Exploring the Influence of Race in Mate Copying Using Former Partner Evaluations

Race and Mate Copying

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Abstract
Human mate choice is a complex, nuanced process that incorporates factors including physical attractiveness, race, culture, and social values. Choosing the wrong partner can be a risky and costly affair; hence, mate choosers may copy the choices of others to inform their own decisions about the mate quality of a potential partner. This phenomenon is known as mate copying (MC). Consistent with previous research methods, the current study presented a sample of 461 Australian women with photographic stimuli of target men of one of three races paired with a description of a former female partner evaluating the target man either positively or negatively. Racial similarity between participants and the target man was statistically controlled for. As hypothesised, positive evaluations elicited MC whereas negative evaluations elicited mate avoidance. Racial similarity was also shown to influence measures of desirability and MC propensity. Results were discussed within the context of existing human MC literature, with particular emphasis on exploring how new factors affect the expression of MC intent within the Australian female demographic. Recommendations for further research based on these outcomes were also made.

Keywords Mate copying · Mate selection · Racial similarity · Racial background · Attraction

Introduction
Choosing the right partner can be a risky and arduous (yet important) endeavour that is often repeated throughout one’s lifetime. For many nonhuman species, a sufficient determinant for choosing a mate is physical quality (Waynforth, 2007). Such a character suggests genetic fitness which is likely to be passed onto any offspring. Thus it is evolutionarily advantageous to romantically align with a mate indicating physical quality (Møller & Jennions, 2001). For humans, mate choice is more nuanced, where physical attractiveness does not necessarily equate to high mate quality (Little et al., 2011). Other important determinants of mate value for human partner choice include high socio-economic status, congruent social and cultural values, and willingness to invest in offspring (Lee et al., 2014; Street et al., 2018). These qualities are less readily observable than attractiveness, thus encouraging partner compatibility testing (dating) to determine whether or not a potential mate is suitable. However, this is a costly process, so to reduce some of the costs associated with dating, humans may copy the romantic choices of others in a phenomenon known as mate copying (MC; for a review see Anderson & Surbey, 2020). Broadly speaking, MC is defined by an increase or decrease in the probability of being chosen as a partner based on previous selection or rejection as a partner, respectively (Pruett-Jones, 1992). Importantly, in this definition it is the modification (upwards or downwards) which is of consequence.

Though originally observed across various nonhuman species, MC theory has been extrapolated to human research (Vakirtzis, 2011). However, human MC research has been influenced by animal-specific methodological designs that have produced inconsistent outcomes, comprising an unsaturated body of theoretical literature (Anderson & Surbey, 2020). Noteworthy here is that studies investigating the phenomenon of MC amongst humans typically focus on
elevations in desirability/attraction (see Scammell & Anderson, 2020).

**Direct and Indirect Cues in MC**

When MC occurs, information about both the target mate and the opposite-sex other is implicitly communicated to others. This information can be gleaned from the directly observable attributes of each individual in the pair or indirectly cued from the circumstances under which the pairing occurred (Bowers et al., 2012). The rationale underpinning MC is that there is likely good justification for a mate being chosen, avoided, or rejected (Vakirtzis, 2011). MC reduces the risks associated with mate selection based solely on direct cues such as physical attractiveness, including transmission of infections or selecting a partner who is not committed to long-term co-habitation or childrearing (Reynolds & Gross, 1990; Westneat et al., 2000).

**Gender Asymmetry**

MC literature disproportionately focuses on women, owing in part to the fact that women’s partner preferences tend to be less directly observable than men’s (Rodeheffer et al., 2016). Although physical attractiveness in a prospective mate is a relevant cue for both men and women, it is typically more salient for men (Fales et al., 2016) as they can approximate a woman’s fertility based on her youthfulness or healthy appearance (Eastwick & Finkel, 2008). Women, however, tend to focus on what security or resources a potential partner can provide for them and any offspring, and also value similar cultural worldviews, social and economic stability, and committed long-term investment to family (Buss & Shackelford, 2008). However, these preferred traits are difficult to discern through visual observation alone. Hence attending to the mate preferences of other women is adaptive as it allows women to acquire mate-relevant information about prospective partners that would otherwise be costly to obtain.

Whilst the adaptive utility of MC amongst women is generally agreed upon, its existence is conditional and sensitive to circumstance. For example, it has been demonstrated that the mere presence of an opposite-sex other (typically another woman, referred to in this context as the “model”) near a target man is sufficient to increase his perceived attractiveness (Hill & Buss, 2008). However, many studies reporting MC do not clearly specify the relationship between the target male and the associated model (Chu, 2012; Hill & Buss, 2008). Research has shown that women prefer single men over men in a relationship (O’Hagen et al., 2003). The omission of this explicit specification can render MC difficult to partition from mate poaching, which is a theoretically related but functionally separate mate choice phenomenon (Uller & Johansson, 2003; for a discussion see Anderson & Surbey, 2020). To investigate MC instead of mate poaching, the relationship context between the target man and model woman should be clearly established (Anderson & Surbey, 2020). To minimise any possible conflation, target men in the current study are described as having recently (but not currently) been in a relationship with the model woman.

It has been shown that the perceived attractiveness of a woman associated with the target man also impacts MC. A model woman who is considered physically attractive by the rater woman and is romantically linked to the target man increases his desirability ratings, compared to target men who were associated with a model woman considered less attractive (Place et al., 2010; Rodeheffer et al., 2016; Waynforth, 2007). There is evidence that this effect is stronger if the model is described as a former partner of the target rather than either a friend or colleague (Yorzinski & Platt, 2010). However, being paired with a model that is perceived as unattractive by the rater decreases his desirability ratings, leading to mate avoidance (Vakirtzis & Roberts, 2010). In an attempt to remove the confounds of model attractiveness and perceived ethnicity (for a discussion see Anderson, 2018), no photographic stimuli of models will be provided in the current study.

**Human MC Research Design**

Human research is subject to ethical and logistical limitations which can make effective research designs such as naturalistic observation difficult to execute. By incorporating written text into designs, researchers have been able to manipulate the context surrounding the pairing of a target man and model female to examine more nuanced factors that elicit MC. For example, a negative evaluation of a target man by a former partner can attenuate MC (mate avoidance; Scammell & Anderson, 2020). Scammell and Anderson (2020) examined the impact of positive and negative partner evaluations using short vignettes describing target men written from the perspective of former partners. It was demonstrated that “good” evaluations or positive social cues associated with the target man increased desirability. Similarly, “bad” evaluations or negatively associated cues diminished desirability of the target man. The authors, in a sense, demonstrated both positive and negative MC.

Although MC can occur for both intended short-term and long-term relationships (Anderson & Surbey, 2020), the adaptive value of MC tends to be greater when considering a long-term partner (Little et al., 2008; Waynforth, 2007). For example, women preferred indirect (unobservable) cues of commitment to family over attractive physical features when considering a target mate for a long-term relationship (Berezczkei et al., 1997). This outcome is consistent with the notion that women engage less in MC when pursuing short-term relationships as information considered valuable in
long-term contexts are seen as less important in short-term contexts (Waynforth, 2007). Thus the current study asked about long-term desirability only.

**The Role of Race in MC**

Despite offering both direct and indirect information cues about the potential romantic compatibility of target man, race is a relatively underexplored factor within the context of MC. Preferences for racial appearance are underpinned by in-group bias, the tendency for many to favour others with whom we are familiar or similar to across certain traits or domains, and disfavour those whom we perceive as different or unfamiliar (Griffiths & Nesdale, 2006). Several studies have suggested that in-group bias begins as early as childhood (Aboud, 2003), which is consistent with the idea of psychological imprinting, typically to one’s parents and their physical traits or characteristics (Little et al., 2003). Traits specific to race such as face shape, eye, or hair colour observed through prolonged exposure to parents can facilitate a child’s preference for those with the same traits later in adulthood. This explains the tendency to prefer same-race others, marked by the prevalence of same-race couples (Canlas et al., 2015), higher ratings of facial attractiveness of own-race members (Combs & Griffith, 2007), and the cross-race effect (Tanaka et al., 2004).

Whilst the impact of race as a direct cue on attractiveness and MC can be inferred from theories of in-group bias and imprinting, race as an indirect cue is more challenging to quantify. Interracial dating and the prevalence of interracial couples is steadily rising (Bonam & Shih, 2009), owing to growing multicultural populations across major metropolitan cities within Australia and around the world, facilitated by the increasing convenience of tourism and international travel. This accessibility to racially different others means that individuals are exposed to members of other races and their cultures at high rates (Zebrowitz et al., 2008).

The ability to accurately differentiate between faces of other races increases proportionately with the length of exposure to other race faces (Tanaka et al., 2004). Exposure also increases the positive ratings of other races, referred to as the mere-exposure effect (Zebrowitz et al., 2008) or the familiarity attraction principle (Peskin & Newell, 2004; Zajonc, 2001). It has also been shown that bias against other races decreases with prolonged exposure to that race (Hasler et al., 2017). These outcomes suggest that on top of in-group preferences, racial preferences are reinforced by prolonged interaction with similar or familiar others in combination with limited exposure to other groups (Furl et al., 2002). Given the impact of race on personal preferences, incorporating race as a factor in the present study may enable further inferences to be drawn in terms of the value race presents within the context of MC.

**Research Aims and Hypotheses**

The present study sought to investigate the existence of MC using text-based evaluations offered by a former female partner of a target man. The study also sought to determine the influence of race on MC propensity.

It was hypothesised that female raters would increase their evaluations about a man’s perceived desirability upon learning about positive relationship evaluations (offered by a former partner), thus indicating a propensity to mate copy (H1a), whereas negative evaluation would lead to a corresponding decrease (mate avoidance, or negative MC; H1b). It was also hypothesised that racial similarity between the target and participant (as assessed by the participant) would influence MC (H2).

**Method**

**Participants**

The sample consisted of 461 Australian female participants over the age of 18 (M = 27.5, SD = 10.9), who were recruited through paid advertisements on Facebook. All participants identified as either heterosexual (79.1%) or bisexual (20.9%), and most were either single (49%) or in a relationship (29.9%). The largest racial background represented in the sample was Caucasian (69.8%), followed by Asian (20.2%). Although ethnicities were not equally represented amongst participants, likely leading to a skewed distribution on the covariate, this was not overly problematic as participant ethnicity was not an independent variable. All participants reported currently residing in Australia. Participants were offered the opportunity to enter into a draw to win a $25 voucher as partial compensation for their time.

**Materials and Procedure**

**MC Survey**

Standardised frontal headshot images of male targets were paired with written text that provided mate-relevant information (as per Eva & Wood, 2006). The images used in this survey were sourced from the Chicago Faces Database (Ma et al., 2015). These images were judged to be suitable for the purpose of psychological research by a sample of social psychologists and demonstrated high inter-rater reliability (α = 0.99), suggesting that the physical features of the images were consistently prototypical of the individuals’
races. Three images were selected for the present study (one each of a Caucasian, Asian, and Black man) with neutral facial expressions. Each had been pre-rated for attractiveness on a seven-point Likert scale from 1 (Extremely unattractive) to 7 (Extremely attractive) by a large sample \((N=1087)\) and were selected on the basis that they were each 1 standard deviation of the mean attractiveness rating of the sample. Racial categorisation was included in the normative data provided by the Database (Ma et al., 2015).

Following a section capturing general demographics, participants were shown individual head shots of the three different target men, presented sequentially, and asked to rate each using seven-point Likert scales from 1 (Not at all) to 7 (Extremely) on their physical attractiveness, self-rated similarity in race to the target, and how desirable the target appeared as a long-term partner (Time 1/T1). A filler comprehension task taking approximately 5 min (text related to human attraction but unrelated to MC) was then completed before participants were asked to re-rate the same three target men, only this time each was uniquely paired with a single (of three) former partner evaluations. Each evaluation offered described the target man either positively, negatively, or neutrally (“she spoke positively/negatively about him” or there was no mention of a partner evaluation; Time 2/T2). Although each participant saw a total of three evaluation vignettes, the race-evaluation association was counterbalanced such that each race (White/Asian/Black) and evaluation (positive/negative/neutral) appeared once in the sequence. All former partners were described as “attractive” and all breakups were described as mutual. An example vignette is provided in Fig. 1.

“’The man pictured above and his previous girlfriend recently ended their two-year relationship on mutual terms. His girlfriend was quite attractive and she spoke very positively about him and their relationship, but they both just wanted to see other people’.”

After re-rating each of the three men, participants were thanked for their involvement in the study and given the opportunity to enter a draw to win a $25 gift voucher.

Design

This study employed a repeated measures design with three independent variables and a single dependent variable. Target race was a within-subject independent variable with three levels. The three target men (Caucasian, Asian, and Black) were each seen by all participants. Time was also a repeated factor, with all three men being evaluated initially (T1) and again later in the survey (T2). The valence of information offered by former partners at T2 (positive, negative, or neutral) was an independent variable, and whilst the three men presented in each condition were always presented in the same order (Caucasian, Asian, and Black), valence information applied differed so that each racial condition was associated with each level of valence information once over the course of the survey. The dependent variable was a desirability composite and comprised an arithmetic combination of the target man’s attractiveness score (1–7 Likert scale) and the participant’s willingness to date him (1–7 Likert scale). Both measurements were taken at both T1 and T2. The variable ultimately analysed was the change in desirability.

Fig. 1 Positive vignette shown to participants
Table 1  Mean (SD) changes in desirability (Time 2 – Time 1)

| Former partner evaluation | Race of target men | White | Asian | Black |
|---------------------------|--------------------|-------|-------|-------|
|                           |                    | 0.85 (1.17) | 0.71 (1.36) | 0.63 (1.2) |
| Positive                  |                    | 0.41 (1.03) | 0.38 (1.06) | 0.34 (1.41) |
| Neutral                   |                    | −0.23 (1.15) | −0.99 (1.57) | −0.66 (1.39) |
| Negative                  |                    |              |       |       |

A positive mean indicates a desirability increase; a negative mean indicates a desirability decrease.

As can be seen in Table 1, the addition of positive information from a former partner (or even the mere fact that a man had a former partner) increased his desirability. However, desirability decreased when negative information was provided. The effects held irrespective of the race of the target man.

We additionally examined whether mate copying occurred irrespective of a participant’s sexual orientation. A one-way between-group multivariate analysis of variance was performed on the difference ratings (T2 – T1) for the positively, neutrally, and negatively described target men, with sexual orientation (heterosexual/bisexual) being the independent variable. Preliminary assumption testing was conducted, with no serious violations of normality, linearity, univariate, or multivariate outliers observed. No overall difference was found between heterosexual and bisexual participants on the combined dependent variables, F(1, 430) = 1.68, p = 0.17, ηg2 = 0.02, Wilk’s lambda = 0.99. Bisexual participants changed their ratings slightly more than heterosexual participants when positive information was given by former partner (p = 0.04), although the effect size was small (ηg2 = 0.01), and there were no differences between them when either neutral or negative information was provided by a former partner (both ps > 0.05). Hence sexual orientations were combined.

Table 2  Desirability scores at T1 and T2 for each of the target men across each condition

| Evaluation | Race of target men | White | Time 1 | Time 2 | p < 0.001 | d = 0.73 | Asian | Time 1 | Time 2 | p < 0.001 | d = 0.53 | Black | Time 1 | Time 2 | p < 0.001 | d = 0.53 |
|------------|--------------------|-------|--------|--------|-----------|--------|-------|--------|--------|-----------|--------|-------|--------|--------|-----------|--------|
| Positive   |                    | 3.17  | 4.01   |        | p < 0.001 | 4.61   | 5.32  | p < 0.001 | 3.55  | 4.19      | p < 0.001 | 4.61   | 5.32  | p < 0.001 | 3.55  | 4.19      | p < 0.001 |
| Negative   |                    | 3.21  | 2.97   | p = 0.013 | 4.56   | 3.57  | p < 0.001 | 3.41  | 2.85      | p < 0.001 | 4.56   | 3.57  | p < 0.001 | 3.41  | 2.85      | p < 0.001 |
| Neutral    |                    | 3.33  | 3.74   | p < 0.001 | 4.40   | 4.77  | p < 0.001 | 3.51  | 3.75      | p < 0.001 | 4.40   | 4.77  | p < 0.001 | 3.51  | 3.75      | p < 0.001 |

Racial categories were collapsed and a one-way repeated measure ANOVA was conducted to assess if former partner evaluation significantly influenced changes in desirability scores. Three separate ANCOVAs using racial similarity to the target as the covariate were conducted to determine the effects of valence information, and whether or not race was a significant factor influencing changes in desirability scores.

Outcomes from the repeated measure ANOVA showed that mean changes in desirability ratings were affected by former partner evaluation, F(1.68, 773.04) = 166.62,
$p < 0.001$, $\eta^2 = 0.27$. Post hoc tests using a Bonferroni correction demonstrated that a positive former partner evaluation ($M = 0.73$, $SE = 0.06$) increased desirability ratings more than the neutral evaluation group ($M = 0.37$, $SE = 0.054$), $p < 0.001$, 95% CI [0.22, 0.50]. Negative former partner evaluation produced a decrease in desirability ratings ($M = -0.64$, $SE = 0.063$) that was significantly below the increase seen in the neutral condition, $p < 0.001$, 95% CI $[-1.2, -0.81]$.

The first of three ANCOVAs was conducted on the differences in desirability ratings (T2 − T1) across former partner evaluation (positive, negative, and neutral control) of a racially White target, adjusting for participant self-rated racial similarity to the target. The covariate, racial similarity ratings compared to the White male target, was significantly related to desirability ratings $F(1, 457) = 4.65$, $p = 0.032$, $\eta^2_p = 0.01$. A negative association between the covariate and changes in desirability ratings ($r = -0.11$, $p = 0.02$) indicated that participants adjusted their desirability ratings more upon learning about valence information, when they were less racially similar to the white male target.

A significant effect was also found for partner evaluations, $F(2, 457) = 35.93$, $p < 0.001$, $\eta^2_p = 0.14$. Planned contrasts showed that a positive evaluation enhanced a man’s desirability significantly more than a neutral evaluation did, $t(457) = 0.43$, $p < 0.001$, $d = 0.15$. A negative evaluation, however, significantly decreased his desirability compared to the modification brought about by a neutral evaluation, $t(457) = -0.64$, $p < 0.001$, $d = 0.51$.

The uncontrolled ANOVA yielded statistically similar results. The effect of partner evaluation was comparable, $F(2, 458) = 36.39$, $p < 0.001$, $\eta^2_p = 0.14$. Planned contrasts showed that positive information enhanced a man’s desirability more than a neutral evaluation did ($d = 0.16$). A negative evaluation, however, significantly decreased his desirability compared to the modification brought about by a neutral evaluation ($d = 0.59$).

The second ANCOVA was conducted on the differences in desirability ratings across former partner evaluation of a racially Asian target male, adjusting for participant self-rated racial similarity to the target Asian male. The covariate, racial similarity ratings to the target Asian male, was significantly related to desirability ratings $F(1, 457) = 6.10$, $p = 0.014$, $\eta^2_p = 0.013$. A positive association between the covariate and changes in desirability ratings ($r = 0.10$, $p = 0.03$) indicated that participants adjusted their desirability ratings more upon learning about valence information, when they were more racially similar to the Asian target.

A significant effect was also found for partner evaluations after controlling for racial similarity to the target Asian male, $F(2, 457) = 70.11$, $p < 0.001$, $\eta^2_p = 0.235$. Planned contrasts showed that a positive evaluation increased desirability more than a neutral evaluation, $t(457) = 1.71$, $p < 0.001$, $d = 0.22$ whilst a negative evaluation, $t(457) = 1.35$, $p < 0.001$, $d = 0.57$ reduced them, compared to a neutral evaluation.

The effect of partner evaluation was in the uncontrolled ANOVA, $F(2, 458) = 69.21$, $p < 0.001$, $\eta^2 = 0.23$. Planned contrasts showed that again, positive information enhanced the target man’s desirability more than a neutral evaluation did ($d = 0.32$). A negative evaluation, however, significantly decreased his desirability compared to the modification brought about by a neutral evaluation ($d = 1.21$). For the Asian target, the magnitude of change in desirability was greater when negative information was provided (and desirability decreased) than when either positive or neutral information was provided (both desirability increases).

As the assumption of homogeneity of regression slopes for our covariate of racial similarity was violated for the Black target, this variable was median-split and used as an independent measure. A two-way within-subject ANOVA was conducted to explore how participant self-rated racial similarity to the Black target and former partner evaluation impacted desirability. Both former partner evaluation $F(2, 459) = 43.10$, $p < 0.001$, $\eta^2_p = 0.16$ and racial similarity $F(1, 460) = 13.91$, $p < 0.001$, $\eta^2_p = 0.03$ were shown to significantly influence desirability. More specifically, positive partner evaluations led to an increase in desirability (from Time 1 to Time 2) for the Black target, whereas a negative evaluation led to a reduction in desirability. Participants with higher self-rated racial similarity were also generally more influenced than those with lower self-rated racial similarity, although the magnitude of change was greater for lowly racially similar participants compared to highly similarity participants, when a negative evaluation was given. However, there was no significant interaction effect between evaluation and self-rated racial similarity, $F(2, 459) = 0.53$, $p > 0.05$, $\eta^2_p = 0.001$.

Post hoc tests using a Bonferroni correction showed that when the Black man was positively evaluated by a former partner, the change in desirability was lower than when a negative evaluation was given, $p < 0.001$, 95% CI [0.94, 1.65], but was not significantly different to neutral evaluations, $p > 0.05$. When negatively evaluated, desirability decreased compared to both positive, $p < 0.001$, 95% CI $[-1.65, -0.94]$ and neutral evaluations $p < 0.001$, 95% CI $[-1.36, -0.64]$.

**Discussion**

In support of H1a, results of this study suggested that men’s desirability increased, irrespective of their race, when they received a positive romantic evaluation from a former partner (MC). Conversely, a negative evaluation (irrespective of race) led to a decrease in desirability ratings (negative MC; H1b). However, the hypothesis that racial similarity between
the target male and subject female would influence MC was only partially supported.

**Findings from the Current Study**

**MC Elicited by Positive Cues**

As expected, target men associated with a positive evaluation from an attractive former partner were rated as more desirable compared to targets paired with a neutral control evaluation without explicit valence. This difference is consistent with findings from existing MC research which suggest that women are likely to mate copy if a man is associated with cues that suggest desirable traits or attributes (Bowers et al., 2012; Gouda-Vossos et al., 2018). These traits or attributes can be direct cues derived from the target man, for example observing his physical attractiveness, or inferred from indirect cues based on the association between the target man and any same-sex others. In the present case, a positive evaluation from an attractive former female partner of the target served as an endorsement for him, suggesting that he possessed intangible yet valuable qualities that warranted the investment of effort and time of another woman. Drawing information from indirect cues is the crux of MC and serves as an evolutionarily adaptive approach to evaluating the suitability of a potential partner compared to independent mate choice methods (Waynforth, 2007) as it increases the likelihood of gaining access to benefits related to the target man. In other words, this positive evaluation is almost a “stamp-of-approval” that signifies that a target man is of high mate quality.

**Mate Avoidance Elicited by Negative Cues**

Contrarily, target men associated with a negative evaluation from an attractive former partner resulted in an overall decrease in desirability ratings which was also statistically different compared to the neutral control condition. Whilst this is typically referred to as mate avoidance, we argue that such a desirability modification following the addition of mate-relevant information provided by a former partner is a form of MC (albeit negative MC). The tendency for women to also infer negative indirect cues aligns with existing MC research (Vakirtzis, 2011) and demonstrates the tendency for adult humans to not only readily attend to negative information (Vaish et al., 2008), but also assign more weight to negatively valenced information when selecting a partner (Jonason et al., 2015). From an evolutionary perspective, mate avoidance can be adaptive as the choosing female is alerted to intangible but undesirable traits or attributes (“dealbreakers”) which may indicate poor mate quality, allowing her to forgo the potential costs associated with romantically aligning with the man.

Despite specifically excluding any valence in the neutral information (control) condition, there was still an increase in overall mean desirability scores. This may be due to merely describing former partners paired with the target men as “quite attractive”. The justification for doing so was two-fold. Firstly, describing the former partner as attractive using only text standardises how indirect cues elicit MC behaviour which would have varied subjectively per participant if photographic stimuli were presented instead. Research has suggested that an attractive woman associated with a target man increases his desirability (Vakirtzis & Roberts, 2012), whilst a man with established former romantic partners is mate copied more readily than just an associated friend or peer (Anderson & Surbery, 2020; Rodeheffer et al., 2016); hence, the combination of both factors was considered adequate. Secondly, not using photographic stimuli eliminated other potential biases related to physical attributes that may have also affected desirability ratings, namely racially typical traits and unique facial features.

**Race Potentially Influences Mate Desirability**

Race is a sparsely explored facet within human MC (Anderson & Surbery, 2020) despite possessing unique potential; in that, it can provide both direct and indirect cues for mate selection. As a direct cue, race is related to physical attractiveness; facial features that are characteristic of a race may be viewed as more attractive by some or less attractive by others as a consequence of biases. In-group favouritism is a bias that can develop in early childhood and can explain the preference for others of the same or similar race (Aboud, 2003). Conversely, the other-race effect documents the inability for many to differentiate between faces of races not similar to our own (Rhodes et al., 2009). This inability to distinguish other-race faces can affect our subjective perception of attractiveness, thus imparting bias on what would ideally be objective ratings of target male attractiveness. As an indirect cue, race can implicitly convey cultural information, which is a nuanced and uniquely human condition that can also impact the mate choice process (Buunk et al., 2010). For the purposes of the present study, self-reported racial similarity was developed as a measure that encapsulated both cues into a quantifiable measure to reveal if race significantly impacted desirability ratings.

The current findings provided some support to the notion that racial similarity is a factor in MC. Overall, most participants reported higher racial similarity to the White target man, which consequently accounted for a significant portion of the variance in desirability ratings between each evaluation. It is notable that participants adjusted their desirability ratings more when they learnt about information provided by a former partner of the target if they were racially dissimilar to the White target man. Interestingly, this pattern was not seen for the Asian target. When participants were
more racially similar to the Asian target, they adjusted their desirability ratings more after learning of the information provided by his former partner.

However, the influence of racial similarity on desirability in the Black target condition was not examined at a continuous level. Instead, a significant difference in desirability scores per evaluation was identified for racial similarity, presented categorically as either high or low. Similar to the White target man, desirability ratings for Black target man were adjusted more following information from a former partner for racially dissimilar participants. As most participants reported high racial similarity to the White target male, this naturally meant most were dissimilar to the other races, notwithstanding the few participants who were mixed races. This contributed to an overall lack of variance within racial similarity scores in response to the Asian and Black target men. In terms of in-group bias, these outcomes would suggest that disfavouring of the out-group is more relevant due to cultural assumptions that can be indirectly cued from racial perception. This disfavouring aligns with the essential notion of risk aversion that underpins the utility of MC. Furthermore, there is evidence to suggest that some East Asian cultures display what is referred to as “in-group derogation” (Ma-Kellams et al., 2011), the tendency for some collectivist cultures to assess their in-group members as less favourable compared to individualist cultures. This finding may explain the contradictory outcome observed with the Asian target male.

Though the findings did not fully support the hypothesis that participant-rated racial similarity to the target male would influence MC, this outcome may be more a consequence of imbalanced demographics rather than an indictment of race as an influence with MC research. As race is an under-explored component of MC, any conclusions that can be legitimately drawn from findings contribute to a developing body of research.

**Current Study Strengths**

**Demonstrating MC Beyond Attractiveness Measures**

Findings from the present study supported the original definition and theories of MC by demonstrating intent to choose a target male, in addition to simple measures of attractiveness (Anderson & Surbey, 2020; Waynforth, 2007). Though early iterations of human MC typically established the existence of the phenomenon using target attractiveness (or increases therein) as the outcome measure (Eva & Wood, 2006; Graziano et al., 1993; Uller & Johansson, 2003; Waynforth, 2007), the intent that underpins the “choice” component to MC is not captured according to traditional MC definitions based on behaviours or nonhuman species research. Understandably, there are ethical and research design challenges that would render true mate choice difficult to observe in humans; thus, an appropriate additional proxy of “dateability” is theoretically and conceptually closer to measuring intent than merely observing an overall change in attractiveness or desirability ratings. Additionally, suggesting that another is attractive is an evaluation that is impersonal and one that can be done with minimal consideration, whereas indicating your willingness to date someone is a legitimate acknowledgement of them as a prospective mate.

MC has previously been inferred using ratings of target attractiveness; however, the relationship between attractiveness and dating success or mate quality is unclear (Bowers et al., 2012; Ma-Kellams et al., 2017). Participants in the current study were explicitly asked to indicate their willingness to date the target man long term. However, future studies may wish to take a more nuanced look at the relationship between the outcome variables of attractiveness and desirability by, for example comparing them or quantifying their association in a between-subject design where participants are randomly allocated to attractiveness or desirability outcome conditions.

**Current Study Limitations**

**Sampling**

Several limitations to this study and interpreting its findings arose from sample related issues. Firstly, despite having a large sample size, a majority of participants in the current study self-reported as racially White. This limited the degree of heterogeneity that was obtainable from the study design. Consequently, ratings of racial similarity were heavily skewed towards the White targets. Although race is a novel factor within MC research, with the theoretical underpinnings of in-group bias coupled with a significant finding in the White target male condition, it stands to reason that future studies exploring racial similarity in MC may benefit from gathering a more racially heterogeneous sample.

**Target Male Attractiveness as a Confounding Factor**

The photographic stimuli of the target males were drawn from a public database which provided pre-ratings for each face, including mean attractiveness. The target males chosen for this study were calculated to be 1 standard deviation below the average attractiveness for males of each race according database ratings. The intention was to minimise the potential confound or a target male’s pre-evaluation attractiveness, given that attractiveness remains a salient factor in mate choice for women (Little et al., 2008; Waynforth, 2007). That is, if a target male is considered attractive enough, a choosing female may select the mate based on the direct cue
of physical attractiveness alone without the need to draw indirect cues and mate copy. Although differences between target males were not anticipated, a comparison of the initial attractiveness ratings of each male showed a significant difference between means, suggesting that attractiveness was not consistent. Of note, the Asian male was rated as more attractive than the Black and White target males, despite a largely self-reportedly White sample. It is notable that this man received a greater reduction in desirability (subsequent to being associated with a negative evaluation) than either of the two men. It may be that negative information is more “impactful” when initial desirability is high. Future studies should consider how mate-relevant information differentially affects individuals of varying desirability, and potentially incorporate initial ratings of attractiveness as multiple covariates, or possibly even eliminate the use of photographic stimuli entirely and opt for text-based dating profiles of target men instead.

Race was too broadly and superficially defined. In terms of racial similarity and the influence of race as a concept, future research recommendations centre largely on breaking race down into more specific, measurable constituents. For example, race is largely intrinsically associated with culture and ethnicity (Coleman, 2004), such that variations between these components may yield drastically different effects on MC. For example, multicultural Australia is home to many Australian-born Asians, which means they are racially Asian, but are ethnically and culturally a combination of Asian and Australian. Between the different ethnicities of the Asian race, many individuals will have differing worldviews and expectations around dating and mate choice. Thus, racial similarity as a lone measure mostly maps only onto physical attractiveness whilst only superficially tapping these other associated factors that are equally sparsely explored within the MC literature. Thus, further research should incorporate a component that explicitly captures the cultural influences on perceptions of attractiveness, and the values that shape the differing expectations around dating and mate choice between these cultures. A mixed-method approach that both quantitatively and qualitatively explores these elements would likely yield the most comprehensive results.

**Research Implications**

The results from the current study have several implications for both existing and future research. By identifying which factors help or hinder desirability as a partner, men can utilise this information to facilitate more successful dating. For instance, men who partake in online dating may attract more positive responses or interest if they included a recommendation by a former partner in their profile. Similarly, a man may benefit from having a female friend or peer speak positively about him to a woman he is pursing.

In a clinical context, these findings may aid relationship counsellors or psychologists who work with clients experiencing issues with dating. By recognising and understanding the preliminary findings on the interplay between race and MC, clinicians may be able to incorporate these factors into their counselling to facilitate approaches that are conducive to dating success, whilst simultaneously addressing complications arising from potential mate rejection. Given that dating and finding a suitable partner are salient goals for most adults, any information that promotes success in dating or validates the impact of rejection would be pertinent to many.

**Conclusion**

The results of the present study have further refined the contexts and methods within which MC occurs, and have substantiated the influence of race as a factor in MC. It was shown that a positive evaluation of a target male by a former female partner increased MC, whereas a negative evaluation of a target male elicited mate avoidance. This outcome is consistent with traditional definitions of MC, captured using proxy measures that reflect the direct and indirect cues underpinning MC behaviour, namely target male attractiveness and willingness to commit long term, respectively. Furthermore, racial similarity to the target male was mostly shown to influence MC, though these results were limited by skewed data. Despite this, the significant outcomes suggest that race is indeed a salient factor that warrants further empirical exploration. Overall, this study contributes to our ever-evolving and broadening understanding of what processes humans undergo to pick the partners that they do.

We, the authors, hereby confirm that this manuscript has not been published elsewhere and is not currently under consideration elsewhere.

**Author Contribution**  All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Joseph Zhang and Ryan Anderson. The first draft of the manuscript was written by Joseph Zhang and Ryan Anderson and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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**Data Availability**  SPSS data file available at [https://osf.io/grm7a/?view_only=ed0efb51285e4a62bcede2db5e99ae8c](https://osf.io/grm7a/?view_only=ed0efb51285e4a62bcede2db5e99ae8c).

**Code Availability**  Not applicable.
Declarations

Ethics Approval  This study received ethical approval from the Monash University Human Research Ethics Committee (approval number 25492).

Consent to Participate  All participants in this study willingly consented to participate in this research (see above).

Consent for Publication  Both authors of this manuscript hereby consent for it to be published.

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References

Aboud, F. E. (2003). The formation of in-group favoritism and out-group prejudice in young children: Are they distinct attitudes? Developmental Psychology, 39(1), 48–60. https://doi.org/10.1037/0012-1649.39.1.48

Anderson, R. C. (2018). Mate copying and the effects of sexual history on romantic desirability. Evolutionary Psychological Science, 4(3), 322–330. https://doi.org/10.1007/s40806-018-0143-y

Anderson, R. C., & Surbey, M. K. (2020). Human mate copying as a form of nonindependent mate selection: Findings and considerations. Evolutionary Behavioral Sciences, 14(2), 173–196. https://doi.org/10.1038/s41802-019-000151

Bereczkei, T., Voros, S., Gal, A., & Bernath, L. (1997). Resources, attractiveness, family commitment; reproductive decisions in human mate choice. Ethology, 103, 681–699. https://doi.org/10.1111/j.1439-0310.1997.tb00178.x

Bonami, C. M., & Shih, M. (2009). Exploring multicultural individuals’ comfort with intimate interracial relationships. Journal of Social Issues, 65(1), 87–103. https://doi.org/10.1111/j.1540-4560.2008.01589.x

Bowers, R. I., Place, S. S., Todd, P. M., Penke, L., & Asendorpf, J. B. (2012). Generalization in mate-choice copying in humans. Behavioral Ecology, 23(1), 112–124. https://doi.org/10.1093/beheco/arr164

Buss, D. M., & Shackelford, T. K. (2008). Attractive women want it all: Good genes, economic investment, parenting proclivities, and emotional commitment. Evolutionary Psychology, 6(1), 134–146. https://doi.org/10.1080/147470490800600116

Buunk, A. P., Park, J. H., & Duncan, L. A. (2010). Cultural variation in parental influence on mate choice. Cross-Cultural Research, 44(1), 23–40. https://doi.org/10.1177/10693710937711

Canlas, J. M., Miller, R. B., Busby, D. M., & Carroll, J. S. (2015). Same-race and interracial Asian-White couples: Relational and social contexts and relationship outcomes. Journal of Comparative Family Studies, 46(3), 307–328. https://doi.org/10.3138/jcfss.46.3.307

Chu, S. (2012). I like who you like, but only if I like you: Female character affects mate-choice copying. Personality and Individual Differences, 52, 691–695. https://doi.org/10.1016/j.paid.2011.12.029

Coleman, D. A. (2004). Partner choice and the growth of ethnic minority populations. Bevolking En Gezin, 33(2), 7–34.

Combs, G. M., & Griffith, J. (2007). An examination of interracial contact: The influence of cross-race interpersonal efficacy and affect regulation. Human Resource Development Review, 6(3), 222–244. https://doi.org/10.1177/1534484407303990

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. https://doi.org/10.1037/0022-3514.94.2.245

Eva, K. W., & Wood, T. J. (2006). Are all the taken men good? An indirect examination of mate-choice copying in humans. Canadian Medical Association Journal, 175, 1573–1574. https://doi.org/10.1503/cmaj.061367

Fales, M., Frederick, D., Garcia, J., Gildersleeve, K., Haselton, M., & Fisher, H. (2016). Mating markets and bargaining hands: Mate preferences for attractiveness and resources in two national US studies. Personality and Individual Differences, 88, 78–87. https://doi.org/10.1016/j.paid.2015.08.041

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods, 39, 175–191. https://doi.org/10.3758/BF03193146

Furl, N., Phillips, P. J., & O’Toole, A. J. (2002). Face recognition algorithms and the other-race effect: Computational mechanisms for a developmental contact hypothesis. Cognitive Science, 26(6), 797–815. https://doi.org/10.1207/s15516709cog2606_4

Gouda-Vossos, A., Nakagawa, S., Dixon, B. J., & Brooks, R. C. (2018). Mate choice copying in humans: A systematic review and meta-analysis. Adaptive Human Behavior and Physiology, 4(4), 364–386. https://doi.org/10.1007/s40750-018-0099-y

Graziano, W. G., Jensen-Campbell, L. A., Shebilske, L. J., & Lundgren, S. R. (1993). Social influence, sex differences, and judgments of beauty: Putting the interpersonal back in interpersonal attraction. Journal of Personality and Social Psychology, 65(3), 522–531. https://doi.org/10.1037/0022-3514.65.3.522

Griffiths, J. A., & Nesdale, D. (2006). In-group and out-group attitudes of ethnic majority and minority children. International Journal of Intercultural Relations, 30(6), 735–749. https://doi.org/10.1016/j.ijintrel.2006.05.001

Hasler, B. S., Spanlang, B., & Slater, M. (2017). Virtual race transformation reverses racial in-group bias. PLoS ONE, 12(4), e0174965. https://doi.org/10.1371/journal.pone.0174965

Hill, S. E., & Buss, D. M. (2008). The mere presence of opposite-sex others on judgments of sexual and romantic desirability: Opposite effects for men and women. Personality and Social Psychology Bulletin, 34(5), 635–647. https://doi.org/10.1177/0146167207313728

Jonason, P. K., Garcia, J. R., Webster, G. D., Li, N. P., & Fisher, H. E. (2015). Relationship dealbreakers: Traits people avoid in potential mates. Personality and Social Psychology Bulletin, 41(12), 1697–1711. https://doi.org/10.1177/0146167215609064

Lee, A. J., Dubbs, S. L., Von Hippel, W., Brooks, R. C., & Zietsch, B. P. (2018). A multivariate approach to human mate preferences. Evolution and Human Behavior, 39(3), 193–203. https://doi.org/10.1016/j.evolhumbehav.2014.01.003

Litt, A. C., Burriss, R. P., Jones, B. C., DeBruine, L. M., & Caldwell, C. A. (2008). Social influence in human face preference: Men and women are influenced more for long-term than short-term attractiveness decisions. Evolution and Human Behavior, 29(2), 140–146. https://doi.org/10.1016/j.evolhumbehav.2007.11.007
Evolutionary Psychological Science (2022) 8:413–423

Little, A. C., Jones, B. C., DeBruine, L. M., & Caldwell, C. A. (2011). Social learning and human mate preferences: A potential mechanism for generating and maintaining between-population diversity in attraction. *Philosophical Transactions of the Royal Society B: Biological Sciences, 366*(1563), 366–375. https://doi.org/10.1098/rstb.2010.0192

Little, A. C., Penton-Voak, I. S., Burt, D. M., & Perrett, D. I. (2003). Investigating an imprinting-like phenomenon in humans: Partners and opposite-sex parents have similar hair and eye colour. *Evolution and Human Behavior, 24*(1), 43–51. https://doi.org/10.1016/S1090-5138(02)00119-8

Ma, D. S., Correll, J., & Wittenbrink, B. (2015). The Chicago face database: A free stimulus set of faces and norming data. *Behavior Research Methods, 47*(4), 1122–1135. https://doi.org/10.3758/s13428-014-0532-5

Ma-Kellams, C., Spencer-Rodgers, J., & Peng, K. (2011). I am against big breasts. *Evolution and Human Behavior, 32*(3), 244–252. https://doi.org/10.1016/j.evolhube.2010.02.001

Little, A. C., Jones, B. C., DeBruine, L. M., & Caldwell, C. A. (2011). Mate choice copying and nonindependent mate choice: A critical review. *Alfredo Zoologici Fennici, 48*(2), 91–107. https://doi.org/10.5735/086.048.0202

Ma, D. S., Correll, J., & Wittenbrink, B. (2015). The Chicago face database: A free stimulus set of faces and norming data. *Behavior Research Methods, 47*(4), 1122–1135. https://doi.org/10.3758/s13428-014-0532-5

Møller, A., & Jennions, M. (2001). How important are direct fitness benefits of sexual selection? *Nature, 415*. https://doi.org/10.1038/35119280

Ma-Kellams, C., Wang, M. C., & Cardiel, H. (2017). Attractiveness and relationship longevity: Beauty is not what it is cracked up to be. *Personal Relationships, 24*(1), 146–161. https://doi.org/10.1111/per.12173

Møller, A., & Jennions, M. (2001). How important are direct fitness benefits of sexual selection? *Naturewissenschaften, 88*(10), 401–415. https://doi.org/10.1007/s001140100255

O’Hagen, S., Johnson, A., Lardi, G., & Keenan, J. P. (2003). The effect of relationship status on perceived attractiveness. *Social Behavior and Personality, 31*, 291–299. https://doi.org/10.2224/sbp.2003.31.3.291

Peskin, M., & Newell, F. N. (2004). Familiarity breeds attraction: Effects of exposure on the attractiveness of typical and distinctive faces. *Perception, 33*(2), 147–157. https://doi.org/10.1023/a:20081263.26359

Place, S. S., Todd, P. M., Penke, L., & Asendorpf, J. B. (2010). Humans show mate copying after observing real mate choices. *Evolution and Human Behavior, 31*(5), 320–325. https://doi.org/10.1016/j.evolhumbehav.2010.02.001

Pruett-Jones, S. (1992). Independent versus nonindependent mate choice: Do females copy each other? *The American Naturalist, 140*(6), 1000–1009. https://doi.org/10.1086/285452

Reynolds, J. D., & Gross, M. R. (1990). Costs and benefits of female mate choice: Is there a lek paradox? *The American Naturalist, 136*(2), 230–243. https://doi.org/10.1086/285093

Rhodes, G., Locke, V., Ewing, L., & Evangelista, E. (2009). Race coding and the other-race effect in face recognition. *Perception, 38*(2), 232–241. https://doi.org/10.1068/p6110

Rodeheffer, C. D., Profitt Levy, R. P., & Hill, S. E. (2016). Attractive female romantic partners provide a proxy for unobservable mate qualities: The when and why behind human female mate choice copying. *Evolutionary Psychology, 14*(2), 1–8. https://doi.org/10.1177/1474704916652144

Scambell, E., & Anderson, R. C. (2020). Female mate copying: Measuring the effect of mate-relevant information provided by former partners. *Evolutionary Psychological Science, 6*(4), 319–327. https://doi.org/10.1007/s40806-020-00239-9

Street, S. E., Morgan, T. J., Thornton, A., Brown, G. R., Laland, K. N., & Gross, C. P. (2018). Human mate-choice copying is domain-general social learning. *Scientific Reports, 8*(1), 1–7. https://doi.org/10.1038/s41598-018-19770-8

Tanaka, J. W., Kiefert, M., & Bukach, C. M. (2004). A holistic account of the own-race effect in face recognition: Evidence from a cross-cultural study. *Cognition, 93*(1), B1–B9. https://doi.org/10.1016/j.cognition.2003.09.011

Uller, T., & Johansson, L. C. (2003). Human mate choice and the wedding ring effect: Are married men more attractive? *Human Nature, 14*, 267–276. https://doi.org/10.1007/s12110-003-1006-0

Vaish, A., Grossmann, T., & Woodward, A. (2008). Not all emotions are created equal: The negativity bias in social-emotional development. *Psychological Bulletin, 134*(3), 383–403. https://doi.org/10.1037/0033-2909.134.3.383

Vakirtzis, A. (2011). Mate choice copying and nonindependent mate choice: A review. *Animal Behaviour, 82*(2), 383–403. https://doi.org/10.1016/j.anbehav.2011.03.045

Vakirtzis, A., & Roberts, S. C. (2010). Nonindependent mate choice in monogamy. *Behavioral Ecology, 21*, 898–901. https://doi.org/10.1093/beheco/arq092

Vakirtzis, A., & Roberts, S. C. (2012). Human nonindependent mate choice: Is model female attractiveness everything? *Evolutionary Psychology, 10*, 225–237. https://doi.org/10.1177/147470491201000205

Waynforth, D. (2007). Mate choice copying in humans. *Human Nature, 18*(3), 264–271. https://doi.org/10.1007/s11090-007-9004-2

Westneat, D. F., Walters, A., McCarthy, T. M., Hatch, M. I., & Hein, W. K. (2000). Alternative mechanisms of nonindependent mate choice. *Animal Behaviour, 59*(3), 467–476. https://doi.org/10.1006/anbe.1999.1341

Yorzinski, J. L., & Platt, M. L. (2010). Same-sex gaze attraction influences mate-choice copying in humans. *PLoS ONE, 5*(2), e9115. https://doi.org/10.1371/journal.pone.0009115

Zajonc, R. B. (2001). Mere exposure: A gateway to the subliminal. *Current Directions in Psychological Science, 10*(6), 224–228. https://doi.org/10.1111/1467-8721.00154

Zebrowitz, L. A., White, B., & Wiencek, K. (2008). Mere exposure and racial prejudice: Exposure to other-race faces increases liking for strangers of that race. *Social Cognition, 26*(3), 259–275. https://doi.org/10.1521/soco.2008.26.3.259

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