The human female orgasm: critical evaluations of proposed psychological sequelae

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Orgasm is assumed to be the height of sexual pleasure, reinforcing the recurrence of sexual behaviors. Surprisingly, data supporting the role of orgasm as a reward in women appear lacking. The most likely psychological function of orgasm in women, consistent with the very limited empirical information, is as a secondary reinfacer. In other words, sexual arousal is the primary reward for sexual behavior in women and orgasm associates sexual arousal with the partner. Data from a small ($n = 38$ women) pilot are presented to highlight the challenges of studying female orgasm. Challenges include differentiating vaginally- or clitorally-generated orgasms by self-report and the large proportion of women who are unsure if they experience orgasms. Finally, the recent spate of publications purporting to show differences in penile-vaginal intercourse induced orgasms is critiqued in light of the information reviewed.

Keywords: female; sexual psychology; vaginismus

Introduction

Although separable (Kinsey, Pomeroy, Martin, & Gebhard, 1953), the rhythmic contractions of orgasm often are accompanied by reports of ecstatic pleasure and high arousal in women (Mah & Yitzchak, 2005). Integration of somatic and pleasurable aspects of the orgasm experience may be reflected in activation of the left insula, which appears greater in response to a sexual partner’s name when orgasm quality is higher with that partner (Ortigue, Grafton, & Bianchi-Demicheli, 2007). The assumption that orgasm is experienced as pleasant and rewarding appears so strong that the consequences of female orgasm have scarcely been examined. For example, reviews commonly describe orgasm as a “peak sensation of intense pleasure” without citation (Meston, Hull, Levin, & Sipski, 2004, p. 66), which should be attributed to a lack of evidence to cite rather than a poor literature review. Only 54% of women in one sample reported that they “usually” or “always” experiencing orgasm during intimacy with their partners (Haavio-Mannila & Kontula, 1997) and 24% of women in a nationally representative survey in the USA reported an inability to orgasm for at least several months in the last year (Laumann, Paik, & Rosen, 1999). In fact, orgasm frequency often is only weakly related to satisfaction with one’s sexual relationship ($\beta = .13$ in Haavio-Mannila and Kontula [1997]; for exception, see Parish et al. [2007]). More frequent orgasms can even create distress if
a woman perceives that the orgasm is not being generated “properly”, such as when a novel vibratory stimulus is used (Marcus, 2011). Furthermore, good predictors of orgasm in women have proven elusive (Zietsch, Miller, Bailey, & Martin, 2011). The recent tsunami of publications attempting to reinvigorate the dated idea (Freud, 1905) that orgasms should be achieved by penile-vaginal intercourse (PVI) alone is likely to reduce any positive sequela of orgasm in women. In the absence of a literature on the immediate consequences of orgasm in women, is there even strong evidence that orgasm in women is rewarding?

Is female orgasm rewarding?

A “reward” could be described as any cue that increases approach behavior (White, 1989). Sensitivity to rewards can vary between individuals (Stephens et al., 2010) and evidence that orgasm is a reward could come from many sources. Of the numerous physiological correlates of rewards, beginning with Olds’ (1955) identification of limbic brain activation in rats, only a few studies have examined physiological correlates of orgasm in females at/after orgasm. From a behavioral perspective, reinforcement can provide evidence that orgasm is a reward. In other words, behaviors contingent with, or near in time to, orgasms should increase in frequency with orgasm, if orgasm is rewarding.

Although the exact reward role of dopamine is debated (Flagel et al., 2011), dopamine increases usually occur with reward. Women with higher orgasm consistency exhibit neural responses more consistent with higher dopaminergic responsivity (Giargiari, Mahaffey, Craighead, & Hutchison, 2005). Also, ventral midbrain and right caudate nucleus activation increase at orgasm, which might reflect dopaminergic activity (Georgiadis et al., 2006). However, more direct, constant cerebrospinal fluid sampling of relevant monoamines yielded negative findings at orgasm in men (Kruger et al., 2006). As yet, dopamine changes at orgasm have not been documented in women; in fact, some have argued that the prolactin increase observed at orgasm could reflect downregulation of dopamine (Exton et al., 1999, 2001). Prolactin decreases hypothalamic dopamine (Bianchi-Demicheli & Ortigue, 2007). Medications interfering with dopamine function do appear to increase women’s difficulty reaching orgasm (Hummer et al., 1999), but this appears relevant for orgasm generation rather than the effects of the orgasm itself. Evidence for dopamine increase at orgasm in women remains weak.

Activation of brain areas associated with other rewards might support the role of orgasm as a reward. Pleasurable stimuli activate both brain areas associated with both emotional arousal and hedonic reward (Costa, Lang, Sabatinelli, Versace, & Bradley, 2010). Sexual arousal, per se, clearly activates areas consistent with this reward (Georgiadis, Kortekaas, Kringelbach, & Berridge, 2010). Early attempts to image women’s brains while they experienced orgasm (Komisaruk & Whipple, 2005) appear to suffer from excessive movement of the participants. Magnetic resonance imaging (MRI) stability or correction techniques developed for movement during acquisition of blood oxygenation level-dependent (BOLD) signal simply have not yet been well-developed for orgasm. Imaging during orgasm is also limited because orgasms generally occur just once. Normally, repeated trials are acquired to increase signal:noise ratio in functional-MRI research. Finally, MRI is notable for its spatial resolution, but not time resolution, so it is possible neural reward processes that occur very quickly would not be identified using this technique.
Attempts to measure surface electroencephalography (EEG) with sufficient time resolution have been reported to reflect only movement artifacts (Heath, 1972). The only other attempt to measure EEG at orgasm in women (Cohen, Rosen, & Goldstein, 1976) occurred before modern artifact reduction and source localization techniques were available. Another MRI study of orgasm in women, using a non-BOLD technique that better overcomes movement artifacts, did not find activation of areas of the brain associated with reward (Georgiadis et al., 2006).

If orgasm increased associated sexual behaviors, this would provide some behavioral evidence for its role as a reward. However, such behavioral data also are weak. The presentation of picture stimuli as soon as men indicated that they would reach orgasm within two minutes has been shown to increase subsequent response to those stimuli within a single laboratory session (Kantorwitz, 1978). Given that men’s orgasms occur much more consistently with sexual activity, the reinforcing properties of orgasm may differ between the sexes (Waterman & Chiauzzi, 1982). This suggests that orgasm might be even more rewarding for women, in whom the response is more variable. However, “orgasm consistency training” in women resulted in only modest increases in sexual desire (Hurlbert & Apt, 1995; Hurlbert, White, Powell, & Apt, 1993; McVey, 1997). Orgasmic reconditioning often fails even in men (Conrad & Wincze, 1976) and has run into resistance and negative results as a “treatment” for sexual orientation (Turkate, Bruch, Kuczmiczyk, & Stechow, 1980). One group found significant increases in facial muscle activation consistent with pleasant affect immediately following orgasm (Fernández-Dols, Carrera, & Crivelli, 2010), although pleasantness is not necessarily rewarding. At this time, data do not support the role of orgasm as a reward in women.

If studies continue to fail to find a reward role for orgasm, then what might best characterize the psychological effects of orgasm in women? Three possibilities include:

1. Orgasm reduces the likelihood of continued sexual activity (i.e., pacing).
2. Orgasm is an incidental reflex triggered by the true primary reinforcer: sexual arousal
3. Orgasm serves as secondary reinforcer linking sexual behaviors and partner affiliation.

With respect to possible pacing, orgasm is associated with brain activation indicative of satiety (e.g., middle orbitofrontal cortex in Georgiadis, Reinders, Paans, Renken and Kortekaas [2009]). Increases in neuropeptides, such as oxytocin, at orgasm also have been speculated to decrease subsequent sexual arousability in humans (Caldwell, 2002). High rates of faking orgasm (67% of intercourse-experienced women ever have [Muehlenhard & Shippee, 2010]) in women suggest an association of orgasm with satiety might be used to communicate the desire to end sexual behaviors to the partner. However, if orgasm provided a “dose” of satiety in women, with every orgasm presumably providing the same regulatory dose, several known features of female orgasm do not fit this model. Women have a capacity for multiple orgasms (Levin, 2007, 2009). Also, partner context predicts orgasmic functioning in women. Specifically, multiple orgasms are more likely with sexual partners than masturbating alone (Haning et al., 2008), orgasm is less likely to occur during a one-night stand (Eschler, 2004) and orgasms occurring with partners are
less genetically heritable than those occurring during masturbation (Dawood, Kirk, Bailey, Andrews, & Martin, 2005). The context of the orgasm should not affect its efficacy in decreasing the likelihood of subsequent sexual behaviors if orgasms are invariant, satiety inductions.

The second possible role of orgasm is that it is a reflex that happens to be triggered by the true primary reinforcement: sexual arousal. Orgasm latency during masturbation is considerably longer in women than men (Fisher, Pollack, & Malatesta, 1986). Presumably intercourse orgasm latency also is longer for women on average, so much of the sexual experience for women is spent in a state of sexual arousal rather than orgasm. Data are much more consistent that sexual arousal is the primary reward of sexual behaviors for women (e.g. Melis & Argiolas, 1995). In other words, sexual arousal, per se, may be the primary reward for sexual behaviors by women, whereas the importance of the orgasm remains unclear (Wallen, 1995). Unlike the few male reports of pain following high sexual arousal without the experience of orgasm (Challett & Nerenberg, 2000; Hite, 2006; McIntyre, 1989), the author is unaware of similar cases reported in women.

Finally, orgasm may be rewarding only because it associates sexual behaviors to increased partner intimacy. Women’s sexual satisfaction is better predicted by individual and relationship variables than orgasm frequency (Hurlbert, Apt, & Rabe, 1993). It may be that orgasm serves a moderating role only. For example, oxytocin released at orgasm (Carmichael, Warburton, Dixen, & Davidson, 1994) does not contribute to uterine “upsuck” (Levin, 2012), but it might increase attention to positive relationship cues (Unkelbach, Guastella, & Forgas, 2008) and counteract couples’ conflict (Ditzen et al., 2009). Berridge and Kringelbach (2011) highlight a useful distinction (Seligman, Steen, Park, & Peterson, 2005) made between the “hedonic” (positive affect and pleasure) versus “meaningfulness” (feeling life has a purpose) aspects of pleasure. Orgasm may enhance affiliation with the sexual partner to contribute to the meaningfulness of the experience when present. Given the very limited data on women’s orgasm and its action in the brain, it is difficult to draw any stronger, empirically-based conclusions about the likely psychological sequelae of orgasm at this time.

Challenges in studying female orgasm: preliminary data

A pilot study with a small group of women examined their own self-regulation of sexual response. These data explore (1) possible advantages of “clitorally induced” orgasm and (2) alternative explanations for differences reported in women with clitoral versus PVI orgasm. Participants were recruited through a Department of Psychology at a large western university to a study that would ask questions about their sexual history and feelings and would ask them to view brief sexual films in private. This convenience sample of 38 female students was largely Hispanic (n=20) and White (n=14), heterosexual (n=35) and bisexual (n=3) and young (M [SD] = 21.7 [5.8]).

Participants first completed a series of questionnaires over a secure, private server. Photographs of relevant external genital structures were available. Assessments of desire for sexual activity alone or with a partner (Spector, Carey, & Steinberg, 1996), sexual self-control (Gailliot & Baumeister, 2007), general sexual history information and detailed orgasm and stimulation questions were included. As a part of these questionnaires, women were asked what part of their body they
felt contributed “the most” to generating their orgasm. Next, they viewed a series of 30, 20-second sexual films separated by the same 20-second neutral film (Rottenberg, Ray, & Gross, 2007). Participants were asked to try to increase their sexual response (10 clips), decrease their sexual response (10 clips) or just continue to watch naturally (10 clips) during each sexual clip. After each 20-second film clip, they reported how “sexually aroused” they felt on a seven-point Likert scale.

Five (13%) women reported that they were anorgasmic (i.e., they did not have orgasms). Of the remaining 33 women who reported having orgasms, only 22 (67%) stated that they were “very sure” they actually were having orgasms. This appears consistent with other data indicating 10 of 67 women were unsure if they had orgasms (Clifford, 1978). The area that contributed “the most” was the clitoral glans, or skin directly over the glans (prepuce: \( n = 22 \) [66.7%]), which is consistent with studies of genital sensitivity (Schober, Meyer-Bahlburg, & Dolezal, 2009). Other women indicated that the inside front wall of their vagina \( ( n = 7 \) [21.2%]) or nipples \( ( n = 2 \) [6%]) contributed the most to their orgasm. Women also were often able to specify another area (or the same area) as contributing the second most to their orgasm experience. Areas contributing the “second most” included a location inside their vagina for 6 of the 22 (27.2%) women who reported the primary site was clitoral; 6 of the 7 (86%) women who said a site inside their vagina contributed the most indicated that their clitoral area contributed the second most to their orgasm. Four women selected the “opening” of their vagina (introitus) as contributing the second most after clitoral stimulation. Tremendous variability also existed in the particular sexual state in which they were filling out the surveys: 5 (15%) women reported orgasm within the last 24 hours, while 19 (58%) reported that at least three days had passed since their last orgasm. The nature of the most recent orgasm experience also varied. A total of 11 (33%) women reported that their last orgasm experience included more than one orgasm close in time. The state in which women are completing such questionnaires may have impacted their responses, for example, by their ability to recall the most recent episode accurately or their feeling of sexual satiety.

The data above suggest it might not be possible for women to distinguish orgasms as clearly clitorally or vaginally initiated (see also, Levin 2012). Despite these limitations, a similar approach was taken in the following analyses to allow comparison with previously published data (Wright, 1949). Specifically, women were classified as experiencing orgasms primarily by clitoral or vaginal stimulation and as their most recent orgasm being attributable primarily to vaginal or clitoral stimulation. Despite the small group size, several significant differences were identified on both questionnaire and behavioral regulation measures (see Table 1). Notably, women reporting a history of orgasm they attributed primarily to vaginal stimulation also reported more desire for sex with a partner; this also was true if the most recent orgasm was attributed to vaginal, rather than clitoral, stimulation. In addition, the primary stimulation site causing the most recent orgasm also predicted desire for masturbation and the level of sexual arousal reported after the sexual clips. Specifically, women who reported that their most recent orgasm was due to clitoral stimulation also reported greater desire for masturbation and higher sexual arousal in response to a sexual film.

Two possible mediating variables were explored including partner presence/absence at last orgasm (Mah & Binik, 2002) and the “strength” of the last orgasm (regardless of how it was stimulated) as compared to a “typical” orgasm for that
Table 1. Reported orgasm generation site by individual differences and self-control during erotic films.

<table>
<thead>
<tr>
<th></th>
<th>Typical</th>
<th>Last orgasm event (main stimulation site)</th>
<th>Last orgasm event (partnered)</th>
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<tbody>
<tr>
<td></td>
<td>Clitoral</td>
<td>Vaginal</td>
<td></td>
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<tr>
<td>n</td>
<td>22</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>M(SD)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Questionnaire measures</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Desire for sex with a partner (SDI)</td>
<td>41.8 (9.3)</td>
<td>52.1 (3.1)</td>
<td>.02</td>
</tr>
<tr>
<td>Desire for masturbation (SDI)</td>
<td>10.0 (4.7)</td>
<td>6.9 (4.3)</td>
<td></td>
</tr>
<tr>
<td>Sexual self-control scale</td>
<td>34.2 (7.7)</td>
<td>38.3 (8.4)</td>
<td></td>
</tr>
<tr>
<td>Frequency of orgasm</td>
<td>4.2 (2.7)</td>
<td>5.4 (2.6)</td>
<td></td>
</tr>
<tr>
<td>Feeling sexually satiated</td>
<td>3.6 (1.3)</td>
<td>4.1 (1.5)</td>
<td></td>
</tr>
</tbody>
</table>

| Task measures of sexual arousal |          |         |        |          |         |        |          |         |        |        |        |        |
|--------------------------------|          |         |        |          |         |        |          |         |        |        |        |        |
| Sex film-watch instruction | 4.5 (1.5) | 3.4 (2.4) |        | 4.8 (1.5) | 3.0 (1.7) | .02 | 1.7 (.4) | 2.1 (.9) |        |
| Sex film-increase instruction | .31 (.45) | .28 (.40) |        | .3 (.5) | .3 (.4) |        | .3 (.4) | .3 (.4) |        |
| Sex film-decrease instruction | -.16 (.46) | -.04 (.09) |        | -.2 (.3) | .01 (.6) |        | -.2 (.5) | -.1 (.5) |        |
person. The results of the partner status also appear in Table 1. These comparisons indicated that having experienced the most recent orgasm with a partner was related to higher levels of desire for sex with a partner and higher feelings of sexual satiation than having experienced the most recent orgasm alone. The rated intensity of the last orgasm also was correlated with the same continuous variables. The greater the intensity of the last orgasm, regardless of the stimulation source that generated it, was associated with feeling more sexually sated ($r_{31} = -0.5, p = 0.003$), less sexual self-control as defined by the Sexual Self Control scale ($r_{29} = -0.35, p = 0.05$), less frequent orgasm ($r_{31} = -0.42, p = 0.02$) and greater reported reduction in sexual arousal when instructed to decrease one’s response ($r_{31} = -0.42, p = 0.04$). In sum, either the presence/absence of the partner or the intensity of the last orgasm might well explain reported differences in “clitoral” versus “vaginal” orgasms, among many other potential explanatory variables.

**Future directions for studying orgasm in women**

Clarifying the likely effects of women’s orgasms could help women understand their own sexual functioning, but considerable work remains to advance empirical knowledge in this area. This final section critiques research concerning the psychological sequelae of female orgasm, especially PVI-induced orgasms (see also Levin, this issue), including ideas for developing stronger research in this area. The large, recent focus on orgasms as PVI- or clitorally-generated, for example, ignores many other characteristics of the experience that may explain more variance. Orgasms may vary in intensity, multiple occurrence or emotional timbre (Mah & Binik, 2002), which also may influence their ultimate effects. Others have identified distinct physical responses (e.g. pelvic rigidity, folding at waist, etc.) that may allow orgasm types to be differentiated by measures like electromyography (Bunzl & Mullen, 1974). To adequately differentiate physical types of orgasm to study their psychological effects, the intensity of the orgasm, or the sexual arousal level immediately preceding it, should be controlled.

Age is one variable that typically has been controlled experimentally or statistically in published reports. This will remain an important control. Older women, particularly postmenopausal, exhibit increased touch/pressure thresholds in the vulva (Romanzi, Groutz, Feroz, & Blaivas, 2001; Vardi, Gruenwald, Sprecher, Gertman, & Yartnitsky, 2000). Sensitivity has not been examined prospectively, but may change differentially in areas typically reported to induce sexual arousal in women over time within a woman (Schober et al., 2009). For example, the clitoral structure may be more exposed to trauma from bike riding (Guess et al., 2006) or chafing (Goodman, 2011) than the vagina, which may differentially change sensitivity over time. Also, one could speculate that the function of orgasm may change from reproductive to non-reproductive years.

Self-reports are of unusually limited utility in the study of female orgasm. Although it is important to understand women’s subjective experience of orgasm, many women are unsure whether they even experience orgasms (for example, see above data). When 75 women were asked to distinguish between vaginal or clitoral orgasms in one study, 26 said there was no difference and 24 were unsure (Clifford, 1978), thus it also appears difficult or impossible for women to identify sites of orgasm stimulation reliably (see also Levin, 2012). Studies asking women to report whether their orgasm was attributable to PVI or clitoral stimulation (Costa & Brody,
appear of limited utility. Studies should include other measures of orgasm in addition to self-report whenever possible. Some have measured physiological indicators, but choose non-specific cardiac factors (Whipple & Ogden, 1992) or respiration (Sipski, Alexander, & Rosen, 1995) rather than orgasm’s hallmark rectal sphincter contractions (Carmichael et al., 1994; Fox & Fox, 1971; van Netten, Georgiadis, Nieuwenburg, & Kortekaas, 2008). This is problematic because cardiac factors are highly malleable, especially in upregulation (Carroll & Whellock, 1980; Stepanov, Zingerman, Menitskii, & Peskovskii, 1982) and increased cardiac response would be consistent with women’s expectancy that they are becoming highly aroused. Anal or vaginal electromyography will not be acceptable to many volunteers and will bias participation (Morokoff, 1986), but studying physiological responses warrants inclusion of physiological measures whenever possible. A number of methods are available (Bohlen & Held, 1979; Levin, 2004; van Netten et al., 2008). It is surprising these have not been used as they were suggested as a method to potentially differentiate vulvar from deeper orgasms long ago (Singer & Singer, 1972). Using a measure of social desirable responses (Costa & Brody, 2010) does not overcome the problem of women being able to report accurately. Relatively, claims that PVI is a better predictor of orgasm consistency than foreplay duration (Weiss & Brody, 2009) openly uses retrospective reporting when more accurate methods for measuring the duration of sexual activities in the home have already been published. For example, intravaginal ejaculatory latency time has been measured in large scale studies using a stopwatch (Waldinger & McIntosh, 2009) and such measures appear necessary as men differ in their ability to accurately estimate their own parameters of performance (e.g. ejaculatory control in Rowland, Strassberg, de Gouveia Brazao and Slob [2000]). Finally, the placement and intensity of the stimulation warrants better characterization with laboratory methods. These are only recently being developed to provoke orgasm in women in a standardized fashion (Laan & van Lunsen, 2002) with additional development for external stimulation to orgasm forthcoming (Prause, Roberts, Legarreta, & Cox, in press).

Variation in participant inclusion/exclusion criteria also highlights two implicit, contrasting models. A “capacity” model of orgasm examines effects by whether or not a woman is able to have (has ever had) the type of orgasm described. For example, classifying women who “have ever had a vaginal orgasm” as having PVI orgasms (Brody, 2007) reflects a capacity model. A “preference” model would classify orgasm experience based on the most typical experience of orgasm. Pilot data (above) were used to examine the “most common” stimulation sites producing orgasm, which is more consistent with a preference model. When studies exclude women who have never had PVI on the basis they “might have the psychological characteristics required for the triggering of vaginal orgasm but have not yet found an appropriate partner” (Costa & Brody, 2008, 2010), it is unclear whether this is selecting against women who may ever have PVI or might prefer PVI. Of course, this also neglects to address whether women who have had PVI may simply have a partner who fails to provide (or from whom they fail to request or do not know to request) appropriate stimulation to experience an orgasm from PVI alone. Relatedly, excluding women who report intercourse of one minute or less (Weiss & Brody, 2009) is not presented with any empirical basis. To avoid the appearance of strategic exclusion, criteria need to be clearly justified empirically and model assumptions made explicit.
The recent deluge of publications selectively advances the hypothesis that orgasms occurring during PVI (or due to PVI, the distinction is not always clear) are superior to orgasms occurring during masturbation (or from clitoral stimulation). This surprising hypothesis, seemingly resurrected from old psychoanalytic studies (e.g., Fisher & Ososky, 1967), must meet a high standard of proof for two reasons. First, women who experience orgasms by non-vaginal means are pathologized when their experience is portrayed as inappropriate, immature or poor sexual functioning. While pathologizing can have the positive function of bringing attention to an area of concern (Rubin, 2000), this appears more consistent with the generation of concern often raised by Tiefer (2001) with the potential for secondary gain. Care is necessary to determine whether pathology really is an appropriate way of thinking about clitoral orgasms, especially when the most effective anorgasmia bibliotherapy treatment available recommends clitoral stimulation as a common starting point (Heiman & LoPiccolo, 1988; Heiman & Meston, 1997). Second, the hypothesis “vaginal intercourse orgasms are superior” is easily falsified by any data showing superiority of functioning in any domain by those who reach orgasm using primarily clitoral stimulation. Data presented here already show women with more “clitoral” orgasms actually respond more to a standardized visual sexual stimulus than women with “vaginal” orgasms. If the intention is only to suggest that PVI orgasms are better in certain circumstances, those circumstances have yet to be detailed. Otherwise, Popperian (1963) falsification standards already would suggest the abandonment of the hypothesis that PVI orgasms are superior to clitorally-generated (or masturbatory) orgasms.

Psychometrically questionable approaches characterize recent work in this area. For example, studies (Costa & Brody, 2010) have used the Defense Style Questionnaire (Andrews, Pollock, & Stewart, 1989) and questions from a national survey in Sweden (Lewin, Helmius, & Månsson, 2000) to suggest women who do not experience PVI orgasms are psychologically inferior. Sometimes results of one subscale is reported, sometimes two (Costa & Brody, 2008). All subscales should be consistently reported to avoid the appearance of capitalizing on Type I statistical error. Both “mature coping” and “neurotic coping” have been posited as explanatory concepts of vaginal orgasm inferiority by Freudians (LaTorre, 1979). Analysis of the Swedish questionnaire data relies on questions that were not characterized psychometrically at all, leaving open whether they were truly assessing any construct of interest. Also, the statistical analyses often appear incorrect in these studies. For example, one study reported that orgasm consistency during intercourse was uncorrelated with orgasm consistency during masturbation (Brody, Laan, & van Lunsen, 2003). How likely are women to masturbate regularly if they do not orgasm? Indeed, on obtaining the data from this question, it showed a negative skew that was significantly non-normal and probably should have been transformed (or a distribution-free test used). Similarly, power is rarely appropriately considered in these studies and effect sizes are not presented. In one study with only 10 women reaching orgasm through intercourse and 9 through masturbation it was concluded that orgasm during intercourse produced a greater prolactin increase than orgasm during masturbation (Brody & Kruger, 2006). Effect sizes are not presented nor are marginal means to allow calculation of effect size from the text. In other words, the effect could be small. A simple post-hoc power test (G*Power) shows that a 2 (Intercourse, Masturbation) X 2 (Gender) ANCOVA with one covariate and one continuous dependent variable generated a 1-β of only .3 to detect even a moderately
large effect size. This is well below the .80 power minimum typically sought to avoid Type II statistical errors (Cohen, 1992). Given that these data were not collected appropriately within subjects to start (Levin, 2007) and no examination for outliers is mentioned (standard error alone would not show outliers necessarily), it seems very likely the stimulation type effect reported might be attributable to other individual differences or outliers. Additionally, no covariate for stimulus intensity, a more parsimonious explanation than complex stimulation type, is offered (and data for orgasm intensity were not collected for the masturbation condition only). Also, despite the same authors’ claims that condoms predict PVI orgasm sequelae (Costa & Brody, 2009), controls for condom presence are rarely observed in this work. Similar psychometric errors are hardly unique to this area of research, but seem particularly frequent in it.

While the function of orgasm in women remains unclear, a few conclusions are possible. First, within the confines of the sparse data currently available, orgasm does not appear to have a role as primary reward for sexual behavior. Second, there is not sufficient evidence that orgasms can be reliably differentiated by the type of stimulation that caused them. Women often are unsure whether they actually are having orgasms and often identify multiple sites of stimulation that contributed to their orgasm. Finally, as a result of these challenges, there remains no psychometrically strong evidence that orgasms achieved by PVI are characteristic of better functioning women than orgasms achieved by clitoral stimulation (or masturbation). Future investigations of orgasm in women would benefit by verifying the actual physical presence of orgasm. At least, self-report studies should consider asking more specific questions regarding orgasm intensity, sexual arousal level preceding orgasm, how sure women are that they experienced orgasm and secondary or tertiary stimulation sites that they believe contribute to their orgasm method.

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