wu et al., 2017) and widely marketed in offline and online sex shops. Further, studies on associations of lubricant use showed that lubricants are often used together with sex toys such as vibrators and dildos (Hensel et al., 2015; Herbenick et al., 2014). We therefore decided to include them in our analysis.

### Perceived Effects of Sex Toy Use

Regarding the *perceived effects of sex toy use*, we expected heterosexual-identified women and men to experience both positive and negative perceived effects. Sex toy marketing, of course, promises the customer better sex and more sexual pleasure, and it often seems to keep those promises (Rye & Meaney, 2007). Empirical studies on the use of vibrators, lubricants, and other sex toys among heterosexual-, homosexual-, and bisexual-identified women and men mostly revealed positive perceived effects, such as improved sexual functioning, greater sexual pleasure, and increased sexual satisfaction (Herbenick et al. 2010; Herbenick, Reece, et al., 2011; Herbenick, Reece, Sanders, et al., 2009; Reece et al., 2009; Reece, Herbenick, et al., 2010; Satinsky et al., 2011; Schick, Herbenick, Rosenberger, & Reece, 2011).

However, in public and academic discourses, different concerns about negative outcomes of sex toy use have also been raised. Sex toys have been criticized in some feminist discourses as a questionable contribution to the commodification of sex within an oppressive capitalist consumer culture (Lieberman, 2016). The increasing publicity and marketing of sex toys are said to induce pressure on people of all genders to perform. While vibrators might help some women to achieve orgasms, their availability could also increase pressure for women (and their partners) to provide (or to elicit) orgasms as part of their sexual performance (Frith, 2015; Wood, 2017). It is reported that women sometimes feel coerced by their male partners to use a sex toy in partnered sex (Fahs & Swank, 2013). Sex toys can have negative outcomes for men as well, if they regard their partners’ vibrator use as an indicator of their own lack of virility, penis size, endurance, or sexual competence (Watson, Séguin, Milhausen, & Murray, 2016). Further, we could be on our way to becoming a society where solo sex that is improved more and more with technologies such as artificial body parts or lifelike sex dolls does not just provide an additional source of sexual pleasure (Richters et al., 2014), but instead becomes a substitute for partnered sex with living human beings (Sharkey, van Wynsberghe,

Robbins, & Hancock, 2017). Last but not least, some studies discussed potential risks of transmitting infections via shared sex toys (Anderson, Schick, Herbenick, Dodge, & Fortenberry, 2014; Gorgos & Marrazzo, 2017; Mitchell, Manhart, Thomas, Agnew, & Marrazzo, 2011). While some of these negative outcomes can be prevented easily (e.g., by using condoms with shared sex toys), others might be harder to tackle (e.g., increased performance pressure).

Based on the Positive Sexuality framework (Williams, Thomas, Prior, & Walters, 2015) and the Positive Technology framework (Riva, Banos, Botella, Wiederhold, & Gaggioli, 2012), both of which are rooted in the Positive Psychology approach (Seligman & Csikszentmihalyi, 2000), it can be assumed that sex toys are developed and used to improve sexual well-being among their users, and therefore are associated with predominantly positive consequences, such as the achievement of sexual pleasure and fulfillment, as well as overall well-being and better quality of life.

The Positive Sexuality framework (Williams et al., 2015) highlights that many debates about sexuality are shaped by implicit or explicit sex-negative beliefs. It proposes to acknowledge risks, but also to emphasize sexual pleasure, freedom, and diversity in sex research, practice, and education. Individual strengths can be identified and used to empower people in sexual matters based on their already existing capabilities (Williams et al., 2015). This might include, for example, fostering new stimulation techniques with or without toys to allow for the experience of sexual pleasure in various biopsychosocial circumstances, such as pain, long-distance relationships, or disabilities (Rohleder & Swartz, 2012). The Positive Sexuality framework therefore rejects a one-sided view concerned primarily with sexual risks and problems and suggests a balanced perspective that focuses on sexual fulfillment.

The Positive Technology framework (Riva et al., 2012) is the applied and scientific approach to the use of technology for improving the quality of personal experience on three levels. Technologies are used to, first, induce positive and pleasant experiences on the hedonic level; second, to support individuals in achieving engaging and self-actualizing experiences on the eudaimonic level; and third, to support and improve connectedness and integration between individuals, groups, and organizations on the social/interpersonal level (Riva et al., 2012). This approach can guide the development of technological systems and applications (e.g., technological artifacts such as vibrators or sex machines) that “foster positive emotions, promote personal growth, and support creativity, thereby contributing to social and cultural development” (Riva et al., 2012, p. 70). The first sex and love toys that aim to improve sexual pleasure and interpersonal closeness for couples with motor disabilities (Gomes & Wu, 2018; Morales et al., 2018) or for couples in long-distance relationships have already been designed (Saadatian et al., 2014).

Empirical knowledge about the prevalence of sex toy use and its perceived negative and positive effects may help to empower people to include them wisely into their sexual

repertoire to improve sexual health, well-being, and happiness. However, working within a Positive Sexuality and a Positive Technology framework does not mean that we should idealize sex toys. Negative consequences must also be taken into account, and an explicitly balanced research approach is needed. Overall, it is an open question to what degree sex toy users perceive positive and/or negative effects, which leads to the fourth and final research question:

RQ4: To what degree do heterosexual-identified women and men in Germany perceive their sex toy use to have negative and/or positive effects on their sexual well-being?

## Method

### Participants and Procedure

This study was designed as a quantitative online survey, and a professional online panel provider was engaged to collect a national sample of Internet users in Germany. The panel provider drew a quota sample of the German online population of adults aged 18–69 years from its total opt-in panel. Gender, age, education, marital status, and residency in a particular federal state of Germany were used as quota variables. Necessary quotas were fulfilled. However, because this approach is a non-probability sampling method, a representative sample of the German online population could not be achieved. The questionnaire was based on previous studies (Herbenick, Reece, Sanders, et al., 2009; Herbenick et al. 2014; Rosenberger et al., 2012) and addressed the prevalence of sex toy use and its perceived effects. The study was conducted in accordance with the ethical guidelines of the American Psychological Association.

After a pretest survey, data collection took place in November 2016 over a period of two weeks. Participants (online panel members) were invited to take part in a basic research study conducted by university researchers on the use of and experience with sex toys. Firstly, participants were directed to an informed consent page and were only selected if they gave informed consent and were over 18 years old. It took approximately 18 minutes to complete the online questionnaire; participants received one Euro as compensation, which is the compensation usually offered for completing questionnaires of this kind and length with this online panel provider.

In total, 2,347 participants completed the survey out of 9,305 panel members invited by the online panel provider, giving a complete interview rate of 25.2%. Subsequently, 347 participants were excluded from the sample during quality control: participants were excluded if they showed an unrealistically fast processing time or a problematic response pattern (e.g., providing exactly the same values for a whole block of items), or if they gave a meaningless response (e.g., “kjsfisdfds”). This resulted in a participation rate of 21.5%

and a national online sample of 2,000 German residents ages 18–69 years. Although this participation rate is lower than could be expected from an online survey (with an average online survey response rate of 34%; Shih & Fan, 2008), it does not seem to be an outlier. Participation rates of such surveys in general show a trend of decreasing and a mean participation rate of 24% was reported for the year 2000 (Sheehan, 2001). The 2017 pilot study of the upcoming first ever nationally representative general sex survey in Germany achieved response rates of 9% for postal questionnaires and 18% for computer-assisted personal interviews (Matthiesen, Dekker, & Briken, 2018). Such low response rates are explained by overall increasing survey fatigue, as well as extra sensitivity regarding privacy and data protection in Germany due to its history (Matthiesen et al., 2018).

As discussed above, only heterosexual-identified women and men were included in this study, resulting in a sample of 1,723 participants. The proportion of women (49%) and men (51%) in our sample is roughly comparable to that of another recent study reporting nationally representative data on sexual behavior in Germany (53% women, 47% men; Haversath et al., 2017). Table 1 presents the sample characteristics for our study. A sizable proportion of our sample reported being in a relationship (82%). Comparable data of representative surveys in Germany is not available; however, 59% of participants in the German Socio-Economic Panel (an annual population representative household survey conducted by the German Institute for Economic Research) reported being married and living together (DIW Berlin, 2013). Being in a relationship without cohabitation was not measured, so the prevalence of being partnered in Germany can safely be assumed to be higher.

### Measures

Participants completed items related to their sociodemographic characteristics, acquisition of sex toys, sex toy use, and perceived effects of sex toy use.

**Sociodemographic Characteristics.** Variables assessed were the participants' gender, age, marital status, relationship status, cohabitation, and education. Participants also responded to a question regarding their sexual identity (heterosexual/homosexual/bisexual/asexual/other; response options were adapted from DeMaria, Hollub, & Herbenick, 2012; Herbenick, Schick, et al., 2011 with a polytomous response format).

**Acquisition of Sex Toys.** Before asking any question about sex toys, participants were provided with a broad definition. Sex toys were defined as all products that are intended for sexual stimulation alone (e.g., masturbation) or during sex with a partner, which includes sex toys of all kinds, erotic lingerie and other accessories, sex furniture, lust pills, lubricants, etc. Based on Döring et al. (2017), acquisition of sex toys was measured by asking participants

**Table 1.** *Sociodemographic Characteristics of Heterosexual-Identified Participants (N = 1,723)*

Variable	n	%
Gender		
Women	846	49
Men	877	51
Age <sup>a</sup>		
18–29	390	23
30–39	336	20
40–49	390	23
50–59	391	23
60–69	216	13
Marital Status		
Single	514	30
Married	1,003	58
Divorced/Widowed	206	12
Relationship Status		
In a Relationship	1,410	82
Not in a Relationship	313	18
Cohabitation <sup>b</sup>		
Cohabitation	1,255	89
No Cohabitation	155	11
Education <sup>a</sup>		
No Graduation	3	<1
Grade School without Professional Training <sup>c</sup>	67	4
Grade School & Professional Training <sup>d</sup>	463	27
Junior High School <sup>e</sup>	532	31
High School <sup>f</sup>	324	19
University Degree	334	19

Note. <sup>a</sup>The total of the percentages is not 100 because of rounding. <sup>b</sup>n = 1,410, since only participants in an existing relationship were included. <sup>c</sup>Grade School without Professional Training = 9 years of study. <sup>d</sup>Grade School & Professional Training = 9 + 2–3 years of study. <sup>e</sup>Junior High School = 10 years of study. <sup>f</sup>High School = 12–13 years of study.

whether they had ever informed themselves about sex toys, looked up a sex toy in an online shop, bought a sex toy, or received a sex toy as a present. One example item was: “Have you ever bought a sex toy?” The items had dichotomous response options (yes/no).

**Sex Toy Use.** Concerning sex toy use, most of the items were derivations of items used in previous studies. We measured both overall sex toy use and specific sex toy use.

For *overall sex toy use*, participants indicated whether they had ever used a sex toy for solo sex (“Have you ever used a sex toy for masturbation?”) and/or partnered sex (“Have you ever jointly used a sex toy with a partner?”), measuring lifetime prevalence (similar items were used by Herbenick et al., 2014; Reece et al., 2009; Robbins et al., 2011; Rosenberger et al., 2012).

We also asked participants whether they had ever used any of seven *specific sex toys*. If this was the case, we asked them to indicate its use within the last 12 months for solo sex and/or partnered sex, respectively. Participants were presented with a list of sex toys comprised of lubricants (e.g., water-based lubricants, silicon-based lubricants,

lubricants with stimulation effects); remedies for enhancing arousal (e.g., aphrodisiacs, sex pills); toys for the stimulation of body parts (e.g., for vagina and vulva: vibrators and dildos; for penis and testicles: masturbators, cock rings, and artificial vaginas; for anus: anal dildos, butt plugs, anal beads); erotic lingerie (e.g., lingerie, latex, leather, costumes); and toys for bondage/S&M (e.g., blindfolds, cuffs, whips). The toys for the stimulation of body parts are referring to the genitals that the toy was designed/marketed for. However, those toys may be perfectly suitable across a range of body parts regardless of their intended use or the gender of its user. For each sex toy, participants were asked to indicate whether they had used the specific sex toy during masturbation/during sex with a partner in the last 12 months. Example items would be: “Sex toy for stimulation of vagina and vulva (for example vibrator, dildo etc.): I have used this toy during sex with a partner in the last 12 months”; “Sex toy for stimulation of anus (for example, anal dildo, beads, plugs, etc.): I have used this toy during masturbation in the last 12 months.” Similar items have been used by Rosenberger et al. (2012) and Satinsky et al. (2011). Items for overall and specific sex toy use had dichotomous response options (yes/no).

**Perceived Effects of Sex Toy Use.** Lastly, we measured the perceived effects of sex toy use on the participants’ sexual well-being, using the self-reported effect of sex toy use on their sex lives as a manifest variable. We decided against using a sexual well-being inventory and chose single-item measures instead in order to keep the time required of participants as short as possible. We used one item for positive and negative perceived effects, respectively (“Using sex toys had a positive/negative effect on my sex life”), on a 7-point Likert scale (1 = not at all to 7 = to a high degree).

## Analyses

All statistical analyses were performed with IBM SPSS 23. We calculated lifetime prevalence for acquisition of sex toys and overall sex toy use, and prevalence of specific sex toy use within the last 12 months (RQ1–3). We also computed a *posteriori* two-dimensional chi-square tests to identify significant gender differences in the prevalence data. Analyses were conducted separately for solo and partnered sex.

Descriptive statistics were computed for the perceived effects of sex toy use (RQ4). We further computed an *a posteriori* two-factor mixed ANOVA to identify significant differences in the perceived effects of sex toy use (within-subject factor) and gender (women and men; between-subject factor).

Given our large sample size, we used a significance level of  $p < .01$  to reduce the likelihood of Type I errors, along with effect sizes of Cramer’s  $V > .10$  and  $\eta_p^2 > .02$ , respectively, to determine which differences were worth interpreting.

**Table 2.** Lifetime Prevalence of Acquisition of Sex Toys for Heterosexual-Identified Women and Men in Germany

Access to Sex Toys	Total		Women		Men		$\chi^2(1)$	<i>p</i>	Cramer's <i>V</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%			
Informed Themselves About Sex Toys	1,309	76	646	76	663	76	0.14	.735	.01
Looked Up a Sex Toy in an Online Shop	1,235	72	593	70	642	73	2.05	.152	.04
Bought a Sex Toy	1,073	62	535	63	538	61	0.66	.418	.02
Received a Sex Toy as a Present	465	27	292	35	173	20	47.80	<.001	.17

Note: *N* = 1,723. *n*<sub>women</sub> = 846. *n*<sub>men</sub> = 877. Chi-square test statistics relate to differences between women and men.

## Results

### Acquisition of Sex Toys

Acquisition of sex toys was highly prevalent, for women as well as for men (see Table 2). The vast majority of the sample had informed themselves about sex toys (76%) or looked them up in an online shop (72%). More than half of the sample had ever bought a sex toy (62%). Overall, there was no difference in sex toy acquisition between women and men, with one notable exception: a significantly higher percentage of women had received a sex toy as a present (35%, *n* = 292) when compared to men (20%, *n* = 173,  $\chi^2(1) = 47.80, p < .001$ ; see Table 2).

### Sex Toy Use in Solo Sex

Nearly half of the total sample (45%) had used a sex toy during solo sex. Women used sex toys significantly more often in solo sex (53%) than men (37%,  $\chi^2(1) = 45.29, p < .001$ ; see Table 3).

Lifetime prevalence of specific sex toy use is presented in Table 4.

The 12-month prevalence presented in Table 5 shows that specific sex toys are used to a considerable degree in solo sex among sex toy-experienced women and men. Even erotic lingerie and toys for bondage/S&M were used by about one-quarter of sex toy-experienced users for solo sex, with no considerable differences between men and women.

Lubricants and arousal-enhancing remedies, as well as toys for anal stimulation, were also used by nearly half of sex toy-experienced participants, and to the same extent by women and men. Originally gender-specific toys (e.g., vibrators for women, masturbators for men) were used by both men and women. However, toys for the stimulation of vagina and vulva were used for solo sex by a significantly higher percentage of sex toy-experienced women (72%, *n* = 366) than men (31%, *n* = 122,  $\chi^2(1) = 146.24, p < .001$ ), while toys for the stimulation of penis and testicles were used by a significantly higher percentage of sex toy-experienced men (52%, *n* = 152) than women (29%, *n* = 50,  $\chi^2(1) = 21.89, p < .001$ ).

### Sex Toy Use in Partnered Sex

More than half of the total sample (52%) had used a sex toy for partnered sex (see Table 3) and no significant gender differences were evident. Using sex toys in partnered sex was even more prevalent than in solo sex (45%). The prevalence rates for the use of specific sex toys in partnered sex within the last 12 months are presented in Table 6. Erotic lingerie and lubricants were used by two thirds of sex toy-experienced users for partnered sex, while toys for bondage/S&M, arousal-enhancing remedies, and all three forms of stimulating toys were used by more than half of sex toy-experienced users. In contrast to solo sex, toys for the stimulation of vagina and vulva were used for partnered sex by a significantly higher percentage of sex toy-experienced men

**Table 3.** Lifetime Prevalence of Overall Sex Toy Use in Solo Sex and Partnered Sex for Heterosexual-Identified Women and Men in Germany

Sex Toy Use	Total		Women		Men		$\chi^2(1)$	<i>p</i>	Cramer's <i>V</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%			
Solo Sex	771	45	448	53	323	37	45.29	<.001	.16
Partnered Sex	901	52	448	53	453	52	0.29	.589	.01

Note: *N* = 1,723. *n*<sub>women</sub> = 846. *n*<sub>men</sub> = 877. Chi-square test statistics relate to differences between women and men.

(76%,  $n = 294$ ) than women (55%,  $n = 280$ ,  $\chi^2(1) = 40.77$ ,  $p < .001$ ). All other gender differences were not significant.

For all sex toys, with the exception of the use of toys for stimulation of penis and testicles among men, more than half of the sex toy-experienced participants had used them for partnered sex within the last 12 months, with no notable differences between women and men. Lubricants, erotic lingerie, and toys for bondage and S&M were highly prevalent, and gender-specific sex toys (for stimulation of vagina and vulva/penis and testicles) were often used in partnered sex by women and men.

### Perceived Effects of Sex Toy Use

Concerning the degree of positive and/or negative perceived effects of sex toy use (RQ4), sex toy-experienced participants clearly stated that they predominantly perceived positive effects as opposed to negative effects (see Table 7). No gender differences appeared in the evaluations of perceived positive and negative sex toy effects. Results of the ANOVA revealed that positive perceived sex toy effects significantly outweighed negative perceived effects, with a large effect size ( $F(1, 1310) = 1,407.48$ ;  $p < .001$ ;  $\eta_p^2 = .52$ ).

**Table 4.** Lifetime Prevalence of Specific Sex Toy Use for Heterosexual-Identified Women and Men in Germany

Sex Toys	Total		Women		Men		$\chi^2(1)$	$p$	Cramer's $V$
	$n$	%	$n$	%	$n$	%			
Lubricants and Remedies									
Lubricant	959	56	471	56	488	56	<.01	.990	<.01
Arousal-Enhancing Remedies	214	14	92	11	149	17	13.38	<.001	.09
Sex Toys for Stimulation									
Toys for Stimulation of Vagina and Vulva	896	52	508	60	388	44	43.10	<.001	.16
Toys for Stimulation of Penis and Testicles	466	27	171	20	295	34	39.33	<.001	.15
Toys for Stimulation of Anus	268	16	124	15	144	16	1.02	.313	.02
Erotic Lingerie	722	42	473	56	249	28	133.94	<.001	.28
Toys for Bondage / S&M	420	24	216	26	204	23	1.21	.272	.03

*Note.* Only participants that answered that they had ever used the specific sex toy were included in this analysis. Chi-square test statistics relate to differences between women and men.

**Table 5.** Prevalence of Specific Sex Toy Use Within the Last 12 Months in Solo Sex for Heterosexual-Identified Women and Men in Germany

Sex Toys	Total		Women		Men		$\chi^2(1)$	$p$	Cramer's $V$
	$n$	%	$n$	%	$n$	%			
Lubricants and Remedies									
Lubricant ( $n = 959$ ; $n_{\text{women}} = 471$ ; $n_{\text{men}} = 488$ )	439	46	208	44	231	47	0.97	.324	.03
Arousal-Enhancing Remedies ( $n = 214$ ; $n_{\text{women}} = 92$ ; $n_{\text{men}} = 149$ )	98	41	30	33	68	46	4.00	.045	.13
Sex Toys for Stimulation									
Toys for Stimulation of Vagina and Vulva ( $n = 896$ ; $n_{\text{women}} = 508$ ; $n_{\text{men}} = 388$ )	488	55	366	72	122	31	146.24	<.001	.40
Toys for Stimulation of Penis and Testicles ( $n = 466$ ; $n_{\text{women}} = 171$ ; $n_{\text{men}} = 295$ )	202	43	50	29	152	52	21.89	<.001	.22
Toys for Stimulation of Anus ( $n = 268$ ; $n_{\text{women}} = 124$ ; $n_{\text{men}} = 144$ )	124	46	60	48	64	44	0.42	.519	.04
Erotic Lingerie ( $n = 722$ ; $n_{\text{women}} = 473$ ; $n_{\text{men}} = 249$ )	196	27	119	25	77	31	2.74	.098	.06
Toys for Bondage / S&M ( $n = 420$ ; $n_{\text{women}} = 216$ ; $n_{\text{men}} = 204$ )	103	25	50	23	53	26	0.46	.500	.03

*Note.* Only participants that answered that they had ever used the specific sex toy were included in this analysis. The percentages were calculated by dividing the 12-month prevalences by the corresponding lifetime prevalences (cf. Table 4), which are given at the beginning of each row. Chi-square test statistics relate to differences between women and men.



## Discussion

In recent years, sex toys have become both more visible and more easily acquired in the Western world, mainly because of their marketing on the Internet. To what extent and with what perceived effects sex toys are incorporated into everyday sexual behavior, however, is underresearched. This study therefore examined acquisition of sex toys (RQ1), sex toy use in solo sex (RQ2) and in partnered sex (RQ3) and, ultimately, the degree of perceived positive and negative effects of sex toy use among heterosexual-identified women and men in Germany (RQ4).

Easy accessibility of sex toys online and offline is mirrored by widespread *acquisition* (RQ1): 76% of participants had informed themselves about sex toys, and 62% had ever bought a sex toy. These results are in line with previous studies finding that sex toys are quite prevalent in the Western world (Döring, 2009; Döring et al., 2017). Although large differences between women and men can be seen in some areas of sexual behavior (pornography use in particular; Petersen & Hyde, 2010), few gender differences are found in acquisition of sex toys, with the exception of a greater number of women than men having received a sex toy as a present. The fact that sex toys are exchanged as gifts nowadays seems to underline a successful image change of sex toys, which are now regarded as a fashionable lifestyle product (Attwood, 2005).

Almost half of the sample (45%) reported *sex toy use in solo sex*, again indicating common use (RQ2). Lifetime prevalence among women (53%) was significantly higher than among men (37%), and a closer look at the use of specific sex toys provides an explanation. The *specific sex toys* that were

**Table 7.** Means and Standard Deviations of Positive and Negative Perceived Effects of Sex Toy Use on Sex Life by Heterosexual-Identified Women and Men in Germany

Perceived Effect of Sex Toy Use	Total		Women		Men	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Positive Effect of Sex Toy Use on Sex Life	4.81	1.47	4.65	1.52	4.88	1.38
Negative Effect of Sex Toy Use on Sex Life	2.41	1.80	2.32	1.76	2.47	1.79

*Note.*  $N = 1,540$ .  $n_{\text{women}} = 678$ .  $n_{\text{men}} = 637$ . Likert scale from 1 = not at all to 7 = to a high degree. Only participants that answered that they had ever used sex toys were included in this analysis.

used most in solo sex were toys mainly designed and marketed for the stimulation of the vagina and vulva, (vibrators, dildos). They were used within the last 12 months in solo sex by 55% of the participants who had ever used such specific sex toys. Unsurprisingly, a much higher percentage of sex toy-experienced women (72%) than men (31%) included them in their solo sex activities. The pattern was reversed concerning toys that are primarily designed for the stimulation of the penis and testicles (e.g., masturbators, artificial vaginas, penis rings, etc.). These sex toys were used for solo sex by 52% of men and 29% of women with prior experience. There was a visible trend toward gender-specific use of some sex toys. However, the reported prevalence rates also reveal that sex toy users are creative and/or pragmatic, and use their sex toys in diverse ways, in accordance with the Positive Sexuality framework (Williams et al., 2015). These ways were probably not intended by their designers (similar findings were reported in

**Table 6.** Prevalence of Specific Sex Toy Use Within the Last 12 Months in Partnered Sex for Heterosexual-Identified Women and Men in Germany

Sex Toys	Total		Women		Men		$\chi^2(1)$	<i>p</i>	Cramer's <i>V</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%			
Lubricants and Remedies									
Lubricant ( $n = 959$ ; $n_{\text{women}} = 471$ ; $n_{\text{men}} = 488$ )	679	71	321	68	358	73	3.14	.076	.06
Arousal-Enhancing Remedies ( $n = 214$ ; $n_{\text{women}} = 92$ ; $n_{\text{men}} = 149$ )	141	59	49	53	92	62	1.69	.194	.08
Sex Toys for Stimulation									
Toys for Stimulation of Vagina and Vulva ( $n = 896$ ; $n_{\text{women}} = 508$ ; $n_{\text{men}} = 388$ )	574	64	280	55	294	76	40.77	<.001	.21
Toys for Stimulation of Penis and Testicles ( $n = 466$ ; $n_{\text{women}} = 171$ ; $n_{\text{men}} = 295$ )	234	50	95	56	139	47	3.08	.079	.08
Toys for Stimulation of Anus ( $n = 268$ ; $n_{\text{women}} = 124$ ; $n_{\text{men}} = 144$ )	159	59	78	63	81	56	1.22	.269	.07
Erotic Lingerie ( $n = 722$ ; $n_{\text{women}} = 473$ ; $n_{\text{men}} = 249$ )	492	68	316	67	176	71	1.13	.288	.04
Toys for Bondage / S&M ( $n = 420$ ; $n_{\text{women}} = 216$ ; $n_{\text{men}} = 204$ )	243	58	114	53	129	63	4.71	.030	.11

*Note.* Only participants that answered that they had ever used the specific sex toy were included in this analysis. The percentages were calculated by dividing the 12-month prevalences by the corresponding lifetime prevalences (cf. Table 4), which are given at the beginning of each row. Chi-square test statistics relate to differences between women and men.

studies from the United States; Reece et al., 2009; Reece, Rosenberger, et al., 2010). Some people might simply use whichever sex toy is at hand in masturbation, regardless if it is a toy that was designed and marketed for women, men, or couples specifically.

We can clearly state that *sex toy use in partnered sex* is also common among women and men in Germany (RQ3): the majority of the sample had ever used a sex toy in partnered sex (52%), and there were no notable differences between women (53%) and men (52%). Lifetime prevalence of sex toy use in partnered sex turned out to be slightly higher than for solo sex (comparable to the findings from the United States provided by Reece, Herbenick, et al., 2010). As all participants were heterosexual-identified adults, and the majority of them had a spouse or life-partner (82%), they had ample opportunity to integrate sex toys into partnered sex. These findings contradict the concern that the growing popularity of sex toys indicates a trend toward a society where solo sex increasingly replaces partnered sex (Sharkey et al., 2017) but are in line with the Positive Technology framework that proposes a fostering of social integration and connectedness by well-designed technological artifacts (Riva et al., 2012). However, high prevalence of sex toy use may also stem from the fact that we included arousal-enhancing remedies and lubricants in our analyses. Both of them are widely used and could therefore inflate our estimate of overall sex toy use, especially considering that lubricants are commonly used together with vibrators and dildos (Hensel et al., 2015; Herbenick et al., 2014). Nevertheless, the more specific data collected about the different types of sex toy use (see Table 4) facilitates comparison with other studies.

Concerning *specific sex toy use* in partnered sex within the past 12 months, lubricants were the most often used (71%), by sex toy-experienced women (68%) and men (73%) alike. Similar findings were obtained in prior studies for women in the United States (Hensel et al., 2015; Herbenick et al., 2014). Again, toys for the stimulation of vagina and vulva were very popular (64% of experienced sex toy users were vibrator/dildo users), and a higher percentage of men (76%) than women (55%) reported incorporating them in partnered sex. However, joint use in partnered sex should lead to comparable prevalence rates for women and men, as was the case for the other individual sex toys. Perhaps men more often recall using sex toys such as vibrators in partnered sex. They might also use them in partnered sex with sex workers, leading to an asymmetry between the genders (Green et al., 1993). Finally, sex toy “use” could be interpreted as “active use” by the participants, in the sense of an “active” partner using a sex toy to stimulate a “passive,” receiving, counterpart. Toys for the stimulation of penis and testicles were used within the past 12 months by half of the participants who had ever used such sex toys at least once (50%). The prevalence data could indicate that sex toy-experienced men and women might include sex toys in their sexual behavior not only for their own stimulation, but also for the stimulation of their partner, increasing connectedness between individuals (Riva et al., 2012). One reason could be

that they enhance their own pleasure by giving pleasure to their counterpart (Watson et al., 2016).

Among women and men with a history of sex toy use for anal stimulation, these sex toys were very popular overall, both in solo (46%) and partnered sex (59%) within the last 12 months. Lifetime prevalence of sex toy use for anal stimulation among women (15%) and men (16%) is similar to previous data on the prevalence of anal intercourse obtained by a recent nationally representative study from Germany (Haversath et al., 2017), which reported lifetime prevalence of 19% of active anal intercourse for men, 4% of passive anal intercourse for men, and 17% of passive anal intercourse for women (irrespective of sexual identity). The survey did not collect data on active anal intercourse for women (for example, with a sex toy), though, representing a lack of research also to be noted in further studies (Chandra, Mosher, Copen, & Sionean, 2011; Copen, Chandra, & Febo-Vazquez, 2016). However, data from national surveys in the United States revealed a lifetime prevalence for heterosexual anal intercourse of around 40% for women and men alike (Chandra et al., 2011; Copen et al., 2016). The rather high 12-month prevalence for solo and partnered sex among anal sex toy users in our study could be an indication that anal intercourse in Germany is increasing in prevalence. A similar trend has already been identified, especially in young people, in studies in Australia and Europe (Ajduković, Stulhofer, & Bačak, 2012; Lewis et al., 2017; Mercer et al., 2013; Owen et al., 2015; Rissel et al., 2015).

Within the last 12 months, sex toys for bondage/S&M were considerably more often used in partnered sex (58%) than in solo sex (25%) by sex toy-experienced users. Although bondage and S&M practices can be employed in solo sex, they usually gain their appeal by being integrated into sexual interactions with a partner (Sagarin, Cutler, Cutler, Lawler-Sagarin, & Matuszewich, 2009). Lifetime prevalence of sex toy use for bondage/S&M by our participants was 24%, with no notable differences between women and men. Similar prevalence was identified by a recent study using a stratified random sample (Joyal & Carpentier, 2017), revealing lifetime prevalence of 19% for consensual masochistic S&M behavior, and 6% for consensual sadistic S&M behavior regardless of sex toy use.

Finally, our findings indicate that the positive *perceived effects of sex toy use* clearly outweigh negative perceived effects (RQ4), supporting the Positive Sexuality framework’s claim to acknowledge sexual pleasure (Williams et al., 2015). Again, no gender differences were found. Previous studies have already discussed that these positive perceived effects of sex toy use are related to greater sexual pleasure, sexual satisfaction (Hensel et al., 2015; Herbenick, Reece, et al., 2011; Reece, Rosenberger, et al., 2010; Watson et al., 2016), and general positive sexual functioning (Herbenick et al., 2010; Herbenick, Reece, Sanders, et al., 2009; Reece et al., 2009; Schick et al., 2011).

## Strengths and Limitations

This study had several limitations. The study design was a survey methodology; thus, only self-report data were collected (Bryman, 2016). Further, the survey was based on a quota sample from an opt-in online access panel. Although basic demographics such as age, gender, education, and relationship status of the sample mirror the population of German Internet users, a quota sample is still biased and not representative. Further, our survey shows a rather low participation rate of 21.5%, which could have affected the results. It is a distinct possibility that persons who were more open toward sexual exploration, or in general were more sexually active, were more inclined to participate in the survey. Therefore, our findings of rather high prevalence of sex toy use could also have been influenced by a biased sample. However, to date, there have been no previous studies of sex toy use among heterosexual-identified women and men in Germany. Therefore, surveying a national quota sample can certainly be regarded as a step forward. Additionally, data were collected using an online questionnaire, thus granting the participants anonymity. Nevertheless, prevalence data on both acquisition of sex toys and sex toy use could have been affected by underreporting, due to reasons of social desirability (Catania, Gibson, Chitwood, & Coates, 1990). Older people in particular may have been reluctant to give full details of sex toy use.

An open issue for academic research is the development of an adequate classification and labeling system for sex toys. In the present study, we used a plausible classification based on how sex toys are categorized and labeled in marketing, for example in online shops. One example would be presenting products classified either for women (e.g., “vibrators”), men (e.g., “masturbators”), or couples. Interestingly, the creative adoption of toys (e.g., men using “women’s sex toys” such as vibrators in their solo sexual activities), however, seems not to be uncommon. This complicates the correct classification of toys both in research and online stores and raises the general question of which terms should be used in research to ensure the understanding of survey participants.

Finally, the instrument only measured the perceived negative and positive effects of sex toy use on sex life on a global level, thereby not reflecting detailed aspects of sexual behavior and functioning. More research is needed to explore what exactly constitutes positive and negative effects of sex toys (e.g., specific positive and negative effects on sexual pleasure, sexual satisfaction, sexual competence, sexual self-esteem, sexual intimacy, etc.), and how population groups differ in their evaluation of sex toy use as being positive and/or negative for their sexual well-being. Furthermore, we need to examine what predictors determine specific positive (e.g., greater sexual pleasure in solo and partnered sex, better sexual functioning) and specific negative effects of sex toys (e.g., pressure to perform, coercion to use sex toys). We therefore need to identify the individual motivations, contexts, and intentions of sex toy use.

Despite the above-mentioned limitations, a strength of this study was that we were able to survey a national quota sample of

1,723 heterosexual-identified women and men in Germany. Moreover, this study is one of the first to examine acquisition of sex toys and sex toy use among heterosexual-identified women and men on a broad scale. Other studies often focused on specific and/or the most frequently used sex toys (most often vibrators and lubricants). However, the spectrum of sex toys is continually increasing, including not only technologically advanced sex toys (Bardzell & Bardzell, 2011) such as Wi-Fi or camera-enabled vibrators, but also sex furniture and sex machines, true-to-life sex dolls, and even sex robots (Döring & Pöschl, 2018; Sharkey et al., 2017). No systematic empirical data on their use and their effects exist, although they are already being marketed.

Finally, having operated within a Positive Sexuality framework (Williams et al., 2015) and a Positive Technology framework (Riva et al., 2012), this study assessed and compared both the negative and positive perceived effects of sex toy use in a balanced manner, where prior studies often focused on either negative or positive effects (Davis, Blank, Lin, & Bonillas, 1996; Herbenick et al. 2010; Herbenick, Reece, et al., 2011; Reece et al., 2009; Reece, Rosenberger, et al., 2010; Rosenberger et al., 2012).

## Conclusion

The current findings have several practical implications for the fields of sexual education and sexual health. Whereas sex toys can be associated with problems, it may be more accurate to consider their use primarily as beneficial. Sex toy use offers ways of achieving sexual pleasure and sexual fulfillment that can contribute to sexual and overall well-being, as well as a better quality of life (Diamond & Huebner, 2012). Consequently, sexual health and sexual education professionals should consider sex toy use as a common and helpful sexual behavior and assist their clients in obtaining the knowledge and skills necessary for beneficial sex toy use.

Under certain conditions, some people feel they need more or perhaps different stimulation in order to experience sexual pleasure: People with illnesses such as breast cancer (Herbenick, Reece, Hollub, Satinsky, & Dodge, 2008) often have special needs in their sexual lives. The sexual needs and rights of older people (Barrett & Hinchliff, 2018; Katz & Marshall, 2003) and people with disabilities (Rohleder & Swartz, 2012; Tepper, 2000) have often been overlooked, neglected, or ignored. If we want to foster sexual well-being and sexual health in these growing populations, we should consider assisting them in choosing and using the right sex toys (Lynae, 2016). Sexual education and sexual health experts could even collaborate with the sex toy industry to develop more products that cater to the specific needs of older and disabled people, as well as people in long-distance relationships (Döring, 2017, 2018; Döring & Pöschl, 2018; Gomes & Wu, 2018; Morales et al., 2018; Owens, 2014; Saadatian et al., 2014).

## ORCID

Sandra Poeschl  <http://orcid.org/0000-0002-6423-8857>

## References

- Ajduković, D., Stulhofer, A., & Baćak, V. (2012). Rising popularity of anal intercourse and sexual risk taking: Findings from two national probability studies of young Croatian adults. *International Journal of STD & AIDS*, 23, 785–791. doi:10.1258/ijsa.2012.011415
- Anderson, T. A., Schick, V. R., Herbenick, D., Dodge, B. S., & Fortenberry, J. D. (2014). A study of human papillomavirus on vaginally inserted sex toys, before and after cleaning, among women who have sex with women and men. *Sexually Transmitted Infections*, 90, 529–531. doi:10.1136/sextrans-2014-051558
- Attwood, F. (2005). Fashion and passion: Marketing sex to women. *Sexualities*, 8, 392–406. doi:10.1177/1363460705056617
- Bardzell, J., & Bardzell, S. (2011). Pleasure is your birthright. In Eds., D. Tan, G. Fitzpatrick, C. Gutwin, B. Begole, & W. A. Kellogg *Proceedings of the 2011 annual SIGCHI conference on human factors in computing systems* (pp. 257–266). doi:10.1145/1978942.1978979
- Barrett, C., & Hinchliff, S. (Eds.). (2018). *Addressing the sexual rights of older people: Theory, policy and practice*. Abingdon, Oxon: Routledge.
- Bauer, R. (2015). Trans\* Verkörperungen in queeren BDSM Praktiken [Trans\* embodiments in queer BDSM practices]. *Zeitschrift für Sexualforschung*, 28(01), 1–21. doi:10.1055/s-0034-1399128
- Bryman, A. (2016). *Social research methods* (5th ed.). Oxford: Oxford University Press. Retrieved from <https://www.loc.gov/catdir/enhancements/fy1617/2015940141-b.html>
- Catania, J. A., Gibson, D. R., Chitwood, D. D., & Coates, T. J. (1990). Methodological problems in AIDS behavioral research: Influences on measurement error and participation bias in studies of sexual behavior. *Psychological Bulletin*, 108, 339–362. doi:10.1037/0033-2909.108.3.339
- Chandra, A., Mosher, W. D., Copen, C., & Sionean, C. (2011). Sexual behavior, sexual attraction, and sexual identity in the United States: Data from the 2006–2008 national survey of family growth. *National Health Statistics Reports*, 36, 1–36.
- Copen, C. E., Chandra, A., & Febo-Vazquez, I. (2016). Sexual behavior, sexual attraction, and sexual orientation among adults aged 18–44 in the United States: Data from the 2011–2013 national survey of family growth. *National Health Statistics Reports*, 88 1–14.
- Crewe, L., & Martin, A. (2016). Sex and the city: Branding, gender and the commodification of sex consumption in contemporary retailing. *Urban Studies*, 54, 582–599. doi:10.1177/0042098016659615
- Davis, C. M., Blank, J., Lin, H. Y., & Bonillas, C. (1996). Characteristics of vibrator use among women. *Journal of Sex Research*, 33, 313–320. doi:10.1080/00224499609551848
- DeMaria, A. L., Hollub, A. V., & Herbenick, D. (2012). The Female Genital Self-Image Scale (FGSIS): Validation among a sample of female college students. *The Journal of Sexual Medicine*, 9, 708–718. doi:10.1111/j.1743-6109.2011.02620.x
- Diamond, L. M., & Huebner, D. M. (2012). Is good sex good for you? Rethinking sexuality and health. *Social and Personality Psychology Compass*, 6, 54–69. doi:10.1111/j.1751-9004.2011.00408.x
- DIW Berlin. (2013). *Wie ist Ihr Familienstand?* [What is your personal status?]. Retrieved from <https://de.statista.com/statistik/daten/studie/180040/umfrage/familienstand/>
- Döring, N. (2009). The internet's impact on sexuality: A critical review of 15 years of research. *Computers in Human Behavior*, 25, 1089–1101. doi:10.1016/j.chb.2009.04.003
- Döring, N. (2017). Vom Internetsex zum Robotersex: Forschungsstand und Herausforderungen für die Sexualwissenschaft [From internet sex to robot sex: State of research and challenges for sexology]. *Zeitschrift für Sexualforschung*, 30(01), 35–57. doi:10.1055/s-0043-101471
- Döring, N. (2018). Sollten Pflegeroboter auch sexuelle Assistenzfunktionen bieten? [Should care robots also offer sexual assistance functions?]. In O. Bendel (Ed.), *Pflegeroboter* [Care robots] (pp. 249–267). Wiesbaden: Springer. doi:10.1007/978-3-658-22698-5\_14
- Döring, N., Daneback, K., Shaughnessy, K., Grov, C., & Byers, E. S. (2017). Online sexual activity experiences among college students: A four-country comparison. *Archives of Sexual Behavior*, 46, 1641–1652. doi:10.1007/s10508-015-0656-4
- Döring, N., & Pöschl, S. (2018). Sex toys, sex dolls, sex robots: Our under-researched bed-fellows. *Sexologies*, 27(3), e51–e55. doi:10.1016/j.sexol.2018.05.009
- Esmer, Y., & Pettersson, T. (Eds.). (2007). *Measuring and mapping cultures: 25 years of comparative value surveys. International studies in sociology and social anthropology: Vol. 104*. Leiden, The Netherlands: Brill.
- Fahs, B., & Swank, E. (2013). Adventures with the plastic man: Sex toys, compulsory heterosexuality, and the politics of women's sexual pleasure. *Sexuality & Culture*, 17, 666–685. doi:10.1007/s12119-013-9167-4
- Frith, H. (2015). *Orgasmic bodies: The orgasm in contemporary Western culture*. London: Palgrave Macmillan UK.
- Gomes, L. M., & Wu, R. (2018). Neurodildo: A mind-controlled sex toy with e-stim feedback for people with disabilities. In A. D. Cheok & D. Levy (Eds.), *Love and sex with robots: Third international conference, LSR 2017, London, UK, december 19-20, 2017: Revised selected papers* (pp. 65–82). Cham, Switzerland: Springer. doi:10.1007/978-3-319-76369-9\_6
- Gorgos, L., & Marrazzo, J. M. (2017). STIs among women who have sex with women. In L. H. Bachmann (Ed.), *Sexually transmitted infections in HIV-Infected adults and special populations: A clinical guide* (pp. 233–246). Cham, Switzerland: Springer. doi:10.1007/978-3-319-56694-8\_13
- Green, S. T., Goldberg, D. J., Christie, P. R., Frischer, M., Thomson, A., Carr, S. V., & Taylor, A. (1993). Female streetworker-prostitutes in Glasgow: A descriptive study of their lifestyle. *AIDS Care*, 5, 321–335. doi:10.1080/09540129308258615
- Hassali, M. A., Saleem, F., Shafie, A. A., Al-Qazaz, H. K., Farooqui, M., Aljadhey, H., ... Masood, I. (2012). Assessment of general public perceptions toward traditional medicines used for aphrodisiac purpose in state of Penang, Malaysia. *Complementary Therapies in Clinical Practice*, 18, 257–260. doi:10.1016/j.ctcp.2012.06.001
- Haversath, J., Gärtner, K. M., Kliem, S., Vasterling, I., Strauss, B., & Kröger, C. (2017). Sexual behavior in Germany. *Deutsches Arzteblatt International*, 114, 545–550. doi:10.3238/arztebl.2017.0545
- Heineman, E. D. (2006). The economic miracle in the bedroom: Big business and sexual consumption in reconstruction West Germany. *The Journal of Modern History*, 78, 846–877. doi:10.1086/511204
- Hensel, D. J., Schick, V. R., Herbenick, D., Dodge, B. S., Reece, M., Sanders, S. A., & Fortenberry, J. D. (2015). Lifetime lubricant use among a nationally representative sample of lesbian- and bisexual-identified women in the United States. *The Journal of Sexual Medicine*, 12, 1257–1266. doi:10.1111/jsm.12873
- Herbenick, D., Reece, M., Hensel, D. J., Sanders, S. A., Jozkowski, K. N., & Fortenberry, J. D. (2011). Association of lubricant use with women's sexual pleasure, sexual satisfaction, and genital symptoms: A prospective daily diary study. *The Journal of Sexual Medicine*, 8, 202–212. doi:10.1111/j.1743-6109.2010.02067.x
- Herbenick, D., Reece, M., Hollub, A., Satinsky, S., & Dodge, B. (2008). T09-O-18 Young female breast cancer survivors: Their sexual function and interest in sexual enhancement products and services. *Sexologies*, 17, S122. doi:10.1016/S1158-1360(08)72851-2
- Herbenick, D., Reece, M., & Hollub, A. V. (2009). Inside the ordering room: Characteristics of women's in-home sex toy parties, facilitators and sexual communication. *Sexual Health*, 6, 318–327. doi:10.1071/SH08086
- Herbenick, D., Reece, M., Sanders, S. A., Dodge, B. S., Ghassemi, A., & Fortenberry, J. D. (2009). Prevalence and characteristics of vibrator use by women in the United States: Results from a nationally representative study. *The Journal of Sexual Medicine*, 6, 1857–1866. doi:10.1111/j.1743-6109.2009.01318.x

- Herbenick, D., Reece, M., Sanders, S. A., Dodge, B. S., Ghassemi, A., & Fortenberry, J. D. (2010). Women's vibrator use in sexual partnerships: Results from a nationally representative survey in the United States. *Journal of Sex & Marital Therapy, 36*, 49–65. doi:10.1080/00926230903375677
- Herbenick, D., Reece, M., Schick, V. R., Sanders, S. A., & Fortenberry, J. D. (2014). Women's use and perceptions of commercial lubricants: Prevalence and characteristics in a nationally representative sample of American adults. *The Journal of Sexual Medicine, 11*, 642–652. doi:10.1111/jsm.12427
- Herbenick, D., Schick, V. R., Reece, M., Sanders, S. A., Dodge, B. S., & Fortenberry, J. D. (2011). The Female Genital Self-Image Scale (FGSIS): Results from a nationally representative probability sample of women in the United States. *The Journal of Sexual Medicine, 8*, 158–166. doi:10.1111/j.1743-6109.2010.02071.x
- Impett, E. A., Muise, A., & Breines, J. G. (2013). From risk to pleasure: Toward a positive psychology of sexuality. In M. Hojjat & D. Cramer (Eds.), *Positive psychology of love* (pp. 57–75). Oxford University Press. doi:10.1093/acprof:oso/9780199791064.003.0005
- Inglehart, R., & Baker, W. E. (2000). Modernization, cultural change, and the persistence of traditional values. *American Sociological Review, 65*, 19–51. doi:10.2307/2657288
- Joyal, C. C., & Carpentier, J. (2017). The prevalence of paraphilic interests and behaviors in the general population: A provincial survey. *Journal of Sex Research, 54*, 161–171. doi:10.1080/00224499.2016.1139034
- Jozkowski, K. N., Schick, V. R., Herbenick, D., & Reece, M. (2012). Sexuality information seeking and sexual function among women attending in-home sex toy parties. *International Journal of Sexual Health, 24*, 112–123. doi:10.1080/19317611.2011.640386
- Katz, S., & Marshall, B. (2003). New sex for old: Lifestyle, consumerism, and the ethics of aging well. *Journal of Aging Studies, 17*, 3–16. doi:10.1016/S0890-4065(02)00086-5
- Kemp Huberman, B. (2009). Shifting the paradigm: What other countries can learn from Western Europe about sexuality education. In E. Schroeder & J. Kuriansky (Eds.), *Sex, love, and psychology: Sexuality education* (pp. 247–256). Santa Barbara, CA: ABC-CLIO.
- Lewis, R., Tanton, C., Mercer, C. H., Mitchell, K. R., Palmer, M., Macdowall, W., & Wellings, K. (2017). Heterosexual practices among young people in Britain: Evidence from three national surveys of sexual attitudes and lifestyles. *Journal of Adolescent Health, 61*, 694–702. doi:10.1016/j.jadohealth.2017.07.004
- Lieberman, H. (2016). Selling sex toys: Marketing and the meaning of vibrators in early twentieth-century America. *Enterprise & Society, 17* (02), 393–433. doi:10.1017/eso.2015.97
- Lynae, E. (2016). *Sex toys & disability guide*. Retrieved from <http://erikalynae.com/2016/10/21/sex-toys-disability/>
- Marshack, A. (1991). *The roots of civilization: The cognitive beginnings of man's first art, symbol and notation* (Rev. and expanded.). Mount Kisco, NY: Moyer Bell.
- Matthiesen, S., Dekker, A., & Briken, P. (2018). Pilotstudie zur Erwachsenensexualität in Deutschland: Einführung, Methoden und erste Ergebnisse zu Machbarkeit und Methodenvergleich [Pilot study on adult sexuality in Germany: Introduction, methods and first results on feasibility and method comparison]. *Zeitschrift für Sexualforschung, 31*(3), 1–15.
- Mercer, C. H., Tanton, C., Prah, P., Erens, B., Sonnenberg, P., Clifton, S., ... Johnson, A. M. (2013). Changes in sexual attitudes and lifestyles in Britain through the life course and over time: Findings from the National Surveys of Sexual Attitudes and Lifestyles (Natsal). *The Lancet, 382*(9907), 1781–1794. doi:10.1016/S0140-6736(13)62035-8
- Mitchell, C., Manhart, L. E., Thomas, K. K., Agnew, K., & Marrazzo, J. M. (2011). Effect of sexual activity on vaginal colonization with hydrogen peroxide-producing lactobacilli and Gardnerella vaginalis. *Sexually Transmitted Diseases, 38*, 1137–1144. doi:10.1097/OLQ.0b013e31822e6121
- Morales, E., Gauthier, V., Edwards, G., Courtois, F., Lamontagne, A., & Guérette, A. (2018). Co-designing sex toys for adults with motor disabilities. *Sexuality and Disability, 36*(1), 47–68. doi:10.1007/s11195-017-9506-8
- Owen, B. N., Brock, P. M., Butler, A. R., Pickles, M., Brisson, M., Baggaley, R. F., & Boily, M.-C. (2015). Prevalence and frequency of heterosexual anal intercourse among young people: A systematic review and meta-analysis. *AIDS and Behavior, 19*, 1338–1360. doi:10.1007/s10461-015-0997-y
- Owens, T. (2014, July 14). Disability and sex: Let's be frank about sex toys. *Disability HORIZONS*. Retrieved from <http://disabilityhorizons.com/2014/07/disability-and-sex-lets-be-frank-about-sex-toys/>
- Petersen, J. L., & Hyde, J. S. (2010). A meta-analytic review of research on gender differences in sexuality, 1993-2007. *Psychological Bulletin, 136*, 21–38. doi:10.1037/a0017504
- Reece, M., Herbenick, D., Dodge, B. S., Sanders, S. A., Ghassemi, A., & Fortenberry, J. D. (2010). Vibrator use among heterosexual men varies by partnership status: Results from a nationally representative study in the United States. *Journal of Sex & Marital Therapy, 36*, 389–407. doi:10.1080/0092623X.2010.510774
- Reece, M., Herbenick, D., Sanders, S. A., Dodge, B. S., Ghassemi, A., & Fortenberry, J. D. (2009). Prevalence and characteristics of vibrator use by men in the United States. *The Journal of Sexual Medicine, 6*, 1867–1874. doi:10.1111/j.1743-6109.2009.01290.x
- Reece, M., Rosenberger, J. G., Schick, V. R., Herbenick, D., Dodge, B. S., & Novak, D. S. (2010). Characteristics of vibrator use by gay and bisexually identified men in the United States. *The Journal of Sexual Medicine, 7*, 3467–3476. doi:10.1111/j.1743-6109.2010.01873.x
- Richters, J., Grulich, A. E., Visser, R. O., de Smith, A. M. A., & Rissel, C. E. (2003). Sex in Australia: Autoerotic, esoteric and other sexual practices engaged in by a representative sample of adults. *Australian and New Zealand Journal of Public Health, 27*, 180–190. doi:10.1111/j.1467-842X.2003.tb00806.x
- Richters, J., Visser, R. O., De, Badcock, P. B., Smith, A. M. A., Rissel, C. E., Simpson, J. M., & Grulich, A. E. (2014). Masturbation, paying for sex, and other sexual activities: The Second Australian study of health and relationships. *Sexual Health, 11*, 461–471. doi:10.1071/SH14116
- Rissel, C., Badcock, P. B., Smith, A. M. A., Richters, J., Visser, R. O., De, Grulich, A. E., & Simpson, J. M. (2015). Corrigendum to: Heterosexual experience and recent heterosexual encounters among Australian adults: The Second Australian study of health and relationships. *Sexual Health, 12*, 568. doi:10.1071/SH14105\_CO
- Riva, G., Banos, R. M., Botella, C., Wiederhold, B. K., & Gaggioli, A. (2012). Positive technology: Using interactive technologies to promote positive functioning. *Cyberpsychology, Behavior and Social Networking, 15*, 69–77. doi:10.1089/cyber.2011.0139
- Robbins, C. L., Schick, V. R., Reece, M., Herbenick, D., Sanders, S. A., Dodge, B. S., & Fortenberry, J. D. (2011). Prevalence, frequency, and associations of masturbation with partnered sexual behaviors among US adolescents. *Archives of Pediatrics & Adolescent Medicine, 165*, 1087–1093. doi:10.1001/archpediatrics.2011.142
- Rohleder, P., & Swartz, L. (2012). Disability, sexuality and sexual health. In P. Aggleton (Ed.), *Understanding global sexualities: New frontiers* (pp. 138–152). Abingdon, Oxon: Routledge.
- Rosenberger, J. G., Schick, V. R., Herbenick, D., Novak, D. S., & Reece, M. (2012). Sex toy use by gay and bisexual men in the United States. *Archives of Sexual Behavior, 41*, 449–458. doi:10.1007/s10508-010-9716-y
- Rye, B. J., & Meaney, G. J. (2007). The pursuit of sexual pleasure. *Sexuality & Culture, 11*, 28–51. doi:10.1007/BF02853934
- Saadatian, E., Samani, H., Parsani, R., Pandey, A. V., Li, J., Tejada, L., ... Nakatsu, R. (2014). Mediating intimacy in long-distance relationships using kiss messaging. *International Journal of Human-Computer Studies, 72*(10–11), 736–746. doi:10.1016/j.ijhcs.2014.05.004
- Sagarin, B. J., Cutler, B., Cutler, N., Lawler-Sagarin, K. A., & Matuszewich, L. (2009). Hormonal changes and couple bonding in consensual sadomasochistic activity. *Archives of Sexual Behavior, 38*, 186–200. doi:10.1007/s10508-008-9374-5

- Satinsky, S., Rosenberger, J. G., Schick, V. R., Novak, D. S., & Reece, M. (2011). USA study of sex toy use by HIV-positive men who have sex with other men: Implications for sexual health. *International Journal of STD & AIDS*, 22, 442–448. doi:10.1258/ijsa.2011.010488
- Schick, V. R., Herbenick, D., Jozkowski, K. N., Jawed-Wessel, S., & Reece, M. (2013). The sexual consumer: Characteristics, expectations, and experiences of women attending in-home sex toy parties. *Journal of Sex & Marital Therapy*, 39, 160–175. doi:10.1080/0092623X.2012.691949
- Schick, V. R., Herbenick, D., Rosenberger, J. G., & Reece, M. (2011). Prevalence and characteristics of vibrator use among women who have sex with women. *The Journal of Sexual Medicine*, 8, 3306–3315. doi:10.1111/j.1743-6109.2011.02503.x
- Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, 55, 5–14. doi:10.1037/0003-066X.55.1.5
- Sharkey, N., van Wynsberghe, A., Robbins, S., & Hancock, E. (2017). *Our sexual future with robots: A Foundation for responsible robotics consultation report*. Retrieved from <https://responsible-robotics-myxf6pn3xr.netdna-ssl.com/wp-content/uploads/2017/11/FRR-Consultation-Report-Our-Sexual-Future-with-robots-1-1.pdf>
- Sheehan, K. B. (2001). E-mail survey response rates: A review. *Journal of Computer-Mediated Communication*, 6. doi:10.1111/j.1083-6101.2001.tb00117.x
- Shih, T.-H., & Fan, X. (2008). Comparing response rates from web and mail surveys: A meta-analysis. *Field Methods*, 20, 249–271. doi:10.1177/1525822X08317085
- Taylor, M. T., Timm, A. F., & Herr, R. (Eds.). (2017). *Not straight from Germany: Sexual publics and sexual citizenship since Magnus Hirschfeld. Social history, popular culture, and politics in Germany*. Ann Arbor: University of Michigan Press.
- Tepper, M. S. (2000). Sexuality and disability: The missing discourse of pleasure. *Sexuality and Disability*, 18, 283–290. doi:10.1023/A:1005698311392
- Watson, E. D., Séguin, L. J., Milhausen, R. R., & Murray, S. H. (2016). The impact of a couple's vibrator on men's perceptions of their own and their partner's sexual pleasure and satisfaction. *Men and Masculinities*, 19, 370–383. doi:10.1177/1097184X15595082
- WHO Regional Office for Europe and BZgA. (2010). *Standards for sexuality education in Europe: A framework for policy makers, educational and health authorities and specialists*. Retrieved from [https://www.bzga-whoec.de/fileadmin/user\\_upload/WHO\\_BZgA\\_Standards\\_English.pdf](https://www.bzga-whoec.de/fileadmin/user_upload/WHO_BZgA_Standards_English.pdf)
- Williams, D. J., Thomas, J. N., Prior, E. E., & Walters, W. (2015). Introducing a multidisciplinary framework of positive sexuality. *Journal of Positive Sexuality*, 1, 6–11. Retrieved from <http://journalofpositivesexuality.org/wp-content/uploads/2015/02/Introducing-Multidisciplinary-Framework-of-Positive-Sexuality-Williams-Thomas-Prior-Walters.pdf>
- Wood, R. (2017). *Consumer sexualities: Women and sex shopping*. London: Routledge.
- Wu, X., Huang, H., Tang, Z., Shen, Z., Lu, H., Chen, H., ... Shao, Y. (2017). Aphrodisiac use and associated factors among older male clients of low-cost female sex workers in Southwestern rural areas of China. *Sexuality Research and Social Policy*, 14, 71–80. doi:10.1007/s13178-016-0224-2