The Roles of Altruism, Heroism, and Physical Attractiveness in Female Mate Choice

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ABSTRACT

The role of prosocial behaviour in female mate choice has been extensively explored, focusing on the desirability of altruism in potential mates, as well as altruism being a mating signal. However, little research has focused on the desirability of heroism *and* altruism in potential partners. Furthermore, the synergistic effect of attractiveness on the desirability of prosocial behavior has only recently been explored, and to our knowledge, has not explored in relation to the desirability of heroism in a romantic partner. We explored the effect of prosociality and attractiveness on female desirability ratings (n=198), and whether desirability was influenced by whether women were seeking a short-term or long-term relationship. We find that women are attracted to men who display heroism and altruism, and this preference is higher when the male is attractive compared to unattractive. Furthermore, preferences for prosocial traits were higher when seeking a long-term compared to a short-term partner. Our findings add to the literature on prosocial behaviour and mate choice. Data and materials [https://osf.io/a76p8/?view_only=95408822fa9f447bb93ba37ad7bae84b].

Keywords: relationship type; attractiveness; prosociality; altruism; heroism; romantic relationships

1.1. Introduction

The role of altruism in mate choice has been extensively explored, showing that this psychological trait can have a positive effect on an individual's romantic desirability. For example, findings indicate strong support that women are attracted to altruism in a mate, particularly for long-term relationships (see Barclay, 2010; Bhogal, Galbraith, & Manktelow, in press; Farrelly, 2011, 2013), and men display altruistic behaviors towards potential romantic partners (Bhogal, Galbraith, & Manktelow, 2016a; Farrelly, Lazarus, & Roberts, 2007; Iredale, van Vugt, & Dunbar, 2008; Tognetti, Berticat, & Raymond, 2012). Furthermore, several studies have provided evidence that, in the real world, altruistic people have greater mating success compared to non-altruistic people (Arnocky, Piche, Albert, Oullette & Barclay, 2017; Stavrova & Ehlebracht 2015).

These findings suggest that altruism has evolved through sexual selection as a mating signal, an argument which is grounded in the idea that altruism is attractive because it signals future behavior towards a romantic partner and future offspring (Miller, 2000, 2007; Tessman, 1995). This implies that altruism acts as a signal of good partner/parenting qualities of the altruist (Kokko, 1998). Alternatively, the costly nature of altruistic acts may also be of value in mate choice, as it can be an honest signal of the altruist's good genetic quality (Gintis, Smith, & Bowles, 2001). Which of these two better explains the desirability of altruism? According to Farrelly (2011, 2013), altruism is better explained as a signal of good parenting/partner abilities than good genetic quality, as it is desired more for longer relationships (and by both men and women). This in turn suggests that it can act as a reliable signal of an individual's prosocial nature more generally, such as their kindness (e.g. Buss, 1989), and that this is what is important in the partners we choose.

If, as suggested, it is a general 'altruistic' nature that is important, then in order to further understand why altruism may be desirable in mate choice, attention should be paid to different forms of altruistic behaviors. In other words, it is useful to see what it means to say that 'altruism' is desirable in mate choice. As a psychological characteristic, it can encompass several different traits, such as kindness, helpfulness, generosity, or fairness (Bhogal, Galbraith & Manktelow, 2016b; 2017). This is reflected in previous research, as several different behaviors are used such as charitable donations (e.g. Iredale et al., 2008), cooperation (e.g. Farrelly et al., 2007, Bhogal et al., 2016a), or signals of an 'altruistic' personality (e.g. Barclay, 2010; Phillips, Barnard, & Ferguson, 2008; Stavrova & Ehlebracht, 2015). Similar findings are found for these different altruistic behaviors, which supports the view that it is a more general altruistic nature being signaled by these behaviors, and that they are desired in mate choice. However, caution should be taken when stating that the roles of *all* altruistic behaviors in mate choice are equivalent. For example, Ehlebracht, Stavrova, Fetchenhauer and Farrelly (2018) found that the desirability of trustworthiness followed a different pattern to that of other altruistic behaviors, which the authors argued is due to the different adaptive value of trustworthiness in mate choice. Therefore, this suggests that the role of altruistic behaviors may be more nuanced than the above research originally suggested. This suggests that further investigation of different forms of altruistic or prosocial behaviors is vital to aid our understanding of their role in romantic relationships.

One such form is heroism, originally examined by Kelly and Dunbar (2001), who found that women were particularly attracted to acts of heroism over altruism for both short-term and long-term relationships. However, since their paper was published, several studies have solely focused on the role of altruism in mate choice, instead of heroism, which we believe leaves a gap in the literature. Furthermore, in research using heroic fictional characters in romantic

literature, women preferred a long-term relationship with a heroic character (Kruger, Fisher, & Jobling 2003). Consistent with these findings, bravery seen in war heroes was also found to be attractive among women, especially when characters are awarded a medal for their bravery (Rusch, Leunissen, & van Vugt, 2015). However, it is important to note that women have been found to be attracted to acts of heroism which involve bravery and risk-taking, as opposed to risky behavior from which there is not an element of helping behavior (Farthing, 2005). This is possibly due to this latter type of risk-taking behavior portraying careless behavior, which when applied to a female's mate choice for a long-term partner, could be considered as a risky investment towards future offspring.

1.2. Heroism as an 'altruistic' trait

Although one could suggest that heroism and altruism are relatively similar (since they both involve personal cost), there may be rudimentary characteristics differing between these two behavioural traits. Altruism (in relation to female mate choice) may be seen as an honest signal within a potential partner, signaling a man will be reliable and provide support for future offspring (Miller, 2000). Heroism, on the other hand, signals intention to take risks for another, suggesting it is a riskier behavior compared to altruism. Moreover, heroism may have evolved as a higher form of altruism (Smirnov, Arrow, & Kennett, 2007) and both traits are thought to be a signal of indirect phenotypic qualities of cooperativeness (Farrelly, 2011). However, heroism can be demonstrated by means of civil courage (Greitemeyer et al. 2007) and it can also result in negative consequences for the heroic individual, where one can put their own life at risk. Altruism is often associated with a positive outcome from helping others (Post, 2005) and rarely involves a threat to one's life. Therefore, heroism can be considered a more extreme trait than altruism (or indeed a more extreme manifestation of altruism). Importantly though, in relation to female mate choice, both traits can be perceived to be honest signals of a long-

term partner's inclination towards future parental care and protection towards a partner and future offspring (Kokko, 1998). This would mean that they can both signal the same general altruistic nature, and that they should be similarly desired in mate choice.

Men have reported higher willingness to take certain risks across a wide variety of domains when under mate choice contexts, suggesting risk taking behavior is a mating strategy (Greitemeyer, Kastenmüller & Fischer, 2013). This kind of behavior has been exhibited using virtual reality technology, where males crossed a virtual bridge faster in the presence of a female observer than a male observer (Frankenhuis et al. 2010). This suggests that, similarly to altruism, men display heroic/risky behavior as a mating strategy. In addition, Ronay and Hippel (2010) found that young male skateboarders, when in the presence of female observers, performed risky tricks even when there was a chance of physical harm.

1.3. Current study

As a result of the aforementioned literature, there is good reason to empirically test whether the roles of heroism and other altruistic traits are similar in mate choice. Therefore, this study aimed to examine the roles of heroism *and* altruism in a mate choice context, similar to Kelly and Dunbar (2001). To do so, we adopted a similar methodology to that of Farrelly, Clemson and Guthrie (2016) who explored whether female preferences for altruism were influenced by the physical attractiveness of potential mates. They found that when women read vignettes involving men's displays of either altruistic or non-altruistic behaviour (with images of low and high attractiveness), they desired a long-term partner who displayed altruism, even when the scenario was accompanied by images of men of low attractiveness. This suggests that altruism is perceived as more important than physical attractiveness alone for long-term partners. Therefore, it will be seen here whether these preferences for prosocial traits also apply to risk-prone behaviour, such as heroism.

Therefore, the main objectives of this study are to add to the growing literature surrounding altruism, and extend it based on heroism in regard to females' mate choice. To do so, the potential synergistic effect of physical attractiveness on desirability, which Farrelly et al., (2016) explored, was employed here in relation to both heroism and altruism. Similar to previous studies, this study used scenarios consisting of male facial images of varying attractiveness, combined with scenarios which contained behaviours which were either low or high in altruism/heroism. This research also aims to build on previous theories surrounding female mate choice, which suggest that certain prosocial and courageous behaviour towards non-kin may have evolved for attracting a mate, as these signals are costly in nature (Zahavi, 1995).

1.4. Hypotheses

Based on the aforementioned literature, we hypothesize that the role of both altruism and heroism as signals in mate choice, will be similar. Therefore, we predicted that for both heroism and altruism, displays of high levels of these traits will be rated more desirable than displays of low levels of these traits (hypothesis 1). In addition, we expected this preference for high levels of both traits would be greater for long-term than short-term relationships for both heroism and altruism (hypothesis 2). Finally, we predicted that physical attractiveness and trait level will interact to positively influence women's desirability, particularly for long-term relationships (hypothesis 3).

2. Method

2.1. Participants and design

Participants were 198 heterosexual women from a UK university (Mean age = 19.86 years old, *SD* = 2.99), recruited using an opportunistic sampling method, through the department's

research participation scheme. Only females were recruited (consistent with Farrelly et al. 2016), as previous research has suggested females are the choosier sex in mate choice, as they are predicted to invest more in their offspring (Trivers 1972). Participants completed the study online, via Bristol Online Survey (www.onlinesurveys.ac.uk). This study was approved by the research ethics committee at the university where the data were collected.

We adopted a 2 (prosocial trait: high and Low) x 2 (attractiveness: high and low) x 2 (relationship type: short-term and long-term) within-subjects design. The prosocial trait was either heroism or altruism depending on the scenario (analysed separately). The dependent variable (DV) was the desirability for a relationship (1 = not very likely to 5, very likely Likert scale). The mean relationship desirability was calculated for each combination of prosocial trait and attractiveness. The questionnaire also included two additional relationship types of friendship and one-time date. However, the latter two were included as dummy variables to conceal the aims of the study and were not included in the analyses.

2.2. Materials and procedure

Twenty-four 2D male facial images were sourced from the Face Research Lab London set database (DeBruine & Jones, 2017). Twenty-four male facial images were used in this study (twelve of high attractiveness and twelve of low attractiveness). Pairs of images were then presented alongside hypothetical scenarios (attractive and unattractive male images were counterbalanced as person "A" and "B"). For instance, two images were presented whereby hypothetical person "A" was high in attractiveness and exhibited a behaviour high in altruism. Person "B" was low in attractiveness and behaved low in altruism in response to the scenario, consistent with Farrelly et al. (2016). However, in this study, we also included scenarios where the person in the image behaved high in heroism, whilst the other male displayed low heroism.

In total, twelve scenarios were included which consisted of four heroic scenarios, four altruistic scenarios and four neutral conditions (note: the neutral conditions were included as dummy scenarios to conceal the aims of the study. All the scenarios, and a list of which pictures were used from DeBruine and Jones (2017) are available on the Open Science Framework (OSF; https://osf.io/a76p8/?view_only=95408822fa9f447bb93ba37ad7bae84b).

Once participants provided informed consent, they proceeded to the questionnaire where they were first informed of the definitions regarding the relationship type being explored (short-term relationship, friend etc.). The images were then presented, alongside the scenarios. Participants were required to read each scenario carefully before recording their desirability ratings. Underneath each image and scenario, participants were required to rate how desirable Person "A" and "B" were for a long-term relationship, a short-term relationship, one-time date, or a friendship, consistent with Kelly and Dunbar (2001).

After completing the first section, participants proceeded to the second part of the questionnaire where they were presented with the twenty-four male facial images separately with no accompanying scenarios. In this section, they were required to rate their perceived attractiveness for each male using the five-point Likert scales provided. After completion, participants were fully debriefed.

3. Results

Data analysis was performed using JASP (JASP team, 2018) and R (R Core Team, 2017). The summary data and analysis files are available on the OSF (https://osf.io/a76p8/?view_only=95408822fa9f447bb93ba37ad7bae84b). Note that we were unable to include the raw data due to open data sharing not being included in the participant consent forms.

A 2 x 2 x 2 repeated measures ANOVA was performed separately on altruism and heroism. This consisted of the prosocial trait (high\low heroism or high/low altruism), the attractiveness of the male (low or high), and the relationship type participants were seeking (short-term or long-term). Mean relationship desirability was used as a DV. To control for the increase in familywise type one error rate in a factorial ANOVA (Cramer, van Ravenzwaaij, & Matzke, 2016), a Holm (Holm, 1979) correction was applied to the effects within each ANOVA. Adjusted *p* values are reported to aid interpretability. Omega squared (ω^2) is reported as a measure of effect size as it provides a less biased estimate of the proportion of variance accounted for by the effect in comparison to eta squared (η^2; Lakens, 2013).

3.1. *Altruism*

There was a significant main effect of altruism ($F (1, 197) = 206.37$, $p < .001$, $\omega^2 = 0.113$), attractiveness ($F (1, 197) = 267.33$, $p < .001$, $\omega^2 = 0.113$), and relationship type ($F (1, 197) = 10.29$, $p = .006$, $\omega^2 = 0.004$). There was a significant interaction between altruism and attractiveness, $F (1, 197) = 6.33$, $p = .026$, $\omega^2 = 0.003$. This suggests that when altruism was low, there was an increase in relationship desirability for high attractive males over low attractive males. When altruism was high, there was a larger increase in desirability for high attractive males over low attractive males. There was an interaction between altruism and relationship type, $F (1, 197) = 57.83$, $p < .001$, $\omega^2 = 0.011$. This suggests that when altruism is low, there is little difference in desirability for a short-term or long-term relationship. However, when altruism was high, there was an increase in desirability for a long-term relationship over a short-term relationship. There was also an interaction between attractiveness and relationship type, $F (1, 197) = 29.20$, $p < .001$, $\omega^2 = 0.004$. This shows that when attractiveness is low, there is a small difference in desirability for either a short-term or long-term relationship. However, when attractiveness is high, dating intention is higher for a long-term relationship over a short-

term relationship. There was not a three-way interaction between altruism, attractiveness and relationship type, $F (1, 197) = 1.71$, $p = .193$, $\omega^2 < .001$.

3.2. *Heroism*

There was a significant main effect of heroism ($F (1, 197) = 246.96$, $p < .001$, $\omega^2 = 0.185$), attractiveness ($F (1, 197) = 37.11$, $p < .001$, $\omega^2 = 0.032$), and relationship type ($F (1, 197) = 4.78$, $p = .03$, $\omega^2 = 0.001$). In addition, there were significant interactions between heroism and attractiveness ($F (1, 197) = 31.49$, $p < .001$, $\omega^2 = 0.018$), heroism and relationship type ($F (1, 197) = 65.70$, $p < .001$, $\omega^2 = 0.028$), and attractiveness and relationship type ($F (1, 197) = 40.85$, $p < .001$, $\omega^2 = .006$). Finally, there was a significant three-way interaction, however with a very small effect size, $F (1, 197) = 6.60$, $p = .022$, $\omega^2 < .001$. As table 1 shows, for a short-term relationship, there is a higher dating desirability towards high attractive males than low attractive males when heroism is low, but this difference increases when heroism is high. On the other hand, for a long-term relationship, there is little difference in desirability towards high or low attractive males when heroism is low. However, when heroism is high, desirability increases and is largest for high attractive males.

Table 1

Mean (SD) mate desirability by prosocial trait, attractiveness, and relationship type.

	Heroism		**Altruism**	
	Low	High	Low	High
Short-term				
Low attractiveness	2.19 (0.99)	2.56 (1.16)	2.23 (0.88)	2.61 (1.17)
High attractiveness	2.46 (1.05)	3.22 (1.15)	2.67 (1.07)	3.25 (1.12)
Long-term				
Low attractiveness	2.14 (0.95)	3.02 (1.34)	2.06 (0.85)	2.78 (1.29)
High attractiveness	2.06 (0.88)	3.50 (1.19)	2.70 (1.08)	3.69 (1.19)

4. Discussion

The results showed that for both prosocial traits of heroism and altruism, there was an increase in desirability when men displayed high levels of altruism/heroism compared to when they displayed low levels of heroism/altruism (supporting hypothesis 1). Similarly, this preference was greater for long-term relationships for both heroism and altruism (supporting hypothesis 2). Due to the lack of previous research exploring relationship type and desirability

towards heroism, our findings strongly add to the literature and fill a gap in the field. The fact that altruism was more desirable for long-term compared to short-term relationships is consistent with previous literature suggesting relationship type influences the desirability of prosocial traits (e.g. Barclay, 2010; Bhogal et al., in press; Farrelly et al., 2016), thus confirming the role of altruism in female mate choice. Finally, there was a positive effect overall of physical attractiveness with high levels of altruism for desirability, and this effect (albeit relatively weak) was present for heroism as well, although only for long-term relationships (supporting hypothesis 3). Although the synergistic effect of attractiveness and prosocial behaviour on mate desirability has only recently been explored, our findings are consistent with the limited research conducted (e.g. Ehlebracht et al. 2018; Farrelly et al. 2016). Overall, our findings are consistent with sexual selection having a role in human altruistic behavior.

Our findings add to the literature exploring the ever-expanding role of prosocial traits in female mate choice, particularly here in relation to heroism. Most importantly it shows that the two traits examined here, altruism and heroism, provided a similar pattern of results which suggests that they both signal the same underlying qualities in mate choice despite their contextual differences. Therefore, this is in line with previous research outlined above that shows that there are indeed many clear similarities between different altruistic behaviors in respect to their role in human mate choice. As a result, it provides further support for the view that it is a more general altruistic nature that is desirable, of which both altruism and heroism acts as reliable signals. This, coupled with the findings that both altruism and heroism were desired more for longer relationships, provides further support for altruistic behaviors being more likely a signal of indirect phenotypic qualities (rather than genetic) of future partner and parental care and provision in romantic relationships (Farrelly, 2011; 2013).

Replication is becoming increasingly important in the psychological sciences (Earp & Trafimow, 2015). Therefore, a key aim of our study was to empirically replicate previous research (e.g. Farrelly et al. 2016), but with the addition of also exploring desirability towards heroism as an altruistic behaviour using the same methodology. We successfully replicated previous findings, and provide support that heroism is also a desirable behavior akin to altruism. As a result, this study has been able to make a key theoretical and empirical contribution to the literature concerning mate choice and altruistic behaviors as outlined previously.

In line with the study's strengths, it is also essential to consider some limitations. For one, the ethnicity of images could have been varied, as all images were white Caucasian men. Furthermore, throughout the high heroism scenarios, some of these scenarios may have been interpreted as risk-taking behaviour, more so than heroic acts of bravery. As such an example in one scenario, a highly heroic male *(Person A witnessed the team member falling over the side, without a second thought dived in after her, even knowing that he too could have been putting himself in danger*). The term 'without a second thought', may be interpreted as risk-taking. This may not have been an attractive behavioural trait for some participants. In support, research has found that heroic acts of bravery appear to be preferred over risk-taking behaviour (Farthing, 2005).

A further limitation relates to the design of the study. We replicated and extended previous research by examining scenarios relating to altruism *and* heroism. However, these scenarios only included one prosocial behaviour or the other. This meant that we could not directly compare desirability ratings towards altruistic and heroic mates. One way of comparing the influence of each prosocial behaviour is by comparing effect sizes. For the interaction effects containing each prosocial behavior, heroism explained a marginally greater proportion of variance in desirability. This may suggest that although both heroism and altruism were

similarly desired, the greater potential desirability of heroism in similar conditions could be due to heroism being a more extreme or exaggerated form of altruism (as previously suggested), and thus more desirable. However, this is debatable based on the current findings, and in order to be able to quantify whether heroism or altruism had a greater effect on desirability, future research could adopt a design where the scenarios included each combination of altruism, heroism, and attractiveness. This would allow the unique contribution of each element to be explored, with the aim of comparing how desirable each trait is.

Finally, this study built on previous research that used a Likert scale for responses. However, it may be beneficial to use more sensitive measures that would allow greater response variability. Likert scales encourage response biases to either the middle or extreme values (Greenleaf, 1992), which is reflected here as Table 1 shows that the responses are anchored towards the middle of the scale. An alternative method that could be used in future research is a visual analogue scale, or the contemporary adaption in the Visual Analogue Scale for Rating, Ranking, and Paired-Comparison (VAS-RRP; Sung & Wu, 2018). This has been shown to have greater psychometric properties and reduced response biases. Using one of these methods may offer a methodological improvement for future research.

In summary, our results add to the growing literature exploring the role of prosocial behavior in female mate choice. There was an increase in desirability when men displayed high levels of prosocial behaviour, and this preference was greater for long-term relationships for both heroism and altruism. Finally, there was an increase in desirability for high physical attractiveness with high levels of altruism, and a weaker effect for heroism, although only for long-term relationships.

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