

Men and Women with Bisexual Identities Show Bisexual Patterns of Sexual Attraction to Male and Female “Swimsuit Models”

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Abstract Do self-identified bisexual men and women actually show bisexual patterns of sexual attraction and interest? To answer this question, I studied bisexual men’s and women’s sexual attraction to photographed male and female “swimsuit models” that varied in attractiveness. Participants (663 college students and gay pride attendees, including 14 self-identified bisexual men and 17 self-identified bisexual women) rated their degree of sexual attraction to 34 male and 34 female swimsuit models. Participants’ viewing times to models were unobtrusively assessed. Results showed that bisexual men and women showed bisexual patterns of attraction and viewing times to photo models, which strongly distinguished them from same-sex heterosexual and homosexual participants. In contrast to other groups, which showed evidence of greater male than female category specificity, bisexual men and women did not differ in category specificity. Results suggest that there are subsets of men and women who display truly bisexual patterns of sexual attraction and interest.

Keywords Bisexuality · Category specificity · Sex differences · Sexual attraction · Sexual orientation · Viewing times

Introduction

Contemporary sex researchers and lay people have wondered about the nature of bisexuality and, at times, even questioned its very existence. While acknowledging that many individuals label themselves as bisexual, both researchers and lay people have sometimes questioned whether such individuals show

equal or near-equal degrees of attraction to men and women (Fox, 2004; Rust, 2002). Common stereotypes have often expressed skepticism about how “bisexual” bisexuals really are—portraying bisexual women as “mostly heterosexual” women who are experimenting with their sexuality and bisexual men as “really gay men” who haven’t fully acknowledged their homosexuality (Rust, 2002; Stokes, Damon, & McKirnan, 1997).

In an apparent empirical confirmation of the latter stereotype, Rieger, Chivers, and Bailey (2005) reported, in a much publicized study, that self-identified bisexual men resembled homosexual men more than heterosexual men in their patterns of genital arousal—i.e., bisexual men tended to respond more to sexually evocative images of men than to images of women—findings supported by earlier studies as well (e.g., Tollison, Adams, & Tollison, 1979). However, more recent studies have qualified Rieger et al.’s conclusion, showing that some bisexual men do, in fact, display bisexual patterns of sexual arousal and interest, which distinguish them from both heterosexual and homosexual men (Cerny & Janssen, 2011; Rosenthal, Sylva, Safron, & Bailey, 2011; see also Ebsworth & Lalumière, 2012, who provided data for both bisexual men and women). Thus, a central empirical question about bisexuality has received inconsistent answers for men, and relatively few answers for women: Do some self-identified bisexual individuals display truly bisexual patterns of sexual attraction, interest, and arousal?

The scientific study of bisexuality can be placed in the broader context of recent research on the category specificity of sexual attraction. Many recent studies have shown that men, on average, display greater category specificity than women do (Chivers, 2005; Chivers, Rieger, Latty, & Bailey, 2004; Chivers, Seto, & Blanchard, 2007; Imhoff et al., 2010; Israel & Strassberg, 2009; Lykins, Meana, & Strauss, 2008; Lippa, 2006, 2007; Suschinsky, Lalumière, & Chivers, 2009). Specifically, men tend to be sexually aroused by one sex but not by the other, they tend to attend to sexual images of one sex considerably more than to images of the other sex, and they typically report sexual attraction to either one sex or

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the other, but not to both. In contrast, women tend to display more nearly equal amounts of arousal and attention to sexual images of the two sexes, and, more than men, they report some degree of sexual attraction to both sexes. By implication, such findings suggest that women may be more likely than men to show genuinely bisexual patterns of sexual attraction and arousal.

In an attempt to assess the category specificity of sexual attractions in a novel and unobtrusive way, Lippa, Patterson, and Marelich (2010) recently developed an experimental paradigm that offers a promising new route to studying the nature of bisexuality in men and women. In this paradigm, participants viewed photographs of male and female swimsuit models, of varying levels of attractiveness, and they rated their degree of sexual attraction to models (thereby providing an explicit measure of sexual attraction to each sex). Simultaneously, participants' viewing times to models were unobtrusively assessed (providing a covert, implicit measure of sexual interest in models). In this paradigm, category specificity was defined in terms of how much participants' sexual attractions and viewing times were a function of model sex and model attractiveness. The swimsuit model paradigm moves beyond previous research by considering the joint impact of model sex and model attractiveness on sexual attraction and interest and by assessing the category specificity of sexual attraction in two different ways: (1) in terms of the "main effect" of target sex on sexual attraction and viewing times, and (2) in terms of the interactive effects of target sex and target attractiveness on sexual attraction and viewing times. A strong "main effect" of target sex on sexual attraction and interest is taken as an indicator of strong category specificity. In addition, a strong target sex by target attractiveness interaction indicates strong category specificity, particularly when the pattern of interaction is such that sexual attraction rises steeply with target attractiveness for participants' preferred sex, but remains uniformly low for participants' nonpreferred sex.

In the swimsuit model paradigm, viewing times serve as the more "covert" measures of sexual interest—i.e., they are assumed to be less influenced by conscious impression management than self-reports of sexual attraction. Indeed, past research has consistently shown that viewing times to sexual images were related to viewers' levels of sexual interest and attraction, with viewers tending to look longer at stimuli they are sexually attracted to and interested in (Brown, Amoroso, Ware, Pruesse, & Pilkey, 1973; Israel & Strassberg, 2009; Laws & Gress, 2004; Quinsey, Ketssetzis, Earls, & Karamanoukian, 1996). Studies that specifically focused on the viewing times of heterosexual and homosexual individuals to sexually evocative images of men and women showed that heterosexual men and women tended to look longer at images of opposite-sex individuals than at images of same-sex individuals, whereas homosexual men and women tended to show the reverse pattern (Israel & Strassberg, 2009; Lippa, 2012; Lippa et al., 2010; Rullo, Strassberg, & Israel, 2010). These studies also found sex differences in category specificity—i.e., both heterosexual and homosexual men tended to look considerably longer at images of their preferred sex than at images of their nonpreferred sex,

whereas heterosexual and homosexual women tended to show smaller differences in the amount of time they spent looking at images of their preferred and nonpreferred sexes (Imhoff et al., 2010; Israel & Strassberg, 2009; Lippa, 2012; Lippa et al., 2010; Wright & Adams, 1999).

In the swimsuit model paradigm, the most straight-forward demonstration of greater male than female category specificity consists of showing that men display much larger differences than women in their self-reported sexual attraction and viewing times to male versus female models. Such patterns have been repeatedly found, both for heterosexual and homosexual participants (Lippa, 2012). The current research extended these findings by investigating whether these patterns generalized to self-identified bisexual men and women. If bisexual individuals show sex-typical patterns, then we would expect bisexual men to show greater category specificity than bisexual women. However, if bisexual individuals show patterns of sexual attraction and sexual interest that are consistent with their sexual identities, then we would expect instead that both bisexual men and women would show low category specificity.

In the swimsuit model paradigm, a second and more subtle demonstration of greater male than female category specificity consists of demonstrating sex differences in the pattern of interaction between target sex and target attractiveness. For example, men display high category specificity when their self-reported attractions to their preferred sex increase steeply with model attractiveness, while their attractions to their nonpreferred sex remain relatively low and "flat" across models of different levels of attractiveness. In contrast, women show lower category specificity when their sexual attractions increase substantially with model attractiveness for both their preferred and nonpreferred sexes. Such sex differences in interaction patterns have been demonstrated, for both heterosexual and homosexual participants (Lippa, 2012; Lippa et al., 2010). Lippa et al. (2010) explained these sex differences in terms of classic learning theories, which propose that drive states "energize" dominant responses more than nondominant responses (Hull, 1943; Spence, 1956; Zajonc, 1965). Men are hypothesized to have strongly dominant attractions to one sex and strongly nondominant attractions to the other sex, whereas women are hypothesized to have same-sex and other-sex attractions that are less strongly segregated into dominant and nondominant attractions. Because of this, model attractiveness "energizes" men's attraction to their dominant sex but not their attraction to their nondominant sex, whereas model attractiveness "energizes" women's attractions to both sexes (Lippa et al., 2010; see also Lippa, 2006, 2007).

What patterns of target sex by target attractiveness interactions might be expected in bisexual men and women? The answer depends on whether or not self-identified bisexual individuals, in fact, display bisexual patterns of attraction. If bisexual men showed a pattern similar to heterosexual men (i.e., their attraction to women increased with women's attractiveness, but their attraction to men was low and unrelated to men's attractiveness), then

researchers could reasonably infer that bisexual men, like heterosexual men, are more strongly attracted to women than to men. Conversely, if bisexual men showed the reverse pattern—common to homosexual men—that attractions to men climbed steeply with model attractiveness, whereas attractions to women were consistently low regardless of women’s attractiveness levels, then researchers could infer that bisexual men, like homosexual men, are more strongly attracted to men than to women. The same reasoning applies to women, with the proper changes made for their preferred and nonpreferred sexes.

There is, of course, another possibility. If bisexual individuals are truly category nonspecific—consistent with their sexual identities—then they should not show the target sex by target attractiveness interactions shown by other groups or they should show them more weakly than other groups. The absence of such interactions would provide strong and subtle evidence that bisexual individuals do not show the category specificity shown by other groups of men and women. The study reported here used the swimsuit model paradigm to probe, in various ways, the category specificity of sexual attractions in self-identified bisexual men and women, to test among the empirical possibilities just listed, and to compare patterns of sexual attraction and interest in bisexual men and women with corresponding patterns shown by same-sex heterosexual and homosexual individuals.

Method

Participants

Participants were 519 Southern California college students (180 men and 339 women) and 144 volunteers solicited at the 2010 gay pride festival in Long Beach, California (97 men and 46 women). The college student sample included 166 heterosexual, 8 bisexual, and 6 homosexual men and 315 heterosexual, 14 bisexual, and 10 lesbian women. The gay pride sample included 10 heterosexual, 6 bisexual, and 81 homosexual men and 9 heterosexual, 3 bisexual, and 33 lesbian women. These classifications were based on participants’ self-reported sexual identities. Because results proved to be very similar for college students and gay pride attendees, the two samples were combined to increase the statistical power of analyses.

Procedure

Participants completed a questionnaire and a photograph rating task, both presented by computer. Demographic questions included the item: “What is your sexual orientation,” with four response options: (1) heterosexual (“straight”), (2) homosexual man, (3) lesbian, and (4) bisexual.

College students responded to questions and the photo-rating task while sitting before the monitor of a desktop computer in a laboratory room. Gay pride volunteers sat at a table at a canopied

booth and responded to questions and the photo rating task via laptop computers. The photo rating task asked participants to rate their degree of sexual attraction to 68 “swimsuit models” (34 males and 34 females) that varied in their pretested levels of attractiveness (for details, see Lippa et al., 2010). In some of the analyses that follow, male photo models and female photo models were ordered in attractiveness, based on the mean sexual attraction ratings made by the 519 college student participants in the current study.

Participants answered questionnaire items and rated swimsuit model photographs in a computer-run experiment that was implemented using MediaLab Research Software (Version 2008.1.21; Empirisoft Corporation, 2006). The photo rating task was presented at the end of the experimental session. Participants rated individual photographs on a scale ranging from 1 (“I am not at all sexually attracted to this person”) to 7 (“I am extremely sexually attracted to this person”). During a given rating session, photos of male and female models were interspersed and the 68 photos were presented in a unique random order to each participant. MediaLab software recorded participants’ sexual attractiveness ratings for each photograph and the amount of time in milliseconds that participants spent viewing each photograph—i.e., the length of time from when a photo first appeared to when the participant rated the sexual attractiveness of that photo.

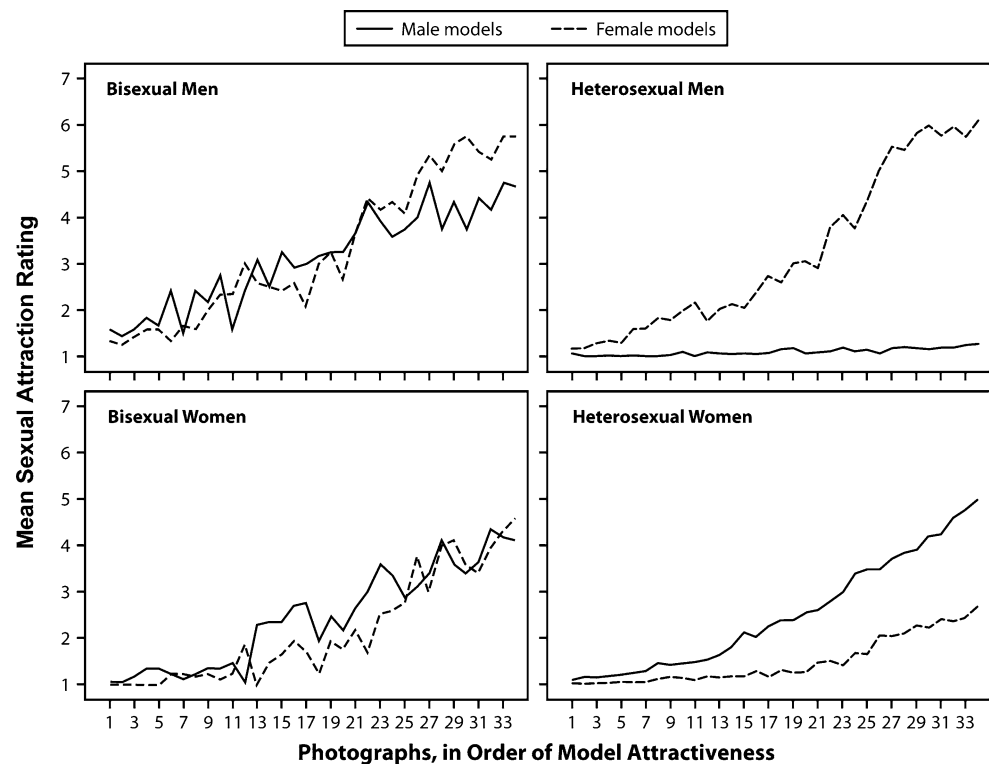
Results

Bisexual Men’s and Women’s Sexual Attraction to Photo Models as a Function of Target Sex and Attractiveness

Figure 1 presents graphs of mean sexual attraction to male and female models for bisexual men (top left panel) and bisexual women (bottom left panel). In these graphs, photographs are ordered in terms of model attractiveness from least attractive (left side of graph) to most attractive models (right side) within each target sex. Graphs show participants’ sexual attraction to photo models as a function of target sex and target attractiveness.

The top left panel of Fig. 1 shows that bisexual men’s sexual attraction to male and female photo models overlapped substantially and that their attraction to both sexes increased steadily with model attractiveness. Bisexual men tended to report slightly greater attraction to male than female models at lower levels of model attractiveness, but slightly greater attraction to female than male models at higher levels of attractiveness; however, this interaction was weak compared to corresponding interactions shown by heterosexual and homosexual men in past studies (Lippa, 2012; Lippa et al., 2010; see top right panel of Fig. 1 for data from heterosexual men in the current study). A 2×34 (target sex \times target attractiveness) repeated-measures ANOVA on the sexual attraction ratings of bisexual men showed a nonsignificant main effect for target sex, $F(1, 11) < 1$, a significant main effect for target attractiveness, $F(33, 363) = 18.85, p < .001$, partial $\eta^2 = .63$, and a

Fig. 1 Bisexual men's and women's (*left panels*) and heterosexual men's and women's (*right panels*) mean sexual attraction to "swimsuit models" as a function of target sex and target attractiveness



significant interaction between target sex and target attractiveness, $F(33, 363) = 1.92, p = .002, \text{partial } \eta^2 = .15$.

The corresponding graph for bisexual women (bottom left panel of Fig. 1) shows that bisexual women's sexual attraction to male and female photo models also overlapped substantially. Overall, bisexual women tended to show a weak preference for men over women, which was most pronounced for models of intermediate attractiveness. This interaction effect was unlike the corresponding interactions shown by heterosexual women and lesbians in past studies (Lippa, 2012; Lippa et al., 2010; see bottom right panel of Fig. 1 for data from heterosexual women in the current study). A 2×34 (target sex \times target attractiveness) repeated-measures ANOVA on the sexual attraction ratings of bisexual women showed a nonsignificant main effect for target sex, $F(1, 16) = 2.27$, a significant main effect for target attractiveness, $F(33, 528) = 18.66, p < .001, \text{partial } \eta^2 = .54$, and a significant interaction between target sex and target attractiveness, $F(33, 528) = 1.67, p = .01, \text{partial } \eta^2 = .09$.

Sexual Attraction to Photo Models as a Function of Target Sex and Attractiveness: Comparing Bisexual Men and Women with Same-Sex Heterosexuals

The previous analyses focused on just bisexual participants, showing nonsignificant main effects for target sex in the sexual attraction ratings of bisexual men and women. These findings were in clear contrast to previous findings for heterosexual men and women, who both showed strong main effects for target attractiveness. Although the sexual attraction ratings of bisexual men

and women showed significant target sex by target attractiveness interactions, these interactions appeared to be considerably weaker than corresponding interactions shown in previous data from same-sex heterosexuals, and, in the case of women, the interaction did not take the form predicted by learning theories, based on the assumption that participants had a preferred and nonpreferred target sex.

To test directly whether the pattern of target sex main effects and target sex by target attractiveness interactions differed between same-sex bisexual and heterosexual participants, I conducted two $2 \times 2 \times 34$ (bisexual versus heterosexual \times target sex \times target attractiveness) repeated-measures ANOVAs on sexual attraction ratings of men (first ANOVA) and women (second ANOVA). Because the purpose of these analyses was to assess if same-sex bisexual and heterosexual participants showed differences in the magnitude of target sex main effects and differences in the pattern of target sex by target attractiveness interactions, I report here just the ANOVA results relevant to these questions: (1) the two-way interaction between sexual orientation and target sex, and (2) the three way interaction among sexual orientation, target sex, and target attractiveness.

For men, the ANOVA yielded a significant two-way interaction between sexual orientation and target sex, reflecting the fact that heterosexual men showed a stronger main effect for target sex than bisexual men did, $F(1, 179) = 52.42, p < .001, \text{partial } \eta^2 = .23$ (see top panels of Fig. 1). There was also a significant three-way interaction among sexual orientation, target sex, and target attractiveness, reflecting the fact that heterosexual men displayed a stronger target sex by target attractiveness interaction than bisex-

ual men did, $F(33, 147) = 3.51, p < .001$, partial $\eta^2 = .44$ (again, see top panels of Fig. 1).

For women, there was similarly a significant two-way interaction between sexual orientation and target sex, reflecting the fact that heterosexual women showed a stronger main effect for target sex than bisexual women did, $F(1, 338) = 12.69, p < .001$, partial $\eta^2 = .04$ (see bottom panels of Fig. 1). There was also a significant three-way interaction among sexual orientation, target sex, and target attractiveness, reflecting the fact that heterosexual women displayed a different sex by target attractiveness interaction than bisexual women did, $F(33, 306) = 2.63, p < .001$, partial $\eta^2 = .22$ (see bottom panels of Fig. 1), with the interaction pattern for heterosexual women but not bisexual women taking the form predicted by classic learning theories.¹

Viewing Times to Photo Models for Bisexual Men and Women

As in the Lippa et al. (2010) study, raw viewing times included a small number of outlier values. To reduce the impact of outliers and reduce error variance, viewing time data were winsorized by capping individual viewing times at 15 s. Averaged across all photographs, less than 1 % of raw viewing times were greater than this value.

Figure 2 presents graphs of bisexual participants' mean viewing times to male and female models for bisexual men (top left panel) and for bisexual women (bottom left panel). In these graphs, photographs are again ordered in terms of model attractiveness from least attractive to most attractive models within each target sex.

The top left panel of Fig. 2 shows that bisexual men's viewing times to male and female photo models overlapped substantially, with a slight preference for male over female models, and attraction to both sexes increased with model attractiveness. Confirming these patterns, a 2×34 (target sex \times target attractiveness) repeated-measures ANOVA on bisexual men's viewing times showed a significant main effect for target sex, $F(1, 13) = 7.21, p = .02$, partial $\eta^2 = .36$, a significant main effect for target attractiveness, $F(33, 429) = 1.77, p < .01$, partial $\eta^2 = .12$, and a nonsignificant interaction between target sex and target attractiveness, $F(33, 429) < 1$.

¹ When corresponding analyses compared the sexual attraction ratings of bisexual men and women with those of same-sex homosexual men and women, homosexual men and women showed greater category specificity than same-sex bisexual individuals. A $2 \times 2 \times 34$ (bisexual versus homosexual \times target sex \times target attractiveness) repeated-measures ANOVAs on sexual attraction ratings of men yielded a significant two-way interaction between sexual orientation and target sex, reflecting the fact that homosexual men showed a stronger main effect for target sex on their sexual attraction ratings than bisexual men did, $F(1, 94) = 63.18, p < .001$, partial $\eta^2 = .40$. The corresponding interaction for women also yielded a significant two-way interaction between sexual orientation and target sex, reflecting the fact that lesbian women showed a stronger main effect for target sex on their sexual attraction ratings than bisexual women did, $F(1, 58) = 31.85, p < .001$, partial $\eta^2 = .36$.

Bisexual women's viewing times to male and female photo models also overlapped substantially, and their viewing times increased with model attractiveness (see bottom left panel of Fig. 2). A 2×34 (target sex \times target attractiveness) repeated-measures ANOVA on the viewing times of bisexual women showed a nonsignificant main effect for target sex, $F(1, 16) < 1$, a significant main effect for target attractiveness, $F(33, 528) = 3.46, p < .001$, partial $\eta^2 = .18$, and a nonsignificant interaction between target sex and target attractiveness, $F(33, 528) < 1$.

Viewing Times to Photo Models as a Function of Target Sex and Attractiveness: Comparing Bisexual Men and Women with Same-Sex Heterosexuals

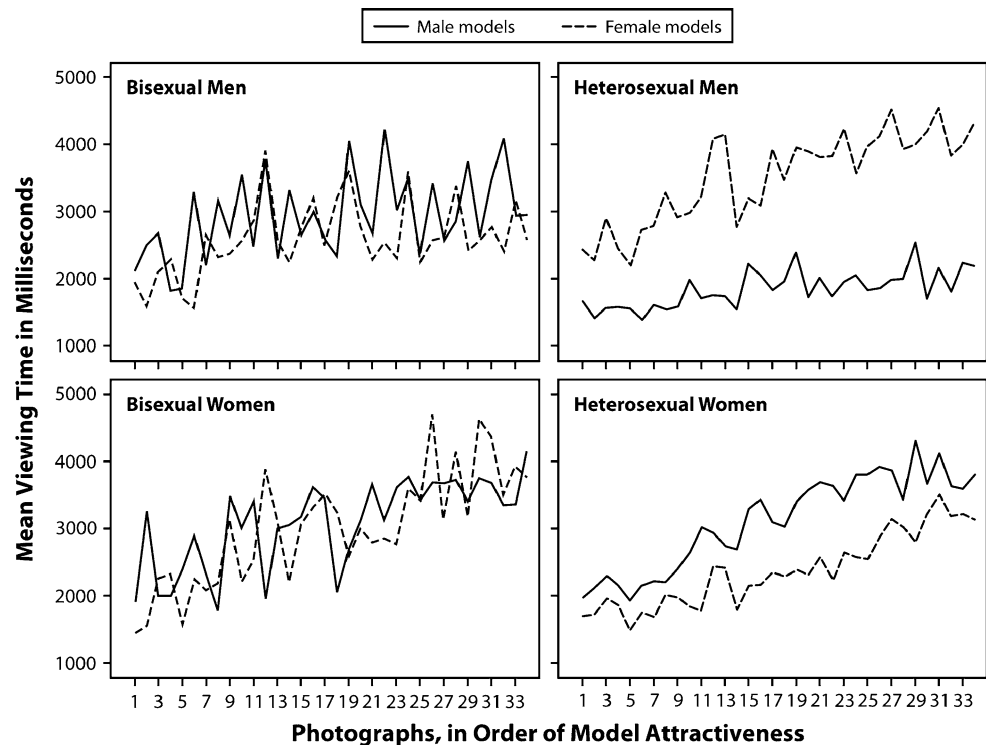
The previous analyses showed that the viewing times of bisexual men showed a weak but significant main effect for target sex, whereas the viewing times for bisexual women showed a nonsignificant main effect for target sex. In addition, the viewing times of both bisexual men and women showed nonsignificant target sex by target attractiveness interactions. To test directly whether the pattern of target sex main effects and target sex by target attractiveness interactions differed for same-sex bisexual and heterosexual participants, I conducted two $2 \times 2 \times 34$ (bisexual versus heterosexual \times target sex \times target attractiveness) ANOVAs on the viewing times of men (first ANOVA) and women (second ANOVA). Because the purpose of these analyses was to assess if bisexual and heterosexual participants showed differences in the magnitude of target sex main effects and differences in the pattern of target sex by target attractiveness interactions, I report here just the ANOVA results relevant to these questions.

For men, there was a significant two-way interaction between sexual orientation and target sex, reflecting the fact that heterosexual men showed a stronger main effect for target sex on viewing times than bisexual men did, $F(1, 188) = 38.19, p < .001$, partial $\eta^2 = .17$ (see top panels of Fig. 2). There was a marginally significant three-way interaction among sexual orientation, target sex, and target attractiveness, reflecting the fact that heterosexual men tended to show a stronger target sex by target attractiveness interaction than bisexual men did, $F(33, 156) = 1.37, p = .10$, partial $\eta^2 = .23$.

For women, there was a significant two-way interaction between sexual orientation and target sex, reflecting the fact that heterosexual women showed a stronger main effect for target sex on viewing times than bisexual women did, $F(1, 339) = 8.13, p = .005$, partial $\eta^2 = .02$ (see bottom panels of Fig. 2). For women, the three-way interaction among sexual orientation, target sex, and target attractiveness was nonsignificant, $F(33, 307) = 1.18$.²

² When corresponding analyses compared bisexual men's and women's viewing times with those of same-sex homosexual men and women, homosexual men and women showed greater category specificity than same-sex bisexual individuals. A $2 \times 2 \times 34$ (bisexual versus homosexual \times target sex \times target attractiveness) repeated-measures ANOVAs on sexual attraction ratings of men yielded a significant two-way interaction between sexual orientation and target

Fig. 2 Bisexual men's and women's (*left panels*) and heterosexual men's and women's (*right panels*) mean viewing times to "swimsuit models" as a function of target sex and target attractiveness



Attraction to Men Versus Women in Heterosexual, Bisexual, and Homosexual Participants of Each Sex

The previous analyses showed that bisexual men and women reported nearly equal levels of attraction to male and female models, on average. However, these patterns could have resulted if some participants reported a preference for men over women while others reported a preference for women over men, with the result that these opposite preferences cancelled out when results were averaged over participants. To investigate this possibility, I constructed an index that assessed individuals' degree of attraction to male versus female photo models: the difference in a participant's self-reported sexual attraction to male and female models, averaged over 34 matched male–female model pairs—i.e., the most attractive male and female models, the second most attractive male and female models, and so on. Two indices were computed, one based on all 34 model pairs and the other on just the 10 most attractive male–female model pairs. These two indices were equally reliable. For the longer scale, Cronbach's α was .97 for all participants, .98 for men, and .94 for women; for the shorter scale, α was .98

for all participants, .98 for men, and .94 for women. In the analyses that follow, I used the index based on the 10 most attractive male–female model pairs, because it seemed reasonable to assume that individuals' degree of attraction to men versus women would be best assessed in terms of their responses to highly attractive images of the two sexes. In practice, the two indices yielded virtually identical results.

Figure 3 plots distributions of individuals' reported attraction to male versus female models for heterosexual, bisexual, and homosexual men (top panel) and for heterosexual, bisexual, and lesbian women (bottom panel). Although there was some overlap, the three sexual orientation groups were distinct in terms of their degree of attraction to men versus women. The overwhelming majority (98.3 %) of heterosexual men reported more attraction to female than male models. A large majority of heterosexual women (86.4 %) reported more attraction to male than to female models. All homosexual men reported more attraction to male than to female models, and almost all lesbians (91.1 %) reported more attraction to female than to male models. Relatively small majorities of bisexual men (57.1 %) and bisexual women (52.9 %) reported more attraction to opposite-sex than to same-sex models, and preference indices for both groups clustered around zero, indicating about equal attraction to male and female models.

To statistically test for group differences within each sex, I conducted two one-way ANOVAs (one for men and one for women) that compared the index of attraction to men versus women for heterosexual, bisexual, and homosexual/lesbian participants. The ANOVA for men showed that heterosexual, bisexual, and homo-

Footnote 2 continued

sex, reflecting the fact that homosexual men showed a stronger main effect for target sex on their viewing times than bisexual men did, $F(1, 99) = 12.98, p < .001$, partial $\eta^2 = .12$. The corresponding interaction for women also yielded a significant two-way interaction between sexual orientation and target sex, reflecting the fact that lesbian women showed a stronger main effect for target sex on viewing times than bisexual women did, $F(1, 59) = 13.85, p < .001$, partial $\eta^2 = .19$.

sexual men differed significantly, $F(2, 274) = 932.82, p < .001$, with respective group means of $-4.32, -.99$, and 3.60 . Post hoc comparisons showed that all pair-wise group differences were significant, both when equal group variances were and were not assumed. Differences between bisexual men and the other two groups were large ($d_s = 2.32$ for the bisexual–heterosexual comparison and 3.27 for the bisexual–homosexual comparison).

The corresponding ANOVA on women's data showed that heterosexual, bisexual, and lesbian women also differed significantly in their attraction to men versus women, $F(2, 383) = 145.86, p < .001$, with respective group means of $1.90, -.06$, and -2.46 . Post hoc comparisons again showed that all pair-wise group differences were significant, both when equal group variances were and were not assumed. Differences between bisexual women and the other two groups were large, but smaller than corresponding values for men ($d_s = 1.21$ for the bisexual–heterosexual comparison and 1.37 for the bisexual–lesbian comparison).

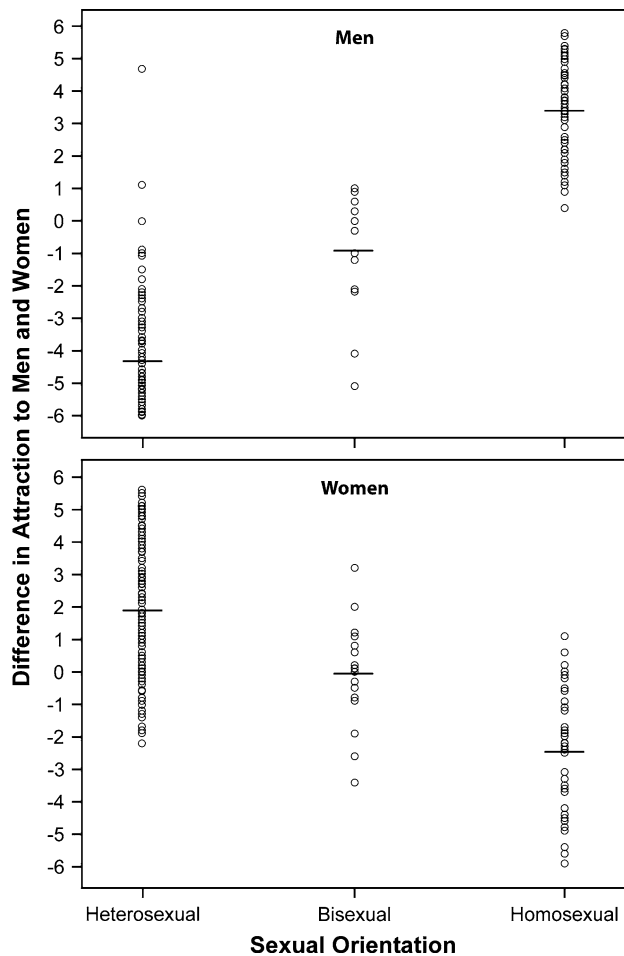


Fig. 3 Differences in sexual attraction to male and female models in heterosexual, bisexual, and homosexual men (*top panel*) and in heterosexual, bisexual, and homosexual women (*bottom panel*). *Horizontal bars* mark the means of each distribution

Time Viewing Men Versus Women in Heterosexual, Bisexual, and Homosexual Participants of Each Sex

To examine individuals' preferences for viewing men versus women, I computed the difference in the time individuals spent viewing male versus female models in matched male–female models pairs. Again, two indices were computed, one for all 34 male–female model pairs and one for the 10 most attractive male–female model pairs. This time, the two indices differed in reliability. The longer scale was more reliable (Cronbach's $\alpha = .91$ for all participants, $.91$ for men, $.80$ for women) than the shorter scale (corresponding values were $.82, .82$, and $.67$). Because of its higher reliability, the index based on all male–female model pairs was used in the following analyses.

Figure 4 plots differences in viewing times to male versus female models for heterosexual, bisexual, and homosexual men (*top panel*) and for heterosexual, bisexual, and lesbian women (*bottom panel*). Although there was some overlap, the three sexual orientation groups were generally distinct. The overwhelming majority of heterosexual men (92.6%) spent more time viewing female than male models, and a large majority of heterosexual women (83.0%) spent more time viewing male than female models. The overwhelming majority of homosexual men (95.4%) spent more time viewing male than female models, and a large majority of lesbians (82.2%) spent more time viewing female than male models. Most bisexual men (92.9%) and women (64.7%) spent more time viewing men than women. At the same time, bisexual men's and women's viewing time indices tended to cluster around zero, indicating that they spent about equal time spent viewing male and female models, despite their overall tendency to view male models longer than female models.

To statistically test for sexual orientation differences within each sex, I conducted two one-way ANOVAs (one for men and one for women) that compared the index of viewing-time preferences for heterosexual, bisexual, and homosexual/lesbian participants. The ANOVA for men showed that heterosexual, bisexual, and homosexual men differed significantly, $F(2, 274) = 125.07, p < .001$, with respective group means of $-1669.20, 343.16$, and 1561.97 ms. Post hoc comparisons showed that all pair-wise group differences were significant, both when equal group variances were and were not assumed. Differences between bisexual men and the other two groups were large ($d_s = 1.72$ for the bisexual–heterosexual comparison and 1.04 for the bisexual–homosexual comparison).

The corresponding ANOVA on women's data showed that heterosexual, bisexual, and lesbian women also differed significantly in their time spent viewing men versus women, $F(2, 383) = 56.43, p < .001$, with respective group means of $740.94, 78.41$, and -772.77 ms. Post hoc comparisons showed that all pair-wise comparisons were significant when equal variances were assumed. When equal variances were not assumed, all pair-wise comparisons were significant except for the comparison between heterosexual and bisexual women, which was marginally significant

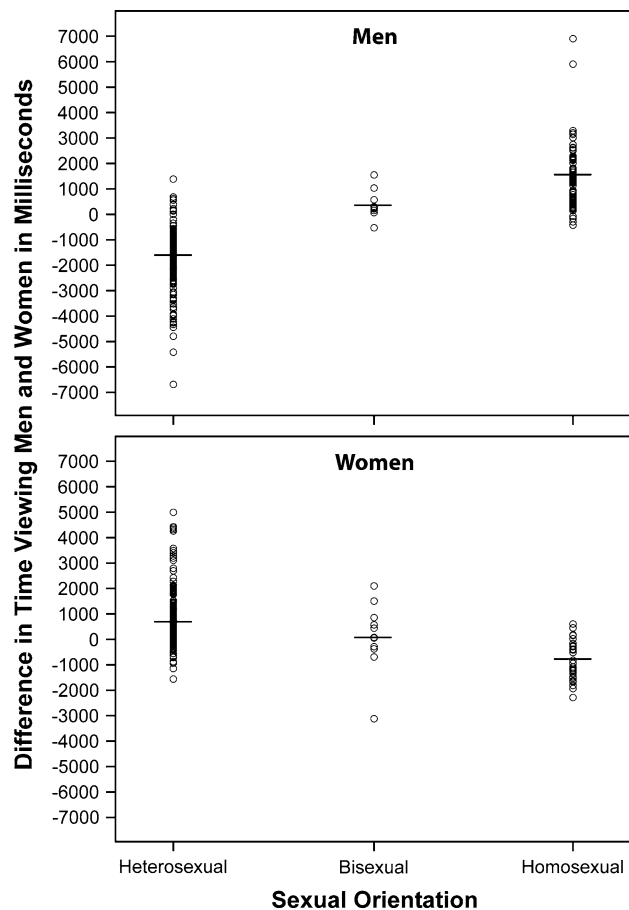


Fig. 4 Differences in viewing times to male and female models in heterosexual, bisexual, and homosexual men (*top panel*) and in heterosexual, bisexual, and homosexual women (*bottom panel*). Horizontal bars mark the means of each distribution

($p = .068$). Differences between bisexual women and the other two groups were moderate to large ($d_s = .71$ for the bisexual–heterosexual comparison and 1.01 for the bisexual–lesbian comparison).

Sex Differences in Category Specificity in Heterosexual, Bisexual, and Homosexual Participants

Previous research has shown that attractions to one’s preferred and nonpreferred sex tend to be more polarized in men than women, a sex difference present for both heterosexual and homosexual individuals (e.g., Lippa, 2006, 2012). However, bisexual men and women may not always have a “preferred” and “nonpreferred” sex. Thus, to assess category specificity in a comparable fashion across all sexual orientation groups, I computed the absolute value of the indices of attraction to male versus female models used in previous analyses. These indices measured the polarization of participants’ attractions to one sex versus the other, regardless of which sex was more preferred.

t -tests conducted on the absolute value index based on sexual attraction ratings showed that heterosexual men were much more category specific than heterosexual women, $t(498) = 18.64$, $p < .001$, $M = 4.38$ for heterosexual men and 2.06 for heterosexual women, $d = 1.75$. Similarly, homosexual men were more category specific than lesbian women, $t(130) = 3.95$, $p < .001$, $M = 3.60$ for homosexual men and 2.54 for lesbian women, $d = .73$. However, bisexual men and women did not differ significantly, $t(29) < 1$, $M = 1.43$ for men and 1.16 for women, $d = .21$.

t -tests conducted on the absolute value index based on viewing times showed again that heterosexual men were much more category specific than heterosexual women, $t(498) = 10.03$, $p < .001$, $M = 1,734.41$ ms for heterosexual men and 859.96 ms for heterosexual women, $d = .94$. Similarly, homosexual men were more category-specific than lesbian women, $t(130) = 3.66$, $p < .001$, $M = 1582.93$ ms for homosexual men and 874.71 ms for lesbian women, $d = .67$. However, bisexual men and women did not differ significantly, $t(29) = -1.03$, $M = 415.25$ ms for men and 667.13 ms for women, $d = -.37$.

Discussion

Results from the swimsuit model paradigm provided strong evidence that many of the self-identified bisexual men and women assessed in the current study did, in fact, show patterns of sexual attraction and interest that were consistent with their sexual identities. Furthermore, bisexual individuals’ patterns of attraction to the two sexes and their patterns of viewing times to images of the two sexes distinguished them strongly from same-sex heterosexual and homosexual individuals. The evidence that bisexual men and women differed from same-sex heterosexual and homosexual individuals took three complementary forms.

Target Sex Main Effects and Target Sex by Target Attractiveness Interactions in Bisexual Men and Women

Bisexual men’s and women’s sexual attraction and viewing time data showed weaker target sex main effects than corresponding data from heterosexual men, heterosexual women, homosexual men, and lesbian women have shown in past studies (e.g., Lippa, 2012; Lippa et al., 2010) and, in the current data, the target sex main effects were shown to differ significantly between bisexual individuals and heterosexual and homosexual individuals of the same sex. Thus, bisexual men and women tended not to show a strong tendency to express more attraction to one sex than to the other, unlike heterosexual and homosexual individuals of the same sex. Similarly, bisexual men and women did not show much of a tendency to view models of one sex longer than models of the other sex.

To the extent that bisexual men showed a target sex by target attractiveness interaction in their sexual attraction ratings, their attractions to women rose more steeply with attractiveness than

their attractions to men did, suggesting that they may have been slightly more attracted to women than to men. This conclusion is tempered, however, by the simultaneous finding that bisexual men showed a weak but significant tendency to look longer at male than at female models.

Overall, bisexual men and women showed weak interactions between target sex and target attractiveness in their sexual attraction data, and no interactions between target sex and target attractiveness in their viewing time data. Furthermore, target sex by target attractiveness interactions in sexual attractions ratings were weaker in bisexual individuals than in same-sex heterosexuals. All these findings, taken together, suggest that bisexual men and women tended not to show much evidence of having a preferred sex and a nonpreferred sex, unlike heterosexual men and women and unlike homosexual men and women.

Indices of Relative Attraction to and Interest in Male and Female Photo Models

Analyses of indices that assessed individual participants' relative attraction to male and female models, both in terms of their sexual attraction ratings and in terms of viewing times, showed that bisexual participants differed strongly and significantly from same-sex heterosexual and homosexual participants in their relative attraction and viewing times to the two sexes. Heterosexual and homosexual participants showed considerably stronger attraction to their preferred sex than to their nonpreferred sex, whereas bisexual participants, on average, showed relatively equal attraction to male and female models. These patterns were present both for indices based on sexual attraction ratings (explicit measures of relative attraction, which may have sometimes reflected conscious attempts at self-presentation) and for indices based on viewing times (implicit measures, presumably not influenced by conscious impression management).

Sex Differences in Category Specificity were Present in Heterosexual and Homosexual Participants but not in Bisexual Participants

Consistent with previous research findings, strong sex differences in category specificity were present for heterosexual and homosexual participants, with men showing greater category specificity than women. However, sex differences were not present for bisexual participants, thus providing a noteworthy exception to the common finding that men strongly exceed women in category specificity.

Limitations to the Current Study and Directions for Future Research

The current results, like all recent research results on human bisexuality, may depend, in part, on the samples studied. In Rieger et al.'s

(2005) study, which found that bisexual men's patterns of genital arousal resembled those of homosexual men more than those of heterosexual men, bisexual participants were solicited via ads in "alternative" and gay-related publications in the Chicago area. Although the bisexual men in the Rieger et al. study self-identified as bisexual, they may not have had actual sexual experience with both sexes or romantic relationships with members of both sexes. Rosenthal et al.'s (2011) more recent study, which found evidence for bisexual patterns of genital arousal in bisexual men, recruited self-identified bisexual men from Internet personal ad lists for men seeking sex with both members of heterosexual couples. Men were not accepted as participants in the study unless they reported having both male and female sexual partners and romantic relationships with both men and women.

The current study assessed relatively large convenience samples of college students and attendees at a gay pride festival. Participants who labeled themselves as bisexual were then compared with participants who labeled themselves as heterosexual or homosexual. One virtue of the current strategy—particularly for the college student sample—is that the self-identified bisexual individuals were not solicited from limited and restricted populations, such as readers of alternative urban or gay-themed publications, individuals who place online sex ads, members of bisexual organizations, and so on. Given that bisexual participants in the current study were not selected based on their prior history of sexual and romantic relationships, it is perhaps all the more impressive that they did, on average, tend to show bisexual patterns of sexual attraction and viewing times, which strongly distinguished them from same-sex heterosexual and homosexual individuals. Furthermore, given that many participants in the current study were young college students, some of whom may not have fully consolidated their adult sexual identities, it is again impressive that self-identified bisexual participants did, on average, show bisexual patterns of sexual attraction and viewing times in the current study.

In Rosenthal et al.'s (2011) study, although self-identified bisexual men did, on average, show more genital arousal to images of their less-preferred sex than heterosexual and homosexual men did, they nonetheless showed about twice as much genital arousal to their preferred sex as to their nonpreferred sex. In other words, although bisexual men showed significant arousal to both sexes, they still tended to show considerably more arousal to one sex than to the other. In contrast, in the current study, self-identified bisexual individuals expressed about equal attraction to men and women, on average, and they viewed male and female photo models about equal amounts of time. At the same time, it should be noted that there clearly was variability among self-identified bisexual individuals. For example, Fig. 3 shows that there were two self-identified bisexual men who were solidly in the heterosexual range—i.e., they expressed much greater attraction to female than male models, and that there were two self-identified bisexual women who reported more extreme preferences for men over women than all the heterosexual women did. Interestingly, bisexual men and women tended to show less variability in their relative interest in

men versus women when relative interest was assessed via viewing time indices. With the exception of one self-identified bisexual woman whose viewing time preference for men over women was more extreme than that of all heterosexual women, most bisexual individuals clustered around zero in Fig. 4—i.e., they viewed male and female photo models about equal amounts of time.

Future research is warranted that replicates the current findings in other samples and compares results from the swimsuit model paradigm with results based on other sorts of measures (e.g., direct measures of genital arousal and measures of the activation of brain regions known to be related to sexual interest and arousal) (e.g., see Safron et al., 2007). Future research is also warranted that investigates bisexual individuals' patterns of sexual attraction and interest across cultures. Such research can address questions like: (1) do bisexual individuals' patterns of sexual attraction and viewing times to male and female models vary across cultures, and (2) are specific cultural and demographic factors (e.g., variations in gender roles, economic development, and religious ideologies) associated with cross-cultural variations in the patterns of sexual interest and attraction shown by self-identified bisexual men and women? Because the swimsuit model paradigm is easily administered and asks participants' to view and rate only mild sexual stimuli, it can potentially be used to collect data from large international samples via Internet surveys.

Whatever the outcome of future studies, the current findings offer a kind of "existence proof," showing that there are self-identified bisexual men and women in the United States who, in fact, display bisexual patterns of sexual attraction and interest. In this regard, the current study is consistent with other recent studies showing that there is a psychological and behavioral reality to the identity of "bisexual," and that self-identified bisexual individuals do, in fact, differ in measurable ways from self-identified heterosexual and homosexual individuals (Cerny & Janssen, 2011; Ebsworth & Lalumière, 2012; Lippa, 2008; Rosenthal et al., 2011).

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