


Functional inferences of mating orientations through body fat and sex-typical body features

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Abstract

Identifying reproductive opportunities and intrasexual rivals has necessitated the evolution of sensitivity to features diagnostic of mate value. In determining the presence of good genes through physical features, individuals may additionally infer targets' short- and long-term mating orientations. This study tested how individuals perceive men's and women's orientations through physical features conducive to reproductive goals. Participants evaluated mating orientations of male and female targets varying in size of sex-typical features (i.e., muscles or breasts) and adiposity. Greater adiposity connoted long-term mating orientations. Large muscles and breasts connoted short-term mating orientations. We frame results from an affordance management framework with respect to inferences regarding parental investment and intrasexual competition.

Keywords

Mate preferences, stereotyping, intrasexual competition, body perception

Identifying mates capable of facilitating reproductive goals is crucial, resulting in adaptations to identify mates with consonant mating strategies. This adaptive challenge is a signal detection problem. People infer others' mating intentions from limited information with a degree of uncertainty, resulting in an evolutionary advantage for increased acuity

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toward physical features consistent with mating goals (Haselton & Buss, 2000). Physically attractive features could be a basis for these perceptions, given perceptions of oneself as capable of employing certain strategies successfully (Lukaszewski & Roney, 2011). Attractive features that might facilitate these strategies include women's large breasts and men's muscularity. Such features connote receptivity toward short-term mating (STM), a strategy emphasizing promiscuity and physically attractive mates (Frederick & Haselton, 2007; Koscinski et al., 2020). Adiposity, a traditionally unattractive feature, connotes parental ability that could implicate individuals as preferring long-term mating (LTM) strategies that emphasize monogamy and biparental investment (Sacco et al., 2020; Tinlin et al., 2013). This study considered how such bodily features shape perceptions of mating orientations.

Judgments of mating strategies

Successful reproduction requires identifying mates who can facilitate goal acquisition, necessitating enhanced sensitivity to relevant features. Affordance detection is central to adaptive person perception, aiding individuals in identifying and approaching goal-congruent individuals while avoiding goal-incongruent individuals (Zebrowitz & Montepare, 2006). Perceptions appear rooted in identifying cues to affordances inferred through behaviors and physical features. Various behaviors appear diagnostic of mating orientation, such as prosociality connoting monogamous intent (Brown & Sacco, 2019). Nonetheless, such displays require time for perceivers to assess targets that could leave them vulnerable to missed opportunities or costs. Selection favored those capable of efficiently inferring behavioral intentions through physical features. For example, women use limbal rings to inform STM decisions (Brown & Sacco, 2018). These immediate first impressions rely on features indicating reproductive quality.

Recognizing others' capability to satisfy reproductive goals through physical features associated with mating strategies could lead to stereotypes of reproductive interests (Brown et al., 2021a, 2021b; Sng et al., 2020). Those deemed attractive by others perceive themselves as more attractive, calibrating them to employ STM strategies (Lukaszewski & Roney, 2011). Associations between attractiveness and STM success may shape perceptions of preferred mating strategies with attractive social targets being perceived as STM-oriented, informing whether prospective mates possess goal-congruent motives to the perceiver.

Contextual mate preferences

Humans utilize LTM and STM strategies to select mates exhibiting contextually desirable traits (Buss & Schmitt, 1993). Women's STM interest in muscular men appears rooted in perceiving dominance as indicating heritable fitness (Frederick & Haselton, 2007). Men's STM preferences center around female features connoting health, including large breasts (Zelazniewicz & Pawlowski, 2011), which could facilitate opportunities to produce healthy offspring (Koscinski et al., 2020). Conversely, individuals espouse aversion

toward adiposity to reduce contact with those vulnerable to health issues (Tinlin et al., 2013).

Within LTM, individuals prioritize mates able to facilitate monogamy. Women are less interested in muscularity for LTM because of its potential incompatibility with LTM (Lei & Perrett, 2021), given strong men's general promiscuity (Gallup et al., 2007). In addition to STM desirability, large breasts elicit perceptions of women as nurturing, a basis for LTM desirability (Dixson et al., 2015). Despite connoting poor health, adiposity augments perceptions of nurturance and potential LTM intentions (Sacco et al., 2020). The health connotation of large breasts with low adiposity could foster additional perceptions of heightened promiscuity (Koscinski et al., 2020; Zelazniewicz & Pawlowski, 2011). The unique combination of adiposity and breast size may conversely elicit judgments of women as LTM-oriented.

Men's muscularity may facilitate STM success and perceptions of STM orientation. Strong men typically employ more promiscuous strategies (Gallup et al., 2007). Conversely, heightened interest in infants is associated with reduced testosterone responses toward sexual stimuli (Zilioli et al., 2016), with fatherhood being associated with reduced testosterone. Given the testosterone implicated in muscularity, androgen-dependent cues may foster perceptions of men as non-monogamous. This perception could additionally align with accompanying reductions of testosterone within monogamous pairbonds that heighten adiposity (Gray et al., 2002). Thus, perceiving affordances through bodily cues could thus facilitate identifying goal-congruent mates and rivals.

Current research

This study investigated mating-related affordances through body compositions. As adiposity connotes parental ability, we predicted high-fat individuals would be perceived as LTM-oriented (Sacco et al., 2020). Large breasts' dual STM and LTM value led us to predict large-breasted women with high adiposity would be perceived as LTM-oriented, whereas low adiposity would foster perceptions of large-breasted women as STM-oriented.

Muscular men's STM success led us to predict muscular men would be perceived as STM-oriented, particularly with low body fat. We additionally considered potential differences in men and women's perceptions, given different functions these perceptions could serve (i.e., reproductive opportunities and intrasexual competition), in exploratory analyses.

Method

Participants

We recruited 312 undergraduates for course credit from a public university in Northwest Arkansas. Seventeen participants were excluded from final analyses for reporting non-opposite-sex attraction or being over 40 (Brown et al., 2020). This decision served to

reduce variability in reproductive goals that could influence findings ($n_{Final} = 295$; 208 women, 87 men; $M_{Age} = 18.82$, $SD = 1.32$; 79.7% White, 7.8% Hispanic, 5.8% Asian, 4.7% Black, 2% Other; 270 heterosexual, 25 bisexual). Sensitivity analyses indicated sufficient power for small effects for a mixed design with one between-subjects factor and three within-subjects factors ($f = 0.06$, $1-\beta = 0.80$). Participants responded to this study over 2 weeks and we sought to recruit at least 50 participants of both sexes.

Materials

Target bodies. Participants viewed four male and four female computer-generated bodies varying in bodily dimensions from UCLA Body Matrices in random order (Gray & Frederick, 2012; Figure 1). Matrices had eight levels of fat, with male bodies possessing four levels of muscularity and female bodies four levels of breast size. We utilized bodies two units away in each dimension from central bodies in matrices and selected bodies for high-fat and low-fat targets for both sexes with either small or large muscles or breasts (Sacco et al., 2020).¹

Affordance judgments. Participants evaluated the extent targets appeared interested in pursuing LTM and STM using single-item measures using two face-valid items, one for each context: “Short-term (Long-term) mating is when someone would be interested in casual dating or one-night stands (committed, romantic relationships). Overall, how interested do you think this person is in short-term (long-term) mating?” Both items operated along 7-point scales (1 = *Not at All*; 7 = *Very Much*) describing the goals of each context (Brown et al., in press).

Results

We conducted two 2 (Participant Sex: Male vs. Female) \times 2 (Target Fat: High vs. Low) \times 2 (Target Size: Small vs. Large) \times 2 (Mating Context: STM vs. LTM) mixed-model ANOVAs, with repeated factors over the latter three factors. One was for male targets and the other for female targets. The Target Size dimension for female targets was breast size and muscle size for male targets. These models’ complexities led us to adjust our alphas to reduce Type I Error ($\alpha = 0.01$). Interactions were decomposed with simple effects.

Female targets

A Target Size main effect indicated participants viewed large-breasted targets as more mating-oriented ($M = 4.57$, $SE = 0.07$) than small-breasted targets ($M = 4.40$, $SE = 0.07$), $F(1, 293) = 13.91$, $p < 0.001$, $\eta_p^2 = 0.045$. A Mating Context main effect indicated participants viewed female targets as more STM-oriented ($M = 4.69$, $SE = 0.08$) than LTM-oriented ($M = 4.27$, $SE = 0.08$), $F(1, 293) = 19.84$, $p < 0.001$, $\eta_p^2 = 0.063$.

A Participant Sex \times Target Size interaction emerged, $F(1, 293) = 21.66$, $p < 0.001$, $\eta_p^2 = 0.069$. Men perceived large-breasted targets as more interested in mating ($M = 4.68$, $SE = 0.12$) than small-breasted targets ($M = 4.31$, $SE = 0.12$), $F(1, 293) = 24.93$, $p < 0.001$,

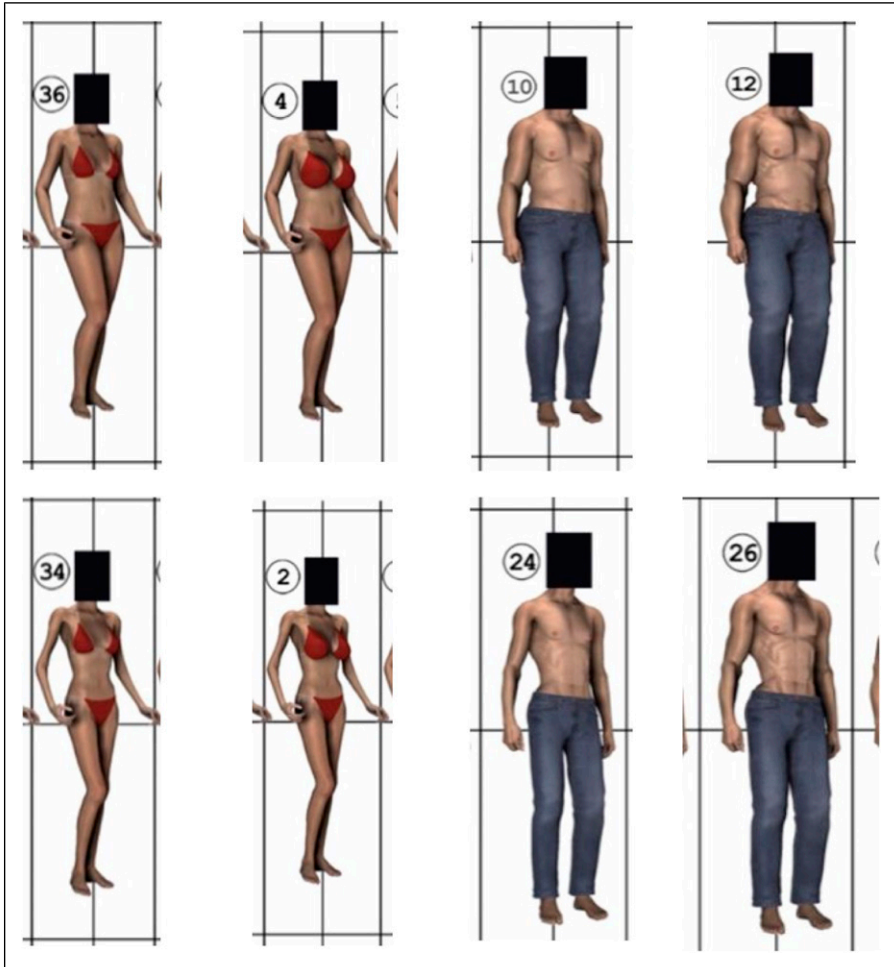


Figure 1. Male and female targets at high (top row) and low levels of body fat, with female targets at large (right column) and small breast sizes, and male targets at large (right column) and small muscle sizes.

$\eta_p^2 = 0.078$. Women perceived large-breasted ($M = 4.45$, $SE = 0.08$) and small-breasted targets ($M = 4.49$, $SE = 0.08$) similarly, $F(1, 293) = 0.72$, $p = 0.392$, $\eta_p^2 = 0.002$.

A Body Fat \times Mating Context interaction emerged, $F(1, 293) = 18.44$, $p < 0.001$, $\eta_p^2 = 0.059$. High-fat targets were perceived as more LTM-oriented ($M = 4.41$, $SE = 0.09$) than low-fat targets ($M = 4.14$, $SE = 0.09$), $F(1, 293) = 13.76$, $p < 0.001$, $\eta_p^2 = 0.045$. Low-fat women were perceived as more STM-oriented ($M = 4.84$, $SE = 0.10$) than high-fat targets ($M = 4.55$, $SE = 0.09$), $F(1, 293) = 11.07$, $p = 0.001$, $\eta_p^2 = 0.036$.

A Target Size \times Mating Context interaction emerged, $F(1, 293) = 36.48$, $p < 0.001$, $\eta_p^2 = 0.111$ (Figure 2(a)). Large-breasted targets were perceived as more STM-oriented ($M = 4.94$,

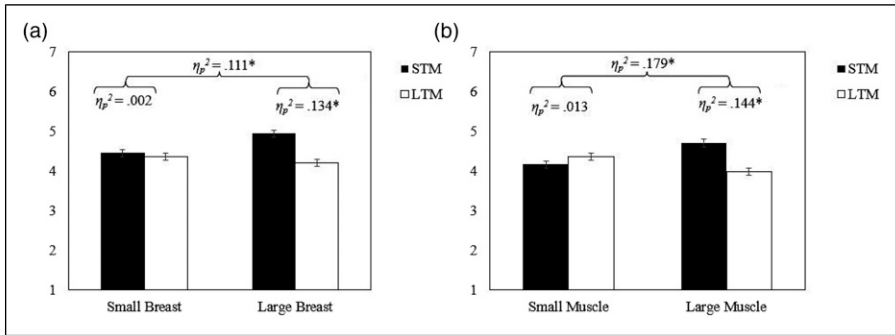


Figure 2. Perceived short-term mating and long-term mating interest (with standard error bars) among small-/large-breasted female targets (a) and small- and large-muscle male targets (b). * $p < .001$.

$SE = 0.09$) than LTM-oriented ($M = 4.19$, $SE = 0.09$), $F(1, 293) = 45.28$, $p < 0.001$, $\eta_p^2 = 0.134$. No difference emerged when comparing small-breasted targets' interest in STM ($M = 4.44$, $SE = 0.09$) and LTM ($M = 4.36$, $SE = 0.09$). $F(1, 293) = 0.66$, $p = 0.417$, $\eta_p^2 = 0.002$. No other main effects or interactions emerged at our adjusted alpha ($ps > 0.012$).

Male targets

A Target Fat main effect indicated participants perceived low-fat targets as more mating-oriented ($M = 4.45$, $SE = 0.06$) than high-fat targets ($M = 4.15$, $SE = 0.07$), $F(1, 292) = 22.85$, $p < 0.001$, $\eta_p^2 = 0.073$. A Mating Context main effect indicated participants perceived male targets as more STM-oriented ($M = 4.43$, $SE = 0.07$) than LTM-oriented ($M = 4.16$, $SE = 0.07$), $F(1, 292) = 10.27$, $p = 0.001$, $\eta_p^2 = 0.034$.

A Target Size \times Mating Context interaction emerged, $F(1, 292) = 63.65$, $p < 0.001$, $\eta_p^2 = 0.179$ (Figure 2(b)). Large-muscle targets were perceived as more STM-oriented ($M = 4.70$, $SE = 0.08$) than LTM-oriented ($M = 3.97$, $SE = 0.08$), $F(1, 292) = 49.24$, $p < 0.001$, $\eta_p^2 = 0.144$. Small-muscle targets' interest in STM ($M = 4.15$, $SE = 0.08$) and LTM ($M = 4.35$, $SE = 0.08$) did not significantly differ, $F(1, 292) = 3.75$, $p = 0.054$, $\eta_p^2 = 0.013$.

A Participant Sex \times Target Fat \times Mating Context interaction emerged, $F(1, 292) = 9.50$, $p = 0.002$, $\eta_p^2 = 0.032$ (Figure 3). We decomposed this interaction with subordinate ANOVAs for men and women. No other superordinate interactions emerged at our adjusted alpha nor did other main effects ($ps > 0.034$).

Men's Target Fat \times Mating Context interaction was significant, $F(1, 86) = 26.76$, $p < 0.001$, $\eta_p^2 = 0.237$. High-fat targets were perceived as more LTM-oriented ($M = 4.19$, $SE = 0.18$) than low-fat targets ($M = 3.64$, $SE = 0.16$), $F(1, 86) = 10.77$, $p < 0.001$, $\eta_p^2 = 0.111$. Low-fat targets were perceived as more STM-oriented ($M = 4.47$, $SE = 0.18$) than high-fat targets ($M = 3.64$, $SE = 0.17$), $F(1, 86) = 29.72$, $p < 0.001$, $\eta_p^2 = 0.257$.

Women's Target Fat \times Mating Context interaction was significant at a larger magnitude, $F(1, 207) = 192.05$, $p < 0.001$, $\eta_p^2 = 0.481$. High-fat targets were perceived as more LTM-oriented ($M = 4.72$, $SE = 0.09$) than low-fat targets ($M = 4.02$, $SE = 0.09$), $F(1, 207) = 31.68$,

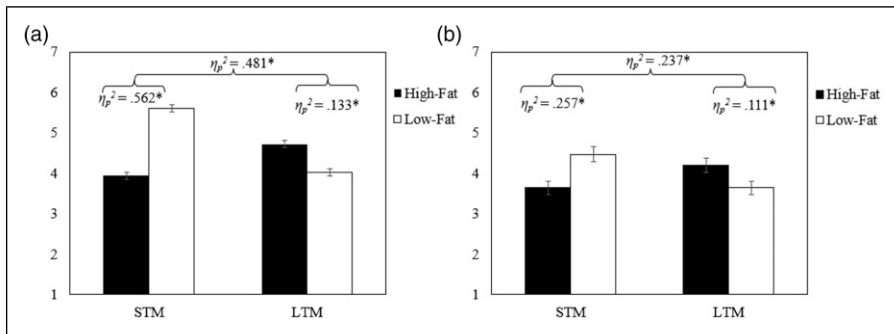


Figure 3. Perceived short-term mating/long-term mating interest for women (a) and men (b) among male targets high/low in body fat (with standard error bars). * $p < .001$.

$p < 0.001$, $\eta_p^2 = 0.133$. Low-fat targets were perceived as more STM-oriented ($M = 5.61$, $SE = 0.07$) than high-fat targets ($M = 3.93$, $SE = 0.09$), $F(1, 207) = 265.15$, $p < 0.001$, $\eta_p^2 = 0.562$.

Discussion

Results provided mixed support for hypotheses. High-fat targets were perceived as LTM-oriented. Concomitant perceptions of adiposity connoting nurturance make this unsurprising (Sacco et al., 2020). In opposite-sex judgments, fat perceptions could facilitate identifying optimal mates. Female adiposity may connote alloparenting opportunities to female perceivers (Lukas & Clutton-Brock, 2012). Conversely, men's same-sex perceptions could be rooted in identifying monogamous men presenting less intrasexual threat. Low-fat targets were perceived as STM-oriented, potentially rooted in perceiving such targets possessing attractive features conducive to STM success (Lukaszewski & Roney, 2011), with participants being similarly aware of this intrapersonal calibration.

Secondary sex characteristics (i.e., breasts and muscles) tracked perceptions of STM interest. Perceiving large-muscled targets as STM-oriented aligns with work implicating muscularity as desirable for STM, with additional findings indicating upper body strength is associated with greater interest in promiscuity (Frederick & Haselton, 2007; Gallup et al., 2007). Perceptions of large-breasted targets could have similar bases. Men's and women's similar perceptions of attractive features suggest judgments are rooted in identifying mates with consonant orientations and vigilance toward rivals.

Sex differences also emerged. Perceiving large breasts as diagnostic of general mating interest was specific to men. This acuity could reflect dual signal value for LTM and STM. Large breasts could connote capabilities of nurturance and heritable fitness. Another sex difference emerged in perceptions of men's adiposity. Women's acuity toward high fat as diagnostic of LTM interest was larger. This difference could reflect women's larger investment in offspring that heightens sensitivity to cues associated with paternal ability (Sacco et al., 2020).

Limitations and future directions

Despite replicating work indicating bodily structures facilitate mating-related affordance judgments, these perceptions remain stereotypes and may not reflect specific kernels of truth. Future studies could consider both perceived and actual mating preferences of social targets. This information could lead to tasking participants with identifying preferred mating strategies of individuals, which could determine whether perceptions are rooted in accurate identifications of sexual strategies or stereotyping (Antar & Stephen, 2021).

Future work would benefit from heightening ecological validity that mirror the various interactive cues humans consider in mating decisions. This could include providing environmental cues of targets, particularly related to resource scarcity. Concomitant stereotypes exist of scarce ecologies fostering interest in promiscuity (Williams et al., 2016), which could amplify perceptions of STM orientation. Research could also consider environments and cultures with especially heightened preferences. For example, individuals in rural areas of Polynesian countries exhibit larger preferences for large breasts and facial adiposity (Dixson et al., 2011, 2017). Future studies could address inferred orientations of targets within those environments.

Our highly standardized stimuli have a cost in understanding how adiposity shapes perceptions of women's bodies. The variability of fat distribution across different areas of women's bodies presents myriad stereotypes. Gluteofemoral distributions of fat (i.e., adiposity in the lower extremities and hips) are more desirable than abdominal distributions (Krems & Neuberg, 2021). Future studies could consider the distribution of body fat in shaping perceptions of mating interests, with the prediction being gluteofemoral distributions would be inferred as diagnostic of an STM orientation due to its attractiveness.

Another caveat for muscularity necessitates consideration of other androgen-dependent cues that alternatively heighten perceptions of paternal ability. Facial hair connotes paternal ability (Dixson & Brooks, 2013), though it does not connote actual fighting ability (Dixson et al., 2018). These competing signal values suggest certain masculine feature connote LTM orientation, potentially rooted in parental dominance.

Conclusion

Identifying mates and rivals within a mating market has proven crucial throughout human history to ensure reproductive success, necessitating evolution of sensitivity to features that would facilitate mating goals. This study determined whether these features initially foster perceptions of mating interests, which could serve to optimize reproductive opportunities.

Declaration of conflicting interests

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Open research statement

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