Arch Sex Behav (2017) 46:2365–2376
https://doi.org/10.1007/s10508-017-0963-z

ORIGINAL PAPER

The Impact of Health, Wealth, and Attractiveness on Romantic Evaluation from Photographs of Faces

Konstantin O. Tskhay[1] · **Jerri M. Clout**[1] · **Nicholas O. Rule**[1]

Received: 9 March 2016 / Revised: 13 February 2017 / Accepted: 15 February 2017 / Published online: 2 March 2017

Abstract A large literature suggests that men and women differ in their self-reported mate preferences such that men place greater weight on physical attractiveness than women do, whereas women value financial prospects more than men. Yet, little research has addressed how these differences generalize to other contexts, such as modern online dating in which mate selection may largely depend on visual cues. Distinct from the sex differences observed in previous studies relying on self-reports, we found that men and women both used perceptions of health and attractiveness to select hypothetical partners based on photographs of their faces. Importantly, although people reliably identified others' wealth from their photographs, these perceptions did not influence men's or women's partner selections. Thus, men and women may select romantic partners similarly based on limited visual information.

Keywords Mate preferences · Online dating · Sex differences · Social perception

Introduction

The advent of the Internet has given rise to a variety of methods for online mate browsing, dramatically changing both the dating landscape and mate selection (Finkel, Eastwick, Karney, Reis, & Sprecher, 2012). Whereas just a few decades ago individuals were mostly limited in their mate selection to people in their local area, modern dating Web sites present their users with thousands of romantic alternatives across wide geographic expanses. Moreover, some of the most popular modern dating services (e.g., Grindr, Hinge, Tinder) have largely eliminated self-descriptions in favor of photographs, basic demographic information (e.g., age, race), and a few hundred characters of text. Users therefore must rely on their very first impressions when deciding to contact potential mates. Although previous research suggests that men favor physical attractiveness in their potential mates whereas women value status (Buss, 1989; Buss & Schmitt, 1993; Fletcher, Tither, O'Loughlin, Friesen, & Overall, 2004), it remains somewhat unclear whether these differences translate to mate selection based on facial appearance alone. In the current work, we examined how perceptions of health, wealth, and attractiveness from photographs influence mate selection.

Sex Differences in Reported Mate Preferences

The empirical study of mate preferences began with people reporting the qualities that they found to be most important in mates. Using self-reports of individuals' mate preferences, Hill (1945) found that men ranked physical attractiveness higher than women did and that women weighed financial prospects more heavily than men. Buss extended these findings by surveying thousands of participants from a number of cultures, interpreting the differences using Trivers' (1972) parental investment theory that suggests that men prefer physical attractiveness because it communicates information about a mate's health, genetics, and reproductive potential and that women attend to mates' earning prospects to secure the resources needed to raise their offspring (Buss, 1989; Buss & Schmitt, 1993; see also Feingold, 1990, 1992; Singh, 1995). Trivers reasoned that these differences emerged from sex differences in reproduction and parental investment, whereas men can impregnate large numbers of women, making their investment into offspring relatively low, women are limited in the number of offspring that they can produce in their lifetime, making a greater investment in their offspring. Therefore, because investment is greater and more prolonged for women, they should be more

✉ Konstantin O. Tskhay
konstantin.tskhay@mail.utoronto.ca

[1] Department of Psychology, University of Toronto, 100 St. George Street, Toronto, ON M5S 3G3, Canada

interested in mates who can provide the necessary resources to nurse and successfully raise the offspring over time. On the other hand, because investment for men is minimal, they need to ensure the survival of their offspring by mating with a large number of women, evaluating their genetic fitness via physical attractiveness (Buss & Schmitt, 1993; Trivers, 1972). Thus, modern sex differences in mate preferences are believed to be the outcome of successful mating practices between physically attractive women and high status men throughout human evolution (Buss & Schmitt, 1993).

Although this research suggests that men prefer attractive women and women prefer high status, financially secure men, it is critical to consider whether these preferences translate to individuals' behavior. Indeed, whereas *preferences* address the question of what individuals value in mates, *selection* refers to how individuals choose them. Naturally, mate selection may not always reflect mate preferences (Wood & Brumbaugh, 2009): for example, individuals may settle for less than what they desire (e.g., Spielmann et al., 2013). Furthermore, when people think about what they prefer in mates, they think about their ideal partners rather than reflecting on physically available alternatives (Buss & Schmitt, 1993). This reflective processing encourages deliberation that may be devoid of the emotions and attractions that influence real mate selection (Eastwick & Finkel, 2008; Wood & Brumbaugh, 2009). These nuances notwithstanding, researchers believe that mate preferences should emerge in mate selection because of their functional evolutionary significance (Buss & Schmitt, 1993).

Indeed, research suggests that men and women select mates based on their preferences for attractiveness and status/resources, respectively. For example, Elder (1969) found that attractive women married high status men and subsequent research has suggested that attractiveness relates to the household income of women (but not their own income), suggesting that the women may have married rich men (Udry & Eckland, 1984). Moreover, upon surveying 800 "Lonely Hearts" advertisements, Harrison and Saeed (1977) found that women were more likely to advertise their physical attractiveness and men to advertise their financial resources, in order to attract potential mates. Complementarily, women sought mates with higher earning potential and men reported looking for physically attractive women. Similarly, men's reported income positively predicts the number of e-mails that they receive from women across modern and relatively outdated online dating platforms (Baize & Schroeder, 1995; de Sousa Campos, Otta, & de Oliveira Siqueira, 2002; Goode, 1996; Hitsch, Hortaçsu, & Ariely, 2010; Lee, Loewenstein, Ariely, Hong, & Young, 2008; Pawlowski & Koziel, 2002). Eastwick and Finkel (2008), however, found that men's and women's reported preferences for physical attractiveness and wealth did not affect their mate selection in a speed-dating context (see also Li et al., 2013; Sprecher, 1989; Wood & Brumbaugh, 2009). Eastwick and Finkel suggested that this divergence occurred because mate preferences represent individuals' rational theories about what they desire in romantic partners but that individuals' actual mate selection decisions involve potentially irrational factors, such as one's gut feelings, chemistry, and attractions. As a result, people might lack awareness about why they choose the partners that they do and likely use their appearance-based first impressions as a guiding principle in mate selection.

Mate Selection from Appearance

In contrast to face-to-face mate selection, the amount of information afforded to participants in the modern online dating environment is severely limited. Thus, people must use their first impressions of individuals (often based just on portrait photographs) to decide about initiating a relationship by contacting a potential mate. Consistent with this reasoning, some recent work demonstrates that people may base their romantic decisions more on the photographs of potential mates than on the accompanying verbal descriptions (de Vries, 2010). Examining mate selection from photographs, Townsend and Wasserman (1998; see also Townsend, 1993; Townsend & Levi, 1990a, b; Townsend & Roberts, 1993 for similar studies) presented participants with two photographs of highly attractive members of the opposite sex (i.e., bathing suit models), each paired with either a high or low status verbal descriptor, and asked them to indicate the degree to which they were interested in dating each person. They found that women were more interested in dating targets described as wealthy than were men. In complement, a separate study showed that men expressed more interest than women in dating targets that others had rated as highly attractive (Stroebe, Insko, Thompson, & Layton, 1971).

Other similar research seems to confirm this, but with some nuances. For example, de Vries, Swenson, and Walsh (2008) found that men indeed based their romantic decisions on attractiveness more than women did (though women also preferred more attractive mates); however, financial resources did not seem to matter for either sex. Research examining gay men's and lesbians' responses to potential mates' photographs has further demonstrated that traditional mate preferences emerge across sexual orientation: both gay and heterosexual men prioritized attractiveness, whereas lesbian and heterosexual women preferred resources (Ha, van den Berg, Engels, & Lichtwarck-Aschoff, 2012). A number of additional studies found that people generally seem to prefer more attractive mates when they evaluate photographs (Byrne, London, & Reeves, 1968; Greitemeyer, 2010; Kocsor, Rezneki, Juhász, & Bereczkei, 2011; Lee et al., 2008; Montoya, 2008), with resource and status cues deemed predictive but less important to people's romantic interest (de Vries et al., 2008). When selecting based on appearance, then, people seem to place more weight on attractiveness than status and wealth. Furthermore, this research shows that traditional sex differences often emerge when people report their interest in romantic relationships based on photographs; however, there is an apparent variability in these findings: although some research shows that attractiveness is indeed more important for men than

women (de Vries et al., 2008; see also Eastwick et al., 2014), other research finds no significant sex differences in preference for attractiveness whatsoever (Byrne et al., 1968). We address this question empirically, examining the evaluations of faces, devoid of additional information, to establish the role of sex differences in the evaluation of others as suitable mates based on facial photographs.

Although research examining mate preferences from photographs largely suggests that traditional sex differences may sometimes emerge in the context of face perception, this research has several limitations that constrain the generalizability of the findings. First, the older studies often explicitly provided the status information to the participants (e.g., Townsend & Levi, 1990a, b; Townsend & Wasserman, 1998); hence, it remains unclear how participants' impressions of status based on facial appearance influenced mate selection alone. This is critical because many modern dating Web sites do not even provide explicit information about users' material status (cf. Hitsch et al., 2010). Instead, users might infer the targets' wealth based on first impressions of their photographs or other indirect cues. In online dating, decisions may thus be based on participants' *perceptions* of wealth rather than their *actual* wealth. However, this raises an additional question: can people reliably and accurately infer wealth simply by looking at other people's faces? Indeed, although Kraus and Keltner (2009) found that subtle nonverbal cues reveal information about individuals' relative socioeconomic status during dyadic interactions, no study has reported whether the type of static cues in photographs might similarly convey such information. Thus, it remains unclear whether mate preferences result in mate selection in the context of modern, largely picture-based, online dating. In the current work, we therefore examined how people select their mates based on first impressions of their facial photographs and whether people can detect wealth information from faces alone.

Previous researchers also presented participants with just a few photographs (Byrne et al., 1968; de Vries, 2010; Ha et al., 2012; Townsend, 1993; Townsend & Wasserman, 1998; however, see Wood & Brumbaugh, 2009) and treated the targets depicted in the photographs as a fixed factor in their analyses. This limits the ability to generalize the findings beyond the few specific yearbook photographs, pictures of undergraduates, and swimsuit models used in those studies. Modern statistical procedures, recently outlined by Judd, Westfall, and Kenny (2012), allow for inferences beyond the observed samples of stimuli and participants. By accounting for variability between targets and perceivers, the approach developed by Judd et al. (2012) treats both factors as interchangeable with all other perceivers and targets in the population. We adopted this approach in the current work to extend previous research on sex differences in mate preferences to the broad population of online daters by treating both participants and stimuli as random factors.

Current Work

Presently, the question of whether mate preferences might generalize to facial photographs, the main medium of communication on modern online dating Web sites, remains obscured by the variability in the findings (e.g., Byrnes et al., 1968; de Vries et al., 2008), the selection and utilization of a small and fixed set of stimuli, and the presence of verbal descriptions of status (e.g., Townsend, 1993). Here, we aimed to examine whether men (cf. women) select people who look attractive and healthy, whereas women (cf. men) select people based on perceptions of their wealth, addressing the limitations of previous research. Consistent with *parental investment theory* (Buss & Schmitt, 1993; Trivers, 1972), men should show more interest in women they perceive as healthy and attractive, because they presumably have greater reproductive value and better genes, to secure the long-term survival of their offspring. Women, on the other hand, should more likely base their dating and relationships decisions on perceptions of wealth because men's status would presumably communicate the capacity to invest in the offspring to assure that it survives. Reducing these judgments to the visual information afforded by photographs posted online could nullify these sex differences, however, such that men and women may make similar judgments. In other words, because people draw on first impressions when presented with limited visual information (e.g., Zebrowitz & Montepare, 2005), we expected that both sexes would use perceptions of health and attractiveness when selecting mates.

In addition to our primary interest in assessing participants' dating interest, we also extended our investigation to long-term relationship interest. Previous research suggested that individuals' short- versus long-term relationship orientation may affect their mate preferences. For example, researchers found that both men and women prefer physically attractive mates in short-term dating partners but that the traditional sex differences described above emerge when seeking long-term relationships (Li & Kenrick, 2006; Li et al., 2013; Pillsworth & Haselton, 2006). We therefore examined whether participants use the health, wealth, and attractiveness information perceived from faces differently depending on whether they are considering partners for a short- versus long-term relationship. Although we expected to find that preferences would diverge for long-term but not short-term mate decisions, the scarcity of information in the context of facial photographs might alternatively nullify the long-term differences found previously.

Importantly, all of the above reasoning relies on the presumption that health, wealth, and attractiveness are legible from photographs of faces. Although a sizable literature has affirmed the latter two (e.g., Kalick, Zebrowitz, Langlois, & Johnson, 1998; Langlois et al., 2000; see also Cunningham, Roberts, Barbee, Druen, & Wu, 1995), evidence that wealth can be reliably discerned from faces is presently lacking. A secondary goal of the present work was therefore to establish whether individuals' relative wealth may be inferred from photographs of their faces (see also Kraus & Keltner, 2009).

We thus asked participants to view opposite sex targets (who had self-reported either relatively high or low incomes), rate them on health, wealth, and attractiveness, and then report their interest in either dating or having a relationship with each target. Because

perceptions of health, wealth, and attractiveness are correlated, we estimated all main effects and interactions between these variables simultaneously with the participant's sex (and context; i.e., a short- vs. long-term relationship) to assure adequate control of the shared variance. To facilitate comparisons with previous findings, we examined the effect of each of these variables on dating interest separately as well. Moreover, we recruited a large number of participants and targets to guard against type I and type II errors by keeping both to rates less than 5% and employed a cross-classified design in which we crossed multiple targets with multiple participants. Because cross-classified analyses treat both targets and participants as random factors by specifying a random intercept for each target and each participant, this method allowed us to examine the contributions of targets' and participants' biases separately (Judd et al., 2012), allowing us to generalize beyond the current sample of stimuli and participants.

Method

Participants

Targets

We downloaded photographs of 81 women and 80 men from personal advertisements posted to online dating Web sites in major U.S. cities.[1] Specifically, we searched the demographic information provided in users' online profiles to determine their relative wealth, considering people who reported annual incomes exceeding $100,000 as wealthy and people who reported annual incomes below $35,000 as unwealthy (slightly above the median US nonfamily household income of $31,178 for 2013; U.S. Census Bureau, 2014). We instructed hypothesis-blind research assistants to download photographs of individuals in these income brackets whose faces were oriented directly toward the photographer's camera and were free of adornments (e.g., piercings, glasses). Because wealth is often cumulative, it could be confounded with age (Shorrocks, 1975); we therefore restricted target selection to a closed age bracket (18–35 years old).[2] We removed the faces from their original backgrounds and cropped them to the top of the hair, bottom of the chin, and span of the ears. Finally, we converted the images to grayscale and standardized them to be identical in height. We excluded three men's faces because they appeared to be blurrier than the other faces (final $n = 158$ targets).

[1] Although we instructed our research assistants to download 80 female faces, they downloaded 81 faces; thus, we included them all.

[2] Although we collected photographs of individuals only within this particular bracket, we did not record each target's specific age when downloading the stimuli and were unable to retrieve this information post hoc. Notably, all effects and significance levels remained reliable when we considered only the targets' peers (i.e., participants who reported their age to be 18–35 years old; $n = 159$).

Participants

We conducted a priori power analyses to estimate the number of participants needed for a cross-classified model with stimuli and participants nested within sex. Considering common variance partitioning components (jakewestfall.shinyapps.io/crossedpower/; Westfall, Kenny, & Judd, 2014), the effect size derived from previous research examining the contribution of earning prospects and attractiveness to initial attraction ($r = .25$; Eastwick, Luchies, Finkel, & Hunt, 2014),[3] and the 158 target stimuli, results revealed the need for at least 100 participants to achieve 95% power. We later added a second, long-term romantic interest condition in which we matched the sample size to that determined in the power analysis for the short-term (dating interest) condition.

To account for possible attrition, we requested 280 American participants through Amazon's Mechanical Turk. Although 311 participants actually engaged the study, only 292 completed it. Of those participants, we excluded three who identified as bisexual and two who identified as gay for a final sample of 287 heterosexual participants ($n = 157$ females; $Mdn_{Age} = 33$ years, $SD = 11.99$; 98 single/never married), ensuring 99.7% power under the parameters described above.

Procedure

We assigned the participants to rate targets of the opposite sex by inquiring about their sex prior to the study and conditionally shunting them to the respective opposite sex block of faces. The participants evaluated each target for his/her perceived health, wealth, and attractiveness[4] using 7-point scales (1 = strongly disagree, 7 = strongly agree) following the prompt "I think this person is [healthy, wealthy, attractive]." Participants viewed the faces one at a time in random order but rated all of the scales simultaneously to minimize the fatigue of repeated blocks. After rating the targets, they proceeded to report the degree to which they would be interested in dating ($n = 144$) or having a long-term romantic relationship ($n = 143$) with each target in a separate block in a between-subjects design by responding to the prompt "I would be interested in dating [having a relationship with] this person" using

[3] According to Eastwick et al.'s (2014) recent meta-analysis, the average correlation between participants' judgments of targets' physical attractiveness and their interest in them at initial attraction (resembling the zero-acquaintance context examined here) was $r = .59$. Similarly, the correlation between participants' evaluations of targets' earning prospects and their interest in them at initial attraction was $r = .25$. To guarantee sufficient power, we (conservatively) used the latter effect size in our power analysis.

[4] We additionally examined whether people indeed evaluated physical attractiveness and not attractiveness in general. To address this, we recruited an independent sample of 61 participants ($n = 28$ female), who provided their ratings of physical attractiveness for the opposite sex targets. We found that people's attractiveness ratings in the main study strongly correlated with the physical attractiveness ratings provided by the participants from the independent sample: $r(156) = .95$, $p < .001$. In other words, people indeed evaluated physical attractiveness.

Table 1 Means, SD, and Pearson's product-moment correlation coefficients between the dependent variables

	M (SD)	1	2	3	4
1. Health	4.54 (1.43)	–	.72***	.91***	.88***
2. Wealth	4.09 (1.41)	.45***	–	.64***	.56***
3. Attractiveness	3.54 (1.61)	.41***	.51***	–	.97***
4. Romantic interest	2.57 (1.71)	.30***	.31***	.62***	–

The correlations above the diagonal represent those at the target level of analysis ($df = 156$) and those below the diagonal at the perceiver level of analysis ($df = 285$). Scale range was 1–7 for all scales

*** $p < .001$

the same 7-point scale. No participants reported recognizing any of the targets in debriefing, and we encouraged them to rely on their gut feelings when rating the targets in the task (see Table 1 for descriptive statistics and bivariate correlations).

Analytic Strategy

Overview

We examined all effects in a cross-classified linear mixed effects model that allowed us to simultaneously account for the variance due to participants, targets, and their relationships, as noted above. We contrast-coded the categorical predictors and grand-mean-centered the continuous variables. We used an unstructured variance–covariance matrix and a restricted maximum likelihood estimator to fit the models (Bates, Maechler, & Bolker, 2005). We report unstandardized regression coefficients accompanied by their standard errors,[5] significance tests, and probability values; estimating the degrees of freedom using Satterthwaite (1946) approximations rounded to integers. We also report the 95% confidence intervals (CIs) for the accuracy model and for the final (i.e., selected) models (described below). Finally, we used the marginal (variance explained by fixed effects) and conditional (variance explained by both fixed and random effects simultaneously) R^2 values in our model comparisons, evaluating reductions in the Akaike information criterion (AIC) as indicators of model improvement with a 5-point threshold set as the criterion for superior model fit (Johnson, 2014; Nakagawa & Schielzeth, 2013; Raftery, 1995).

Accuracy

Although previous research found that relative economic standing could be inferred from nonverbal behaviors during dyadic interactions (Kraus & Keltner, 2009), none has reported whether people can accurately infer wealth from targets' faces. Given the presumed importance of resources to mate selection throughout evolutionary history (e.g., Buss, 1988; Buss & Schmitt, 1993), we predicted that people might be able to infer targets' wealth more accurately than chance because doing so would have afforded a notable adaptive advantage (see Zebrowitz & Collins, 1997, for discussion on adaptive affordances in social perception). To test for any unanticipated sex differences in this ability, we included participant sex and the actual wealth × sex interaction in the model. Thus, we estimated a cross-classified linear mixed effects model in which we regressed perceptions of wealth on targets' actual wealth (1 = wealthy, −1 = unwealthy), participants' sex (1 = male, −1 = female), and their interaction. Because there was no theoretical reason to believe that participants' age and relationship status would affect their perceptions of wealth, we did not include these variables in the model. As described above, we specified random intercepts for targets and participants and estimated a random effect of actual wealth on perceived wealth within participants.

Romantic Interest

Previous research has suggested that, when selecting mates, women value wealth, whereas men value health and attractiveness (e.g., Trivers, 1972). We therefore expected to observe these preferences during individuals' evaluation of potential partners' photographs such that women's evaluations of wealth would predict their romantic interest over and above health and attractiveness and that men's evaluations of health and attractiveness would predict their romantic interest more than wealth would. As noted above, however, an alternative hypothesis is also possible: because the context of present-day online dating provides only minimal visual information about potential mates, these typical sex differences may not emerge if men and women rely equally on facial cues. Thus, in contrast to our first hypothesis, we alternatively predicted that men and women may not differ in mate selection here when choosing partners based just on first impressions from faces.

To address these questions, we constructed a series of hierarchically nested cross-classified linear mixed effects models with romantic interest as the outcome variable (refer to Table 3 for variables included in each model). In Model 1, we estimated a null model, establishing a baseline for further model comparison and specifying only a random intercept for targets and participants. Next, in Model 2, we additionally regressed romantic interest on participants' age, sex, and relationship status, which served as control variables. Specifically, we expected that men would be more romantically interested in targets because parental investment the-

[5] Because standardized estimates may be misleading in the context of multilevel modeling, we report unstandardized coefficients accompanied by their standard errors (Hox, 2010).

ory suggests that men should want to maximize their chances of reproductive success by mating with a greater number of targets (Buss & Schmitt, 1993). Furthermore, we reasoned that older people and people in relationships would be less romantically interested because their reproductive needs are either being fulfilled or past eligibility. In Model 3, we added random effects for perceptions of targets' health, wealth, and attractiveness to assess their effects on romantic interest over and above the effects of demographics and within each participant. Finally, in Model 4, we examined the hypothesized interactions between participant sex with each of targets' perceived health, wealth, and attractiveness to test for any sex differences in preferences for healthy, wealthy, and attractive mates, controlling for the effects of age and relationship status.[6]

Moderation of Romantic Interest

Although we assessed both dating and relationship interest, we examined these variables jointly as a single dependent variable (i.e., romantic interest). We did so because we expected that people would evaluate short- versus long-term mates similarly when they only receive visual input and no other additional qualifying information. However, because we wanted to demonstrate this empirically, we included short- (−1) versus long-term (1) romantic interest as a moderator of the relationship between trait ratings and romantic evaluations in Model 4. This procedure is similar to a multivariate regression model, whereby multiple outcomes are assessed simultaneously (Nezlek, 2007).

Additionally, we examined whether participants' relationship status might moderate the association between their trait evaluations, their sex, and their romantic interest in each target. Indeed, it is possible that the relationships between the variables may be weaker for individuals currently involved in romantic relationships versus those who are single. We wanted to assess this possibility empirically and to also examine whether romantic interest may moderate the interactive influence of the trait ratings and participants' sex on romantic interest, reasoning that the conventionally observed sex differences may emerge for single participants but not for those in relationships.

Results

Accuracy

We observed a statistically significant positive relationship between targets' actual wealth and participants' perceptions of their wealth: $b = .230$, SE = .043, 95% CI [.146, .314], $t(165) = 5.36$, $p < .001$. Thus, participants could, on average, discern whether the targets were wealthy or unwealthy better than chance. The model revealed no significant main effect of participant sex: $b = .027$, SE = .055, 95% CI [−.080, .135], $t(342) = 0.50$, $p = .62$. Furthermore, participant sex did not interact with actual wealth to predict perceptions of wealth: $b = .018$, SE = .043, 95% CI [−.066, .102], $t(165) < 1$. Thus, both men and women perceived targets' wealth with similar levels of accuracy, thereby validating the use of perceived wealth as a predictor of romantic interest in the analyses reported below. Notably, including participants' age and relationship status as control variables did not change the pattern of significance, and participants discriminated between the rich and poor targets more accurately than chance when perceptions of their attractiveness were also included in the model as an additional covariate: $b = .121$, SE = .035, 95% CI [.052, .190] $t(165) = 3.47$, $p < .001$.

Romantic Interest

Before proceeding with formal examination of the effects we outlined in the analytic strategy section, we wanted to examine the simple bivariate multilevel relationships between our three predictors (health, wealth, and attractiveness) and romantic interest. Thus, we regressed romantic interest onto each variable separately for men, women, and men and women combined in a total of nine models. Here, we did not control for any of the variables that we included later in the analyses and used the same multilevel specifications described above.

Health, wealth, and attractiveness positively predicted romantic interest for men, women, and men and women combined (see Table 2). Attractiveness predicted romantic interest best, followed by perceptions of health, followed by perceptions of wealth. Visual inspection of the model estimates suggested that men and women did not differ in the weight that they placed on health, wealth, and attractiveness when reporting on their romantic interest. Although this qualitative inference is informative, we formally tested for sex differences in the multilevel models below.

Model Fit and Comparison

For our main analysis, we examined a series of hierarchically nested linear mixed effects models to determine the unique contributions of participant demographics and targets' perceived health, wealth, and attractiveness (as well as their interactions with participant sex) to participants' expressed romantic interest.

First, we estimated a null model with random intercepts for both targets and participants with romantic interest as the dependent variable in order to establish a baseline model (Model 1). This revealed that 46.82% of the variance in romantic interest could be attributed to variance between individual participants and targets (see Table 3 for model fit and comparison). In Model 2, we added fixed effects for participants' demographics (i.e., their age, sex, and relationship status), which improved the variance explained by the fixed effects (represented by the marginal R^2) by

[6] Because we were interested in how perceptions of health, wealth, and attractiveness relate to romantic interest, we did not include actual wealth in these models.

Table 2 Separate simple random effects models predicting romantic interest from health, wealth, and attractiveness for men, women, and men and women combined

Predictor	Men *b* (SE)	Women *b* (SE)	Men and women *b* (SE)
Attractiveness	0.47 (0.03)***	0.49 (0.03)***	0.48 (0.02)***
Wealth	0.19 (0.03)***	0.19 (0.03)***	0.19 (0.02)***
Health	0.31 (0.03)***	0.29 (0.03)***	0.30 (0.02)***

The control variables (i.e., age, sex, and relationship status) were not included in these models

***$p < .001$

2.40% and the variance explained by the fixed and random effects combined (the conditional R^2) by 0.65%. Upon adding the random effects of targets' perceived health, wealth, and attractiveness as predictors of romantic interest (Model 3), we observed a 23.21% increase in marginal R^2 and a 9.25% increase in conditional R^2. Finally, in Model 4, we regressed romantic interest on the participant demographic variables, the trait perceptions, and the hypothesized interaction between participant sex and each trait, which resulted in a 0.28% increase in the marginal R^2 and an increase of 0.15% in the conditional R^2, suggesting that sex did not moderate the associations between the trait ratings and romantic interest. Examination of the differences between the AIC values confirmed this via similar goodness-of-fit scores for Model 3 and Model 4: $\Delta AIC = 4.77$. Notably, the smaller AIC for Model 3 indicated the (negligible) superiority of Model 3 over Model 4. Thus, the model including the participant sex × perceived target traits interaction terms did not meaningfully differ from the model without them, suggesting that men and women used the information about health, wealth, and attractiveness similarly when reporting their romantic interest.

Parameter Estimates

Because we observed an improvement in the variance explained in the marginal and conditional R^2 values, a substantial improvement in the AIC in Models 1 through 3, and no difference in the variance explained by Model 3 versus Model 4, we interpret only the relationships estimated in Model 3. Specifically, in Model 3, we included the effects of participants' demographic characteristics and their perceptions of the targets' health, wealth, and attractiveness on romantic interest simultaneously. In that model, we observed that older people expressed less romantic interest in targets overall, $b = -.008$, SE = .003, 95% CI [−.014, −.002], $t(268) = 2.22$, $p = .03$, and that men showed significantly more interest in targets than women did: $b = .113$, SE = .051, 95% CI [.013, .213], $t(404) = 2.20$, $p = .03$. Furthermore, and unsurprisingly, single participants (i.e., single/never married) reported marginally more romantic interest than did participants with partners or those who had been married in the past: $b = -.080$, SE = .044, 95% CI [−.166, .006], $t(266) = 1.81$, $p = .07$.

Consistent with the general preference for healthy and attractive mates, we observed that both men and women evaluated people who looked healthier, $b = .053$, SE = .010, 95% CI [.033, .073], $t(216) = 5.33$, $p < .001$, and more attractive, $b = .463$, SE = .016, 95% CI [.432, .494], $t(287) = 28.14$, $p < .001$, as more desirable romantic alternatives. Perceived wealth did not relate to romantic interest, however: $b = -.005$, SE = .010, 95% CI [−.025, .015], $t(249) < 1$. Thus, whereas people relied on their own perceptions of attractiveness and health to select mates, their perceptions of wealth did not significantly contribute to their reported romantic interest when we included all three variables in the model as predictors. Importantly, we did not observe an interaction between any of the perceived traits and sex, as demonstrated by negligible improvements in the amount of variance explained by Model 4. Thus, although men and women considered attractiveness and health similarly when evaluating targets as dates and relationship partners, their perceptions of wealth did not seem to affect their romantic interest in the context of face perception.

Moderation of Romantic Interest

Next, we wanted to ensure that neither participants' relationship status (single vs. not) nor the context (short- vs. long-term mating) moderated our effects of interest. Neither participants' relationship status nor the context of judgment moderated the sex × trait interaction effect on romantic interest in the current study: $ts < 1.26$, $ps < .21$. Thus, regardless of whether the participants were single or in a relationship, or whether they judged target persons as potential short- or long-term romantic partners, they still preferred healthier and more attractive targets as mates.

Finally, we also examined whether attractiveness mediated the links between health and wealth with romantic interest. An instrumental variable model in which health and wealth first predicted attractiveness, which then predicted romantic interest, showed poor model fit: $\chi^2(1) = 16.45$, $p < .001$. Yet a multiple mediation model, where the link between attractiveness and interest was explained through health and wealth, fared even worse: $\chi^2(1) = 29.01$, $p < .001$. Thus, despite overlap in the cues that support judgments of health, wealth, and attractiveness (see Table 1), attractiveness did not emerge as a reliable mediator of the relationships between health and wealth with romantic interest.

Discussion

Although previous studies have shown that men and women, respectively, value beauty and wealth in mate selection (Buss, 1989), these divergent preferences did not emerge in romantic evaluations based on first impressions made from facial photographs. Rather, we found that targets' perceived wealth (albeit accurately judged) did not contribute to women's or men's interest

Table 3 Summary of hierarchically nested random effects regression models predicting romantic interest

Source	Model 1			Model 2			Model 3			Model 4		
	b (SE)	*df*	*t*	*b* (SE)	*df*	*t*	*b* (SE)	*df*	*t*	*b* (SE)	*df*	*t*
Constant	2.764 (0.081)	342	33.96***	2.799 (0.082)	360	34.09***	2.783 (0.054)	416	51.13***	2.784 (0.054)	415	51.16***
Participant demographics												
Age				−0.003 (0.004)	283	0.73	−0.008 (0.003)	268	2.22*	−0.008 (0.003)	268	2.67**
Relationship status				−0.101 (0.057)	283	1.78†	−0.080 (0.044)	266	1.81†	−0.080 (0.044)	266	1.81†
Sex				0.221 (0.081)	351	2.73**	0.113 (0.051)	404	2.20*	0.126 (0.053)	412	2.36*
Trait ratings												
Health							0.053 (0.010)	216	5.33***	0.053 (0.010)	227	5.30***
Wealth							−0.005 (0.010)	249	0.49	−0.005 (0.010)	252	0.54
Attractiveness							0.463 (0.016)	287	28.14***	0.464 (0.017)	287	28.10***
Interactions												
Health × sex										0.004 (0.010)	227	0.39
Wealth × sex										−0.005 (0.010)	252	0.52
Attractiveness × sex										0.017 (0.017)	287	1.00
Marginal R^2		0.00%			2.40%			25.61%			25.89%	
Conditional R^2		46.82%			47.47%			56.72%			56.87%	
AIC		75,890.77			75,883.10			69,696.42			69,701.19	
ΔAIC		–			−7.67[a]			−6,186.68[a]			4.77	

Degrees of freedom rounded to integers

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$; [a]ΔAIC < 5.00

in partners. Furthermore, men and women did not differ in their use of health and attractiveness cues when evaluating targets as either potential dates or long-term relationship partners. These data, therefore, suggest that the traditional sex differences in mate preferences may not manifest in the context of evaluations of photographs that is common to modern online dating Web sites.

Because online dating profiles rely heavily on the visual information presented by photographs (e.g., Tinder), it is not surprising that men and women used the same cues (i.e., health and attractiveness) when making hypothetical mate selection decisions. That is, perhaps the simplicity of the photograph judgment context and the large number of possible romantic alternatives causes people to regress from rational and deliberate thinking about their ideal partner preferences to responding heuristically to the simple visual information offered by the targets' faces (e.g., Finkel et al., 2012). In other words, they may have decided based on a general holistic sense of the person (i.e., their gut instinct). The current work therefore suggests that, when presented with multiple romantic options and minimal visual information, people use simple heuristics to establish their interest. These findings thus complement those from previous studies examining mate preferences from an evolutionary perspective (e.g., Buss, 1989; Eastwick & Finkel, 2008) by suggesting that both men and women select their mates based on heuristics about health and attractiveness in the absence of in-depth information about potential mates. Indeed, perceived attractiveness may be the best cue for mate selection in a first impressions context because people stereotype attractive people as both healthy and successful (Langlois et al., 2000; see also Zebrowitz, 1997). As such, self-reported mate preferences may not necessarily reflect ideal mate preferences (Wood & Brumbaugh, 2009).

Although we have suggested that men and women used similar cues when they evaluated hypothetical mates from photographs because heuristics are privileged in the context of limited information, alternative explanations are also possible. For example, one might wonder whether people's initial selection of mates based on first impressions may differ from the selections they make later when they have more information (e.g., during a date), at which point their choices may diverge along the evolutionarily adapted lines indicated in earlier work. Although we do not have the data to address this possibility directly, previous research suggests that traditional sex differences in mate preferences do not always emerge as predictors of romantic interest or selection as in speed dates (Eastwick & Finkel, 2008; Todd, Penke, Fasolo, & Lenton, 2007). The present context may resemble that of speed dating more closely than the information-laden tests used in earlier work, as both speed dating and mere pictures provide small amounts of information about targets. The present study may have exacerbated this by explicitly instructing participants to make their judgments based on their "gut instinct." Future research might therefore want to explore these differences further, examining whether the sex differences typically found in mate preferences manifest in mate selection differently according to the stage of relationship formation.

Other alternative explanations for the null moderation by sex in the present research are also possible. For instance, it could be that mate selection has changed as a function of changes in dating norms over time (Finkel et al., 2012). Specifically, although men and women might have, respectively, favored physical attractiveness and material resources in the past, societal changes in gender equality that now allow women more opportunities for individual financial success might have diminished the priority that women formerly placed on resources (see Goode, 1996; Zentner & Mitura, 2012). However, given that recent work demonstrated that traditional sex differences still emerge today in self-reported mate preferences in North America (Eastwick & Finkel, 2008), this explanation may need additional empirical support.

The current study also simulated the low-information decision-making process common to modern online dating platforms where users merely swipe their fingers left and right after viewing pictures of potential dates to indicate their interest in the person (e.g., Tinder). In such contexts, people may use visual heuristics to health and attractiveness to aid dating decision-making. In fact, perceptions of targets' traits explained a moderate proportion of variance in romantic interest in the current work. The present study therefore not only contributes to the literature on mate preferences and mate selection, but also adds to the literature examining online behavior (e.g., Finkel et al., 2012; Tskhay & Rule, 2014). This aspect of the method also highlights a limitation of the work, however, as the present investigation is largely confined to these particularly low-information contexts. Additionally, because the dating and relationship decisions here were only hypothetical and many of the participants were already partnered (although we controlled for this in our analyses), future research may need to consider how mate selection differs across contexts outside of a laboratory setting (e.g., Eastwick & Finkel, 2008). The empirical examination of these and other alternative explanations may reveal additional insights about mate preferences and the process of mate selection that could promote a better understanding of the ways in which mate selection occurs.

Related to the previous point, earlier research has typically examined the role of wealth information when it was explicitly available either via an experimental manipulation (Townsend & Wasserman, 1998) or as a part of one's online dating profile (Hitsch et al., 2010). As such, the participants in those studies could be certain about using wealth as a criterion for their judgments, rather than relying on its mere inference (as here). Many modern dating Web sites do not request such information, however (e.g., Tinder), and certainly explicit information about an individual's wealth is typically absent in real world interactions. In such cases, individuals must rely on their impressions of earning potential when assessing potential partners, as they did here. Notably, such inferences parallel those made in evaluating potential partners' health, which is also legible but somewhat uncertain from one's appearance (e.g., Miller & Maner, 2012). That said, in the current work, we did not measure participants' sense of certainty when making their judgments, and thus, we do not know whether they might have prioritized directly observable qualities

(like attractiveness) over characteristics that require greater inference (such as health and wealth). However, some previous research suggests that the certainty of judgments may not have any influence on how people weigh the information (e.g., Ronis & Lipinski, 1985). Future research may therefore benefit from measuring how certain participants feel about targets' traits when evaluating them as potential partners to ascertain how this might impact their mate choices. Furthermore, it is important to mention that when the participants reported on their dating and relationship interest they were not selecting the mates per se, but rather were undergoing the very initial phase of the mate selection process. Given that first impressions are impactful to daily interactions (see, for example, Rule, Bjornsdottir, Tskhay, & Ambady, 2016), we are certain that the initial evaluations will have an impact on whether or not the person will even be considered in further stages of mate vetting and selection. Thus, researchers in the future should continue examining how the various variables integrate across the mate selection process.

Another limitation of the present work is that we recruited both targets and participants from the USA. As such, the conclusions from the current work may not apply to members of other cultural groups. Buss (1989) previously investigated mate preferences in a number of cultures and found consistency in the traits that men and women valued in ideal mates. Though this suggests that there may be some degree of continuity in mate selection across cultures, Buss' results supported the traditional sex difference between appraisals of wealth versus attractiveness not found here. Given that the medium of study we investigated may be more common among people from Western, educated, industrialized, rich, and democratic societies (see Finkel et al., 2012), it seems tenable that the present results may not generalize to the same extent as those described by Buss. Future research is needed to resolve this outstanding question. Related to this, researchers should explore the current effects in other populations, including the members of the LGBTQ community who may have different evaluation strategies in mate selection (Burrows, 2013).

Additional research also seems warranted for better understanding the relationships between health, wealth, and attractiveness. Does being wealthy allow people to become healthier and more attractive, or might attractiveness and health facilitate the acquisition of wealth (Anderson, John, Keltner, & Kring, 2001)? These possibilities may be complementary: wealthier people likely have better access to resources that improve health and attractiveness (e.g., more nutritious food, cosmetic surgery); furthermore, healthier and more attractive people may be able to accumulate more resources (Langlois et al., 2000; Zebrowitz, 1997). Answering these questions would allow for a better understanding not only of the results reported here, but also of the very process by which attractiveness evolved into such an important trait for mate selection. Moreover, very little research has examined perceptions of wealth (cf. Kraus & Keltner, 2009), leaving it unclear as to how perceptions of wealth are formed. In the current work, we demonstrated that just a brief glance at an individual's face allowed for an accurate inference of his or her wealth. However, we have not investigated the physical cues that people may use to arrive at said accuracy. Thus, future research might benefit from a systematic examination of what in a face cues a person's wealth. An additional limitation of the current study was that we could not fully examine the contribution of targets' ages to perceptions of wealth or to evaluations of romantic interest because we had information only about the targets' age range, rather than their individual ages. However, we found that even restricting the participants' to those similar in age to the targets produced similar effects. Still, it may be fruitful to asses both target and participant age in the future to examine whether they interact to predict romantic interest.

In sum, although previous studies have suggested that women prize wealth to a greater degree than men do when evaluating mates, we found that these sex differences did not emerge based on first impressions made from faces. Rather, our data demonstrated that both men and women selected mates based on their perceived health and attractiveness when evaluating faces. These data thus suggest that people might use heuristics about attractiveness and health when selecting mates in the context of first impressions. Differences between the sexes in mate preference may therefore vary according to context such that men and women may be more similar than different when it comes selecting mates from photographs posted online.

Acknowledgements We would like to thank Rebecca Zhu and other members of the Social Perception and Cognition Lab for their help with data collection. The current work was supported by a grant from the Social Sciences and Humanities Research Council of Canada to Nicholas O. Rule.

Funding This study was funded by the Social Sciences and Humanities Research Council of Canada Grant.

Compliance with Ethical Standards

Conflict of interest Konstantin O. Tskhay declares that he has no conflict of interest. Jerri M. Clout declares that she has no conflict of interest. Nicholas O. Rule declares that he has no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

Anderson, C., John, O. P., Keltner, D., & Kring, A. M. (2001). Who attains social status? Effects of personality and physical attractiveness in social groups. *Journal of Personality and Social Psychology, 81,* 116–132.

Baize, H. R., & Schroeder, J. E. (1995). Personality and mate selection in personal ads: Evolutionary preferences in a public mate selection process. *Journal of Social Behavior and Personality, 10,* 517–536.

Bates, D., Maechler, M., & Bolker, B. (2005). Linear mixed-effects models using S4 classes. *R package version 0.98-1.*

Burrows, K. (2013). Age preferences in dating advertisements by homosexuals and heterosexuals: From sociobiological to sociological explanations. *Archives of Sexual Behavior, 42,* 203–211.

Buss, D. M. (1988). The evolution of human intrasexual competition: tactics of mate attraction. *Journal of Personality and Social Psychology, 54,* 616–628.

Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences, 12,* 1–49.

Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100,* 204–232.

Byrne, D., London, O., & Reeves, K. (1968). The effects of physical attractiveness, sex, and attitude similarity on interpersonal attraction. *Journal of Personality, 36,* 259–271.

Cunningham, M. R., Roberts, A. R., Barbee, A. P., Druen, P. B., & Wu, C. H. (1995). " Their ideas of beauty are, on the whole, the same as ours": Consistency and variability in the cross-cultural perception of female physical attractiveness. *Journal of Personality and Social Psychology, 68,* 261–279.

de Sousa Campos, L., Otta, E., & de Oliveira Siqueira, J. (2002). Sex differences in mate selection strategies: Content analyses and responses to personal advertisements in Brazil. *Evolution and Human Behavior, 23,* 395–406.

de Vries, J. M. (2010). Impact of self-descriptions and photographs on mediated dating interest. *Marriage & Family Review, 46,* 538–562.

de Vries, J. M., Swenson, L., & Walsh, R. P. (2008). Hot picture or great self-description: Predicting mediated dating success with parental investment theory. *Marriage & Family Review*, *42*(3), 7–34.

Eastwick, P. W., & Finkel, E. J. (2008). Sex differences in mate preferences revisited: Do people know what they initially desire in a romantic partner? *Journal of Personality and Social Psychology, 94,* 245–264.

Eastwick, P. W., Luchies, L. B., Finkel, E. J., & Hunt, L. L. (2014). The predictive validity of ideal partner preferences: A review and meta-analysis. *Psychological Bulletin, 140,* 623–665.

Elder, G. H. (1969). Appearance and education in marriage mobility. *American Sociological Review, 34,* 519–533.

Feingold, A. (1990). Gender differences in effects of physical attractiveness on romantic attraction: A comparison across five research paradigms. *Journal of Personality and Social Psychology, 59,* 981–993.

Feingold, A. (1992). Gender differences in mate selection preferences: A test of the parental investment model. *Psychological Bulletin, 112,* 125–139.

Finkel, E. J., Eastwick, P. W., Karney, B. R., Reis, H. T., & Sprecher, S. (2012). Online dating: A critical analysis from the perspective of psychological science. *Psychological Science in the Public Interest, 13,* 3–66.

Fletcher, G. J., Tither, J. M., O'Loughlin, C., Friesen, M., & Overall, N. (2004). Warm and homely or cold and beautiful? Sex differences in trading off traits in mate selection. *Personality and Social Psychology Bulletin, 303,* 659–672.

Goode, E. (1996). Gender and courtship entitlement: Responses to personal ads. *Sex Roles, 34,* 141–169.

Greitemeyer, T. (2010). Effects of reciprocity on attraction: The role of a partner's physical attractiveness. *Personal Relationships, 17,* 317–330.

Ha, T., van den Berg, J. E., Engels, R. C., & Lichtwarck-Aschoff, A. (2012). Effects of attractiveness and status in dating desire in homosexual and heterosexual men and women. *Archives of Sexual Behavior, 41,* 673–682.

Harrison, A. A., & Saeed, L. (1977). Let's make a deal: An analysis of revelations and stipulations in lonely hearts advertisements. *Journal of Personality and Social Psychology, 35,* 257–264.

Hill, R. (1945). Campus values in mate-selection. *Journal of Home Economics, 37,* 554–558.

Hitsch, G. J., Hortaçsu, A., & Ariely, D. (2010). What makes you click? Mate preferences in online dating. *Quantitative Marketing and Economics, 8,* 393–427.

Hox, J. J. (2010). *Applied multilevel analysis* (2nd ed.). New York: Routledge.

Johnson, P. C. (2014). Extension of Nakagawa & Schielzeth's R2GLMM to random slopes models. *Methods in Ecology and Evolution, 5,* 944–946.

Judd, C. M., Westfall, J., & Kenny, D. A. (2012). Treating stimuli as a random factor in social psychology: A new and comprehensive solution to a pervasive but largely ignored problem. *Journal of Personality and Social Psychology, 103,* 54–69.

Kalick, S. M., Zebrowitz, L. A., Langlois, J. H., & Johnson, R. M. (1998). Does human facial attractiveness honestly advertise health? Longitudinal data on an evolutionary question. *Psychological Science, 9,* 8–13.

Kocsor, F., Rezneki, R., Juhász, S., & Bereczkei, T. (2011). Preference for facial self-resemblance and attractiveness in human mate choice. *Archives of Sexual Behavior, 40,* 1263–1270.

Kraus, M. W., & Keltner, D. (2009). Signs of socioeconomic status a thin-slicing approach. *Psychological Science, 20,* 99–106.

Langlois, J. H., Kalakanis, L., Rubenstein, A. J., Larson, A., Hallam, M., & Smoot, M. (2000). Maxims or myths of beauty? A meta-analytic and theoretical review. *Psychological Bulletin, 126,* 390–423.

Lee, L., Loewenstein, G., Ariely, D., Hong, J., & Young, J. (2008). If I'm not hot, are you hot or not? Physical-attractiveness evaluations and dating preferences as a function of one's own attractiveness. *Psychological Science, 19,* 669–677.

Li, N. P., & Kenrick, D. T. (2006). Sex similarities and differences in preferences for short-term mates: What, whether and why. *Journal of Personality and Social Psychology, 90,* 468–489.

Li, N. P., Yong, J. C., Tov, W., Sng, O., Valentine, K. A., Jiang, Y. F., & Balliet, D. (2013). Mate preferences do predict attraction and choices in the early stages of mate selection. *Journal of Personality and Social Psychology, 105,* 757–776.

Miller, S. L., & Maner, J. K. (2012). Overperceiving disease cues: The basic cognition of the behavioral immune system. *Journal of Personality and Social Psychology, 102,* 1198–1213.

Montoya, R. M. (2008). I'm hot, so I'd say you're not: The influence of objective physical attractiveness on mate selection. *Personality and Social Psychology Bulletin, 34,* 1315–1331.

Nakagawa, S., & Schielzeth, H. (2013). A general and simple method for obtaining R2 from generalized linear mixed-effects models. *Methods in Ecology and Evolution, 4,* 133–142.

Nezlek, J. B. (2007). Multilevel modeling in personality research. In R. W. Robins, R. C. Fraley, & R. F. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 502–522). New York: Guilford.

Pawlowski, B., & Koziel, S. (2002). The impact of traits offered in personal advertisements on response rates. *Evolution and Human Behavior, 23,* 139–149.

Pillsworth, E. G., & Haselton, M. G. (2006). Male sexual attractiveness predicts ovulatory shifts in female extra-pair attraction and male mate retention. *Evolution and Human Behavior, 27,* 247–258.

Raftery, A. E. (1995). Bayesian model selection in social research. *Sociological Methodology, 25,* 111–164.

Ronis, D. L., & Lipinski, E. R. (1985). Value and uncertainty as weighting factors in impression formation. *Journal of Experimental Social Psychology, 21,* 47–60.

Rule, N. O., Bjornsdottir, R. T., Tskhay, K. O., & Ambady, N. (2016). Subtle perceptions of male sexual orientation influence occupational opportunities. *Journal of Applied Psychology, 101,* 1687–1704.

Satterthwaite, F. E. (1946). An approximate distribution of estimates of variance components. *Biometrics Bulletin, 2,* 110–114.

Shorrocks, A. F. (1975). The age-wealth relationship: A cross-section and cohort analysis. *The Review of Economics and Statistics, 57,* 155–163.

Singh, D. (1995). Female judgment of male attractiveness and desirability for relationships: Role of waist-to-hip ratio and financial status. *Journal of Personality and Social Psychology, 69,* 1089–1101.

Spielmann, S. S., MacDonald, G., Maxwell, J. A., Joel, S., Peragine, D., Muise, A., & Impett, E. A. (2013). Settling for less out of fear of being single. *Journal of Personality and Social Psychology, 105,* 1049–1073.

Sprecher, S. (1989). The importance to males and females of physical attractiveness, earning potential, and expressiveness in initial attraction. *Sex Roles, 21,* 591–607.

Stroebe, W., Insko, C. A., Thompson, V. D., & Layton, B. D. (1971). Effects of physical attractiveness, attitude similarity, and sex on various aspects of interpersonal attraction. *Journal of Personality and Social Psychology, 18,* 79–91.

Todd, P. M., Penke, L., Fasolo, B., & Lenton, A. P. (2007). Different cognitive processes underlie human mate choices and mate preferences. *Proceedings of the National Academy of Sciences, 104,* 15011–15016.

Townsend, J. M. (1993). Sexuality and partner selection: Sex differences among college students. *Ethology and Sociobiology, 14,* 305–329.

Townsend, J. M., & Levy, G. D. (1990a). Effects of potential partners' costume and physical attractiveness on sexuality and partner selection. *Journal of Psychology, 124,* 371–389.

Townsend, J. M., & Levy, G. D. (1990b). Effects of potential partners' physical attractiveness and socioeconomic status on sexuality and partner selection. *Archives of Sexual Behavior, 19,* 149–164.

Townsend, J. M., & Roberts, L. W. (1993). Gender differences in mate preference among law students: Divergence and convergence of criteria. *Journal of Psychology, 127,* 507–528.

Townsend, J. M., & Wasserman, T. (1998). Sexual attractiveness: Sex differences in assessment and criteria. *Evolution and Human Behavior, 19,* 171–191.

Trivers, R. L. (1972). Parental investment and sexual selection. In B. G. Campbell (Ed.), *Sexual selection and the descent of Man, 1871–1971* (pp. 136–179). Chicago, IL: Aldine.

Tskhay, K. O., & Rule, N. O. (2014). Perceptions of personality in text-based media and OSN: A meta-analysis. *Journal of Research in Personality, 49,* 25–30.

Udry, J. R., & Eckland, B. K. (1984). Benefits of being attractive: Differential payoffs for men and women. *Psychological Reports, 54,* 47–56.

U.S. Census Bureau. (2014). *Income and poverty in the United States: Current population reports*. Retrieved from http://www.census.gov/content/dam/Census/library/publications/2014/demo/p60-249.pdf on May 8, 2015.

Westfall, J., Kenny, D. A., & Judd, C. M. (2014). Statistical power and optimal design in experiments in which samples of participants respond to samples of stimuli. *Journal of Experimental Psychology: General, 143,* 2020–2045.

Wood, D., & Brumbaugh, C. C. (2009). Using revealed mate preferences to evaluate market force and differential preference explanations for mate selection. *Journal of Personality and Social Psychology, 96,* 1226–1244.

Zebrowitz, L. A. (1997). *Reading faces: Window to the soul?* Boulder, CO: Westview Press.

Zebrowitz, L. A., & Collins, M. A. (1997). Accurate social perception at zero acquaintance: The affordances of a Gibsonian approach. *Personality and Social Psychology Review, 1,* 204–223.

Zebrowitz, L. A., & Montepare, J. M. (2005). Social psychological face perception: Why appearance matters. *Social and Personality Psychology Compass, 2,* 1497.

Zentner, M., & Mitura, K. (2012). Stepping out of the caveman's shadow: Nations' gender gap predicts degree of sex differentiation in mate preferences. *Psychological Science, 23,* 1176–1185.