Evolutionary Behavioral Sciences

ISSN: 2330-2925

2021, Vol. 15, No. 3, 305–311
http://dx.doi.org/10.1037/ebs0000244

SHORT REPORT

The Point of Nipple Erection 1: The Experience and Projection of Perceived Emotional States While Viewing Women With and Without Erect Nipples

Rebecca L. Burch
State University of New York at Oswego

David R. Widman
Juniata College

To determine whether female nipple erection is perceived as a sign of sexual arousal or interest, male and female participants were asked to rate photos of real women with and without salient nipple erection on a series of 16 emotional and physiological states, including positive, negative, and sexually aroused states. Nipple erection salience was rated by independent raters, and faces in photos were obscured to prevent discerning emotional states from facial cues. Men clearly projected more sexy and positive emotions onto the stimuli when the stimuli displayed erect nipples. Whereas women did project more positive emotions with erect nipples, they did not differ in their expression of sexy. We also observed that men's self-ratings of sexy and positive emotions were the same as their ratings of the stimuli. Women, however, reported significantly less sexy and positive emotions for themselves relative to the stimuli.

Public Significance Statement
Given the research that suggests men attend to nipples and that nipple erection is triggered by sexual excitement (among other triggers), we questioned whether men see nipple erection as a sign of sexual interest. Our findings indicate that men (but not women) see women as sexier when they have nipple erection and also see themselves as sexier, supporting the idea that nipple erection is perceived signaling arousal or sexual interest.

Keywords: nipple erection, breasts, sexual signals, sexual over perception bias

Whereas much has been written regarding the physiology of the breasts and nipples and their reactions during the human sexual response, little has been investigated regarding what nipple erection signals, or is perceived to signal, in the human species.

Breasts, Nipples, and the Human Sexual Response

The bulk of research regarding nipple erection was conducted by Masters and Johnson (1966) in their seminal work, "The Human Sexual Response." Here Masters et al. state that nipple erection is the "first external evidence of the elevated sexual tensions and . . . occurs shortly after the onset of any form of effective sexual stimulation" (p. 224). Masters et al. go on to detail just how nipple erection varies between sexes and across contexts. For example, a full erective response may increase nipple length by .5–1.0 cm and base diameter by .25–.5 cm (large, protruding nipples usually have relatively less capacity for size in-

This article was published Online First August 20, 2020.
Rebecca L. Burch, Department of Human Development, State University of New York at Oswego; David R. Widman, Department of Psychology, Juniata College.

Correspondence concerning this article should be addressed to Rebecca L. Burch, Department of Human Development, State University of New York at Oswego, 7060 State Route 104, Oswego, NY 13126. E-mail: rebecca.burch@oswego.edu

creases than do the more typical sized nipples). This erective response takes place during the excitement phase but then can be masked by vasocongestion of the breast during the plateau phase. Nipples appear to become erect again when the vasocongestion subsides during the resolution phase. Interestingly, this masking effect is diminished in women who have breastfed because their breasts do not "demonstrate as definitive a size increase as the unsuckled breast" (p. 29). Masters et al. also made it clear that nipples remain rigidly tumescent in comparison with the areolae. This is particularly the case when the woman experiences an orgasm: "If orgasm does not occur, areolar detumescence is a much slower process, corrugation does not develop, and the false erection reaction of the nipples usually is reduced in intensity" (p. 130). This implies that female orgasm would create visible patterns in nipple erection.

Masters et al. (1966) also report that whereas breast size and reaction continues to shift dramatically across pregnancy, reactions of nipple erection and areolar tumescence remain constant through all three trimesters. Likewise, nipple erection in aging women (up to 70 years) follows the exact pattern as younger women. Whereas breast swelling is not as great during the excitement phase (e.g., none of the women older than 60 years showed any clinically obvious increase in breast size), the nipple erection occurs as normal. Given these reports, breast swelling during the sexual response can provide cues as to age and reproductive states in women, but nipple erection remains a consistent marker of sexual excitement.

Nipple sensitivity and erection fluctuate with the menstrual cycle (being most sensitive at ovulation) and significantly increases when a girl reaches puberty. Moreover, this midcycle peak in sensitivity is absent in women taking oral contraceptives (Robinson & Short, 1977).

In summary, female nipple erection, particularly in the excitement and resolution stages, indicates sexual excitement and satisfaction. During the plateau phase, it can be obscured by reproductive and physiological changes in the breasts and their sexual response.

Male Breasts and the Sexual Response

Are these sexual changes in nipple erection isolated to women? Firstly, men show no increase in breast or nipple sensitivity after puberty (Robinson et al., 1977). Secondly, there has been no constancy of nipple erection established for male breasts. Masters et al. (1966) estimate that 50–60% of all sexually responding males demonstrate some degree of nipple tumescence. Of the men who do show nipple erection, this well may be delayed into the plateau phase before a full erective reaction is established, and it is maintained throughout the plateau phase because swelling of breast tissue is not nearly as extreme in men as in women. This erection lasts through the orgasm phase, as Masters et al. (1966) state: "Few men under 60 years of age ejaculate without an obvious turgidity, if not full erection, of the nipples" (p. 224). As the male ages, however, the degree of nipple erection diminishes, with little to no visible erection in the men older than 70 years. Men also maintain nipple erection long after orgasm.

The human sexes show clear differences in patterns of nipple erection. In women, it is linked to sexual arousal, emerging at the very beginning of sexual excitement and disappearing quickly after orgasm. For men, it does not emerge until plateau, if at all, and remains even during the refractory period when sexual excitement is impossible. If humans were to perceive nipple erection as a sexual signal, it would indicate very different sexual states for women versus men.

Perceptions of Nipple Erection

Although researchers like Kinsey, Pomeroy, Martin, and Gebhard (1953) have documented that men particularly aroused by female breasts, few have examined the effect of nipple erection on arousal in the viewer or even how humans perceive nipple erection. To be sure, nipple erection is not only triggered by sexual arousal, but it can also occur in response to cold temperatures (Anderson, Held, & Wright, 2004; Fox, & Wyatt, 1962; Tezer, Ozluk, Sanli, Asoglu, & Kadioglu, 2012). In addition, self-reports of nipple erection indicate that erection can be due to several factors related to stress and fear (Harrison, Hones, Hughes, & LeFevre, 2013). However, what triggers nipple erection, and what is perceived to trigger nipple erection (what nipple erection is perceived to signal) may be very different. Nipples certainly attract the attention of men. Eye-tracking studies have

found that when confronted with nude torsos of women, men's first fixation was more frequently the nipple/areola area (Dixson, Grimshaw, Linklater, & Dixson, 2011) and that men spent more time looking at the nipple/areola than women (Pietruski et al., 2019). It is interesting to note that in both of these studies, the nipples appeared to be at least partially erect.

If nipple erection signaled sexual arousal or interest, it would be adaptive for men to detect nipple erection, perceive it as an indication of sexual arousal, and attempt to respond to that signal. Even if nipple erection was sometimes in response to other factors, numerous studies have found that men attribute more sexuality to women's behavior than women generally attribute to other women (Saal, Johnson, & Weber, 1989). This adaptive sexual overperception bias, as reviewed in Haselton and Buss (2000), would lead men to minimize the cost of missed sexual opportunities and maximize reproductive effort. Little research has been conducted to investigate the impact of nipple erection on the attribution of certain characteristics to women. One would predict that when presented with women displaying nipple erection that men would be more likely to perceive nipple erection as a sign of sexual interest as opposed to other emotional states and that men would be more likely to respond with greater sexual arousal when viewing women with nipple erection as opposed to other emotional responses. This study intended to investigate what nipple erection signals to men and women, whether and how men and women perceive nipple erection differently, and what effect, if any, nipple erection has on responses in men and women.

To this end, we had groups of men and women look at photos of women with either erect nipples or without. They then completed a questionnaire, answering about their feelings of specific states and the pictured woman's feelings on specific states. These states were categorized as positive, negative, or sexy. We hypothesize that men will feel more positive and sexy while looking at women with erect nipples and will project more sexy feelings on the pictured women. We expect that women will feel more negative feelings toward the pictured woman and will project more negative feelings to her.

Method

Participants

Eighty-five men (average age 22.6 years, $SD = 7.33$) and 355 women (average age 20.7 years, $SD = 3.79$) were surveyed. Participants were primarily White (83.4%) from a regional public university in the northeastern United States. Whereas we collected data on sexual orientation, there were only 19 total participants who suggested an orientation other than heterosexual (eight men and one woman listed homosexual as their sexual orientation; eight women and one man listed bisexual as their sexual orientation). Because of these small numbers, we simply ignored this dimension but retained the data in the samples.

Materials

Photos of real women displaying nipple erection in real-world settings were collected from the Internet. All women were fully clothed and photographed while walking, standing, or sitting in public (candid photos). Photos ranged from full-body photos to torsos (from the waist up). The photos were edited to conceal facial cues to emotional states and identity by placing a white box over the woman's face.

The photos were then placed in a slideshow, and a set of participants ($N = 10$) were asked to rate the salience of nipple erection of the bodies in the photos. Zero participants were able to correctly identify the women in the photos. Of 35 photos, 15 photos with the most salient nipple erection rated 2.6–4.4 on a 5-point salience scale (1 = *not at all* to 5 = *extreme*) were then selected as stimuli. These photos were then further edited by concealing the nipple erection in the photo. Participants were then asked to rate this set of photos on nipple erection. These photos were altered until they scored a unanimous 1 (none at all) by participants.

A new set of participants were then shown both versions of the photos separately in a slideshow presentation. In total, participants viewed 10 slides in randomized order (the order of the slides differed, but no specific slide was shown directly after its counterpart) with five slides of women, each depicted with and without nipple erection. For this study, participants rated the

women in the slides (on a scale of 1, *not at all*, to 9, *extremely likely*) on a list of 16 emotional states (relaxed, happy, confident, friendly, depressed, nervous, jealous, shy, frightened, angry, sexy, aroused, affectionate, sleepy, tired, and disgusted), first how the woman in the picture made them feel and then how the woman in the picture was feeling. It is important to reiterate that the faces of the photos were obscured, so no emotional states could be discerned from the faces. These ratings were made on a paper and pencil response form that ensured anonymity.

The 16 emotional states were divided into three composite states: positive (relaxed, happy, confident, and friendly), negative (depressed, nervous, jealous, shy, frightened, and angry), and sexually aroused (sexy, aroused, and affectionate). The states sleepy, tired, and disgusted were not used in the analysis. These states were removed from the analysis because we believed that they did not clearly fit within just one category. Values for these composite emotional states were calculated as the average for the specific adjectives.

Results

A 2 × 2 × 2 × 3 mixed ANOVA was performed on the emotional states ratings with gender of participant (man vs. woman) serving as a between subject factor and nipple presence (present vs. absent), Target of rating (self vs. other), and emotional composite (sexual, positive, and negative) as within-subject factors. Results indicated that whereas the four-way interaction was not significant, $F(2.870) = 0.99$, $p = .372$, all of the main effects (Fs > 19.00, all ps $< .001$, all $\eta_p^2 = .042$) and the two-way interactions (Fs > 33.50, all ps $< .001$, all $\eta_p^2 = .071$) were significant. Additionally, the analysis revealed that three of the three-way interactions were significant. The only nonsignificant three-way interaction was interaction between target, presence of erect nipples, and gender was not, $F(1, 435) = 1.91$, $p = .167$.

The significant three-way interaction between emotion, nipple presence, and gender, $F(2, 870) = 31.95$, $p < .001$, all $\eta_p^2 = .068$, is shown in Figure 1. Examination of the figure suggests that men viewed the stimuli as more

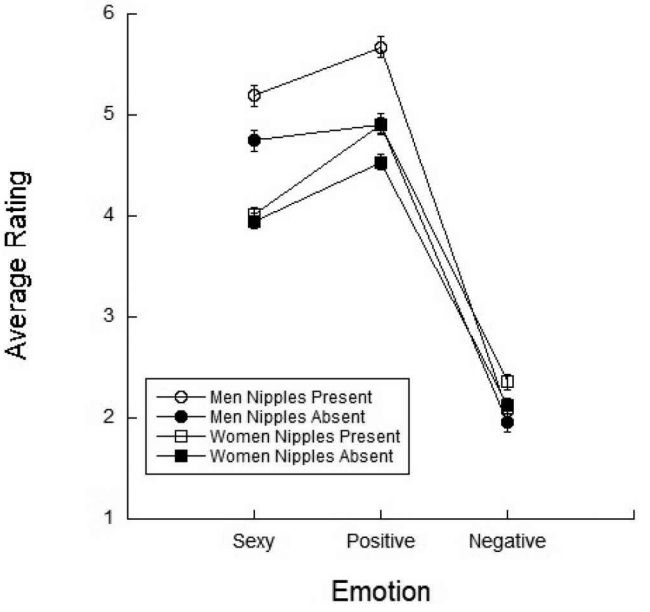

Figure 1. Average rating for the three emotion composites (sexy, positive, and negative) for the men (circles) and women (squares) for the stimuli with erect nipples (open symbols) and without erect nipples (closed symbols).

sexy than women, regardless of nipple presence. It also suggests that the sexiness of the stimuli varied with nipple presence for men, who perceived the stimuli with erect nipples as more sexy. Women, on the other hand, did not perceive a difference in sexiness with nipple erection. Conversely, both men and women associated positive emotions with nipple erection, the stimuli with erect nipples being rated as more positive than the nonerect nipple stimuli. It also suggests that both men and women rated the stimuli as more positive than either sexy or negative, the exception being men who rated the nonerect nipple stimuli as equally sexy and positive. Post hoc comparisons using Tukey's corrections supported each of these impressions.

The significant three-way interaction between emotion, target of rating, and gender, $F(2, 870) = 74.62$, $p < .001$, all $\eta_p^2 = .089$, is shown in Figure 2. Most striking feature in this figure is that there are no differences in rating of self versus other for men across all three emotional composites, whereas there are significant differences for the women. Women rate themselves as less sexy and positive and more negative than the stimuli. Finally, men rate themselves and the stimuli as more sexy and positive than the women. Post hoc comparisons with Tukey corrections verified these impressions.

The final significant three-way interaction between emotion, target of rating, and nipple presence, $F(2, 870) = 123.99$, $p < .001$, all $\eta_p^2 = .222$. is shown in Figure 3. Several impressions stand out from this figure. First, regardless of the presence of nipples, positive and sexy ratings are lower for self than for the stimuli. Second, for the self ratings, nipple presence enhanced the ratings for sexy and positive. Finally, for the other ratings, the presence of nipple erection produced greater sexy ratings but no differences for positive and negative ratings. As with the previous three-way interactions, post hoc analysis with Tukey's corrections confirmed these impressions.

Discussion

There are clear gender differences in how nipple erection is perceived. Men and women saw the same randomized slides that were composed of two identical images of women, one with nipple erection and one without, yet re-

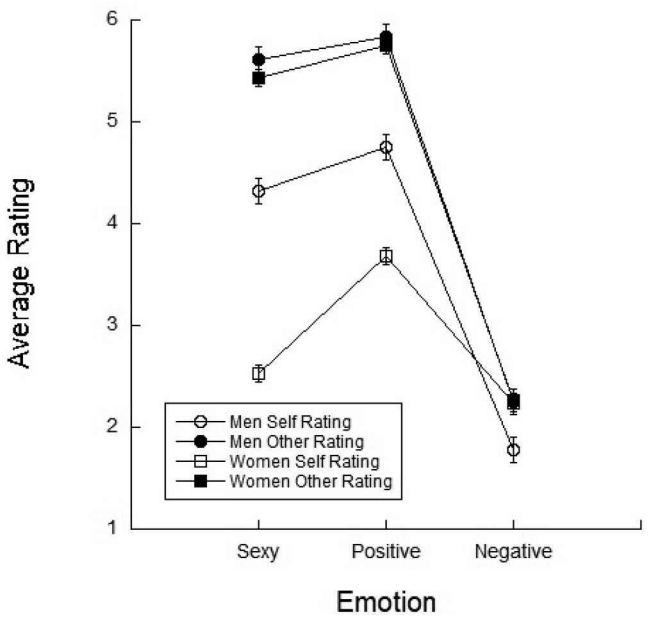

Figure 2. Average rating for the three emotion composites (sexy, positive, and negative) for the men (circles) and women (squares) for themselves (open symbols) and for the women in the images (closed symbols).

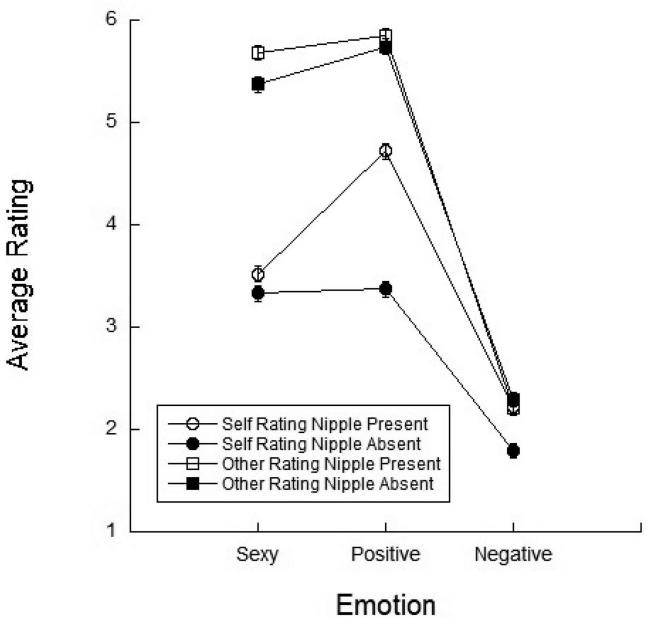

Figure 3. Average rating for the three emotion composites (sexy, positive, and negative) for themselves (circles) and for the women in the images (squares) for the stimuli with erect nipples (open symbols) and without erect nipples (closed symbols).

sponded significantly different in how they felt and how they thought the woman in the images felt. It is important to reiterate here that the faces of the women in the photos were fully obscured so that participants could not discern any identity or emotional states. Men clearly experienced more sexy and positive emotions when the stimuli displayed erect nipples. Whereas women did express more positive emotions with erect nipples, they did not differ in their expression of sexy. We also observed that men's self-ratings of sexy and positive were the same as their ratings of the stimuli. Women, however, reported significantly less sexy and positive emotions for themselves relative to what they projected for the stimuli. In short, men and women view women with nipple erection as displaying more positive emotional states (even without facial cues), and men view both the women and themselves as more positive and sexier. Women did not. In fact, women viewed themselves less positively and less sexy.

The male reactions do appear to support the sexual over perception bias (Haselton et al., 2000). Whereas men and women both view nipple erection as displaying positive emotions, men also see this as sexier and connect their own sexiness or arousal to the display. This is without any actual interest, action, or even facial expression on the part of the women in the photos.

Whereas the role of breast and nipple response in various reproductive states is well known, this study sought to examine nipple erection by itself as a signal of sexual arousal. Therefore, we did not examine the role of reproductive states in this study. No facial cues were provided that could display age, and all women in the stimuli were clothed, so cues to breast/skin age or reproductive states (areola color) were not presented. Moreover, the only variable that differed between stimuli was the presence or absence of nipple erection. Reactions to women with dissonant facial cues (unhappy faces) or in various reproductive states could be examined in future studies.

Future studies could also examine what happens after people detect this perceived sexual signal. If men perceive nipple erection as sexual interest, how does this change how they interact with these women? Likewise, how do women react in other social scenarios involving women

with nipple erection, for example, competitive contexts, if they view themselves less positively? Future studies can examine various scenarios and expectations of women (and perhaps men) who display nipple erection.

References

Anderson, J. E., Held, N., & Wright, K. (2004). Raynaud's phenomenon of the nipple: A treatable cause of painful breastfeeding. *Pediatrics, 113,* e360–e364. http://dx.doi.org/10.1542/peds.113.4.e360

Dixson, B. J., Grimshaw, G. M., Linklater, W. L., & Dixson, A. F. (2011). Eye tracking of men's preferences for female breast size and areola pigmentation. *Archives of Sexual Behavior, 40,* 51–58. http://dx.doi.org/10.1007/s10508-010-9601-8

Fox, R. H., & Wyatt, H. T. (1962). Cold-induced vasodilatation in various areas of the body surface of man. *Journal of Physiology, 162,* 289–297. http://dx.doi.org/10.1113/jphysiol.1962.sp006933

Harrison, M. A., Hones, K., Hughes, S. M., & LeFevre, A. J. (2013). Self-reports of nipple erection in emotional and somatic contexts. *Psychological Record, 63,* 489–500. http://dx.doi.org/10.11133/j.tpr.2013.63.3.006

Haselton, M. G., & Buss, D. M. (2000). Error management theory: A new perspective on biases in cross-sex mind reading. *Journal of Personality and Social Psychology, 78,* 81–91. http://dx.doi.org/10.1037/0022-3514.78.1.81

Kinsey, A. C., Pomeroy, W., Martin, C., & Gebhard, P. (1953). *Sexual behavior in the human female*. Philadelphia: Saunders.

Masters, W. H., & Johnson, V. E. (1966). *Human sexual response*. Boston: Little, Brown and Company.

Pietruski, P., Paskal, W., Paskal, A. M., Jaworowski, J., Paluch, Ł., & Noszczyk, B. (2019). Analysis of the visual perception of female breast aesthetics and symmetry: An eye-tracking study. *Plastic and Reconstructive Surgery, 144,* 1257–1266. http://dx.doi.org/10.1097/PRS.0000000000006292

Robinson, J. E., & Short, R. V. (1977). Changes in breast sensitivity at puberty, during the menstrual cycle, and at parturition. *British Medical Journal, 1,* 1188–1191. http://dx.doi.org/10.1136/bmj.1.6070.1188

Saal, F. E., Johnson, C. B., & Weber, N. (1989). Friendly or sexy? It may depend on whom you ask. *Psychology of Women Quarterly, 13,* 263–276. http://dx.doi.org/10.1111/j.1471-6402.1989.tb01001.x

Tezer, M., Ozluk, Y., Sanli, O., Asoglu, O., & Kadioglu, A. (2012). Nitric oxide may mediate nipple erection. *Journal of Andrology, 33,* 805–810. http://dx.doi.org/10.2164/jandrol.111.014951

Received February 27, 2020
Revision received June 4, 2020
Accepted June 6, 2020 ■