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Original Article

# Mate retention behavior modulates men's preferences for self-resemblance in infant faces

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**Abstract**

Visual assessments of relatedness may affect paternal investment decisions and altruistic behaviors. Work examining preferences for cues to self-resemblance in child faces has been equivocal, with findings showing that men have a higher preference than women, that preference for self-resemblance was statistically significant in women but not men, and that both men and women have a significant preference for self-resemblance when making parental investment decisions. Using data from 67 heterosexual romantic couples, we present evidence that both men and women prefer self-resembling infants, but show no significant preference for partner-resembling infants. Moreover, men's intersexual negative inducement tactics were correlated with, and significantly predicted, their preferences for self-resembling infants. These findings provide evidence that, although both men and women show a general preference for self-resemblance in infant faces, men's preferences for self-resemblance may be further modulated by perceived threat of cuckoldry.
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*Keywords:* Self-resemblance; Mate retention; Paternal certainty

## 1. Introduction

Both men and women prefer self-resemblance in the faces of adults (DeBruine, 2002; DeBruine, Jones, Little, & Perrett, 2008) (see also DeBruine, 2004a, 2005) and children (Bressan, Bertamini, Nalli, & Zanutto, 2009; DeBruine, 2004b; Platek, Burch, Panyavin, Wasserman, & Gallup, 2002; Platek et al., 2003). Previous authors have theorized that assessment of relatedness through the matching of physical cues may affect paternal investment decisions (Daly & Wilson, 1982; Neff & Sherman, 2002; Regalski & Gaulin, 1993), and cues to genetic relatedness may increase altruistic behaviors (DeBruine, 2002, 2005; Hamilton, 1964). Artificially produced facial resemblance, a potential kinship cue, has been shown to increase both trusting behavior (DeBruine, 2002, 2005) and the attractiveness of same-sex faces (DeBruine, 2004b), but contrary to findings that romantic partners tend to resemble each other (e.g., Zajonc, Adelmann, Murphy, & Niendenthal, 1987), self-resemblance does not increase the attractiveness of other-sex adult faces (DeBruine, 2004a, 2005; Penton-Voak, Perrett, & Pierce, 1999b). Although newborn children do not tend to resemble one parent more than the other (Bressan & Grassi, 2004), men receive considerable verbal reassurance about their resemblance to their offspring, particularly from friends and relatives of the offspring's mother (Bressan, 2002; Daly & Wilson, 1982; Regalski & Gaulin, 1993). This could function to reduce suspicions of cuckoldry and thereby maintain relationship stability, as infidelity is frequently cited as a cause of relationship dissolution and divorce across cultures (Betzig, 1989). Verbal reassurance of paternity could also serve to increase paternal investment, given that men's investment in their children is predicted by perceptions of their partner's fidelity and by father-offspring resemblance (Apicella & Marlowe, 2004). Moreover, when hypothetically choosing a child for adoption, men place a greater emphasis on resemblance than women do (Volk & Quinsey, 2002). Altogether, these findings have led some researchers to conclude that men value self-resemblance in child faces more than women do (see also Platek et al., 2002, 2003; Volk & Quinsey, 2002).

Work examining preferences for cues to self-resemblance in child faces has produced equivocal findings. Platek et al. (2002, 2003) found that, when presented with groups of five

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child faces, men were more likely than women to choose a self-resembling child as the most attractive and as the child they would hypothetically invest in (these effects have also been replicated using fMRI, see Platek & Kemp, 2009; Platek et al., 2004). However, DeBruine (2004b), whose methods of manipulating self-resemblance produced more realistic images, found that infant self-resemblance increased attractiveness judgments and hypothetical willingness to invest in both male and female participants, with no sex difference. Furthermore, although Bressan et al. (2009) also found no sex difference, they did find a significant preference for self-resembling children in women, but not in men. While different methods of manipulating self-resemblance in child faces and regional variation in preferences between different samples may have contributed to the mixed findings of these studies, so too may have other, as yet uninvestigated characteristics of the participants.

Although mate selection is important in human reproduction, mate retention also has implications for reproductive success (Buss, 1988b, 2000; Buss & Shackelford, 1997a; Daly, Wilson, & Weghorst, 1982; Goetz, Shackelford, Romero, Kaighobadi, & Miner, 2008; Haselton & Gangestad, 2006; Kaighobadi, Starratt, Shackelford, & Popp, 2008; Shackelford, Goetz, & Buss, 2005a). Jealousy, in particular, generates behaviors that may promote retention of mates by reducing the likelihood of a partner straying or being poached (e.g., Buss, 1988a, 1988b, 2000; Daly et al., 1982; Shackelford, Besser, & Goetz, 2008; Shackelford et al., 2005a; Shackelford, Goetz, Buss, Euler, & Hoier, 2005b). The Mate Retention Inventory (MRI, Buss, 1988b) is used to assess incidence of mate retention tactics, ranging from love and care tactics to violence. Empirical research using the MRI has yielded a number of important findings, including evidence for sex differences in tactic use, with resource provisioning, intrasexual threats, and physical violence more frequently reported by men and appearance enhancement more frequently reported by women in both unmarried (Buss, 1988b) and newly married (Buss & Shackelford, 1997a) couples. Men married to women who exhibit cues to fertility (i.e., youth and physical attractiveness) devote more effort to mate retention than other married men, while women married to men with higher incomes devote more effort to mate retention than other married women (Buss & Shackelford, 1997b). Additionally, self- and spouse-reported MRI scores are highly correlated (Shackelford et al., 2005a), indicating that spouses can reliably describe one another's mate retention behaviors.

Given that men's mate retention behaviors (Platek & Shackelford, 2006) and preferences for self-resemblance (Platek et al., 2002, 2003) may reflect vigilance to the threat of cuckoldry, it is possible that these behaviors and preferences will be correlated. Similarly, men's and women's sociosexuality scores positively predict their romantic partner's mate retention tactics (Kardum, Hudek-Knežević, & Gračanin, 2006), such that men and women who have very unrestricted sociosexual orientations (i.e., are more open to short-term sexual relationships) tend to have partners who exhibit more mate retention behaviors overall. Therefore, any relationships between men's preferences for self-resemblance in child faces and their mate retention behavior may reflect a tendency for men whose partners have unrestricted sociosexual orientations to develop a greater preference for physical cues to paternal certainty. Lastly, if there is a preference for self-resemblance and no preference for partner-resemblance, this would support findings by DeBruine (2004b) that preferences for self-resemblance are not due to familiarity. However, to be clear, we do not hypothesize that preferences for partner-resemblance (as opposed to self-resemblance) will in any way reflect vigilance to the threat of cuckoldry.

We tested preferences for self- and partner-resembling infant faces and how those preferences relate to mate retention behavior and sociosexuality in heterosexual romantic partners. It is possible that, in men, partner Sociosexual Orientation Inventory (SOI) scores could predict preference for self-resemblance, with high SOI women potentially having partners who are more concerned with cues to paternity. However, it is possible that own SOI will negatively correlate with preferences for self-resemblance, if individuals who favor a more promiscuous strategy are less concerned with paternity. This may be the case given that persons with an unrestricted sociosexuality are more open to short-term relationships (Simpson & Gangestad, 1991), suggesting limited investment in both partners and, for men, in potential offspring. Furthermore, because men's mate retention behaviors may reflect concern over paternal certainty (Platek & Shackelford, 2006), we hypothesize that mate retention behaviors will predict preferences for self-resemblance in infant faces in men, but not in women (who do not face the same problem of parental certainty as men do, Buss, 1988b).

Frequency/intensity of mate retention tactics directed at mates, rather than potential competitors, may also predict preferences for self-resemblance in infant faces. Mate-directed tactics may connote a lack of trust in one's partner, meaning that the use of these tactics may be prompted by a perceived need to keep a partner from straying. Partner straying, as opposed to poaching by rivals, likely poses a greater risk to males and is likely more closely associated with putative fathers investing in unrelated offspring. Indeed, a would-be interloper will likely be unsuccessful if the female is not interested, but a female interested in extra-pair sex may find many willing partners, and therefore partner straying increases the chances that the current partner was impregnated by someone else without the putative father's knowledge. Therefore, we hypothesized that partner-directed mate retention behaviors would more strongly predict men's preferences for self-resemblance in infant faces than would competitor-directed mate retention behaviors. Finally, some evidence suggests that proprietary or controlling mate retention tactics (e.g., emotional manipulation), hereafter referred to as negative partner-directed mate retention tactics, may be most effective at preventing women's sexual infidelity (Cousins & Gangestad, 2007). Thus, we predicted

that men who more often use negative partner-directed mate retention tactics would show a stronger preference for self-resemblance in infant faces than would other men.

## 2. Methods

### 2.1. Participants

Sixty-seven White heterosexual romantic couples (mean age=20.14 years, S.D.=1.93) took part in this study (Mean relationship duration=12.69 months, S.D.=13.57, range=1–53 months). All participants received $14 USD or equivalent course credit.

### 2.2. Stimuli

Given that infancy is the most likely age at which decisions to invest are made (Daly & Wilson, 1984), we used infant faces as stimuli. A composite infant face was first made by averaging the shape, color, and texture cues of photographs of 10 male (mean age=5.8 months, S.D.=1.18) and 10 female (mean age=5.25 months, S.D.=1.14) infants aged 3.5 to 7 months using established computer graphics methods (Rowland & Perrett, 1995; Tiddeman, Burt, & Perrett, 2001). Adult male and female composite faces were also manufactured using these methods, which have been widely used in studies of face perception (e.g., Penton-Voak et al., 1999a; Welling et al., 2007). All composite faces were then made perfectly bilaterally symmetrical by adjusting the locations of corresponding *X-Y* landmarks on either side of the face, so that the subsequent manipulations would not affect symmetry.

When communicating with participants during recruitment for this study, we requested that male participants attend the session clean-shaven. Because several male participants still had facial hair at testing, past methods (Bressan et al., 2009; DeBruine, 2004b; Platek et al., 2002, 2003) of manipulating self-resemblance in child faces were inappropriate and would have required drastically reducing the sample size (see Fig. 1). We therefore modified previous methods. We took 50% of the 2D linear shape differences and 15% of the color differences between the symmetrized same-sex composite image and the participant's face and applied them to the symmetrized composite infant face. This resulted in an image in which the shape cues differed appreciably between individual images, but the color cues differed only slightly (i.e., not enough of the participant's own color cues were sufficiently visible to enable facial hair or makeup to appear on the transformed infant image, see Fig. 1). Lastly, the hair and background were masked to prevent potential confounds (see DeBruine, Jones, Smith, & Little, 2010), leaving a masked infant version of each participant in the study. We also made self-resembling infant images for six unfamiliar White men and six unfamiliar White women, who were photographed at a different North American university and who were not participants in this study. These acted as comparison images (see Procedure

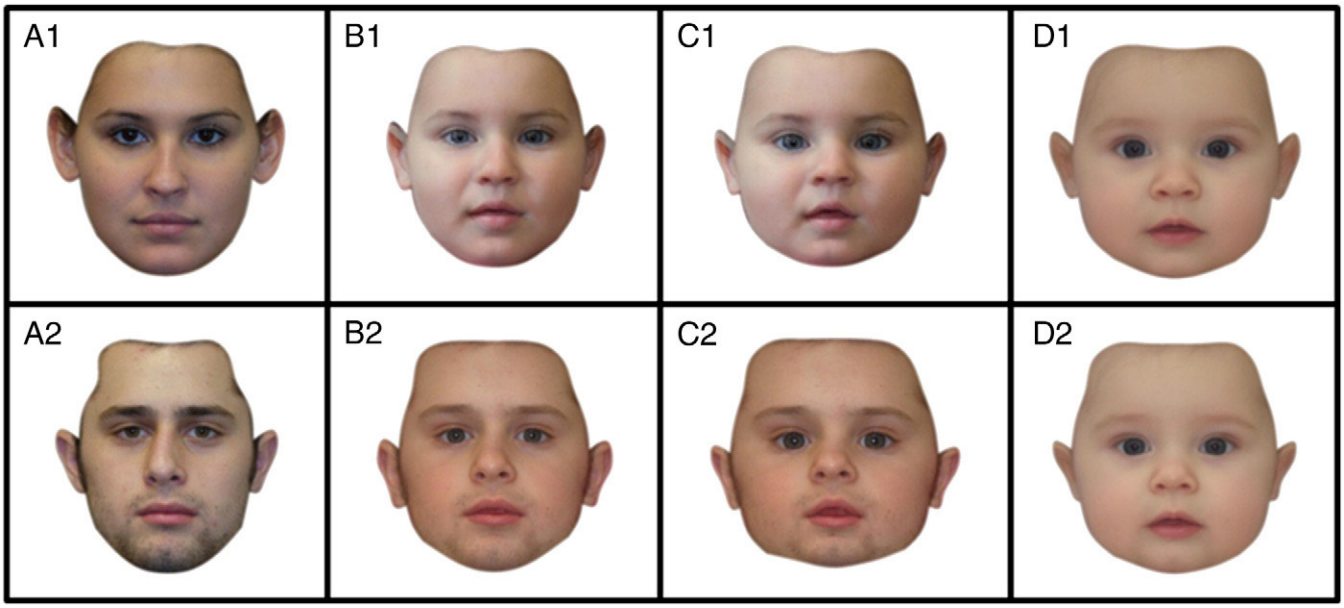


Fig. 1. Examples of our and other methods for manipulating self-resemblance in infant faces. This example shows a female (A1) and a male (A2) participant's face. Past methods of manipulating self-resemblance in child faces have included blending a child's face with the participant's face (B1 and B2, similar to Bressan et al., 2009; Platek et al., 2002, 2003) and blending a neotenized adult's face with an infant's face (C1 and C2, similar to DeBruine, 2004b). Our methods (D1 and D2) involved adding 50% of the differences in 2D shape and 15% of the differences in color between a composite same-sex image and the participant's image to a composite infant image. It should be noted, however, that Bressan et al. (2009), DeBruine (2004b), and Platek et al. (2002, 2003) made efforts to exclude men with facial hair to ensure that no facial hair would appear on their child face morphs. Such exclusions were inappropriate in the current study as they would have drastically reduced our sample size and may have biased the composition of the sample.

below) and were chosen at random from a larger image set that is made up of images of similarly aged students. This method of creating self-resembling and partner-resembling infant faces, unlike methods such as those used by Platek et al. (2002, 2003) and Bressan et al. (2009) in which adult faces are combined with baby faces to make an adult/baby composite, does not alter the apparent age of the infant, nor does it introduce unnatural artifacts, such as the heavyset jaw lines typical of males who have undergone puberty.

Nine male and nine female adults (Mean age=25.83 years, S.D.=4.06) who did not participate in the main study rated all adult images used to make the stimuli (i.e., the participants' photographs and the photographs used to make the comparison images) for attractiveness on a seven-point scale (1=very unattractive, 7=very attractive). Reliability in this sample was high ($\alpha$=.89), and comparison images were not rated as significantly more attractive than the participants' images by either men or women (all $t$<1.20, all $p$>.26), indicating that the effects described below are unlikely to be an artifact of attractiveness.

### 2.3. Procedure

Participants attended the laboratory with their romantic partner twice, with sessions scheduled exactly one week apart. During the first session, we informed participants that the study concerned how people choose and compete for mates and that their photograph would be taken to allow us to measure their face shape. Participants consented to some aspects of the study procedure (i.e., that we would use their photographs to create self-resembling infant faces) being intentionally kept from them. Participants removed spectacles and facial jewelry, tied back long hair so that their hairline and ears were visible, and adopted a neutral expression. We then photographed participants from a focal distance of approximately 2 meters. Photographs were taken in a windowless laboratory with consistent overhead lighting using a digital camera with a mounted flash. Participants then completed an unrelated face preference task.

One male participant opted not to have his photo taken, and so did not complete the self-resembling infant face task (his partner completed the self-resembling task only). The remaining 133 faces (67 female) were used to make self-resembling and partner-resembling infant faces as described above. One week later, participants returned to the laboratory and completed the infant face preference test at private computer workstations. This comprised four tasks that were completed in a random order. Participants saw pairs of infant faces and selected the face that was more attractive (Task 1) and the face of the child whom they would rather babysit (Task 2). Attraction and babysitting were used because DeBruine (2004b) found that participants chose self-resembling images significantly more frequently when considering these concepts. The stimuli used in each task included the participant's self-resembling infant face and six infant faces transformed to resemble unfamiliar persons of the same sex as the participant. The seven images used as stimuli in Tasks 1 and 2 were shown in every possible pair combination, resulting in 21 trials per task.

Tasks 3 and 4 were identical to Tasks 1 and 2, except that the stimuli were partner- rather than self-resembling and of the opposite-sex. Participants saw pairs of infant faces and selected the face that was more attractive (task 3) and the face of the child whom they would rather babysit (task 4). Trial order was fully randomized for each task, as was the side of the screen on which each image appeared. Participants were not told that the infant faces had been manipulated.

Next, participants completed a demographics questionnaire, the SOI-Revised (SOI-R, Penke & Asendorpf, 2008), and the self-report MRI-SF (Buss, Shackelford, & McKibbin, 2008) in a random order. The MRI-SF consists of 19 mate retention tactics that can be grouped into five categories: direct guarding (comprising the vigilance, concealment of mate, and monopolization of time tactics), intersexual negative inducements (comprising the jealousy induction, punish mate's infidelity threat, emotional manipulation, commitment manipulation, and derogation of competitors tactics), positive inducements (comprising the resource display, sexual inducements, appearance enhancement, love and care, and submission and debasement tactics), public signals of possession (comprising the verbal possession signals, physical possession signals, and possessive ornamentation tactics), and intrasexual negative inducements (comprising the derogation of mate, intrasexual threats, and violence against rivals tactics). These five categories can further be grouped into two domains: Intersexual Manipulations (comprising the direct guarding, intersexual negative inducements, and positive inducements categories) and Intrasexual Manipulations (comprising the public signals of possession and intrasexual negative inducements categories) (Buss, 1988b; Kardum et al., 2006; Shackelford et al., 2005a).

Additionally, all participants were asked to rate their own and their partner's attractiveness, and their commitment to their relationship. Men were asked to rate their partner's femininity and women were asked to rate their partner's masculinity and dominance. All ratings were on a 1 (not at all) to 10 (very) scale. After the experiment was complete, participants were debriefed and given a formal opportunity to withdraw from the study. We asked all participants if they suspected that any of the faces had been manipulated to resemble them or their partner. Participants responded by checking boxes on a paper form, as we considered this more likely than spoken questions to cue honest responses. Those who reported suspicions ($n$=27, 12 female) or did not return for the second session ($n$=2, 1 female) were excluded from further analyses. Although the exclusion criteria were strict, this allowed us to be more confident that those who truly suspected were excluded from analysis.

Data for trials containing no self- or partner-resembling infant faces were discarded. For each participant, we calculated the proportion of trials on which the self-resembling face in each pair was chosen in both the babysitting and

attractiveness judgment tasks. Corresponding scores were also calculated for partner-resembling face tasks.

## 3. Results

Paired-samples *t* tests revealed no significant differences between the attractiveness and babysitting tasks in the proportion of self-resembling faces chosen (Tasks 1 and 2) in men or in women, or for the proportion of partner-resembling faces chosen (Tasks 3 and 4) in men or in women (all $p>.30$). Therefore, each participant's scores for tasks 1 and 2 were averaged to create a preference for self-resemblance score and scores for Tasks 3 and 4 were averaged to create a preference for partner-resemblance score.

There was a significantly greater preference for self-resemblance in infant faces than for partner-resemblance for both male ($t_{47}=2.065$, $p=.044$; Mean preference for self=.59, S.D.=.18; mean preference for partner=.52, S.D.=.23) and female participants ($t_{52}=2.866$, $p=.006$; mean preference for self=.59, S.D.=.26; Mean preference for partner=.45, S.D.=.27). Male participants' scores were not significantly different from those of female participants, either for preferences for self- or partner-resemblance in infant faces, although men's preference for partner-resemblance was nearly significantly higher than women's ($p=.087$). Preferences for partner-resemblance were not correlated with the length of the relationship in either men or women (both $p>.28$). One-sample *t* tests revealed that preferences for self-resemblance were significantly greater than chance (i.e., a proportion of .5) for both men ($t_{49}=2.134$, $p=.038$) and women ($t_{53}=2.584$, $p=.013$). Preferences for partner-resemblance, however, were not significantly greater than chance for men or women (both $p>.14$) (see Fig. 2).

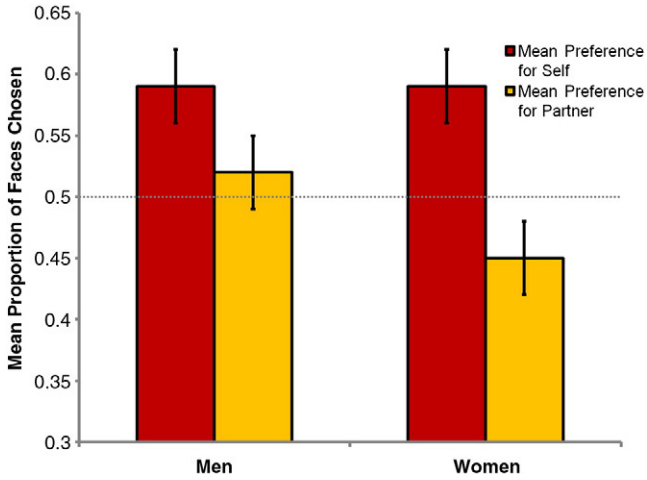


Fig. 2. Men's and women's mean preferences for self-resembling and partner-resembling infant faces. Both men and women had significantly higher preferences for self-resemblance in infant faces than for partner-resemblance. However, men's and women's scores were not significantly different for either preference for self-resemblance or preference for partner-resemblance in infant faces, though men's preference for partner resemblance was nearly statistically higher than women's preference for partner resemblance. Also, although both men's and women's preferences for self-resembling infant faces were greater than chance (i.e., .5), preferences for partner-resembling infant faces were not.

There was no significant correlation between total Mate Retention Inventory scores (i.e., the sum of item scores for all 19 tactics) and preferences for self- or partner resemblance, although the relationship between men's preferences for self-resemblance and their total MRI-SF scores was marginally significant ($r_{48}=.258$, $p=.073$). As mentioned previously, the 19 tactics of the MRI-SF can be grouped into five categories: direct guarding, intersexual negative inducements, positive inducements, public signals of possession, and intrasexual negative inducements. These five categories can be further grouped into two domains: Intersexual Manipulations (i.e., behaviors directed towards one's partner) and Intrasexual Manipulations (i.e., behaviors directed towards potential rivals or competitors) (Buss, 1988b; Kardum et al., 2006; Shackelford et al., 2005a). Of the two MRI domains, men's reported intersexual manipulations were positively correlated with their preferences for self-resemblance in infant faces ($r_{48}=.288$, $p=.022$) with no other significant correlations (all $p>.180$). Breaking down men's reported intersexual manipulations into its three categories (i.e., direct guarding, intersexual negative inducements, and intersexual positive inducements) for post hoc analyses revealed a positive correlation between men's preferences for self-resemblance and their reported intersexual negative inducements ($r_{48}=.262$, $p=.034$), a positive correlation between men's preferences for self-resemblance and their reported direct guarding tactics ($r_{48}=.252$, $p=.040$), but only a marginally significant correlation between men's preferences for self-resemblance and their reported intersexual positive inducements ($r_{48}=.212$, $p=.072$).

Because we found relationships between men's preferences for self-resemblance and the predicted MRI domains and categories and because most previous work has addressed mate retention at the tactic level (e.g., Buss & Shackelford, 1997a; Kaighobadi et al., 2008; Shackelford et al., 2005a, 2005b), we next explored correlations between preferences for self-resemblance and each of the three MRI-SF tactics that make up the direct guarding category (i.e., vigilance, concealment of mate, and monopolization of mate's time) and each of the five tactics that make up the negative inducements category (i.e., threaten infidelity, punish mate's threat of infidelity, emotional manipulation, commitment manipulation, and derogation of competitors). Men's preferences for self-resemblance were positively correlated with their reported emotional manipulation ($r_{48}=.468$, $p<.001$), commitment manipulation tactics ($r_{48}=.286$, $p=.023$), vigilance ($r_{48}=.281$, $p=.028$), monopolization of their partner's time ($r_{48}=.262$, $p=.034$), and their derogation of competitors ($r_{48}=.253$, $p=.039$), with no other significant correlations (all $p>.060$).

There were no significant correlations between self/partner-rated attractiveness, self/partner-rated dominance, self/partner-rated masculinity/femininity, or total SOI-R

scores and preferences for self- or partner-resemblance for either men or women (all $p>.110$) and statistically controlling for these factors did not alter the results of previous analyses.

### 3.1. Additional analyses

We further examined the relationship between men's preferences for self-resemblance and their mate retention behaviors using a multiple regression analysis (backwards method) with men's preferences for self-resemblance as the outcome variable and the five mate retention categories (direct guarding, intersexual negative inducements, positive inducements, public signals of possession, and intrasexual negative inducements) as predictors. The multiple regression model yielded two significant predictors (intersexual negative inducements and direct guarding). These two variables accounted for 13.9% of the variance [$R^2=.139$, $F_{2,44}=3.701$, $p=.032$; both variance inflation factors (VIFs)<2.7]. It should also be noted that a model encompassing intersexual negative inducements, direct guarding, and intrasexual negative inducements was nearly significant ($R^2=.153$, $F_{3,44}=2.713$, $p=.056$; VIFs<2.7). Significant variables are outlined below.

| Variable | β | $t_{44}$ |
|---|---|---|
| Intersexual negative inducements | .350 | 2.564* |
| Direct guarding | .352 | 2.575* |

* $p<.05$.

Kolmogorov–Smirnov tests of men's preference for self-resemblance scores and their scores on each of the five MRI categories (i.e., direct guarding, intersexual negative inducements, positive inducements, public signals of possession, and intrasexual negative inducements) revealed that all data were normally distributed (all $p>.09$) except for the direct guarding category scores ($p<.001$). Exploration of the data revealed that the data from one participant appeared to be skewing the distribution for this category and that he was the only male to have chosen his self-resembling infant face in all trials (i.e., he showed a 100% preference for self-resemblance). Repeating the above multiple regression analysis without this participant revealed a marginally significant model with two variables (intersexual negative inducements and intrasexual negative inducements). This removed direct guarding as a significant predictor. These two variables accounted for 11.4% of the variance ($R^2=.114$, $F_{2,44}=2.891$, $p=.065$; VIFs<1.9) and are outlined below. Intersexual negative inducements (i.e., negative acts directed towards one's partner) significantly predicted men's preferences for self-resemblance in both models.

| Variable | β | $t_{44}$ |
|---|---|---|
| Intersexual negative inducements | .470 | 2.389* |
| Intrasexual negative inducements | .368 | 1.869+ |

* $p=.021$.
\+ $p=.068$.

## 4. Discussion

We found that both men and women had stronger preferences for self-resemblance in infant faces than would be expected by chance, supporting DeBruine's (2004b) finding that resemblance to self increases the appeal of infant faces for both men and women. Such preferences could have evolved to promote investment in kin, including offspring, younger siblings, grand-offspring, nieces and nephews. The evolutionary advantages are perhaps more obvious for men, given that, unlike women, men cannot be certain that they have sired the offspring attributed to them. Nevertheless, a preference for self-resemblance could enable persons of both sexes to assess genetic relatedness prior to investing (e.g., in fraternal nieces and nephews, see also the Discussion section in DeBruine, 2004b), which may be adaptive. In support of this argument, Gaulin, McBurney, & Brakeman-Wartell (1997) found that, although aunts generally invest significantly more in nieces and nephews than do uncles, matrilateral aunts and uncles invest significantly more than patrilateral aunts and uncles. Similarly, maternal grandmothers provide more care to their daughter's offspring than paternal grandmothers do to their son's putative offspring (Euler & Weitzel, 1999). Altogether, these findings suggest that it may be adaptive for both sexes to assess and show preference for cues of kinship, particularly so that levels of investment in patrilateral relatives may be adjusted according to estimated genetic relatedness to the self.

We also found that both men and women preferred self-resembling infant faces more than partner-resembling infant faces. This is unlikely to be due to effects of familiarity because preference for partner-resembling faces (which the participant is likely to have found familiar) was not significantly different from chance (see also DeBruine, 2004b for further evidence that preferences for self-resemblance in infant faces is not due to familiarity). Indeed, Bressan and Zucchi (2009) found that visual information about the self superseded visual information about closely related family members (i.e., a monozygotic or a dizygotic twin) when eliciting judgments of prosocial regard, indicating that human kin recognition may be self-, rather than family-, referential. Furthermore, although one is more likely to be familiar with the face of a partner with whom one has shared a long relationship, relationship length was not correlated with either men's or women's preferences for partner-resemblance, adding further evidence that preference for self-resemblance is not a byproduct of a preference for familiarity. However, we concede that 18 or more years gaining familiarity with one's own face does make for higher familiarity than a few months to a few years of gaining familiarity with a partner's face. Consequently, it may be beneficial for future research to compare preferences for self-resemblance against preferences for faces that resemble other, nonrelated individuals that the participant has known since infancy (i.e., adoptive parents or childhood friends).

Men's mate retention behaviors were related to preferences for self-resemblance, a possible cue to kinship, in infant faces. That men's preferences for self-resemblance were not correlated with SOI, self/partner attractiveness, or dominance ratings indicates that these associations between men's mate retention behaviors and their preferences for self-resembling infants are unlikely to be mediated by other factors that may correlate with mate retention behaviors. This is not to say, however, that preferences for self-resemblance are driven by uncertain paternity alone, but that certain mate retention behaviors appear to at least partially moderate men's preferences for self-resemblance. Men who exhibited more negative partner-directed mate retention behaviors showed a comparatively greater preference for self-resemblance than men who exhibited fewer of these behaviors. In our first multiple regression model, men's intersexual negative inducements and direct guarding behaviors predicted their preferences for self-resemblance, accounting for approximately 14% of the variance. Additionally, our second multiple regression model that excluded a participant who reported particularly high direct guarding behaviors, though marginally significant, yielded two predictors, men's intersexual negative inducements and men's intrasexual negative inducements, and accounted for more than 11% of the variance. Despite the direct guarding category no longer being a significant predictor in the second multiple regression model, men's intersexual negative inducements remained a strong predictor in both models and intrasexual negative inducements were near significant in both multiple regression analyses. Indeed, this is the first evidence that preferences for physical cues to paternity in infant faces are related to mate retention behaviors in men.

Women do not face the same problem of parental certainty as men do because women are always certain that any child to which they gave birth is related to them (Buss, 1988b). While our female participants had strong preferences for self-resembling infant faces, these women (unlike the men) showed no significant relationships between preferences for self-resemblance in infant faces and total MRI-SF scores or either MRI domain. For men, the relationship between total MRI-SF scores and preference for self-resemblance in infant faces was not significant, but men's intersexual manipulations scores were positively correlated with their preference for self-resembling infant faces. The intersexual manipulations domain contains three out of the five MRI categories (direct guarding, intersexual negative inducements, and positive inducements) and refers to acts directed at one's mate rather than acts directed towards same-sex competitors (Buss, 1988b; Shackelford et al., 2005a). This correlation, along with the multiple regression models, lends some support to our prediction that partner-directed acts may suggest a lack of trust in one's partner and, therefore, be more strongly related to preferences for cues to paternity than are competitor-directed acts. However, we must add a note of caution here as intrasexual negative inducements (i.e., negative acts directed towards rivals) were nearly a significant predictor of men's preferences for self-resemblance. Therefore, it seems plausible that negative or violent mate retention acts more generally may partly moderate men's preferences for self-resemblance in infant faces. Moreover, because male jealousy and control of female sexuality appear to be important factors motivating physical aggression in romantic relationships (Cousins & Gangestad, 2007; Daly & Wilson, 1988; DeKeseredy & Schwartz, 1998; Follingstad, Bradley, Laughlin, & Burke, 1999), and because these traits are believed to have at least partly evolved to defend against cuckoldry and unknowingly investing in another man's offspring (Daly & Wilson, 1988; Gangestad, Thornhill, & Garver, 2002), it is rational that the men who are most intent on retaining their mates using negative tactics show a greater preference for infants that show physical cues to paternity. Indeed, our correlational analyses revealed significant relationships between men's preferences for self-resemblance and their intersexual negative inducements, but not for their positive inducements.

Intersexual negative inducements (jealousy induction, punish mate's infidelity threat, emotional manipulation, commitment manipulation, and derogation of competitors) often take the form of controlling, manipulative, or proprietary tactics. When this mate retention category was further broken down to its individual tactics, men's preferences for self-resemblance were positively correlated with their reported emotional manipulation, commitment manipulation, vigilance, monopolization of their partner's time, and their derogation of competitors. This suggests that men who are particularly concerned with their mate's fidelity and make efforts to guarantee it through controlling/manipulative mate-directed behavior may also be more concerned about paternal certainty than other men, although the correlations at the tactic level should be interpreted cautiously. Future research should retest these hypotheses.

Past research has demonstrated that jealousy, mate retention tactics, and violence discourage a mate's infidelity (Buss, 1988b; Shackelford et al., 2005b). Ours is the first work to demonstrate that mate retention tactics can mediate men's preferences for physical cues to paternal kinship. Our findings are in line with past research that has found significant preferences for self-resemblance in both men and women (DeBruine, 2004b) with no significant difference between the two sexes (Bressan et al., 2009; DeBruine, 2004b). More importantly, however, our work extends this past research by demonstrating that there is a moderating variable at play, thereby introducing the possibility that discrepant findings in past research may have reflected differences in mate retention behaviors among the participants. The finding that negative partner-directed mate retention behaviors predict men's preferences for self-resemblance in infant faces may be the strongest evidence at present that these preferences may function partly in solving the problem of paternity uncertainty.

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