



The Point of Nipple Erection 2: The Effect of Nipple Erection on Intended and Expected Altruism

Rebecca L. Burch¹ and David R. Widman²

¹ Department of Human Development, State University of New York at Oswego

² Department of Psychology, Juniata College

Previous research has shown that men perceive nipple erection as signaling more sexually receptive states. This study intended to determine if this perception changed male hypothetical behavior. For example, would men be more willing to assist women with nipple erection as opposed to those without? Participants were asked to rate pictures of women with and without salient nipple erection (faces were obscured to prevent discerning emotional states). Men perceived women with nipple erection as more deserving of altruism, especially if that altruism involved greater interaction with the woman, and they expected these same women to behave more altruistically toward them. They also believed the women with erect nipples should be included in their social groups. Women, on the other hand, did not perceive them as deserving of greater altruistic behaviors, did not expect greater altruistic behaviors from them, and did not want to include them into their social groups.

Public Significance Statement

This study shows that men are more likely to do things for sexualized women, in this case, women with nipple erection. Women, however, would prefer to avoid women with nipple erection socially. This can have implications for sex and dating strategies, and female interaction in social settings.

Keywords: nipple erection, breasts, sexual signals, altruism, promiscuity

Altruism is commonly defined as fitness-reducing acts that confer fitness benefits on other individuals (Fehr & Fischbacher, 2003), behavior that simultaneously entails fitness costs to the giver and fitness benefits to recipient (Kerr et al., 2004). Although this definition has been revised and argued in terms of motivations and outcomes, it can encompass broad categories of loss of time,

investment in other activities, and resources for the sake of others.

Both kin selection (Hamilton, 1964) and reciprocal altruism (Trivers, 1971) are common in the animal kingdom. However, these two forms do not fully explain the altruism seen in humans. Fehr and Fischbacher (2003) argued that human altruism is far beyond what is seen in other species, and Bowles (2006) suggested that humans who are more altruistic are more likely to survive in a competitive environment. Bowles argued that genetic differences in an ancestral environment spurred the trait of altruism. For this, a form of altruism called *competitive altruism* has been proposed (Hardy & Van Vugt, 2006). This theory suggests that altruistic acts in humans that do not fit within kin selection or reciprocal altruism serve to enhance the individual's reputation in the group. Several studies have shown that public altruistic acts do indeed

Rebecca L. Burch  <https://orcid.org/0000-0001-5923-3747>

David R. Widman  <https://orcid.org/0000-0003-0738-2382>

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, United States. Email: rebecca.burch@oswego.edu

raise the reputation of individuals in groups (Bereczkei et al., 2007; Hardy & Van Vugt, 2006).

An important benefit of a greater reputation for men may be greater access to reproductive opportunities. A study by Aoki (2004) hypothesized that altruism is a trait in males that has been selected for by a female preference for this trait. The trait and the preference have since evolved together (Aoki, 2004). The relationship between altruistic acts in men and reproductive effort has been well documented. For example, men tend to respond with greater altruism in the form of giving to a charity (Iredale et al., 2008) or making greater contributions to the pot in a public goods game (Van Vugt & Iredale, 2013) in the presence of a female observer relative to the either no observer or a male observer. Additionally, men have been shown to be sensitive to female attractiveness in their altruistic behavior. Bhogal et al. (2016), for example, found that men showed greater altruistic intentions toward pictures of attractive women relative to unattractive women. Two field studies confirmed this laboratory finding. Both studies had either attractive or unattractive women approach men asking for help, one in real life and one using a social network (Schwarz & Babfeld, 2019; Wilson, 1978). Both reports found that men were more helpful and friendly with attractive women relative to less attractive women. For an evolutionary strategy to persist, it needs to lead to some success. Across a number of studies, women have found a man who is altruistic more attractive and desirable as a mate (Barclay, 2010; Margana et al., 2019; Oda et al., 2013). This strategy in men has become so transparent that Kawamura and Kusumi (2017) found that men who helped young women were actually perceived as having a selfish motivation. Men who helped old women or other men did not differ.

Finally, Arnocky et al. (2017) found that participants who scored higher on self-reported altruism also reported their own greater desirability to the opposite sex, more sex partners, more casual sex partners, and having sex more often within relationships. In their second study, participants who were willing to donate potential monetary winnings (in a hypothetical scenario) reported having more lifetime sex partners, more casual sex partners, and more sex partners in the last year.

Nipple Erection as a Sign of Arousal

The work of Masters and Johnson (1966) painted a compelling picture for nipple erection (NE) as a sign of sexual arousal and interest. Unlike that of males, female NE is a consistent first response of sexual arousal during the excitement phase and disappears quickly after orgasm. Males show NE far less consistently and only during the later stages of the response (end of plateau, orgasm, and then long into the resolution phase; see Burch & Widman, 2020 for a brief review). Moreover, this response is consistent across premenopausal women, and breast and nipple sensitivity show distinct increases after puberty in girls (Robinson & Short, 1977). This sensitivity also fluctuates across the menstrual cycle, peaking at ovulation.

The topic of examination here is the perception of NE; how men and women perceive and react to women with NE. If NE is perceived as a sign of arousal, and men and women perceive women with NE as sexualized, we expect that men would be more altruistic toward women with NE. Men view women with NE as more attractive (Burch & Widman, 2020). Women, however, are found to dehumanize sexualized women due to a desire to distance from an objectified subgroup (Vaes et al., 2011). Women's dehumanization is also found to be related to intrasexual competitiveness toward other women in the mating market, including negative perceptions of women who are perceived to be more attractive (Agthe et al., 2011) or more sexually available. Combining the research on altruism and sexualization of women, it would be predicted that men would want to interact personally with sexualized women (women with NE) and display altruism. However, women would be more distant and competitive with sexualized women, therefore less likely to behave altruistically toward them.

Given that the hypothetical women in this study had their faces obscured, males could not assess beauty or emotion using facial cues, as other studies have done (Bhogal et al., 2016). However, because all women had the same bodies (digitally manipulated NE was the only difference in the photos), we predict that men are more likely to help the women in the photos but are particularly motivated to help the women in the photos with NE. Women on the other hand, would not be motivated to assist the women in the photos, and NE may trigger even less assistance if the women were perceived as sexual rivals.

In addition to investigating possible altruistic acts toward women with and without NE, we will also examine the expected altruistic acts from the women. If men perceive women with NE as more attractive, as suggested by Burch and Widman (2020); then we might expect to see a halo effect in terms of greater expectations of altruistic behaviors (Eagly et al., 1991) or that men would seek favors from these women in order to have contact with them. Jaeger (2019), for example, found greater cooperation in face-to-face interactions with attractive interviewers relative to less attractive interviewers. Finally, we also examine the intentions of the participant to include the women in their social groups. From an altruistic point of view, inclusion in your social group would suggest that you expect future benefits from altruistic interactions with the women.

In summary, if nipple erection serves as an indicator of sexual arousal (Masters & Johnson, 1966), we predict the following:

Men will be more likely to help the women in the photos, and will be particularly motivated to help the women with NE.

Men will select scenarios to help where they are in close contact with these women.

Men will have greater expectations of altruistic behaviors on the part of the women with NE.

Women, compared with men, will be less likely to help the women in the photos.

Women may perceive these women to be intra-sexual rivals and will be less likely to help women with NE.

Method

Participants

Participants were 440 students (85 men, 355 women) recruited from a regional university in the northeastern United States. The average age of male participants was 22.6 years (SD 7.33), and 87.4% self-identified as White. The average age of female participants was 20.7 years (SD 3.79), and 82.2% self-identified as White. Ten men and nine women declared a sexual orientation other than heterosexual and were removed from further analysis. This resulted in a final sample comprising 75 men and 346 women.

Materials

Photos of real women displaying NE in real-world settings were collected from the Internet according to the following criteria, all women were fully clothed, displaying nipple erection 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 then edited by placing a white box over the woman's face to conceal facial cues to emotional states and identity.

To make sure that faces were adequately obscured, participants were instructed to attempt to identify the women in the photos. Zero participants were able to correctly identify the women in the photos. The photos were then placed in a slideshow and a set of participants ($N = 10$) were asked to rate the salience of NE of the bodies in the photos. Out of 35 photos, 15 photos with the most salient NE (rated 2.6 to 4.4 on a 5-point salience scale (1 = *not at all* to 5 = *extreme*)) were then selected to be presented. A duplicate set of these selected photos were then edited to conceal the NE in the photo. Participants were then asked to rate this set of photos on NE. Photos were altered until they scored a unanimous 1 (*none at all*) by participants. This created a set of photos of unidentifiable women with salient nipple erection in one photo, and the exact same person (pose, clothing, etc.) without nipple erection in a second photo.

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 showing five slides of women with NE and their concealed counterparts. There were six sets of slides (slideshows) in total, with participants able to view up to two sets without repeating slides.

Participants were asked a series of questions regarding the likelihood of 15 altruistic behaviors (see tables for list of items) on a 9-point scale, ranging from 1 (*not at all*) 9 (*extremely likely*). The acts varied in several dimensions. First, they varied in who would be the benefactor. In some acts, the participant assessed their likelihood of engaging in acts to benefit the stimulus women. In others, they assessed the likelihood that the stimulus woman would engage in acts that would benefit the participant. Additionally, for those acts that benefited the stimulus woman, these acts varied in their level of

interaction with the stimulus woman. Some suggested considerable interaction, whereas others implied almost no interaction. Finally, some of the questions asked if the participant was willing to invite the stimulus woman into their social groups. Participants had the right to answer, or not answer, any questions. As a result, not all questions were answered by all participants.

Results

Three separate analyses were performed on the data using Jamovi (Version 1.2; The Jamovi Project, 2020). The first examined the effects of NE on the intended altruistic behaviors toward the stimulus women and the expected altruistic behavior from the stimulus women. The second analysis looked exclusively at the intended altruistic behaviors. Here, two different conditions were formed based on the expected intensity of the interaction between the participant and the stimulus women. Some of the altruistic behaviors, such as picking her up while she is hitchhiking, imply a considerable amount of interaction with the stimulus woman. Other altruistic acts imply little interaction, such as house sitting for her. The purpose of this analysis is to investigate the effect of NE on these two categories of interaction. Finally, we examined the effect of NE of inclusion in the participant's social group. For all these analyses, we plan to compare within each sex across the NE conditions for all measures.

For the first analysis, two composite scores were calculated from the specific questions on the

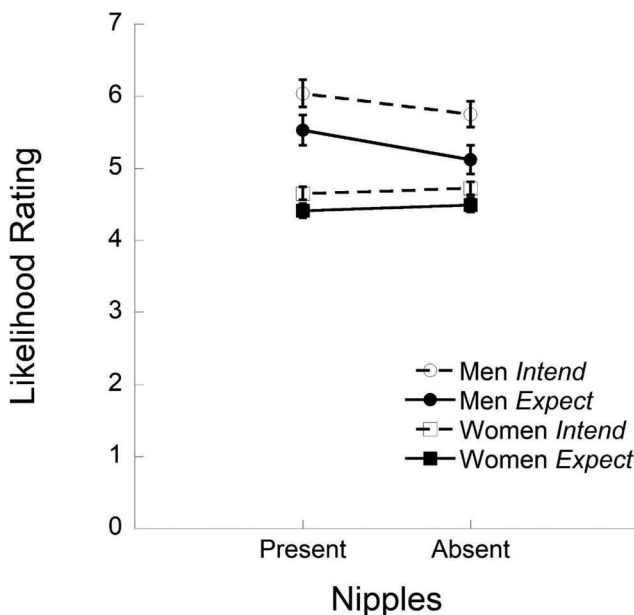
survey. The first composite was the average of the items that assessed the participants' intended altruistic behaviors toward the stimulus woman (e.g., lend her \$100, pick her up if she is hitchhiking; see Table 1 for the complete list of items in the composite). The second was the average of the items that assessed the expected altruism from the stimulus woman (e.g., ask a favor, borrow her car; see Table 1). A $2 \times 2 \times 2$ repeated-measures analysis of variance (ANOVA) was then performed on the composites with sex as the between-subjects factor and NE (present vs. absent) and directionality of the altruistic act (intended vs. expected) as within-subjects factors. This analysis revealed that all main effects and interactions were significant (all $F_s > 4.28$, all $p_s < .039$, all $\eta_{ps}^2 > .010$). The three-way interaction among sex, NE, and directionality is shown in Figure 1. Post hoc Tukey's comparisons revealed that for both men and women, regardless of NE, there was a lower expectation of expected altruism versus intended altruism; all comparisons within participant sex and intended versus expected altruistic acts regardless of NE were significantly different. However, NE did not affect the altruism for women; there were no significant differences between the nipple present or absent for either intended or expected altruism. For men, NE did make a difference in altruistic acts, with men expecting greater likelihood of altruism, both intended and expected. There were significant differences between present and absent erect nipples and the levels of likelihood for intended and expected altruism.

For the second analysis, we divided the intended altruism acts into two composite scores, those acts

Table 1
Intended and Expected Altruism Composite Items

Category/item	Cronbach's α
Intended	.957
Would you lend her \$100?	
Would you loan her your car?	
Would you house sit for her?	
Would you do her a favor?	
You are doing very well in a class (all A's). She is not. Would you tutor her?	
You see her car broken down on the side of the road. Would you stop to help?	
You see her hitchhiking. Would you pick her up?	
You see her having trouble swimming. You do not swim well. Would you swim out to help?	
Would you share food if you are both hungry?	
Expected	.922
Would you borrow her car?	
Would you ask a favor of her?	
Would you let her house sit?	

Figure 1
Average Rated Likelihood of Intended and Expected Altruism
for Men and Women



Note. Error bars represent standard error of the mean.

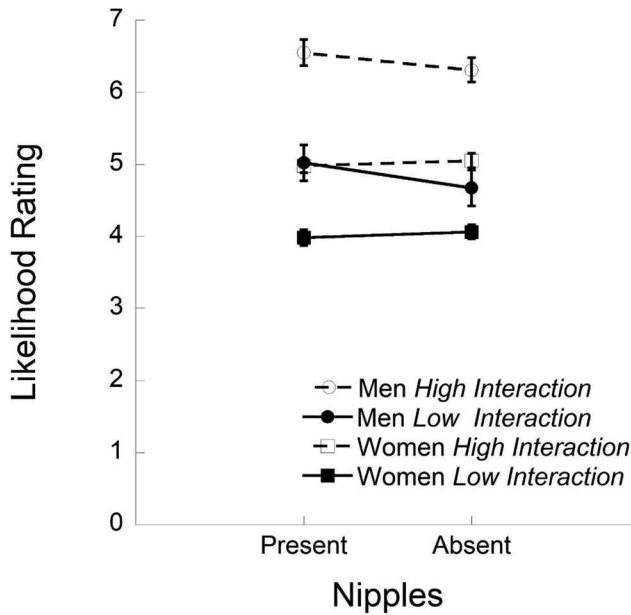
that entail significant interaction with the stimulus woman (e.g., pick her up if she is hitchhiking, tutoring her for a class) and those that did not (e.g., lend her your car, house sit for her; see Table 2 for a complete list of acts). The intended altruistic act “do her a favor” was not used because it did not imply a level of interaction. These two composites were then analyzed using a $2 \times 2 \times 2$ repeated measures ANOVA similar to the previous analysis, with sex as the between-subjects factor and NE (present vs.

absent) and level of interaction (high vs. low) as within-subjects effects. The results indicated that all of the main effects were significant (all F s > 11.92, all p s < .00, all η_p^2 s > .028). It also revealed that the two-way interactions between NE and sex, $F(1, 417) = 36.14, p < .001, \eta_p^2 = .08$, and Interaction and sex, $F(1, 417) = 8.06, p = .005, \eta_p^2 = .019$, were significant. Finally, the three-way interaction was significant, $F(1, 417) = 3.94, p = .048, \eta_p^2 = .009$.

Table 2
High- and Low-Interaction Intended Altruism Composite Items

Category/item	Cronbach's α
High interaction	.944
You are doing very well in a class (all A's). She is not. Would you tutor her?	
You see her car broken down on the side of the road. Would you stop to help?	
You see her hitchhiking. Would you pick her up?	
You see her having trouble swimming. You do not swim well. Would you swim out to help?	
Would you share food if you are both hungry?	
Low interaction	.945
Would you lend her \$100?	
Would you loan her your car?	
Would you house sit for her?	

Figure 2
Average Rated Likelihood of High-Interaction and Low-Interaction Altruism for Men and Women



Note. Error bars represent standard error of the mean.

The significant three-way interaction among NE, sex, and level of interaction is shown in Figure 2. Planned comparisons, using Tukey's correction, revealed that for both high and low interaction, men's likelihood of altruistic behavior, both high interaction and low interaction, decreased significantly absent erect nipples. For women, there was no difference between erect and nonerect nipples for either the high- or low-interaction altruism.

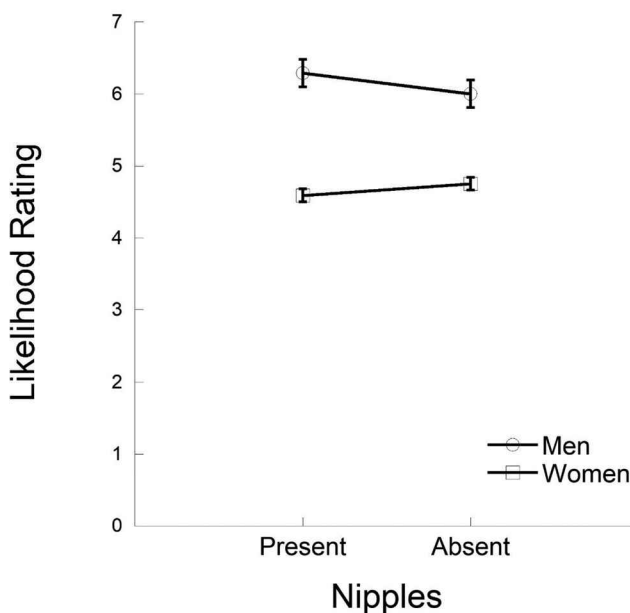
For the final analysis, a composite score was formed of the items that suggested that the participant was willing to add the stimulus woman to their social network (e.g., become friends, choose her for a project at work; see Table 3 for the complete list of items). This was then analyzed as a 2×2 repeated-measures ANOVA with sex serving as a

between-subjects factor and NE (present vs. absent) serving as a within-subjects factor. The results indicated a significant main effect of sex, $F(1, 417) = 49.80, p < .001, \eta_p^2 = .107$, and a significant interaction of NE and sex, $F(1, 417) = 30.93, p < .001, \eta_p^2 = .069$. The main effect of NE was not significant, $F(1, 417) = 1.83, p = .18$. Figure 3 shows the two-way interaction between NE and sex. Post hoc Tukey's tests revealed that for both men and women, there were significant differences between the presence of NE and inclusion, with men showing greater inclusion of the stimulus woman with erect nipples and women showing lesser inclusion for the stimulus woman with erect nipples.

Table 3
Social Inclusion Composite Items

Category/item	Cronbach's α
Social inclusion	.936
Would you be friends with her?	
Would you live with her?	
You must choose people for an important project at work. Would you choose her?	

Figure 3
Average Rated Likelihood of Social Group Inclusion for Men and Women



Note. Error bars represent standard error of the mean.

Discussion

These results clearly suggest that men perceive women with nipple erection as more deserving of altruism, especially if that altruism involves greater interaction with the woman, and that they expect these same women to behave more altruistically toward them. They additionally believe that women with erect nipples deserve to be included into their social groups. Women, on the other hand, perceive other women with erect nipples very differently. They do not perceive them as deserving of greater altruistic behaviors; neither do they expect greater altruistic behaviors from them. Finally, they do not want to include them into their social groups relative to women without erect nipples.

Although men reported an increase in the likelihood of altruistic acts when the women displayed NE, men in general responded with a greater likelihood of altruistic acts relative to women, regardless of NE. However, rather than suggesting that women are less altruistic than men, it may be the case that the men's motives were not completely free of benefit to them. Men showed the greatest likelihood of performing an altruistic act when that

act entailed significant interaction with the woman. That is, if the man could reasonably expect to be in greater contact with the woman, he was more likely to behave altruistically. This suggests that the man may be anticipating some greater return in his investment, especially a possible reproductive reward. This provides further support for the hypothesis that NE serves as a signal of sexual arousal and interest.

That men expect greater altruistic acts from women with erect nipples is further support that men perceive these women as more attractive. Given that altruistic acts are generally seen as positive, socially desirable behaviors, the enhancement of these acts may be taken as the application of the halo effect (Eagly et al., 1991). This finding is consistent with previous research where men make more positive attributes to attractive women relative to less attractive women (e.g., Bak, 2010). These findings also support the sexual overperception bias (Haselton, 2003); these men may perceive these women as sexually interested in them and more likely to behave altruistically toward them because of this sexual interest. Importantly, the images of the women only differed in NE. That

is, the same woman was depicted both with and without NE. Therefore, we can surmise that the NE itself allowed for this effect and, more importantly, that men found the erect nipples enough to, by themselves, enhance the attractiveness of the woman.

Limitations

As mentioned in a previous study by Burch and Widman (2020), none of this work has examined the response to male NE. Likewise (see the following text), there are several other possibilities for other stimulus materials (men, older women, unattractive women, etc.) to examine the limits of this effect. For this study specifically, a larger variation of altruistic scenarios, with a greater variation of interactions, could have provided more insight. There were only a few scenarios that depicted significant (i.e., life risking) altruism. It would be interesting to see just how far men are willing to behave altruistically for women (with and without NE).

Another interesting question is how this study applies to the environment of evolutionary adaptedness. So that nipple erection was not conflated with nudity, only women who were fully clothed in opaque clothing were used as stimuli in this study. In an ancestral environment, this would be a rare sight. Because clothing obscures other salient features of the breast, such as nonerect nipples and areolae, it would be interesting to determine whether the effect of nipple erection endures when nude women are used as stimuli. In addition, several studies have examined various aspects of bare breast and areolae shape and size (Dixon et al., 2011, 2015; Furnham & Swami, 2007; Pazhoohi et al., 2020; Swami & Tovée, 2013; Zelazniwicz & Pawlowski, 2011), including attractiveness to the opposite sex. Each of these features must be considered if bare breasts are studied in future research. These preferences, and how they differ by sex, must be incorporated into future research to remove confounding variables. Therefore, this study isolated changes in the stimuli to erect or nonerect (but covered) nipples.

Another issue is that of breastfeeding women. Women who are pregnant or breastfeeding experience breast and nipple/areolae changes (Geddes, 2009) and changes in the nipples from breastfeeding (Ziemer & Pigeon, 1993). However, while there are distinct differences in the breasts' reaction to sexual arousal throughout pregnancy and postpartum, Masters and Johnson (1966) reported no difference in the reaction of the nipples (admittedly,

their sample was very small). It is not yet known how men and women react to nipple erection in these breasts or what they are perceived to signal. Additionally, it is fully expected that the knowledge that a woman has a child or is pregnant will affect several aspects of attractiveness and altruism.

Future Research

Although this study is the first to examine this phenomenon, it reflects other research on male sexual strategies, particularly altruism, and the male sexual over perception bias (Haselton & Buss, 2000) in expecting altruism from women with NE. If NE signals arousal, as argued by Masters and Johnson (1966; and supported by Burch and Widman (2020) and this study), NE can be used in a number of studies to examine male sexual responses and female intrasexual competition. For example, how women respond to intrasexually competitive scenarios would be an important addition to the important work on female competition (Fisher, 2017). Even nonsexual competitive contexts would be interesting; as we can see from this study, women do not want these women in their social groups, even when these groups are for work or other tasks.

Research on male responses can be furthered to test the limits of this "altruism," or whether men will report expecting sexual "reward" for their behavior. Moreover, what do women think of this "altruism"? We already know that Kawamura and Kusumi (2017) found that men who helped young women were perceived as having a selfish motivation and would expect the same with target women having NE. This research should also expand into specific male sexual strategies and how they shift with NE in target women, for example, whether male strategies become more aggressive or sexually assertive. Other studies have shown that men are more willing to behave sexually aggressively toward objectified women (Bevens & Loughnan, 2019).

Further research also needs to parse out whether male expectations are better explained by the halo effect or the sexual overperception bias. Do men expect more altruistic behaviors from women because they perceive them as kind people or because they believe the women want to seduce them? Future studies should ask men if they perceive these women to be kind and altruistic to others as well as specific questions regarding their perceived sexual interests. We would predict, given

that nipple erection is a sign of sexual arousal, that the sexual overperception bias better explains these perceptions.

In addition, all the stimulus materials used depicted young women with attractive bodies. No work has yet been done to examine the limits of the “nipple erection effect.” Does it shift with older, larger, or less attractive women? Additionally, all photos had the faces obscured. What happens when the target women have differing facial cues, such as anger or disgust? In total, this study generates several questions and opens many new avenues for attractiveness, sexual strategy, competition, and altruism research.

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