Men's strategic preferences for femininity in female faces

Anthony C. Little1, Benedict C. Jones2, David R. Feinberg3, & David I. Perrett4

[1]School of Natural Sciences,
University of Stirling

[2]Institute of Neuroscience and Psychology,
University of Glasgow

[3]Department of Psychology, Neuroscience and Behaviour
McMaster University

[4]School of Psychology,
University of St Andrews

Word count (exc. References/figures/tables): 7569

*Requests for reprints should be addressed to Anthony Little, School of Natural Sciences, University of Stirling, Stirling, FK9 4LA, UK (e-mail: anthony.little@stir.ac.uk).

33 **MEN'S STRATEGIC PREFERENCES FOR FEMININITY IN FEMALE**

34 **FACES**

35 **ABSTRACT**

36 Several evolutionarily relevant sources of individual differences in face
37 preference have been documented for women. Here we examine three such
38 sources of individual variation in men's preference for female facial femininity:
39 term of relationship, partnership status and self-perceived attractiveness. We
40 show that men prefer more feminine female faces when rating for a short-term
41 relationship and when they have a partner (Study 1). These variables were
42 found to interact in a follow-up study (Study 2). Men who thought themselves
43 attractive also preferred more feminised female faces for short-term
44 relationships than men who thought themselves less attractive (Study 1 and
45 Study 2). In women similar findings for masculine preferences in male faces
46 have been interpreted as adaptive. In men, such preferences potentially
47 reflect that attractive males are able to compete for high quality female
48 partners in short-term contexts. When a man has secured a mate, the
49 potential cost of being discovered may increase his choosiness regarding
50 short-term partners relative to unpartnered men, who can better increase their
51 short-term mating success by relaxing their standards. Such potentially
52 strategic preferences imply that men also face trade-offs when choosing
53 relatively masculine or feminine faced partners. In line with a trade-off, women
54 with feminine faces were seen as more likely to be unfaithful and more likely
55 to pursue short-term relationships (Study 3), suggesting that risk of cuckoldry
56 is one factor that may limit men's preferences for femininity in women and
57 could additionally lead to preferences for femininity in short-term mates.

58

59 **Key words:** Facial attractiveness; masculinity/femininity; mate value; partner;
60 condition-dependence; short-term/long term.
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MEN'S STRATEGIC PREFERENCES FOR FEMININITY IN FEMALE

FACES

Mature features in adult human faces reflect the masculinisation or

feminisation of secondary sexual characteristics that occurs at puberty. These

face shape differences in part arise because of the action of hormones such

as testosterone. For example, smaller jawbones and fatter cheeks are

features of female faces that differentiate them from male faces (e.g., Enlow,

1982). In terms of women's attraction to masculinity in male faces, the

direction of relationship varies across studies and researchers have

documented differences in the attractiveness of masculinity according to

short-term versus long-term mating contexts and various sources of individual

differences in preferences (Little, Jones, Penton-Voak, Burt, & Perrett, 2002;

Penton-Voak et al., 1999). Men's preferences for female faces are not as well

studied as women's preferences for male faces. This is potentially due in part

to the unequivocal preferences for femininity in female faces.

Several researchers have proposed that femininity in human female

faces may be a cue to heritable fitness or other benefits and therefore relate

to attractiveness (e.g., Perrett et al., 1998). Facial femininity is associated with

oestrogen levels (Law-Smith et al., 2006) and also health (Thornhill &

Gangestad, 2006). Femininity of face shape is also associated with youth

(Perrett, et al., 1998) and so preferences may also reflect male attention to

youth, also linked to fertility and fecundity (Buss & Barnes, 1986). Increasing

the femininity of female faces should therefore enhance attractiveness, and

indeed there is considerable evidence that feminine female faces are

considered attractive. Studies measuring facial features from photographs of

88 women (Cunningham, 1986; Grammer & Thornhill, 1994) and studies which

89 manipulate facial femininity using computer graphic techniques (Perrett, et al.,

90 1998) all indicate that feminine features increase the attractiveness of female

91 faces. However, despite overall preferences for feminine faces, men may also

92 display strategic preferences for femininity in the same way women show

93 strategic preferences for masculinity. Three sources of individual differences

94 in preferences are discussed here: condition, relationship context, and

95 partnership status.

96   Condition-dependent mate choice is seen in females of some fish

97 species (Bakker, Künzler, & Mazzi, 1999) and women (Little, Burt, Penton-

98 Voak, & Perrett, 2001; Little & Mannion, 2006; Penton-Voak et al., 2003). This

99 follows the logic that low-quality individuals of both sexes are expected to be

100 less choosy (Parker, 1983), whereby individuals who are of high quality, or

101 attractive, will be more discriminating of their potential partners than those of

102 lower quality. Consequently, condition-dependent effects are also seen in

103 male fish. For example, in three-spined sticklebacks (*Gasterosteus aculeatus*)

104 attractive (more ornamented) males show stronger preferences for large

105 females than do unattractive (drab-looking) males (Kraak & Bakker, 1998).

106 Likewise, in the two-spotted goby (*Gobiusculus flavescens*), large and small

107 males are equally eager to court females but only large males show

108 discrimination via their greater interest in more colourful females (Amundsen

109 & Forsgren, 2003). Attractive men may then be more discriminating than less

110 attractive men and display greater preferences for femininity. Indeed,

111 attractive men prefer more feminine female faces than their less attractive

112   counterparts, but only in short-term relationship contexts (Burriss, Welling, &

113   Puts, 2011).

114   Relationship context can impact on preferences. Humans differ in their

115   inclination to engage in short-term and long-term partnerships, often

116   measured as willingness to have sex outside of loving relationships and with

117   multiple people (Simpson & Gangestad, 1991), and there are different benefits

118   to males and females in engaging in either type of mating (Buss & Schmitt,

119   1993). While men may report being more interested in short-term mating

120   (Buss & Schmitt, 1993), there are benefits to women in engaging in short-term

121   parings, such as acquiring good-genes from men who are unwilling to engage

122   in long-term relationships, and also benefits to men engaging in long-term

123   relationships, such as paternal investment leading to more successful

124   offspring (Buss & Schmitt, 1993). For short-term relationships women pay

125   more attention to men's physical attractiveness than to men's parenting skills

126   and cooperative nature whereas the opposite is true in long-term contexts

127   (Scheib, 2001). In face preferences, women judging for short-term

128   relationships prefer more masculinity in faces than those judging for long-term

129   relationships (Little, et al., 2002). It is possible this reflects choosing a long-

130   term partner whose less masculine appearance suggests cooperation and

131   extended paternal care and/or choosing short-term partners whose higher

132   facial masculinity may indicate better genetic quality (Little, et al., 2001; Little,

133   et al., 2002; Penton-Voak, et al., 1999). In other words, women can extract

134   potential genetic benefits from attractive men by copulating and conceiving

135   within a short-term relationship but such men may not make ideal long-term

136 partners because they are in demand and so may provide limited long-term

137 investment (Gangestad & Simpson, 2000).

138   While men appear less constrained by investment issues, men can still

139 be deserted by their partners or face possible cuckoldry and thus also face a

140 trade-off in long-term and short-term mating. Because humans have bi-

141 parental care and men often invest heavily in their children, for long-term

142 relationships we might expect men to value cues to mothering ability and a

143 cooperative personality. Not all men, however, will be able to attract and keep

144 a partner who has physical traits associated with health and who will be

145 cooperative. Attractive, feminine women, for example, may be more likely to

146 leave a relationship being confident of finding another partner and/or be more

147 likely to cheat on their partner if their partner is not of greater attractiveness

148 than themselves (Buss & Haselton, 2005; Haselton & Gangestad, 2006). Men

149 may then actually prefer less attractive/feminine women in their long-term

150 choices. As there are few costs, males may be more focussed on cues to

151 attractiveness and femininity in short-term contexts as the effects of any

152 potentially negative behavioural traits associated with physical attractiveness

153 are less relevant (Buss & Schmitt, 1993). Additionally, men may be attracted

154 to different traits for short-term relationships than those they would find

155 unattractive for long-term relationships, such as cues to interest in short-term

156 mating.

157   Having a partner has also been shown to affect women's face

158 preferences. An increased preference for traits other than parental investment

159 may be expected when a woman has already acquired a long-term partner.

160 When a woman has already secured investment within a long-term

partnership she may be able to pursue extra-pair relationships with more

attractive men from whom little or no investment is available. Because

physically attractive men are attractive for short-term relationships they are

expected to be less inclined to long-term investment (Gangestad & Simpson,

2000), and so physical attractiveness may be valued higher if long-term

investment is available from another man. Alternatively, a woman with a

partner may be choosier in her preferences as she looks to acquire a new

partner more attractive than her current partner. Such changes in preferences

may then reflect differences in preferences either for extra-pair copulations or

potential mate replacement. Little et al. (2002) have shown that women who

have partners prefer relatively more masculine male faces than those without

a partner. Further studies have shown that women without partners

demonstrate stronger preferences for direct gaze (indicating social interest)

from feminine male faces than from masculine male faces when judging

men's attractiveness for long-term, but not short-term relationships (Conway,

Jones, DeBruine, & Little, 2010) and that women's stronger preferences for

femininity in men's faces when assessing men as long-term partners is most

pronounced among women who see feminine men as trustworthy (Smith et

al., 2009).

In terms of male preferences, many of the issues influencing female

mating strategies may also apply. Like women, in long-term contexts, factors

such as cooperation are likely to be important to men whereas such factors

will be of decreased importance in short-term preferences. On the other hand,

without the need to maintain a relationship, physical attractiveness is likely to

be of increased importance for short-term preferences. In men, we would then

186 expect that long-term preferences may reflect a trade-off between certain

187 personality traits and physical attractiveness. In women, this trade-off may be

188 between a man's attractiveness and his willingness to invest or likelihood to

189 desert. In men, investment may be less of an issue but desertion is still a risk

190 of choosing an attractive partner. Further, men also face an additional risk:

191 cuckoldry. Because only women can be 100% certain that their children are

192 their own, if his partner cheats on him, a man risks raising a child which is not

193 his own. There is evidence that women may be more likely to cheat on less

194 attractive partners. Women with more asymmetric partners are more likely to

195 express interest in other men when during the fertile phase of the menstrual

196 cycle, suggesting that women may seek out alternative partners to father their

197 children if their current partner is less attractive (Gangestad, Thornhill, &

198 Garver, 2005). Because feminine women are more likely to pursue short-term

199 relationships (Boothroyd, Jones, Burt, DeBruine, & Perrett, 2008), men may

200 then not always be best served in preferring the most feminine woman and

201 instead choose more masculine women for long-term relationships. These

202 arguments also apply to male attractiveness influencing preferences, leading

203 to the prediction that less attractive men may prefer more masculine women

204 for long-term relationships to enhance the chances that they select someone

205 who will remain faithful. Effects of male attractiveness are also likely for short-

206 term ratings as attractive, feminine women, who may be more likely to pursue

207 short-term relationships (Boothroyd, et al., 2008), are likely to do so only with

208 attractive men (Little, et al., 2001). Indeed, attractive men report more short-

209 term partners than less attractive men (Rhodes, Simmons, & Peters, 2005).

210 Again, following similar logic applied to female preferences, those males who

211 have a current partner may also have more unconstrained preferences than

212 their unpartnered counterparts. When, a man has a current partner, he does

213 not have to consider issues of cuckoldry or cooperative behaviour in

214 preferences for other women if he pursues only a short-term relationship. Men

215 with partners may then focus more on physical traits associated with

216 attractiveness.

217   As noted earlier, there is evidence that men show potentially strategic

218 preferences. For example, men who score highly on sensation seeking, a trait

219 on which men generally score higher than women (Zuckerman, 1984), prefer

220 more feminine faced women (Jones et al., 2007), and men also prefer more

221 feminine female faces when their testosterone levels are high (Welling et al.,

222 2008). Men also appear to moderate their preferences according to context.

223 Context has been shown to moderate the effects of some variables. For

224 example, self-rated and other-rated attractiveness in men is positively

225 correlated with their preferences for feminine faced women for short-term, but

226 not long-term, relationships (Burriss, et al., 2011), an effect similar to that

227 seen in women. For more direct effects of context, preferences for more

228 feminine stimuli have been found to be greater for short-term than for long-

229 term judgements for both face (Little, Connely, Feinberg, Jones, & Roberts,

230 2011), and voice stimuli (Little, et al., 2011; Puts, Barndt, Welling, Dawood, &

231 Burriss, 2011), although one study using face stimuli did not show differences

232 in men's preferences across contexts (Burriss, et al., 2011). In the case for

233 female bodies, however, Little et al. (2011) found that men preferred more

234 masculine body shapes for short-term versus long-term relationships.

235 Whether men prefer femininity differently across context is therefore not clear

236 cut. Additionally, while partnership status is known to be associated with

237 women's preferences for male faces (Little, et al., 2002), to date, the impact of

238 partnership status on men's preferences remains unexamined.

239   Given the documented potentially strategic preferences that women

240 display for male facial masculinity and theoretical reasons to expect men to

241 vary in their preferences, we examined three sources of individual differences

242 in regard to men's preferences for female facial femininity: context, condition,

243 and relationship status. For condition-dependent preferences we used self-

244 perceived attractiveness as a proxy for mate-value/condition following

245 previous studies (e.g., Burriss, et al., 2011; Little, et al., 2001; Little &

246 Mannion, 2006). We addressed the impact of short-term versus long-term

247 context, self-rated attractiveness, and partnership status on men's

248 preferences for female facial femininity in both laboratory based (Study 1) and

249 internet based (Study 2) tests. We additionally noted that preferring feminine

250 women may also carry a cost to men in regards to potential cuckoldry.

251 Feminine faced women are more inclined to pursue short-term relationships

252 (Boothroyd, et al., 2008), raising the possibility that men may be sensitive to

253 this cue. To address whether men saw feminine faced women as less likely to

254 be faithful, we also examined the relationship between femininity and

255 perceived faithfulness/inclination to short-term mating (Study 3). If feminine

256 faced women are seen to be less faithful and more promiscuous then this

257 would be an important potential cost to choosing a very feminine partner.

258   **STUDY 1**

259 **PARTICIPANTS**

260 Seventy-five male participants (aged 17-38, mean age = 21.4, SD = 3.1) took

261 part in the study. Participants were volunteers and were selected for reporting

262 to be heterosexual (homosexual and bisexual participants were recruited but

263 their data are not analysed here). Out of the 75 participants, 40 reported

264 having a current partner and 35 reported no current partner.

265 **STIMULI**

266 Test stimuli were manufactured from sets of 90 male and 145 female

267 Caucasian (aged 18-25 years) photographs taken under standardised lighting

268 conditions and with a neutral expression. An additional set of 28 male and 28

269 female Japanese (aged 20-23 years) photographs also taken under

270 standardised lighting conditions and with a neutral expression were used.

271   For every image 174 feature points were delineated on each face

272 image. Individual images were divided into four Caucasian and one Japanese

273 group for each sex and combined to make a composite image for each (to

274 make 5 male and 5 male composite images). Composite images were

275 created by warping, and then superimposing all of the images in each group

276 into the relevant average face shape (Benson & Perrett, 1993). All images

277 were made perfectly symmetrical by combining them with their mirror image

278 prior to femininity-masculinity manipulation.

279   Each composite face was transformed along a feminine-masculine

280 dimension by using the linear difference between feature points of a

281 composite male and composite female face (Benson & Perrett, 1991; Perrett,

282 et al., 1998; Tiddeman, Burt, & Perrett, 2001). The Caucasian composites

283 were transformed using the difference between Caucasian composites (e.g.,

284 male composite 1 was transformed suing the difference between male

285 composite 1 and female composite 1) and the Japanese composites were

286 transformed using the difference between the Japanese male and Japanese

287 female composite. For each composite image a sequence of 11 face shapes

288 ranging from +50% masculinized to +50% feminised was constructed (the

289 mid-point, 0% transform, represented the original image).

290   Final stimuli were ten sequences of faces (5 male and 5 female) to be

291 used to assess preferences for femininity in faces. These image sequences

292 have been used in previous studies (Penton-Voak, et al., 1999; Perrett, et al.,

293 1998). Figure 1 shows an example of a masculinised and feminised female

294 and male face (see Penton-Voak et al., 1999; Perrett et al., 1998 for further

295 example images).

296 **Figure 1 around here**

297 **PROCEDURE**

298 The study was administered in the laboratory. Participants completed a short

299 questionnaire addressing age, partnership status (yes/no), and sexuality

300 (heterosexual/bisexual/homosexual). Self-reported attractiveness was

301 measured by giving participants a seven-point scale to rate themselves upon

302 (1 = low, 4 = average, 7 = high). Participants were then presented with 5

303 interactive face sequence trials. The interactive face sequence trials were

304 presented in random order with subjects being cued to make judgements

305 based on either short or long term relationships by the message "alter the face

306 until you think it is closest to the appearance you would find attractive for a

307 short [or long] term relationship." Definitions of short-term and long-term

308 relationships were provided prior to rating for each condition following

309 previous studies (see e.g., Little, et al., 2011 for full definitions).

310   During each trial left or right (counterbalanced between trials) mouse-

311 movement instantly altered the shape of the face in the on screen image

312 making it more or less masculine. The starting frame was randomly selected.

313 Participants rated both for long- and short-term relationships and order of

314 rating by term was randomised. Participants also judged same-sex male faces

315 and did so after female face trials. The task was the same except that

316 participants were asked to "alter the face until you think it is most attractive to

317 someone of the opposite-sex". Clicking the mouse button selected an image

318 and a score corresponding to the image, between 0 and 10, was recorded.

319   **RESULTS**

320 We calculated % preference for femininity separately for short- and long-term

321 judgements by averaging the recorded scores (converting to the

322 corresponding %, i.e., 0=-50%) from each of the faces to give a score in

323 percent that could range from -50% (preference for masculinity) to +50%

324 (preference for femininity). Preferences were normally distributed using one-

325 sample Kolmogorov-Smirnov tests (all z <.85, p < .47). A one-sample t-test

326 against no preference (0%) revealed preferences for femininity for both short-

327 term (mean =19.77, SD = 14.78, t_{74} = 11.58, p < .001) and long-term (mean =

328 15.12, SD = 21.05, t_{74} = 6.22, p < .001) relationships. The same test showed

329 significant preferences for masculinity in male faces (mean = -7.50, SD =

330 19.11, t_{74} = 3.40, p = .001). There was a significant positive correlation

331 between preferences for femininity in short- and long-term contexts (r = .520,

332 p < .001) while preferences in both short-term (r = -.163, p = .161) and long-

333   term (r = -.181, *p* = .120) contexts were negatively, but not significantly,

334   related to preferences for femininity in male faces. Age was not significantly

335   correlated with either short-term (r = .012, *p* = .917), long-term (r = -.119, *p* =

336   .308) or same-sex (r = -.080, *p* = .494) preferences. Using independent

337   samples t-tests, self-rated attractiveness (partnered mean = 4.63, SD = 0.77,

338   unpartnered mean = 4.38, SD = 1.25, t_{73} = 1.04, *p* = .303) and age (partnered

339   mean = 22.09, SD = 3.72, unpartnered mean = 20.73, SD = 2.20, t_{73} = 1.96, *p*

340   = .054) were not found to significantly differ between partnered and

341   unpartnered men, although the effect for age was close to significance. To

342   examine the influence of included Japanese face trials, we recalculated mean

343   preferences leaving these trials out. White-only preferences were highly

344   correlated with the original scores (long-term r = .95, short-term r = .87, same-

345   sex r = .95), suggesting ethnicity of face had little influence on average

346   preferences.

347   **STRATEGIC PREFERENCES**

348   A 2x2 mixed model ANOVA with femininity preference as the dependent

349   variable, *term* (short-term/long-term) as a within-participant factor, *relationship*

350   *status* (partner/no partner) as a between-participant factor, and *self-rated*

351   *attractiveness* entered as a covariate revealed a significant main effect of *term*

352   ($F_{1,72}$ = 4.93, *p* = .030), a significant interaction between *term* and *self-rated*

353   *attractiveness* ($F_{1,72}$ = 7.94, *p* = .006)*,* and a significant main effect of

354   *relationship status* ($F_{1,72}$ = 5.83, *p* = .018).There was no significant interaction

355   between *term* and *relationship status* ($F_{1,72}$ = 0.12, *p* = .735) or main effect of

356   *self-rated attractiveness* ($F_{1,72}$ = 0.35, *p* = .557). The significant main effects

357 indicated that men preferred femininity more for short-term relationships and

358 when they had a partner. These effects are presented in Figure 2.

359   To examine the significant interaction between *self-rated*

360 *attractiveness* and *term* we ran Pearson product moment correlations. These

361 revealed a significant positive correlation between self-rated attractiveness

362 and preference for femininity in female faces for short-term relationships (r =

363 .306, *p* = .008). Self-rated attractiveness was not significantly correlated with

364 long-term preferences (r = .066, *p* = .576). The interaction then indicates that

365 self-rated attractiveness mainly influenced short-term and not long-term

366 femininity preferences.

367   **Figure 2 around here**

368 **SAME-SEX FACES**

369 A univariate ANOVA with same-sex femininity preference as the dependent

370 variable, *relationship status* (partner/no partner) as a between-participant

371 factor, and *self-rated attractiveness* entered as a covariate revealed no

372 significant effect of *relationship status* ($F_{1,72} = 0.79$, *p* = .376) and no

373 significant effect of *self-rated attractiveness* ($F_{1,72} = 2.63$, *p* = .109).

374   Pearson product moment correlations confirmed that self-rated

375 attractiveness was not related to preferences for femininity in same-sex faces

376 (r = .176, *p* = .131).

377 **Sequential Bonferroni correction for correlations**

378 Alpha values were compared with sequential Bonferroni corrected levels of

379 significance (Rice, 1989). This is done by ordering significant p-values by

380 decreasing levels of significance and comparing with a Bonferroni corrected p-

381 value based on the number of tests conducted (i.e., p1 compared to 0.05, p2

382 compared to 0.05/2, p3 compared to 0.05/3). All significant correlations

383 remained significant using this correction.

384 **STUDY 2**

385 Study 1 demonstrated relationship term, partnership status, and male

386 attractiveness were related to preferences for female facial femininity in a

387 student sample of young adults. In Study 2, we examined the same variables

388 and their relationship with men's preferences for female faces in a larger and

389 more representative online sample of men to address the issue of whether

390 these effects are applicable at a wider range of ages and backgrounds as well

391 as probing more detailed questions regarding partnership status in a sub-

392 sample of men. The method of assessing preference was also changed in

393 Study 2 from the interactive test used in Study 1 to a two alternative forced

394 choice (2AFC) test in Study 2. We note that online preference tests have been

395 found to produce similar patterns of results to laboratory based tests (Jones et

396 al., 2005; Little, Jones, & Burriss, 2007).

397 **PARTICIPANTS**

398 Three hundred and ninety three male participants (aged 17-45, mean age =

399 27.6, SD = 6.5) took part in the study. The study was administered over the

400 internet and participants were volunteers visiting a research website and were

401 selected for reporting to be heterosexual (homosexual and bisexual

402 participants were recruited but not analysed here) and for being between 17

403 and 45 years old. Out of the 393 participants, 207 reported having a current

404 partner and 186 reported no current partner. Of those reporting having a

405 partner, 100 men filled in additional questions concerning their relationship

406 and partner. Relationship data were available only for a sub-sample of men

407 because a revised version of test, with an expanded questionnaire including

408 these questions, replaced the original version part way through testing.

STIMULI

410 Images were manufactured from 50 young adult male and 50 female

411 photographs taken under standardised lighting conditions and with a neutral

412 expression (all were Caucasian and aged 18-25 years). Composite images

413 were used as "base" faces to which transforms were applied (10 male and 10

414 female composite images each made of 5 individual images). The composite

415 images were made by creating an average image made up of 5 randomly

416 assigned individual facial photographs using techniques outlined for Study 1.

417 Faces were transformed in masculinity +/-50% in the same way as described

418 for Study 1. Final images were 10 feminine/masculine female pairs.

419 Transforms were equivalent to those depicted in Figure 1.

PROCEDURE

421 A short questionnaire was presented which was the same as in Study 1.

422 Participants were then shown 10 pairs of masculine and feminine female

423 faces. Participants were asked to choose the face from the pair that they

424 found most attractive for either a short-term or long-term relationship using a

425 set of eight buttons indicating a preference and confidence in their choice

426 (only the binary choice was analysed below). Clicking a button moved

427 participants on to the next face trial. Image order and side of presentation was

428 randomised. Participants chose between the pairs of faces twice, once for

429 long-term and once for short-term relationships. Order of rating of term was

430 randomised. Definitions of short-term and long-term relationships were

431   provided prior to rating for each condition as in Study 1. A sub-sample of men

432   also completed questions concerning their relationship and their partner:

433   relationship length (in months), how happy they were in their current

434   relationship (1=not happy, 7= very happy), how serious they considered their

435   current relationship (1=not serious, 7=very serious), and how attractive they

436   thought their partner was (1 = low, 7 = high).

437   **RESULTS**

438   We calculated % preference for femininity separately for short- and long-term

439   judgements by taking the mean number of choices of the feminine image of

440   each of ten pairs and converting the score into a percentage ranging from 0%

441   (preference for masculinity) to 100% (preference for femininity). A one-sample

442   t-test against zero preference (50%) revealed preferences for femininity for

443   both short-term (mean = 68.47, SD =24.71, t_{392} = 14.82, $p < .001$) and long-

444   term (mean = 69.26, SD =24.47, t_{392} = 15.61, $p < .001$) relationships. There

445   was a positive correlation between preferences for femininity in short-term and

446   long-term contexts (r = .553, $p < .001$). Age was not significantly correlated

447   with either short-term (r = .008, $p = .870$) or long-term (r = -.045, $p = .379$)

448   preferences. Using independent samples t-tests, self-rated attractiveness

449   (partnered mean = 4.99, SD = 1.05, unpartnered mean = 4.71, SD = 1.13, t_{391}

450   = 2.56, $p = .011$) and age (partnered mean = 28.16, SD = 6.96, unpartnered

451   mean = 26.81, SD = 5.92, t_{391} = 2.22, $p = .017$) were found to differ between

452   partnered and unpartnered men, although the lack of correlation between age

453   and preference justifies not entering age as a covariate. Indeed, entering age

454   as an additional covariate in the ANOVA below does not change the pattern or

455   significance of the effects reported.

456 **STRATEGIC PREFERENCES**

457 A 2x2 mixed model ANOVA with femininity preference as the dependent

458 variable, *term* (short-term/long-term) as a within-participant factor, *relationship*

459 *status* (partner/no partner) as a between-participant factor, and *self-rated*

460 *attractiveness* entered as a covariate revealed a significant main effect of *term*

461 ($F_{1,390} = 4.72$, $p = .030$), a significant main effect of *self-rated attractiveness*

462 ($F_{1,390} = 6.03$, $p = .015$), a significant interaction between *term* and *self-rated*

463 *attractiveness* ($F_{1,390} = 4.17$, $p = .042$)*,* and a significant interaction between

464 *term* and *relationship status* ($F_{1,390} = 5.61$, $p = .018$). There was no main effect

465 of *relationship status* ($F_{1,390} = 0.53$, $p = .466$). Mean scores from this analysis

466 can be seen in Figure 3.

467   **Figure 3 about here.**

468   To examine the significant interaction between *self-rated*

469 *attractiveness* and *term* we ran Pearson product moment correlations. These

470 revealed a significant positive correlation between self-rated attractiveness

471 and preference for femininity in female faces for short-term relationships ($r =$

472 .169, $p = .001$). Self-rated attractiveness was not significantly correlated with

473 long-term preferences ($r = .058$, $p = .251$). The interaction then indicates that

474 self-rated attractiveness mainly influenced short-term and not long-term

475 femininity preferences.

476   To examine the significant interaction between *term* and *relationship*

477 *status,* independent samples t-tests were conducted comparing preferences

478 of those with and without partners. This revealed no significant differences for

479 long-term preferences ($t_{391} = 0.32$, $p = .750$) but that those with partners had

480 significantly stronger preferences for femininity than those without partners for

481   short-term relationships (t_{391} = 2.16, p = .031). Splitting by partnership status,

482   paired samples t-test revealed that those with a partner did not significantly

483   differ in their preference for feminine faces for short-term versus long-term

484   relationships (t_{206} = 1.30, p = .197) and that those without partners preferred

485   more feminine faces for long-term versus short-term relationships (t_{185} = 2.45,

486   p = .015).

487   **Preferences and ratings of relationship partner attractiveness**

488   For a sub-sample of men with partners we had additional questions

489   concerning their opinions about their relationship and partner's. Partnership

490   length ranged from 1 to 280 months (M = 58, SD = 69). We additionally

491   computed a difference in attractiveness score by subtracting partner

492   attractiveness from the man's self-rated attractiveness score. Positive scores

493   then indicate a man thought he was more attractive than his partner while

494   negative scores indicated he thought he was less attractive. We used this

495   score instead of rated partner attractiveness to assess relative attractiveness.

496   We conducted partial correlations controlling for age because age was

497   related to relationship length (r = .724, p < .001), although we note that all

498   significant correlations remain so when not controlling for age. For short-term

499   preferences, relationship seriousness was negatively related to (r = -.227, p =

500   .024) and attractiveness difference was positively related (i.e. the more a man

501   thought he was more attractive than his partner) to (r = .242, p = .016)

502   preferences for femininity. Other correlations were not significant (relationship

503   length, relationship happiness, all r .06 to .09, p > .360). For long-term

504   preferences, no variable was significantly correlated with femininity preference

505   (all r -.04 to .12, p > .220).

Sequential Bonferroni correction for correlations

Alpha values were compared with sequential Bonferroni corrected levels of significance as in Study 1. All significant correlations remained significant using this correction.

<div align="center">

STUDY 3

</div>

Study 1 and Study 2 demonstrate that men who think they are attractive prefer more feminine female faces. Men's preferences for facial femininity also change according to partnership and relationship term. These effects suggest a cost to preferences for facial femininity. In Study 3 we examined one potential cost to preferences for femininity in long term relationships: a lack of faithfulness. Specifically, men preferring and forming relationships with more feminine women may incur a cost in terms of a lower likelihood of faithfulness from feminine women because feminine faced women report greater interest in short-term mating than masculine faced women (Boothroyd, et al., 2008). To address relationships between short-term and long-term attractiveness, femininity, and faithfulness we collected ratings of each of these variables using unmanipulated female faces.

PARTICIPANTS

Images: For photography 73 women (aged 18-26 years, mean = 21.6, S.D. = 1.4) came to the laboratory and were paid £5 for participation. Raters: Participants were 15 men (aged 19-30 years, mean = 22.3, S.D. = 3.2) who were all students participating for course credit. All participants reported to be heterosexual (homosexual and bisexual participants were not excluded in recruitment but their data would not have been analysed here).

STIMULI

531 For the photographs, female participants were photographed with a neutral

532 expression and under standardized lighting conditions. Images were aligned

533 on interpupillary distance to help standardize head size and images were

534 presented masked based on the outline of the face so that ears, hair, and

535 clothing were not visible in the picture. Images were taken two years prior to

536 ratings leading to a lower likelihood that stimuli images were familiar to raters.

537 **PROCEDURE**

538 Testing took place under laboratory conditions. Participants were presented

539 with a short questionnaire addressing their age. Female faces were presented

540 to participants individually and in a random order. Order of rating was blocked

541 by question, with each image appearing alongside one question within a

542 block, and block order was also randomized. Images remained on screen until

543 the face was rated, which moved the participant on to the next trial.

544 Participants rated each face on a 7-point Likert scale, 1=low, 7=high, for the

545 following traits: "How ATTRACTIVE is this face for a LONG-TERM

546 relationship?", "How ATTRACTIVE is this face for a SHORT-TERM

547 relationship?", "How MASCULINE is this face?", "How FAITHFUL would this

548 person be in a relationship with you?", and "How interested in a SHORT-

549 TERM relationship would this person be?". Masculine ratings were reverse

550 scored to give a rating of femininity.

551 <div align="center">**RESULTS**</div>

552 Long-term and short-term attractiveness ratings were highly correlated ($r =$

553 $.833$, $p < .001$). To address relative attractiveness for the two terms we

554 subtracted short-term ratings from long-term ratings. This created a difference

555   score for which high scores indicated the face was found more attractive for

556   long-term than short-term relationships while low scores indicated the face

557   found more attractive for short-term than long-term relationships. We term this

558   variable "relative long-term attractiveness".

559   To address relationships with perceived femininity we ran Pearson

560   product moment correlations. These revealed significant correlations between

561   femininity and perceived faithfulness ($r = -.339$, $p = .003$), perceived short-

562   term inclination ($r = .338$, $p = .003$), and relative long-term attractiveness ($r = -$

563   .281, $p = .016$). More feminine female faces were seen as less likely to be

564   faithful, more likely to engage in short-term relationships, and were less

565   attractive for long-term relationships/more attractive for short-term

566   relationships.

567   Perceived faithfulness ($r = .370$, $p = .001$) and short-term inclination (r

568     $= -.332$, $p = .004$) were also significantly related to relative long-term

569   attractiveness, with faces that were more attractive for long-term relationships

570   being seen as more faithful and less likely to pursue short-term relationships

571   and faces more attractive for short-term relationships being seen as less

572   faithful and more likely to pursue short-term relationships. To address the

573   impact of perceived faithfulness and short-term inclination on the relationship

574   between femininity and relative long-term attractiveness we ran a partial

575   correlation controlling for perceived faithfulness and short-term inclination.

576   When controlling for these variables, a non-significant relationship between

577   femininity and relative long-term attractiveness was found ($r = -.160$, $p = .182$).

578   **Sequential Bonferroni correction for correlations**

579 Alpha values were compared with sequential Bonferroni corrected levels of

580 significance as in Study 1. All significant correlations remained significant

581 using this correction.

582   **GENERAL DISCUSSION**

583 The current series of studies demonstrated individual differences in men's

584 preference for female facial masculinity. Mirroring an effect seen in women's

585 preferences, men who thought themselves attractive preferred more femininity

586 in female faces when rating for short-term relationships than those who

587 thought themselves less attractive (Study 1 and Study 2). There was also an

588 effect of term and relationship status whereby men rating for short-term or

589 who had partners preferred more feminine female faces (Study 1). These

590 effects were seen somewhat differently in Study 2 in which we found an

591 interaction between term and relationship status, with men who had partners

592 generally preferring more feminine faces for short-term relationships than men

593 without partners. Relationship status and self-rated attractiveness were not

594 related to same-sex femininity preferences (Study 1) suggesting effects are

595 not to do with general preferences for masculinity and are relevant only for

596 mate-choice relevant attractiveness judgements. These effects were seen in

597 both laboratory tests (Study 1) and internet based tests (Study 2). We also

598 found perceptual relationships among perceived femininity, relative long-term

599 attractiveness, faithfulness, and inclination to short-term mating. Feminine

600 faced women were preferred for short-term relationships relative to long-term

601 relationships and were also seen as less likely to be faithful and more inclined

602 to pursue short-term relationships (Study 3).

603   Study 1 and Study 2 differed in sample (university student vs. internet

604   sample), place of testing (lab vs. web,) and method of preference

605   measurement (interactive sequence vs. forced choice). Despite such

606   differences, the results of each study are comparable. In both studies there

607   was an interaction between term and self-rated attractiveness in which self-

608   rated attractive was positively correlated with long-term but not short-term

609   femininity preferences. Both studies also suggested femininity preferences

610   were greater when rating for short-term relationships and when a man already

611   had a partner, although in Study 2 greater femininity preferences were only

612   seen in men with a partner. Similar findings across samples of students and a

613   broader sample recruited online and across web-based and laboratory-based

614   tests are unsurprising. While the percentage preferences are calculated very

615   differently across Study 1 and 2 (taking the mean % chosen from a sequence

616   ranging from -50 to +50% or calculating the % chosen from pairs transformed

617   either -50 or +50%), both measures should reflect relative preferences for

618   femininity: men who prefer more feminine faces would be expected to both

619   select more feminine images from the sequence (Study 1) and select more

620   feminine vs. masculine images in force-choice tests (Study 2). We do note,

621   however, there is no reason the mean preference for femininity would be the

622   same in the two different measures. This difference is one potential

623   explanation for why stronger preferences for femininity were seen in Study 1.

624   Little et al. (2001) found that women who thought they were physically

625   attractive preferred more masculine faces for long-term relationships than

626   those women who thought they were less attractive. The lower level of

627   preference for proposed markers of good genes was interpreted as potentially

628   adaptive for women of low mate-value in order to avoid the costs of decreased

629   parental investment/potential desertion from the owners of masculine features

630   (Little, et al., 2001). Our findings in Study 1 and 2 here suggest that an

631   equivalent mechanism may be operating in male preferences (see also

632   Burriss, et al., 2011). In men, as in women, differences in mate preferences

633   based on self-perceived attractiveness may reflect different mate-choice

634   strategies between individuals. In men, self-rated attractiveness influenced

635   preferences for short- rather than long-term partners whereas the effect of

636   self-rated attractiveness on masculinity preferences is mainly seen for long-

637   term preferences in women (Little, et al., 2001; Penton-Voak, et al., 2003). In

638   women, the specificity of effects of self-rated attractiveness to long-term face

639   preferences is in line with the notion that women face a trade-off between

640   investment and quality, which is not applicable to short-term preferences. In

641   men, specificity of effects of self-rated attractiveness to short-term face

642   preferences is more suggestive that attractiveness effects are driven by

643   factors potentially related to likely reciprocation of interest by women in short-

644   term encounters.

645   Such condition dependent preferences suggest a cost to less attractive

646   men choosing very feminine partners even in short-term relationships. The

647   results of Study 3 are indicative of a trade-off between feminine traits and

648   perceived faithfulness. More feminine women were seen as less likely to be

649   faithful and so faithfulness potentially limits men's attraction to femininity for

650   long-term relationships. Conversely, femininity may be a more desirable trait

651   in short-term partners because perceptions of low faithfulness or promiscuity

652   may indicate a greater chance that interest will be reciprocated. One study

653   has shown that a woman's rated facial femininity is positively related to their

654   ideal number of children (Law-Smith et al., 2012). While Law-Smith et al.'s

655   (2012) findings are suggestive that men should prefer feminine women for

656   both long-term and short-term relationships, as men choosing to mate with

657   such women may then produce a greater number of offspring, the perceived

658   potential cuckoldry of feminine women, as shown in Study 3, could still

659   outweigh any benefits of preferring women with an increased interest in

660   children for men's long-term preferences. Men's perceptions of faithfulness

661   may be enough to drive preferences and some studies suggest attractiveness

662   is actually linked to the pursuit of short-term relationships in women

663   (Boothroyd, et al., 2008). If men use short-term mating as a means to assess

664   potential long-term partners, factors such as faithfulness may still impact on

665   such preferences. Given we found that effects of self-perceived attractiveness

666   were relatively specific to short-term relationships, an alternative explanation

667   is that a man's attractiveness more simply limits the likelihood of reciprocal

668   sexual interest. In other words, attractive men are more able to attract

669   feminine women whereas less attractive men demonstrate preferences for

670   less feminine women which will more likely lead to mating. Men of high

671   attractiveness may then maximise their reproductive success by maximising

672   phenotypic quality (indicating fertility, fecundity or some aspect of genetic

673   quality) in short-term partners and men of low attractiveness may maximise

674   their reproductive success by pursuing females most likely to reciprocate

675   interest in short-term relationships.

676   In Study 1, we found main effects of both term and relationship status

677   but in Study 2 we found these variables interacted. The reason for this

678 difference between the two studies is unclear, and perhaps reflects

679 differences in the sensitivity of the measures of preference or the mean age of

680 the participants (who were older in Study 2). For example, in terms of sample

681 age, partnerships may be less serious to a younger versus older group

682 leading to differences in how having a partner may impact on short-term

683 preferences. Despite the difference, the effects are generally consistent,

684 suggesting greater attraction to femininity for short-term preferences and

685 when a man has a partner, although in Study 2 men without partners

686 expressed preferences for feminine female faces for long-term over short-term

687 relationships. This interaction in Study 2 might help explain mixed findings for

688 preferences for more feminine stimuli being greater for short-term than for

689 long-term judgements in men (Burriss, et al., 2011; Little, et al., 2011; Puts, et

690 al., 2011), as the partnership status of the men being studied might be an

691 important variable (the participants in Burriss et al.'s study all had partners).

692 Again, similar phenomena are seen among women, whereby those who have

693 a partner or are rating a short-term partner prefer more masculine male faces

694 (Little, et al., 2002). For women's preferences, the logic put forward to explain

695 such effects is that the possession of a partner or judging in the context of a

696 short-term relationship are both circumstances in which a woman can be less

697 concerned by the potential of low investment from masculine faced men. The

698 higher preferences for femininity in female faces by men for short-term

699 judgements when they have a partner may be shaped by both similar and

700 different pressures. Changing preferences in women may in part reflect an

701 adaptation to become pregnant by men who are not their long term partners, a

702 factor not applicable to men. Men who cheat on their partner, however, risk

703   losing this partner if the infidelity is discovered. Potentially then, partnered

704   men may be generally more choosy in terms of preferences for femininity than

705   single males to somewhat offset the costs associated with this risk. In other

706   words, because of an associated cost, the payoff must be larger for men to

707   consider cheating on or leaving their current partner. From the unpartnered

708   man's perspective, there is potentially greater pay-off in pursuing short-term

709   relationships and so unpartnered men may be most likely to compromise their

710   short-term partner preferences and relax their standards to favour more

711   masculine women. In terms of generally greater preferences for masculinity in

712   long-term partners, preferences for femininity may be relaxed because

713   femininity is ranked as less important relative to other factors (such as

714   cooperative tendencies, for example).

715   In Study 2, we additionally asked questions concerning the relationship

716   and partner attractiveness for partnered men. Our measurement of

717   relationship status in Study 1 as only a yes/no variable did not address the

718   influence of relationship length and other relationship qualities that may have

719   been important in determining how partnership affects preferences. However,

720   in Study 2, where such information was available for a sub-sample of men,

721   only limited effects of partnership length and happiness were seen.

722   Relationship length and happiness were unrelated to either long-term or short-

723   term preferences and no other variable was related to long-term preferences.

724   For short-term preferences, relationship seriousness was negatively related to

725   preferences for femininity indicating that lower levels of seriousness were

726   related to greater preferences for femininity. One explanation for this finding is

727   that some men may be prone to generally consider their relationships as less

728   serious. Such men may be inclined to take a long-term partner while

729   attempting to have extra-pair relationships with more feminine women even

730   when equivalently happy in these relationships to men who tend to consider

731   their relationships more serious. The difference in perceived attractiveness

732   between a man and his partner also predicted short-term preferences. Men

733   who thought they were more attractive than their partner preferred more

734   feminine female faces for short-term relationships. Again, this finding may

735   reflect dynamics within a relationship. A man may be happy with his partner,

736   but if he feels more attractive then he may pursue short-term relationships

737   with more feminine women.

738   In Study 3, we observed that more feminine women were seen as less

739   faithful and more likely to pursue short-term relationships. Both effects likely

740   reflect perceived opportunity, opportunities particularly important for less

741   competitive men. A male of average attractiveness may be at greater risk of

742   cuckoldry by partnering with a very feminine woman (Buss & Haselton, 2005).

743   While feminine women were also seen to be more likely to pursue short-term

744   relationships it is unlikely that they would be seen to do so with all men. As

745   noted above, some men may not direct their attention towards very feminine

746   women, even if they are seen as good short-term prospects, because of a low

747   likelihood of mating success. Indeed, attractive, feminine women may be more

748   likely to pursue short-term relationships (Boothroyd, et al., 2008) but they are

749   likely to do so only with attractive men. The findings of Study 3 may then also

750   offer another explanation for men's preference for femininity in the short-

751   term/when they have a partner: it may in fact be easier to secure a short-term

752 relationship with a woman with a more feminine than less feminine face, and

753 this may be most relevant to attractive men.

754   Overall, men, like women, might face a trade-off between attraction and

755 investment. Attractive men may be able to retain the interest of more feminine

756 women with lower risk of cuckoldry than less attractive men (Little, Cohen,

757 Jones, & Belsky, 2007). Attractive men may also be more competitive for

758 short-term partners allowing them to be choosier (Gangestad, et al., 2005).

759 Men may focus on attractive traits in short-term contexts when they have a

760 partner because they do not have to be concerned with behavioural traits that

761 are important in long-term relationships (Little, Cohen, et al., 2007; Puts, et al.,

762 2011) and because the potential costs of being discovered lead to an increase

763 in choosiness relative to un unpartnered men who are more willing to relax

764 their standards to increase potential short-term mating.

765   In summary, here we show individual differences in men's preferences

766 for female facial femininity. Such differences appear somewhat similar to

767 effects seen when women judge the attractiveness of masculinity in male

768 faces, being influenced by self-perceived attractiveness, short- and long-term

769 contexts, and partnership status. The data here are suggestive that men may

770 also face trade-offs when choosing a masculine or feminine faced partner

771 and, while the exact pressures may be less clear than for women, the

772 variation observed here may serve an adaptive function in driving male mate

773 preferences.

774

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924   Figure 1: Examples of feminised (left) and masculinised (right) female and
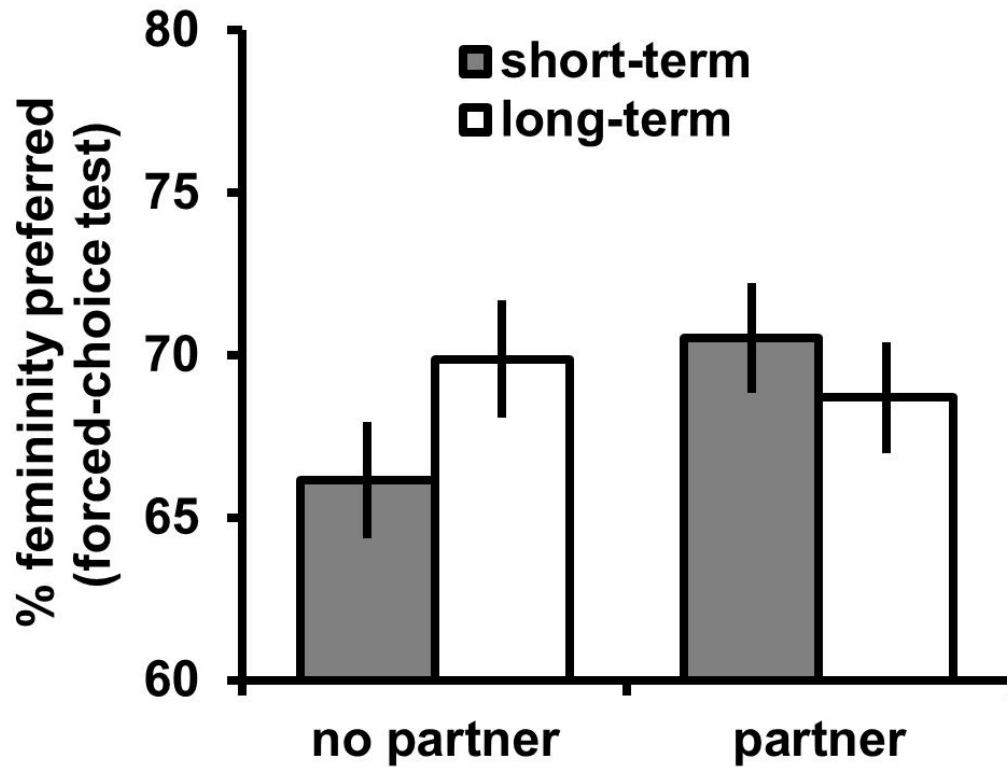
925   male faces.

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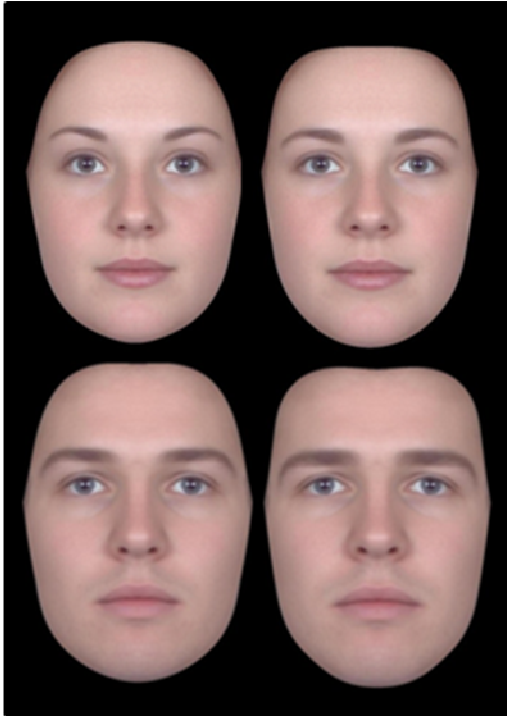
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930 Figure 2: Study 1: Preferences for femininity in female faces (mean % based
931 on choice from sequence -50% to +50%) judged by men split by partnership
932 status and long- and short-term preferences (estimated marginal means
933 controlling for self-rated attractiveness, +/- 1 SE of mean).
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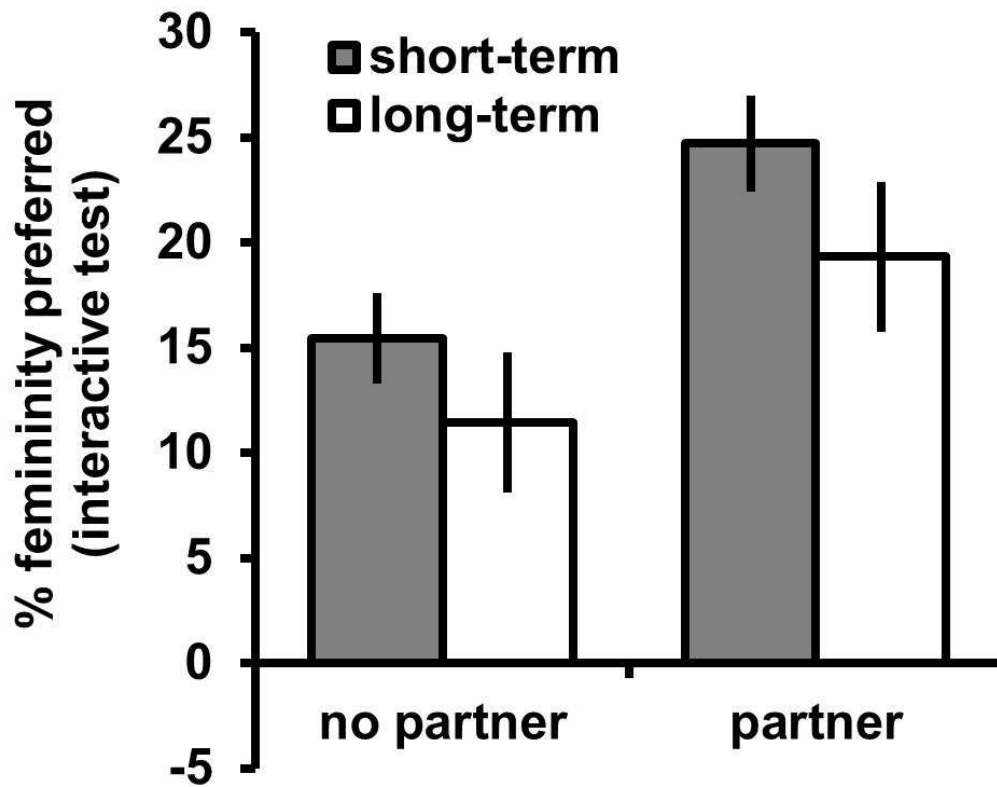
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937 Figure 3: Study 2: Preferences for femininity in female faces (mean % of
938 choice of feminine face in force choice trials, 0-100%, 50% = equal number of
939 masculine and feminine faces chosen) judged by men split by partnership
940 status and long- and short-term preferences (estimated marginal means
941 controlling for self-rated attractiveness, +/- 1 SE of mean).

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