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Women's Experience of Orgasm During Intercourse: Question Semantics Affect Women's Reports and Men's Estimates of Orgasm Occurrence

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Abstract Most women report reliably experiencing orgasm from masturbation, but a smaller proportion of women report regularly experiencing orgasm from intercourse. Research suggests that concurrent clitoral stimulation during intercourse increases the likelihood of orgasm, yet most surveys of orgasm during intercourse leave unspecified whether vaginal intercourse does or does not include concurrent clitoral stimulation (assisted intercourse or unassisted intercourse, respectively). Using an online sample of 1569 men and 1478 women, we tested whether phrasing of questions about the occurrence of orgasm in intercourse modulates women's reported frequency and men's estimates of women's frequency of orgasm in intercourse. Participants provided estimates of orgasm when asked explicitly about intercourse with stimulation unspecified, assisted intercourse, and unassisted intercourse. Women's reports of orgasm occurrence were highest in response to assisted intercourse (51–60%), second highest in response to intercourse with clitoral stimulation unspecified (31–40%), and lowest in response to unassisted intercourse (21–30%). Men's estimates of women's orgasms were highest in response to assisted intercourse (61–70%), and lowest in response to unassisted intercourse (41–50%); in both conditions, men's estimates were significantly higher than women's reports. When clitoral stimulation was unspecified, women interpreted "orgasm in intercourse" in three ways: as from intercourse alone, as including concurrent clitoral stimulation though it was unspecified, or as an average of assisted and unassisted intercourse. Taken together, these results demonstrate that the phrasing of questions about women's orgasm produces markedly different orgasm estimates, and suggest that concurrent clitoral stimulation increases the likelihood of women experiencing orgasm in intercourse.

Keywords Female orgasm · Intercourse · Clitoral stimulation · Masturbation · Sex difference

The occurrence of orgasm during intercourse differs between men and women with nearly 100% of adult men reporting experiencing orgasm during intercourse, and during most acts of intercourse (Haavio-Mannila & Kontula, 1997; Kinsey, Pomeroy, & Martin, 1948; Richters, de Visser, Rissel, & Smith, 2006). A much lower and more variable percentage of women report ever experiencing orgasm during intercourse, and an even smaller percentage report routinely experiencing orgasm from intercourse by itself (Armstrong, England, & Fogarty, 2012; Brewer & Hendrie, 2011; Fisher, 1973; Hite, 1976; Kinsey, Pomeroy, Martin, & Gebhard, 1953; Wallen & Lloyd, 2011). In contrast, there is virtually no sex difference in the occurrence of orgasm during masturbation, with greater than 95% of men and women reliably experiencing orgasm during masturbation (Brewer & Hendrie, 2011; Hite, 1976; Kinsey et al., 1953).

A potential explanation for this sex difference in orgasm during intercourse, but not during masturbation, is that stimulation

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The name of coauthor Kaytlin J. Renfro has been corrected since this article was originally published.

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during intercourse mirrors the stimulation men most frequently use during masturbation, but not for women. The overwhelming majority of men report masturbating using penile stimulation (Kinsey et al., 1953), which is the same stimulation experienced by men during intercourse. Women most often report masturbating using direct clitoral glans stimulation (Gebhard, Johnson, & Kinsey, 1979; Hite, 1976). Less than 5% of women report masturbating using vaginal stimulation alone (Carvalheira & Leal, 2013; Hite, 1976), stimulation that predominates during penile–vaginal intercourse. Though it is true that clitoral stimulation is experienced during penile–vaginal intercourse, this clitoral stimulation differs in several important aspects as compared to the clitoral stimulation experienced during masturbation. The clitoral complex is composed externally of the clitoral glans, and internally of a group of structures including the crura, corpora, and bulbs (O'Connell, Eizenberg, Rahman, & Cleeve, 2005; O'Connell, Hutson, Anderson, & Plenter, 1998). During penile–vaginal intercourse, it is believed that the majority of clitoral stimulation likely results from penile stimulation of the internal structures of the clitoris; during masturbation, it is typically the external clitoral glans that is stimulated (Carvalheira & Leal, 2013; Hite, 1976). While some clitoral glans stimulation may be experienced indirectly during penile–vaginal intercourse, it likely differs in magnitude to that experienced during direct clitoral glans stimulation.

It thus follows that the addition of direct clitoral glans stimulation, mirroring the type of stimulation most often used by women during solitary masturbation, during penile–vaginal intercourse could significantly increase women's frequency and likelihood of orgasm. Indeed, the idea that concurrent clitoral stimulation affects the likelihood of orgasm during intercourse has been long-acknowledged. Sexologists in the 1970s and 1980s often recommended clitoral glans stimulation during intercourse and intercourse positions likely to increase clitoral stimulation as "treatments" for anorgasmic women, where anorgasmia was defined as a lack of orgasm during intercourse (Eichel, Eichel, & Kule, 1988; LoPiccolo & Lobitz, 1972). The earliest reports of women citing the importance of concurrent clitoral stimulation emerged in the 1970s as well, with between 19 and 25% of women citing such stimulation as necessary for experiencing orgasm during intercourse (Fisher, 1973; Hite, 1976). More recently, Wade, Kremer, and Brown (2005) surveyed over 800 undergraduate students and found that both women and men acknowledged the role of clitoral glans stimulation in modulating the likelihood of orgasm during intercourse, though the precise frequencies of orgasm during assisted and unassisted intercourse were not assessed. Qualitative studies have also suggested that men and women believe additional clitoral glans stimulation during intercourse contribute substantially to women's sexual pleasure and likelihood of orgasm (Salisbury & Fisher, 2014).

Despite prior work suggesting that the presence or absence of additional clitoral glans stimulation during intercourse could significantly modulate women's likelihood of orgasm, survey questions about orgasm during intercourse have rarely explicitly specified whether "intercourse" includes additional clitoral glans stimulation (termed here "assisted intercourse"), or explicitly excludes additional clitoral glans stimulation (termed here "unassisted intercourse;" Dawood, Kirk, Bailey, Andrews, & Martin, 2005; Kinsey et al., 1953; Levine & Yost, 1976; Raboch & Bartak, 1983; Raboch & Raboch, 1992; Tavris & Sadd, 1977). Ambiguous phrasing of questions has been identified as a significant limitation of research on the nature and variability of women's orgasm during intercourse for several reasons (Lloyd, 2005). Questions about orgasm during intercourse, where the specifics of genital stimulation are unspecified, do not clarify what types of stimulation are necessary for women's orgasm during intercourse, or how effective different types of stimulation may be. It is furthermore unknown how women interpret the meaning of "intercourse" when explicit information on clitoral stimulation is not provided. That is, we do not know whether the reports women provide in response to survey questions on "intercourse" reflect their experiences of orgasm during all acts of intercourse, during intercourse with concurrent clitoral stimulation, or during intercourse without concurrent clitoral stimulation. Though it has not been previously explored, it is possible that the interpretation of "intercourse," where information on types of stimulation is not present, differs among women. That women may be interpreting and responding to the same survey questions in different manners impairs our ability to draw conclusions based on prior research about the frequency with which women experience orgasm during intercourse.

Our incomplete understanding of women's orgasm during intercourse is not solely attributable to ambiguous question phrasing. Other noteworthy limitations of extant women's orgasm research highlighted by Lloyd (2005) include the fact that samples are often non-representative as they may be recruited from gynecologist offices or sex clinics (Levine & Yost, 1976; Raboch & Raboch, 1992), and that many studies have relied on self-report through face-to-face interviews (Kinsey et al., 1953; Laumann, Gagnon, Michael, & Michaels, 1994; Raboch & Bartak, 1983) which may systematically introduce biases in responses (Tourangeau & Yan, 2007).

The present study addressed the ambiguity inherent in previous work on women's orgasm during intercourse in a large, non-clinical sample of both men and women. First, we tested whether women's reports of orgasm frequency varied with the way in which the question regarding orgasm during intercourse was phrased. We asked women about their frequency of orgasm during intercourse first using an ambiguous question that did not specify the presence or absence of clitoral stimulation ("intercourse in general," representing the wording most commonly used in prior research on women's orgasms), and subsequently asked them about frequency of orgasm during intercourse when concurrent clitoral stimulation was explicitly specified as being present ("assisted intercourse"), and when clitoral stimulation was explicitly specified as being absent ("unassisted intercourse"). We hypothesized that women's reports of orgasm frequency would differ significantly across all 3 questions, with orgasm incidence being highest during assisted intercourse and lowest during unassisted intercourse. We also asked men to estimate

women's frequency of orgasm during assisted and unassisted intercourse, hypothesizing that their estimates of assisted and unassisted intercourse would also differ significantly, with their estimates of assisted intercourse being higher than those of unassisted intercourse. Finally, we analyzed whether women's responses for intercourse in general where identical or different from assisted intercourse and unassisted intercourse to explore how women interpreted "intercourse during intercourse" with type of stimulation unspecified.

Method

Participants

Criteria for inclusion in the study included: identifying as being over 18 years of age, self-identification as either male or female, and previous experience with vaginal intercourse. The Kinsey scale was used to classify subject sexual orientation (Kinsey et al., 1948). Because of the aims of the current study, only data from individuals identifying as primarily heterosexual (0, 1, or 2 on the Kinsey scale) were included in the following analyses.

Of the 4566 heterosexual men and women who began the survey, 3698 completed it. It is unknown how many men and women accessed the survey page but did not begin the survey. A completion rate of 80.1% is comparable to completion rates of other surveys of sexual behavior (Fenton, Johnson, McManus, & Erens, 2001). Participants were asked to concurrently consider both their experiences and desires in classifying their sexual orientation, and those included in the present study identified as exclusively heterosexual (Kinsey 0, 56.5%), predominantly heterosexual with some homosexual experience/desire (Kinsey 1, 37.0%), or predominantly heterosexual with much homosexual experience/desire (Kinsey 2, 6.5%). Slightly more men ($n = 1569$) than women ($n = 1478$) completed the survey and were included in analyses. See Table 1 for additional demographic information.

Participants were recruited to take the anonymous, online survey via flyers and web-based sources. Flyers advertised that the study's aim was to determine how sexual attitudes and behaviors have changed in the last 60 years. Flyers were posted in libraries and coffee shops around the Atlanta, GA, and Washington, DC areas. The survey could be accessed and taken for course research credit in introductory psychology courses at a midsized Southeastern university. Links and study descriptions were posted on social media sites such as Facebook, Twitter, and Reddit. A recruitment e-mail was also sent out via SexNet, a listserv dedicated to the dissemination of sex research and the discussion of topics related to sexuality.

Procedure

After entering the survey's URL into their web browser or following the provided link, participants were directed to a SurveyMonkey™ page entitled "Sexual Attitudes and Behaviors." The title page of the survey provided a brief description of the study aims, explaining that the aim was to collect information about individual's sexual experiences and accompanying attitudes; participants were not informed that the aim of the study was to examine reports and estimates of orgasm during intercourse. Participants were told to answer in accordance with their overall or typical sexual experiences, rather than in accordance with their experiences with their most recent or current partner, to minimize any potential partner-specific effects on orgasm frequencies. For example, some women experience secondary anorgasmia, wherein they experience orgasms generally, but are unable to experience them with a specific partner (Meston, Hull, Levin, & Spipski, 2004). Orgasm frequency may be modulated by partner-specific factors such as partner's attractiveness (Puts, Welling, Burriss, & Dawood, 2012), relationship satisfaction (Costa & Brody, 2007), or even by time-specific factors such as current menstrual cycle phase (Garver-Apgar, Gangestad, Thornhill, Miller, & Olp, 2006). Because we were interested in women's general experiences of orgasm during intercourse, rather than partner-specific or time-specific effects on orgasm frequency, participants were told to respond in accordance with their typical experiences. Participants were told they could skip any question they did not want to answer, and that they could exit the survey anytime without penalty. To ensure participants' anonymity, no identifying information was collected and IP tracking was disabled. Except for the individuals who received course credit for survey completion (using another online system for tracking research participation), there was no compensation for participating. Participants indicated consent electronically on the first page of the survey. All procedures were done in accordance with the local Institutional Review Board.

Measures

Data on orgasm during intercourse were obtained using scales with answer choices starting at zero (indicating never experiencing orgasm during intercourse) and then grouped by intervals of nine percentage points (i.e., *1–10% of the time, 11–20% of the time…. 81–90% of the time, 91–100% of the time*). For analyses, responses for questions on frequency of orgasm during intercourse were recoded into numbers from zero to 10, with 0 representing *never,* one representing *1–10%,* two representing *11–20%,* and so forth, until 10, which represented 91–100% of the time. Each question about orgasm during intercourse was presented on its own page to minimize participants' ability to easily compare answers across questions. Questions were presented to all participants in the same order. In order to clarify what was meant by "vaginal intercourse," "strictly vaginal intercourse," and "intercourse with additional clitoral stimulation," we provided definitions that appeared in a box (pop-up) above these terms when the participant moved the screen cursor across the term with the mouse. The definitions for these terms are provided below. It is

Table 1 Sample demographics

	Women ($n = 1478$)	Men ($n = 1569$)	Combined ($n = 3047$)
Median age (IQR)	22 (20–24)	23 (20–28)	22 (20–26)
% Caucasian	83.6	87.9	85.8
Education			
% currently in college	46.1	34.2	39.8
% completed 4-year degree	26.3	30.2	28.4
Location			
% Northeast USA	22.1	19.6	20.8
% non-USA	25.8	28.2	27.1
Relationship status			
% single	25.3	31.1	28.4
% in a relationship	59.5	45.0	51.8

unknown what percent of participants read the pop-up definitions; however, all words with provided definitions appeared hyperlinked—they appeared in blue, underlined and bolded text, so as to bring participants' attention to these words. Pop-up definitions are shown within parentheses below.

1. ("Intercourse in general" form) What percent of the time do you come to climax (orgasm) during *vaginal intercourse* (vaginal intercourse: the part of intercourse with a man that occurs while the man's penis is in the woman's vagina)?
2. (Unassisted form) When having *strictly vaginal intercourse* (strictly vaginal intercourse: intercourse with no additional clitoral stimulation from hands or a vibrator at the same time vaginal intercourse is going on), what percent of the time do you reach orgasm?
3. (Assisted form) When having *intercourse with additional clitoral stimulation* (intercourse with additional clitoral stimulation: intercourse with additional touching or rubbing of the clitoris with hands or a vibrator at the same time that intercourse is going on), what percent of the time do you reach orgasm?

Whereas women provided responses for all three questions, men provided estimates for women's responses to the items on assisted and unassisted intercourse, but did not provide estimates for women's responses to the "intercourse in general" question. Additionally, participants responded to questions about when they first experienced a range of sexual behaviors and how often they engaged in these behaviors, and questions about religiosity and drug and alcohol use. These data were not analyzed in the present study.

Data Analysis

SPSS version 21 (IBM, Armonk, NY) was used for all analyses. Values for estimates and reports of orgasm are presented below as means and 95% confidence intervals (CI). To test whether women's and men's responses differed with the type of intercourse specified, we ran a repeated-measures ANOVA on women's reports and men's estimates of orgasm frequency during assisted intercourse and unassisted intercourse to examine the additive value of clitoral stimulation in modulating women's orgasm frequency. A similar repeated-measures ANOVA was then run using women's estimates of orgasm during intercourse in general, assisted intercourse, and unassisted intercourse. We then compared women's responses to the questions on assisted intercourse and unassisted intercourse to their response on intercourse in general to draw inferences about women's interpretation of intercourse in general. This was done by calculating the following percentages: women who provided identical responses for intercourse in general and for assisted intercourse, but a different response for unassisted intercourse; women who provided identical responses for intercourse in general and for unassisted intercourse, but a different response for assisted intercourse; women who provided different responses for all three questions; and women who provided identical estimates for all three questions. All significance levels were set to $\alpha = 0.05$. Cohen's d (calculated using an online effect size calculator) and η^2 (calculated using SPSS) were used to evaluate effect sizes.

Results

Intra-Individual Variability in Estimates of Orgasm Frequency

Of the women and men who answered all three questions regarding orgasm during intercourse, 94.2 and 97.5% reported experience with assisted intercourse, respectively. The remaining 5.8% of women and 2.5% of men who reported no experience with assisted intercourse were excluded from subsequent analyses. Thus, a total of 1478 women provided numerical estimates for all 3 questions about frequency of orgasm during intercourse, and 1569 men provided numerical estimates for women's orgasm during assisted and unassisted intercourse. An ANOVA including both women and men comparing the frequency of orgasm during

assisted and unassisted revealed a significant main effect of sex, $F(1, 3044) = 328.26$, $p < .001$, $\eta^2 = 0.10$, question type, $F(1, 3044) = 2654.31$ $p < .001$, $\eta^2 = 0.46$, as well as a significant interaction between question type and sex, though the effect size for this interaction was negligible, $F(1, 3.44) = 18.04$, $p < .001$, $\eta^2 < 0.01$. Men's estimates of women's orgasm during unassisted intercourse were significantly higher than women's reports, $t(3297) = 18.08$, $p < .01$, $d = 0.65$, as were men's estimates of women's orgasm during assisted intercourse were significantly higher than women's reports, $t(3297) = 14.96$, $p < .01$, $d = 0.55$ (see Fig. 1). That the effect size for the difference between women's reports and men's estimates is slightly greater for unassisted intercourse suggests that men are more likely to overestimate women's orgasm during unassisted intercourse as compared to assisted intercourse, which likely explains the observed interaction between question type and sex. Within sexes, women's reports of orgasm during intercourse were higher during assisted intercourse ($M = 6.17$, 95% [orgasm 51–60% of the time], 95% CI 6.10–6.34) than during unassisted intercourse ($M = 3.20$ [orgasm 21–30% of the time], 95% CI 3.02–3.38), $t(1476) = 36.19$, $p < .01$, $d = 0.81$. Similarly, men's estimates of women's orgasm during intercourse were higher during assisted intercourse ($M = 7.98$ [orgasm 61–70% of the time], 95% CI 7.80–8.13) than during unassisted intercourse ($M = 5.46$ [orgasm 41–50% of the time], 95% CI 5.28–5.63), $t(1568) = 35.31$, $p < .01$, $d = 0.80$.

A second ANOVA was then conducted using women's estimates of orgasm during intercourse in general, assisted intercourse, and unassisted intercourse. The omnibus ANOVA indicated that orgasm frequency varied significantly across the three questions of orgasm during intercourse, $F(1.67, 2479.15) = 934.34$, $p < .001$, $\eta^2 = 0.39$. Women's reports of orgasm during intercourse in general ($M = 4.72$ [orgasm 31–40% of the time], 95% CI 4.52–4.91) were significantly higher than assisted intercourse, $t(1476) = 25.24$, $p < .001$, $d = 0.38$, and significantly greater than unassisted intercourse, $t(1476) = 23.65$, $p < .001$, $d = 0.41$ (see Fig. 1).

The percentage of all women reporting never experiencing orgasm during intercourse varied across questions. Twenty-two percent, 14.1 and 36.9% of women reported never experiencing orgasm during intercourse in general, during assisted intercourse, and during unassisted intercourse, respectively. The overall chi-square was significant, $\chi^2(2) = 675.82$, $p < .01$, $\varphi = 0.68$. Standardized residuals from this analysis were used to evaluate which percentages differed significantly from each other, with residuals > 1.96 indicating a significant difference; all standardized residuals were > 4.5, indicating the percentage of women reporting never experiencing orgasm differed significantly among all three question types. Conversely, the percentage of women reporting always experiencing orgasm during intercourse (i.e., 91–100% of the time) was 16.0% during intercourse in general, 30.0% during assisted intercourse, and 15.1% during unassisted intercourse. The overall chi-square was significant, $\chi^2(2) = 395.68$, $p < .01$, $\varphi = 0.52$. Values for all standardized residuals exceeded 2.8, suggesting significant differences among the percentage of women always experiencing orgasm across the three question types.

Almost all (> 95%) women who reported never experiencing orgasm during assisted intercourse reported also never experiencing orgasm during unassisted intercourse and during intercourse in general, when clitoral stimulation was unspecified. However, of the women who reported never experiencing orgasm during unassisted intercourse (36.9% of total sample), 86.9% reported experiencing orgasm during assisted intercourse. See Table 1 in supplementary materials for further data on percent of women experiencing orgasm stratified by question type.

Effects of Age, Relationship Status, and Sexual Experience on Women's Response Patterns

Repeated-measures ANOVAs were run to determine whether women's response patterns differed with age, relationship status, or past sexual experience. When including subject age as a

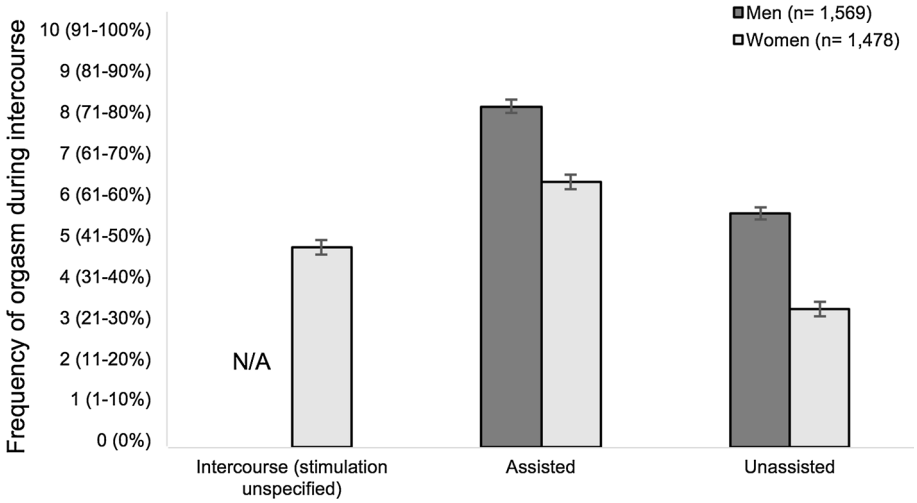

Fig. 1 Men's mean estimates of women's experiences of orgasm during intercourse and women's mean reports of orgasm during assisted and unassisted intercourse. Men's estimates were significantly higher than women's reports for both assisted and unassisted intercourse. Estimates and reports of orgasm during assisted intercourse were significantly higher than those for unassisted intercourse in both men and women. Error bars represent 95% confidence intervals

between-subjects factor, dividing subjects into age bins used in previous studies of sexuality (Herbenick et al., 2010), there was a significant main effect of question wording, $F(1.68, 2473.03) = 318.83, p < .001, \eta^2 = 0.18$, a significant main, but small, effect of age, $F(4, 1473) = 8.27$, $p < .001$, $\eta^2 = 0.002$, but no significant interaction between question wording and age, $F(6.72, 2479.15) = 1.17, p = .32, \eta^2 = 0.003$. Regressions were run to further elucidate the effect of age on responses. Age was positively associated with frequency of orgasm during intercourse in general $\beta = 0.08$, $t(1476) = 2.99$, $p < .01$, unassisted intercourse $\beta = 0.06$, $t(1476) = 2.25$, $p = .03$, and assisted intercourse $\beta = 0.09$, $t(1476) = 3.66$, $p < .01$. When current relationship status was included as a between-subjects factor, there was again a small significant main effect of question wording, $F(1.68, 2425.63) = 318.83, p < .001, \eta^2 = 0.10$, a very small significant main effect of current relationship status, $F(4, 1442) = 8.88, p < .001, \eta^2 = 0.02$ with women currently in a relationship, engaged, or married experiencing orgasm more frequently than single and divorced women, but no significant interaction between question wording and current relationship status, $F(5.04, 2407.88) = 1.84$, $p = .08$, $\eta^2 < 0.01$. Finally, when number of previous sexual partners was included as a between-subjects factor, there was a significant main effect of question wording, $F(1.68, 2455.33) = 843.09$, $p < .001$, $\eta^2 = 0.37$, a small effect of number of previous sexual partners, $F(4, 1464) = 2.15$, $p = .07$, $\eta^2 = 0.10$, and no significant interaction between question wording and number of previous sexual partners, $F(6.71, 2455.33) = 0.65, p = .71, \eta^2 = 0.002$; see Fig. 1 in supplementary materials. Regressions elucidating the main effect of number of previous partners suggested that this variable was not associated with the frequency of orgasm during intercourse in general $\beta = 0.03$, $t(1476) = 1.08$, $p = .28$ or during unassisted intercourse $\beta = 0.03$, $t(1476) = 1.18$, $p = .24$, but that it was positively associated with frequency of orgasm during assisted intercourse $\beta = 0.06, t(1476) = 2.24, p = .03$.

Interpretation of Intercourse (Clitoral Stimulation Unspecified) in Women

Table 2 presents the data on how women's estimates of orgasm were consistent or differed across the three question forms. Approximately 18% of women provided the same frequency report for orgasm during intercourse in general and during assisted intercourse, but a different report for unassisted intercourse. Of these women, all but two (99.26%) provided their lowest report for unassisted intercourse, and their reports for unassisted intercourse were significantly lower than those of assisted intercourse and intercourse in general, with a large effect size (Cohen's $d = 1.0$) for these comparisons. Twenty-four percent of women reported the same estimate for unassisted intercourse as for intercourse in general but a different estimate for assisted intercourse. Of this subset of women, 96.69% reported higher estimates for assisted intercourse than for unassisted intercourse or intercourse in general. Orgasm in intercourse estimates were significantly higher for assisted intercourse than those of unassisted intercourse or intercourse in general, with a large effect size (Cohen's $d = 0.9$). Interestingly, about 30% of women appeared to "average" rates of orgasm with and without concurrent clitoral stimulation when estimating their occurrence of orgasm in intercourse in general, providing an estimate whose magnitude was between their incidence for assisted and unassisted intercourse. These women's average frequency for assisted and unassisted intercourse was 5.19, and the mean frequency for orgasm during intercourse in general was 5.39. While this difference was statistically significant, likely because of our large sample size, the effect was small (Cohen's $d = 0.08$). Lastly, for 26.52% of subjects the form of the question was irrelevant, and they provided the same frequency estimates for all three forms of the questions. Of this subset of women, 51.5% reported never experiencing orgasm during intercourse across all questions, and 27.6% reported always experiencing orgasm across all questions.

Discussion

Through collecting responses via an anonymous online survey from a large, nonclinical sample of both men and women, we investigated the extent to which the type of stimulation experienced modulates women's reports and men's estimates of the frequency of women's orgasm during intercourse. Additionally, because surveys have not historically specified the presence or absence of concurrent clitoral stimulation when inquiring about orgasm during intercourse, we compared women's responses across questions to provide preliminary data and inferences as to whether "intercourse" is interpreted similarly among participants. Women's reports and men's estimates suggest that women experience orgasm significantly more frequently when concurrent clitoral stimulation is present, and that in questions where "intercourse" is not explicitly defined, subjects may differ in their interpretation of the term.

The vast majority of women and men in the current sample (94 and 97.5%, respectively) reported having experience with concurrent clitoral stimulation during intercourse. In these women, consistent with prior work suggesting a higher likelihood of orgasm during assisted intercourse (Fisher, 1973; Hite, 1976; Wade et al., 2005), and more generally, when clitoral glans stimulation is present (Brewer & Hendrie, 2011; Salisbury & Fisher, 2014), orgasm was experienced roughly twice as frequently during assisted intercourse than during unassisted intercourse. Across questions, patterns of response were similar irrespective of women's age, current relationship status (though women in relationships reported a higher orgasm frequency than did single women), and number of previous sexual partners such that for all groups the highest estimates of orgasm were during assisted intercourse, the second highest for intercourse in general, and the lowest for unassisted intercourse. Approx-

Table 2 Consistency of women's estimates of orgasm during intercourse across the three forms of the orgasm questions

Consistency of women's response across question types	Percent of women responding	Mean incidence (95% CI) of orgasm in intercourse by form of question[a]			Omnibus ANOVA	Effect size (Cohen's *d*)
		A. Intercourse—stimulation unspecified	B. Unassisted intercourse	C. Assisted intercourse		
A = C, B different	18	6.72 (6.28–7.16)	3.10 (2.67–3.53)	6.72 (6.28–7.16)	$F(2, 270) = 332.02$, $p < .01$	A versus B, $d = 1.0$ A versus C, $d = 0.0$ B versus C, $d = 1.0$
A = B, C different	24	3.61 (3.24–3.98)	3.61 (3.24–3.98)	6.62 (6.24–7.00)	$F(2, 359) = 418.53$, $p < .01$	A versus B, $d = 0.0$ A versus C, $d = 0.90$ B versus C, $d = 0.90$
A = B = C	27	3.61 (3.17–4.05)	3.61 (3.17–4.05)	3.61 (3.17–4.05)	n/a	All, $d = 0.00$
A, B, and C different	30	5.39 (5.15–5.63)	2.56 (2.32–2.80)	7.82 (7.61–8.04)	$F(2, 442) = 677.30$, $p < .01$	A versus B, $d = 1.10$ A versus C, $d = 0.99$ B versus C, $d = 2.51$ A versus average (B + C), $d = 0.08$[b]

Questions either specified the type of clitoral stimulation ("unassisted" or "assisted") or did not specify the type of clitoral stimulation

[a]Incidence of orgasm on a scale of 0–10, with 0 = 0% of the time and 10 = 91–100% of the time

[b]"Average" equals the arithmetic average of questions B and C, compared to the actual score for question A

imately 40% of women in the present sample reported never experiencing orgasm during unassisted intercourse, but of this subsample, 87% reported experiencing orgasm during assisted intercourse. This, along with the finding that women experience orgasm roughly twice as often during assisted intercourse as compared to unassisted intercourse, suggests that it is common among women to require concurrent clitoral stimulation to achieve orgasm during intercourse, and that the magnitude of effect of explicit clitoral stimulation during intercourse is striking. Men also appreciate the role of concurrent clitoral stimulation in facilitating women's orgasm during intercourse, as their estimates for women's frequency of orgasm during assisted intercourse were about 20% higher than their estimates for women's frequency of orgasm during unassisted intercourse; further, the effect sizes comparing orgasm during assisted and unassisted intercourse within men and within women suggest that both sexes similarly appreciate the effect of additional clitoral stimulation in modulating women's orgasm, consistent with previous work suggesting that both sexes acknowledge the role of additional clitoral stimulation in increasing the likelihood of women's orgasm (Salisbury & Fisher, 2014). While it seems most likely that concurrent clitoral stimulation itself increases likelihood of orgasm, there may be other factors associated with assisted intercourse that influence rates of orgasm. For example, assisted intercourse may be associated with emotional intimacy or duration of sexual activity, which could in turn modulate orgasm frequency (Brody & Weiss, 2010; Waite & Joyner, 2001); however, there is currently a paucity of research on factors associated with the presence or absence of concurrent clitoral stimulation during intercourse.

Though men's and women's estimates of orgasm during intercourse showed similar patterns across questions, frequency estimates within questions differed significantly between the sexes, with men overestimating how frequently women experience orgasm during both assisted and unassisted orgasm. Specifically, men consistently underestimated the percent of women never experiencing orgasm, and consistently overestimated the percent of women experiencing orgasm 91–100% of the time. The present study extends prior findings of men overestimating women's orgasm (Laumann et al., 1994; Von Sydow, 2002; but see Fallis, Rehman, & Purdon, 2014) by showing that men's estimations differ from women's reports in cases of when presence or absence of concurrent clitoral stimulation is specified. The discrepancy between men's estimates and women's reports may reflect men's difficulty in accurately detecting women's orgasms, or alternatively, men's difficulty in detecting when women fake orgasm. More than 50% of women report having faked an orgasm (Ellsworth & Bailey, 2013; Roberts, Kippax, Waldby, & Crawford, 1995), which if successful make it difficult for men to accurately estimate how often women actually experience orgasm during intercourse.

Data were consistent with our hypothesis that women may not uniformly interpret questions on intercourse in general (with the absence or presence of concurrent clitoral stimulation not specified). For the 18% of women who provided the same reports for intercourse in general and assisted intercourse but a different frequency report for unassisted intercourse, it is likely that they interpreted intercourse in general as synonymous with assisted intercourse, or that assisted intercourse was their common way of having intercourse and thus responded to intercourse in general as reflecting assisted intercourse; similar logic follows for the 24% of

women who provided the same reports for intercourse in general and unassisted intercourse, but a different frequency report for assisted intercourse. Approximately a third of women appeared to calculate an approximate "average" of their reports for assisted and unassisted intercourse for their report for intercourse in general. That there seem to be at least three different ways in which women interpret questions about orgasm during intercourse where the presence or absence of concurrent clitoral stimulation is not specified highlights the importance of precise wording of questions about orgasm during intercourse. While it is unknown how women participating in previous orgasm research interpreted "intercourse" in survey questions where the stimulation involved in intercourse was unspecified, the present results strongly suggest that participants may have interpreted such questions in a heterogeneous manner, and that the manner in which participants interpreted the question significantly modulated their responses. These data suggesting that women may interpret the same question in different manners undermine the validity of comparing responses to questions of orgasm during intercourse across participants.

The present study had limitations. Selection bias increases as survey content becomes more personal in nature, and this is a long-standing concern in particular for research on sexual behavior (Clement, 1990). Because participants were told they would be answering a series of questions about sexual behavior, individuals less comfortable answering such questions were less likely to begin or complete the survey. Biases in self-report may provide systematic, inaccurate population estimates of behavior (Michaels & Giami, 1999; Turner, Miller, & Rogers, 1997). However, anonymous data collection through online methods by generating a very large sample may have mitigated the effect of such biases. Because of limitations of the online platform, we were unable to randomize the order in which we asked questions about orgasm during assisted and unassisted intercourse, raising the possibility that the magnitude of some our findings related to these two questions specifically was influenced by order effects or demand characteristics. Future work should investigate the effects of both question order and question wording when asking women about orgasm during intercourse. This study was also relatively skewed in regard to age demographics. Specifically, the number of women over 30 who responded to all questions about orgasm during intercourse ($n = 123$) was small relative to that of participants between 18 and 29, and thus it is possible that our sample is not representative of women over 30. However, it is important to note that studies of orgasm during intercourse typically have entire sample sizes smaller than that of our sample of women over 30 (e.g., Costa & Brody, 2007; Garver-Apgar et al., 2006; Thornhill, Gangestad, & Comer, 1995). Given that there was no interaction between the effect of question type and any of the demographic variables tested (age, relationship status, and sexual experience), it is unlikely that these results are specific to the population tested here. However, future research that more directly compares responses between different demographic groups is necessary to make more definitive claims regarding this point. Finally, because we did not collect data on whether or not women read the pop-up definitions provided for each of the intercourse questions, we do not know whether all participants read and interpreted each question in the same manner, though this concern is in part mitigated by the fact that words with pop-up definitions were in bold, underlined, and blue text.

Taken together, our data suggest that future researchers should be clear and explicit when asking questions about orgasm during intercourse to avoid heterogeneity in question interpretation across subjects, and to contribute to a better understanding of what types of stimulation are required and used during intercourse by women. While biological and psychological factors have been shown to be associated with orgasm during intercourse (Wallen & Lloyd, 2011), it remains unknown whether such associations would hold if the presence or absence of clitoral stimulation were to be specified. Increased clarity in how questions are phrased would better enable the study influences that lead to individual differences in women's reports of their experiences of orgasm. Future studies should investigate how frequently and under what conditions concurrent clitoral stimulation is used during intercourse, which our findings suggest is a very important aspect of sexual behavior that markedly affects the likelihood that a woman will experience orgasm during intercourse.

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