Evolutionary Psychology

www.epjournal.net – 2010. 8(3): 462-476

Original Article

Altruism between Romantic Partners: Biological Offspring as a Genetic Bridge between Altruist and Recipient

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Abstract: When the cost of altruism is low, individuals are more likely to help non-kin (i.e., friends and romantic partners) than kin. This trend is thought to reflect the fact that people tend to be emotionally closer with friends and romantic partners than kin. However, as the cost of altruism increases, altruistic preference shifts to kin. The present study highlights this phenomenon by examining altruism between siblings, romantic partners, romantic partners who have biological children together, and romantic partners who have adopted children together. Participants (n = 203) completed a questionnaire about altruism in low-, medium-, and high-cost situations. Participants gave more low-cost help to their romantic partners (regardless of whether they had a child together) than their siblings. More medium-cost help was given to romantic partners who had a child (biological and adopted) than siblings and romantic partners without children. In the high-cost condition, the estimated altruistic tendencies were stronger toward siblings and romantic partners who have a biological child than toward romantic partners with no children and partners with adopted children. Participants also believed they were more altruistic than their siblings and romantic partners.

Keywords: Altruism; inclusive fitness; perspectives; biological parents; adoptive parents

Introduction

The human propensity for altruistic behavior, according to Hamilton's inclusive fitness theory (1964), is influenced by genetic relatedness or the probability of shared relatedness. This altruistic behavior preserves the same gene in other individuals when the altruistic agent extends aid to kin members – the individuals who are most likely to carry a copy of the same altruism gene. This concept is nicely illustrated by Hamilton's rule ($c < br$), which indicates that an altruist will perform an altruistic act when the biological cost (c) is less than the product of the reproductive benefits (b) and the genetic relatedness (r) shared between the altruist and recipient.

Studies following Hamilton's work have shown that individuals indicate greater altruistic intentions toward close kin than non-kin or more distantly related kin in hypothetical life threatening situations (Burnstein, Crandall, and Kitayama, 1994; Fitzgerald and Colarelli, 2009; Fitzgerald and Whitaker, 2009; Kruger, 2001; Neyer and Lang, 2003; Stewart-Williams, 2007, 2008). More clearly, the amount of aid one is willing to offer diminishes with a reduction in genetic relatedness. In addition, studies have also shown that kin members who are biologically unlikely to reproduce – thereby inhibiting the replication of the altruism gene – are less likely to receive aid from kin members as opposed to their reproductively sound counterparts (Burnstein et al., 1994; Essock-Vitale and McGuire, 1985; Fitzgerald and Colarelli, 2009).

Other research into inclusive fitness theory has found that emotional closeness between altruist and recipient mediates the relationship between genetic relation and altruism (Korchmaros and Kenny, 2001; 2006). In fact, Stewart-Williams (2007) found that people were more likely to help friends (who tend to share high levels of emotional closeness) than genetic relatives (e.g., siblings and cousins) when the cost of helping was low. In addition, further research found that people share higher levels of emotional closeness with their romantic partners than with their friends, and people were more likely to help their romantic partners than their friends regardless of the cost of altruism (Stewart-Williams, 2008). Interestingly though, Stewart-Williams (2008) also found that people were emotionally closer with their romantic partners and friends than their siblings; however, when the cost of altruism was life-threatening, participants were more likely to help their siblings than their partners and friends – indicating that genetic relatedness (i.e., the possibility of the recipient carrying the gene responsible for nepotistic altruism) is the most salient when the cost of altruism becomes life-threatening.

Given what we know about inclusive fitness theory, it is not surprising to find that people are more likely to help kin over non-kin in life-or-death situations. Nevertheless, the influence that emotional closeness has on altruism cannot be ignored. The present study aims to examine the effects of emotional closeness and genetic consequences by studying altruism between romantic partners who have biological children together. Romantic partners can share greater levels of emotional closeness than siblings, cousins, and friends (Stewart-Williams, 2008), but those with biological children have a common genetic interest (i.e., this offspring would have a 50% (r = .5) chance of carrying each of its parents' nepotistic altruism alleles), so it is possible that romantic partners who have a biological child together will be more likely to help each other in life-threatening situations than romantic partners who do not have a biological child together. By the same logic, romantic partners who have a biological child together may also be more likely to help each other in these situations than partners who have an adopted child together – seeing as how partners with adopted children (and no biological children) do not have the common genetic interest. Also, the influences from this shared genetic interest may be similar to the influence from direct genetic relatedness (e.g., the drive one has to save a sibling – someone to whom the altruist is directly related). Thus, the present study is comparing the altruistic tendencies between romantic partners who have a biological child together, partners who have an adopted child together, partners who do not have children together, and siblings.

Direct and Indirect Kinship Cues

As the literature has shown, altruistic tendencies toward one's kin can increase one's overall inclusive fitness, but how does one discriminate his/her kin from non-kin? Research on kin recognition has revealed several different types of cues that animals use to differentiate their kin from non-kin, as well as their genetically close kin from more distantly related kin (See Park,

Schaller, and Van Vugt (2008) for a full review). These kinship cues may be presented through phenotypic matching (e.g., having similar facial features or body odors) which reflect a direct genetic relationship between kin members (Apicella and Marlowe, 2004; Hauber and Sherman, 2001; Lundström, Boyle, Zatore, and Jones-Gotman, 2009; Platek, Burch, Panyavin, Wasserman, and Gallup Jr., 2002).

Other more indirect cues may also be used to detect kin. For instance, co-residence and close spatial proximity have been shown to facilitate altruistic behavior (Anderson, Kaplan, and Lancaster, 1999; Bressan, Colarelli, and Cavalieri, 2009) and decrease the likelihood of sexual behavior between unrelated individuals (indicating the activation of an incest avoidance mechanism) (Walter and Buyske, 2003; Wolf, 1970). Although these indirect kinship cues may serve as successful kin recognition mechanisms, they are more subject to error and have little impact when direct kinship cues are present (Lieberman, Tooby, and Cosmides, 2007). Ultimately, kin recognition is an extremely complex process comprised of several mechanisms. As Park, Schaller, and Van Vugt (2008) wrote, "this is because the evolution of increasingly complex psychological mechanisms has generally occurred by adding to – rather than replacing – existing mechanisms" (p. 216).

Kinship cues, regardless of whether or not they are direct, facilitate higher levels of altruistic behavior (Webster, 2008). Yet it must be noted that this is not a direct causal relationship – other factors can influence altruistic tendencies as well, such as psychological aspects like emotional closeness (Korchmaros and Kenny, 2001; 2006). Although emotional closeness may not be a kinship cue in and of itself, genetic relatedness is associated with feelings of emotional closeness (Korchmaros and Kenny, 2001) – indicating the complexity of kin recognition and its role in generating nepotistic altruism.

Both genetic relatedness and emotional closeness influence altruism; however, these are facilitators operating on two different levels of explanation. Genetic relatedness – represented by direct kinship cues – operates at the ultimate level. Nepotistic altruism has been positively selected because it promotes the successful reproduction of the altruism allele. Emotional closeness, on the other hand, is a proximate factor – helping people that one is emotionally close with may not increase the probability of passing on the altruism allele (especially if the emotionally close people are unrelated), but other benefits can accrue from helping emotionally close others (e.g., reciprocation, social acceptance, etc.).

This intricate relationship leads to a series of factors that may influence altruistic behavior between kin and non-kin based on the presentation of direct and indirect kinship cues. For instance, when examining the altruistic behavior between romantic partners with biological children, we cannot know if people's altruistic decision-making is being influenced by the biological relationship to the child (showing that the child is presenting a direct kinship cue) or if the presence of a child is merely acting as an indirect kinship cue – which can be prone to error. A potential altruist may view his/her romantic partner differently if they have a biological child as opposed to romantic partners who have a non-biological child (i.e., an adopted child). The biological child may present direct kinship cues to his/her parents, causing these romantic partners to view each other as sharing the same vested genetic interests. This view may facilitate a greater likelihood of altruism than romantic partners who do not have a child or have a child that does not present direct kinship cues (i.e., an adopted child).

In order to tease out this possibility, the present study has focused on comparing hypothetical altruistic tendencies between romantic partners with no children, romantic partners with biological children, and romantic partners who have adopted children but no biological

children. Such a comparison should reveal whether it is the biological relationship to the child or merely the presence of a child in general that influences altruism between partners. Thus, the present study is also examining hypothetical altruistic tendencies between romantic partners who have adopted a child (but do not have any biological children) and comparing them to the altruistic tendencies between siblings, romantic partners with no children, and romantic partners with biological children.

The Effects of Paternity Uncertainty

Mothers invest much time and resources in their offspring, especially during the gestation period. Mothers also have complete maternal certainty. Thus, research has shown that mothers are more likely than fathers to tend to the needs of their offspring, and have a greater interest in the offspring during the child's development (Babchuck, Hames, and Thompson, 1985; Taylor et al., 2000). Although not directly pertinent to the present study, one can see that if fathers are less likely than mothers to expend resources to be altruistic toward their offspring, it would be reasonable to assume that fathers would also be less likely to expend resources (and their safety) to be altruistic toward their offspring's mother as well.

There have also been several studies that have found that paternity uncertainty decreases the likelihood of hypothetical altruistic intentions in many types of family members, including parents, cousins, aunts and uncles, and grandparents (Bishop, Meyer, Schmidt, and Gray, 2009; Daly and Wilson, 1980; Gaulin, McBurney, and Brakeman-Wartell, 1997; Euler and Weitzel, 1996; Jeon and Buss, 2007); so it would seem as though females would be more likely than males to be altruistic toward their partners with whom they share a biological child. Rescuing one's partner helps to ensure that one's offspring will be cared for in the near future; however, because males face paternity uncertainty, they may be less likely to risk their lives to help someone with whom they may not share a common genetic interest. In the case of adoptive parents – where both the mother and father certainly know the child is not biologically theirs – paternity uncertainty should not produce a sex difference in altruistic tendencies. Although adoptive parents may be less likely to help their romantic partners than biological parents in life-threatening scenarios, there should not be any significant difference in altruistic tendencies between adoptive parents.

Changes in Perspective

Many previous altruism studies have suffered from potential social desirability biases. For instance, some studies have found inflated altruism ratings when asking people about their likelihood of saving someone in a life-or-death situation (Fitzgerald and Colarelli, 2009; Stewart-Williams, 2008). In other words, when a researcher asks a participant to indicate how willing they believe they would be to risk their lives to help someone, the participant cannot give a 100% accurate response. Altruism research is asking about some high-stress situations (e.g., running into a burning house to save a loved one), and it is quite improbable that one can give an accurate prediction of their behavior in non-existent high-stress situations, especially when they are simply circling a number on a pencil-and-paper scale. It is also possible that people are much less heroic than they believe themselves to be.

Because it is highly impractical and unethical to place people in harm's way merely to investigate their altruistic behavior, the questionnaire method has served as a substitute – and a fairly accurate one (Stewart-Williams, 2007). However, the social desirability bias can influence almost any explicit questionnaire study. Therefore, the present study has decided to examine this bias as its own variable. The questionnaire used in this study contains altruism items used in countless previous studies (Burnstein et al., 1994; Cunningham, 1986; Essock-Vitale and McGuire, 1985; Lieberman et al., 2007; Neyer and Lang, 2003; Stewart-Williams, 2007; 2008),

but not only have we presented these altruism items, we have also presented them with the perspective reversed. In other words, the eight items asking each participant about their altruistic tendencies toward their sibling or romantic partner are accompanied by a second set of these eight items that ask each participant about their sibling's or partner's altruistic tendencies toward the participant. It is possible that these *reversed perspective* items will fall subject to social desirability bias as well, especially since previous research has found that people perceive themselves as more ethical than others (Alicke, Klotz, Yurak, and Vredenburg, 1995; Hoorens, 1993). Kruger (2003) used reverse perspective items and found that these were the strongest predictors of altruistic intentions. That data, combined with previous research associated with the social desirability bias, leads us to hypothesize that perceived altruistic intentions by oneself will be greater than the perceived altruistic intentions of others.

Materials and Methods

Participants and Design

Participants consisted of 164 undergraduate and graduate students (59 male and 105 female) at Central Michigan University (which consisted of all groups except for the adoptive parents group), and 39 adoptive parents (19 male and 20 female). Of the 164 students, 40 of them were biological parents. The average number of biological children was $M = 2.5$ ($SD = .99$). The adoptive parents were characterized as having adopted at least one child and not having any biological children. The average number of adopted children was $M = 2.4$ ($SD = .98$). The average age of the sample was $M = 25.5$ years ($SD = 5.2$). The average length of relationship was $M = 3.1$ years ($SD = 1.3$) for romantic partners with no children, $M = 6.6$ years ($SD = 3.4$) for romantic partners with biological children, and $M = 9.6$ years ($SD = 2.8$) for romantic partners with adopted children.

The student participants were recruited online from a pool of undergraduate and graduate psychology students. The adoptive parents were recruited online from a listserv of adoptive parents registered with an adoption support website. Prior to recruiting from this website, the administrator had given the experimenters permission to collect data from its members.

The study design consisted of a 4 (relationship category: partners with no children, partners with biological children, partners with adopted children, and siblings) x 3 (cost of altruism: low-, medium-, and high-cost) x 2 (sex of the participant) x 2 (sex of the target) x 2 (perspective) mixed-design. Cost of altruism and perspective were within-subject variables while relationship category, sex of the participant, and sex of the target were between-subject variables.

Stimulus Materials and Measures

In order to follow previous altruism research procedures, the items used in the present study mimic those that were used in Stewart-Williams's (2008) study on altruism between romantic partners, which was also derived from previous research (Burnstein et al., 1994; Cunningham, 1986; Essock-Vitale and McGuire, 1985; Lieberman et al., 2007; Neyer and Lang, 2003). There were three emotional closeness items and eight altruism items total. The three emotional closeness items stemmed from the two-item Subjective Closeness Index (SCI) (Berscheid, Snyder, and Omoto, 1989) and the one-item Inclusion of Other in Self Scale (IOS) (Aron, Aron, and Smollan, 1992). Responses for these items were recorded on a 7-point Likert-type scale. The items yielded a high level of internal consistency ($\alpha = .88$) and were therefore aggregated to form the *emotional closeness* variable.

The questionnaire continued with two questions regarding how much low-cost help (e.g., emotional support: advice, comfort when feeling sad) the participants had given the specific person in the past 2 months. These items produced a high level of internal consistency (α = .84) and were aggregated to form the *low-cost altruism* variable. The next three questions pertained to the amount of medium-cost help (e.g., errands, shopping, household chores) given in the past 2 months, which also yielded high internal consistency (α = .86) and were averaged to create the *medium-cost altruism* variable. Responses were recorded on a 9-point Likert-type scale (1 = *never* and 9 = *often*). The final two items referred to hypothetical scenarios, asking the participants how willing they would be to help the specific person in life-or-death situations (e.g., donating a kidney, rescuing them from a burning house). Their responses were recorded on a 9-point Likert-type scale (1 = *not at all willing* and 9 = *extremely willing*). These items produced a reliable level of internal consistency (α = .75) and were averaged to create the *high-cost altruism* variable. All of the altruism questions were presented randomly in the questionnaire.

The eight altruism items were also given within each questionnaire but with the perspective reversed. Each low- and medium-cost altruism question asked the participants how often their sibling or partner had helped them over the past two months while the high-cost altruism questions asked the participants to indicate how willing they believed their sibling or romantic partner would be to perform the life-threatening altruistic acts. These items also produced high levels of internal consistency (α = .84 for low-cost, α = .83 for medium-cost, and α = .79 for high-cost) and so were aggregated accordingly to produce the *low-cost*, *medium-cost*, and *high-cost reversed perspective altruism* variables. Responses were recorded on 9-point Likert-type scales in the same format as described above. These *reversed perspective* questions were randomly presented throughout the questionnaire as well.

The questionnaire was created electronically using the website Survey Monkey (www.surveymonkey.com).

Procedure

An electronic link to the questionnaire was e-mailed to participants after they had signed up for participation in the study online. Upon clicking the link, participants were directed to the questionnaire. The first page of the questionnaire consisted of a consent form which disclosed the purpose and content of the study. The participants had to click on a button which stated they read the consent form and agreed to participate in the study. After clicking the acknowledgment button, the first question of the questionnaire was presented. Each question was presented on a single page. The 9-point Likert-type scale was presented below each question. To indicate their response, participants clicked on the appropriate selection on the 9-point scale and then clicked on the "Next" button to proceed to the following question (which was presented on a new page). After completing the questionnaire, the participants were thanked for their participation and given more disclosure as to the purpose of the study.

Results

Altruistic Tendencies

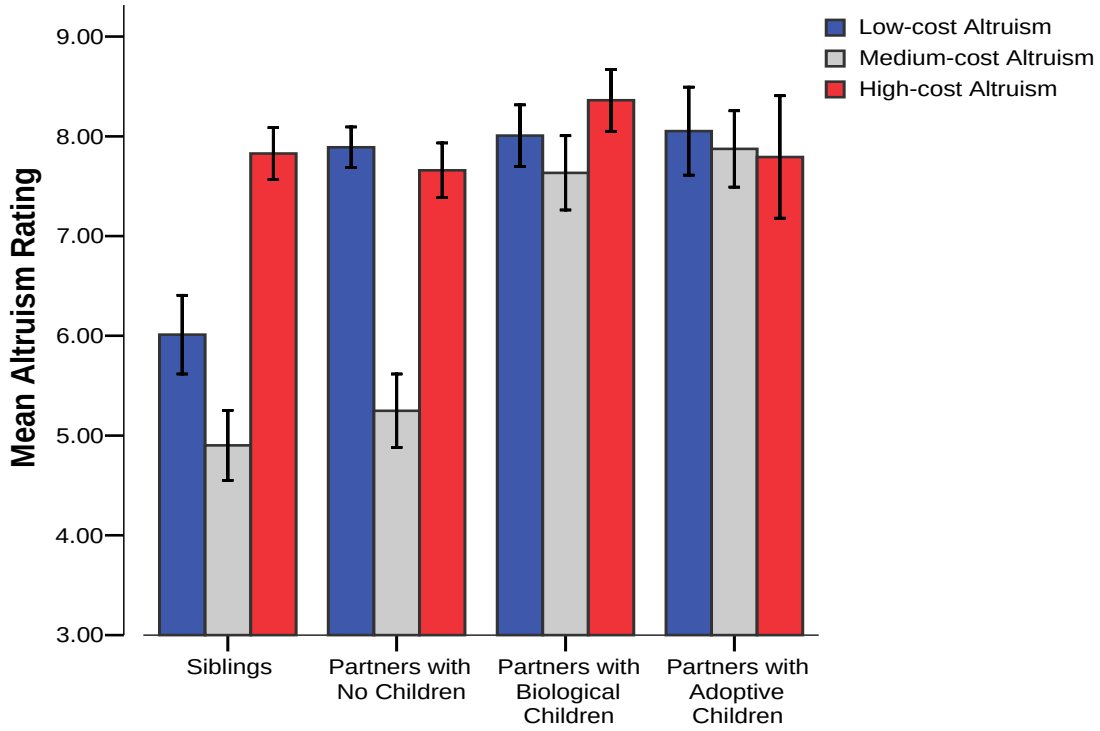
Altruistic tendencies were analyzed using a 4 (relationship category) x 3 (cost of altruism) x 2 (sex of the participant) x 2 (sex of the target) x 2 (perspective) mixed-design analysis of variance (ANOVA). Sex of the participant and sex of the target did not yield any

significant results (p = .17 and p = .89 respectively), nor did they interact with any of the variables, and are therefore not discussed further in this section.

The ANOVA also revealed a significant main effect for relationship category, $F(3, 193) = 21.54$, $p < .001$, $\eta_p^2 = .25$, and a significant main effect for cost of altruism, $F(2, 193) = 85.86$, $p < .001$, $\eta_p^2 = .31$. However, these main effects were qualified by a significant two-way interaction, $F(6, 193) = 17.56$, $p < .001$, $\eta_p^2 = .21$. Three follow-up one-way ANOVAs (one for each level of altruism) with Tukey post-hoc analyses revealed the following results.

Relationship category significantly influenced low-cost altruism, $F(3, 199) = 24.84$, $p < .001$, $\eta_p^2 = .27$. More specifically, participants were significantly more likely to help romantic partners (regardless of whether or not they have a biological or adopted child with them) than siblings.

Figure 1. Mean Altruism Ratings as a Function of Relationship Category and Cost of Altruism.



Relationship category significantly influenced medium-cost altruism as well, $F(3, 199) = 56.98$, $p < .001$, $\eta_p^2 = .46$. Post-hoc analyses revealed no significant differences in frequency of altruism toward siblings and toward romantic partners with no children, nor were there any significant differences in frequency of altruism toward romantic partners with biological children and romantic partners with adopted children. However, the altruism ratings toward partners with biological and adopted children were significantly higher than the altruism ratings toward siblings and partners with no children.

A significant relationship was found between relationship category and high-cost altruism, $F(3, 199) = 4.96$, $p = .002$, $\eta_p^2 = .07$. Post-hoc analyses indicated no significant differences in estimated altruistic tendencies toward siblings and toward romantic partners with biological children. In addition, there were no significant differences in estimated altruistic

tendencies toward partners with no children and partners with adopted children. However, estimated altruistic tendencies toward siblings and partners with biological children were significantly greater than estimated altruistic tendencies toward partners with no children and partners with adopted children. See Figure 1 for mean altruism ratings in relationship to cost of altruism and relationship category.

Perspective also yielded a significant main effect, $F(1, 193) = 72.35$, $p < .001$, $\eta_p^2 = .27$. The results show that people rated their own frequency of performing altruistic acts significantly higher than they rated their perception of their sibling's and partner's frequency of performing altruistic acts. Perception did not interact with any other variables, which supports the theory that individuals' perceptions of their own estimated altruistic tendencies are greater than their perceptions of others' altruistic tendencies, regardless of whom they are perceiving and what cost of altruistic act is being performed. See Figure 2 for mean altruism ratings as a function of participant perspective.

Altruistic Tendencies when Controlling for Emotional Closeness

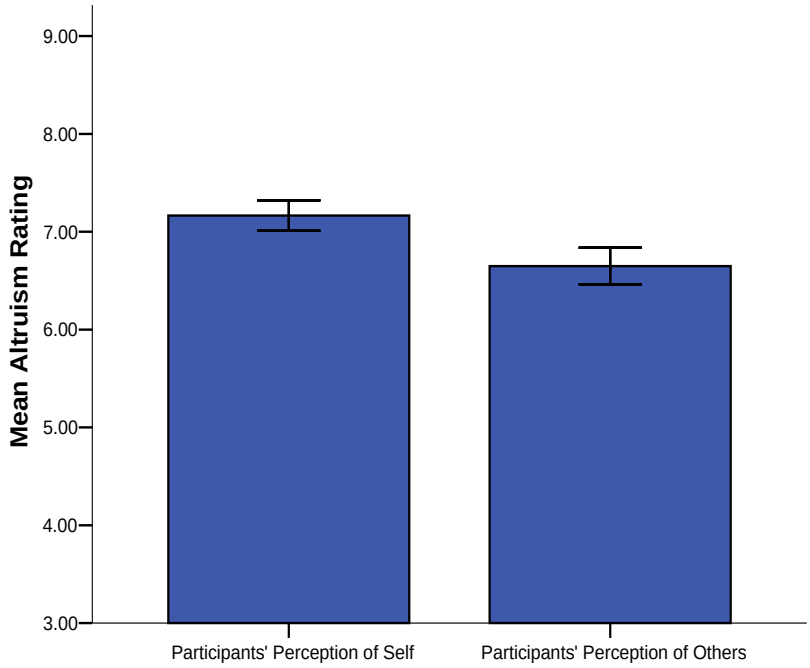
Further analyses were performed to examine the potential effects of genetic relatedness on altruistic tendencies while controlling for emotional closeness. The same effects were found when controlling for emotional closeness, only with smaller effect sizes. When using a 4 (relationship category) x 3 (cost of altruism) x 2 (sex of the participant) x 2 (sex of the target) x 2 (perspective) mixed-design analysis of covariance (ANCOVA), sex of the participant and target still did not yield any significant results ($p = .48$ and $p = .97$ respectively), nor did they interact with any of the other variables. The ANCOVA also revealed significant main effects for relationship category, $F(3, 251) = 17.07$, $p < .001$, $\eta_p^2 = .17$, and cost of altruism, $F(2, 502) = 9.82$, $p < .001$, $\eta_p^2 = .04$. These main effects were also qualified by a significant two-way interaction, $F(6, 251) = 16.60$, $p < .001$, $\eta_p^2 = .17$.

Follow-up analyses indicated significant simple effects that were similar to those found in the ANOVA in which emotional closeness was not controlled for. Relationship category significantly influenced low-cost altruism, $F(3, 258) = 22.35$, $p < .001$, $\eta_p^2 = .21$. Participants were significantly more likely to help romantic partners (regardless of whether or not they had a biological or adopted child with them) than siblings.

There was a significant main effect for relationship category in the medium-cost altruism condition, $F(3, 258) = 35.47$, $p < .001$, $\eta_p^2 = .29$. Participants indicated they were just as likely to help siblings and romantic partners with no children, and just as likely to help romantic partners with biological children and romantic partners with adopted children, in medium-cost situations. The altruism ratings toward partners with biological and adopted children were significantly higher than the altruism ratings toward siblings and partners with no children.

A significant relationship was found between relationship category and high-cost altruism, $F(3, 258) = 4.77$, $p = .003$, $\eta_p^2 = .05$. There were no significant differences in estimated altruistic tendencies toward siblings and toward romantic partners with biological children. There were also no significant differences in estimated altruistic tendencies toward partners with no children and partners with adopted children. However, altruism ratings toward siblings and partners with biological children were significantly greater than altruism ratings toward partners with no children and partners with adopted children.

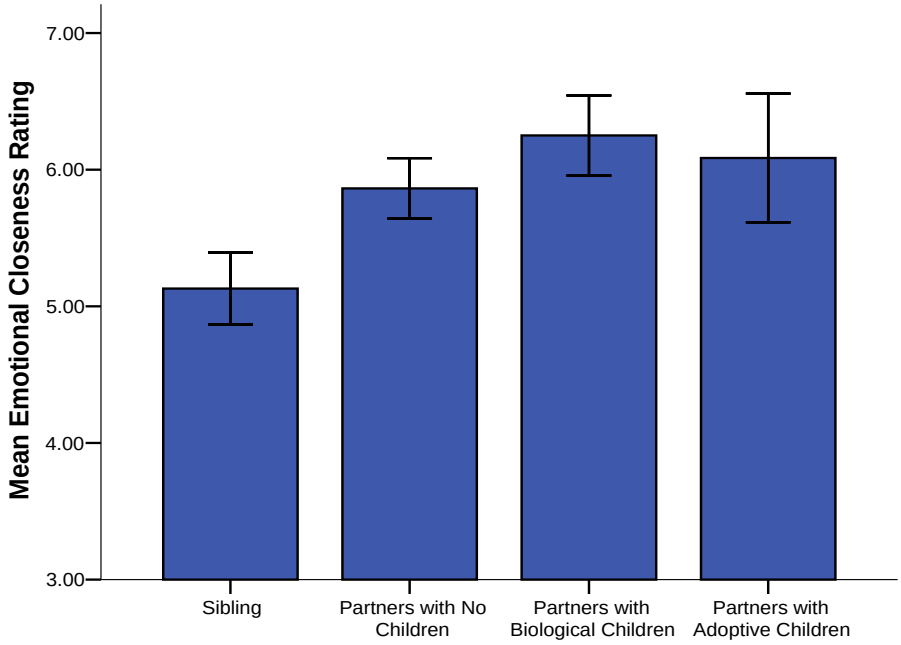
Figure 2. Participants' Perception of Their Own Altruistic Tendencies Compared to Their Perception of Others' (i.e., siblings and romantic partners) Altruistic Tendencies.



Emotional Closeness

A 4 (relationship category) x 2 (sex of target) x 2 (sex of participant) analysis of variance (ANOVA) analyzed the levels of emotional closeness between participants and their siblings and romantic partners. The relationship category revealed a significant main effect upon emotional closeness ratings, $F(3, 193) = 6.98$, $p < .001$, $\eta_p^2 = .10$. Sex of the participant and sex of the target did not have any significant influences on emotional closeness ($p = .44$ and $p = .66$ respectively), nor did they exhibit any interactions. A Tukey post-hoc analysis on the main effect of relationship category indicated that participants were significantly closer with romantic partners, regardless of whether or not they had a biological or adopted child, than they were with siblings. This also indicates that romantic partners were just as emotionally close to each other regardless of how long they have been together. See Figure 3 for mean emotional closeness ratings.

Figure 3. Mean Emotional Closeness Ratings as a Function of Relationship Category.



Discussion

The present study revealed multiple insights into inclusive fitness theory and the roles that emotional closeness and genetic relatedness play in relation to altruism. Emotional closeness appears to play a larger role in low-cost altruism, while genetic relatedness seems to be the driving force behind performing life-threatening feats to save someone. The data on emotional closeness in this study supported previous theory that people are emotionally closer with their romantic partners than their siblings (Stewart-Williams, 2008), but the data from the current study also revealed that people are just as emotionally close with their partner regardless of whether or not they have a biological or adopted child together.

In low-cost altruistic scenarios, people gave more help to their romantic partner (regardless of whether or not they have a biological or adopted child) than their sibling. As expected, these results (along with the emotional closeness results) distinctly show that emotional closeness accounts for the low-cost altruistic behavior that people perform. This finding supports previous research (Essock-Vitale and McGuire, 1985; Kruger, 2003; Stewart-Williams, 2007; 2008) showing that people who are very emotionally close receive greater shares of help when the cost of help is not life-threatening.

When looking at the medium-cost altruism condition, one finds an obvious relationship between altruism and people with children (biological and adopted). Individuals gave more aid to their romantic partners in these conditions – which centered on running errands and performing household chores – when they had a child with them. This was also not very surprising – people with children will have more work to do around the house, such as having to buy more groceries and keeping the house clean (kids can be messy). Thus, it is possible that the medium–cost altruism results are due to a higher welfare trade-off ratio for partners with children than partners without children. The welfare trade-off ratio indicates that altruistic behavior toward one's kin

may not be directly proportional to one's shared genetic relatedness (Tooby, Cosmides, Sell, Lieberman, and Sznycer, 2008). In other words, other factors besides genetic relatedness may influence the costs and benefits incurred from altruistic acts. For instance, an altruist may be more likely to help a specific recipient, such as a romantic partner with whom one has a child, because there may be a decreased cost, and increased benefit, of help. Presumably, partners who have children together live in the same household, indicating that medium-cost help would benefit the altruist (e.g., having food and a clean living space) as well as the recipient at a lower cost to the altruist (i.e., the altruist does not have to travel far – and therefore expend less resources – to clean his/her own home).

More intriguing, however, were the results surrounding estimated altruistic tendencies toward specific people in hypothetical high-cost altruistic scenarios. Finding that people are most likely to be altruistic toward siblings and their partners with whom they have a biological child shows strong support for Hamilton's (1964) inclusive fitness theory. It would not be in one's best genetic interests to risk his/her life to save someone who is genetically unrelated. Losing one's life to save someone who is unrelated completely eliminates the possibility of passing on one's own altruism gene. However, in the case of the romantic partner who has a biological child, we see that the presence of a child influences altruistic decision-making between the altruist and recipient. It may be in one's best genetic interest to risk one's life to save his/her partner because it helps to ensure that their genetic offspring will be cared for in the future. The key point here is that this effect was only found when people were asked about rescuing their partners with whom they have a biological child. If either having a child in general (i.e., adopted child, step child, etc.) or having high levels of emotional closeness were facilitating the likelihood of performing life-threatening altruistic acts, then we would have found a significant increase in estimated altruistic tendencies toward romantic partners with no children and romantic partners with adopted children. This was not the case, and because of this we can see that genes play a much stronger role in life-threatening altruism than once theorized.

In addition, there was no significant difference in estimated altruistic tendencies between the sibling condition and the romantic partner with biological children condition. This represents a direct relationship between genetic relatedness and likelihood of altruism. People are just as likely to save their siblings and their romantic partners when they have a biological child together. Similarly, parents and offspring have the same probability of sharing the altruism gene (r = .5) as siblings do (r = .5). Thus we can see that people are more likely to help their partners because of this probability of passing on the altruism gene via their offspring.

Although past altruism studies have not found sex differences in the examples used in this study (Burnstein et al., 1994; Fitzgerald and Colarelli, 2009; Kruger, 2001; Stewart-Williams, 2007; 2008), the incorporation of altruism toward partners with whom the altruist has a biological child seemed as though it would spark a sex difference. Paternity uncertainty has been shown to influence altruism in many distant kin members, including cousins, aunts and uncles, and grandparents (Bishop et al., 2009; Daly and Wilson, 1980; Gaulin et al., 1997; Euler and Weitzel, 1996; Jeon and Buss, 2007), so it seemed logical that we would find it influencing altruism between partners (in the form of male participants being less altruistic than females). However, this was not the case.

Lastly, finding that people perceive themselves as more altruistic than others regardless of genetic relation and emotional closeness was interesting. The present study has found that people believe they are better altruists than others, regardless of whom they are comparing themselves. It does not matter how emotionally and/or genetically close people are, each of them

will tend to perceive him- or herself as more altruistic than the other. This leads us to believe that questionnaire methodology for altruism research suffers from participant social desirability bias; however, the fact that perspective did not interact with any variables in this study reflects that the influence that genetic relatedness and emotional closeness have on altruism does not suffer from this bias. If that were the case then not only would we have found a three-way interaction between perspective, relationship category, and cost of altruism, but we would have different simple effects between relationship category and cost of altruism after parsing that interaction. Thus, it is safe to assume that the bias found in this study only inflates the altruism ratings and not the actual relationships between the independent variables and the dependent variable, indicating that the questionnaire methodology is a reliable format for testing altruistic behavior in humans. However, the data are also consistent with the possibility that participants have more information about altruistic acts performed by oneself without anyone else knowing it, so that could also have led to increase altruism ratings for oneself.

Limitations

There are many other relationship categories that could have been added into this study. For instance, examining estimated altruistic tendencies toward a partner with whom the altruist has a step-child could have been useful. Having a step-child may symbolize reproductive fertility to the altruist and could therefore increase the altruistic potential; however, it may also represent a possibility of cuckoldry, which could decrease the likelihood of altruism.

Another limitation centers on the sample size. Gaining a sample of adoptive parents was extremely difficult and left us with a total of 39 adoptive parents. There were also a smaller number of males in this study than females – which may be responsible for the lack of sex differences found.

There were also large age differences between the different romantic partner groups. This could possibly be a limitation to the study; however, the lack of significant differences in emotional closeness between these groups and the relationship that these groups had with the differing levels of altruism seem to indicate that age was not a factor. Previous research on age and altruism has found that age does not significantly influence altruistic decision-making until the recipient reaches an age where the probability of sexual reproduction is severely decreased or eliminated (Burnstein et al., 1994). Because the present study did not have any participants outside of reproductive age, it would be unlikely to find that the age differences between groups had any significant effect on altruism.

Another limitation of this study was the use of the word “often” in the altruism items. Participants were asked to indicate how often they had helped their sibling or partner in the past two months (on a 9-point Likert-type scale where 1 = *never* and 9 = *often*), but “often” is a relative term. One may see “often” as helping someone 50 times in the past two months, but others may see “often” as helping someone 10 times in the past two months. Using more definitive and absolute terminology may have led to results dissimilar to what was found in this study.

There are many other factors that may have played an influential role in altruistic decision-making. For instance the presence of adopted children and absence of genetic children can be viewed as a cue of infertility, and infertility has been shown to decrease the likelihood of altruism in life-threatening situations (Essock-Vitale and McGuire, 1985; Fitzgerald and Colarelli, 2009). So it is possible that altruism ratings were lower for romantic partners with

adopted children because of the lack of possibility of passing on the nepotistic altruism gene via reproduction with one's romantic partner.

Although this study has further added to the literature on altruism between kin and non-kin, future researchers may want to increase the sample of adoptive parents, perhaps examine altruistic tendencies toward romantic partners with whom the altruist has a step-child, increase the number of males in the sample, and try to omit any relative terminology.

Conclusion

The present study shed some further light on Hamilton's (1964) inclusive fitness theory. There has been heavy debate over what has a stronger influence on altruism – emotional closeness or genetic relatedness – and the results acquired in this study added empirical evidence that can help settle this debate. Ultimately, emotional closeness plays a much larger role in altruistic decision-making when the cost of altruism is not life-threatening, but as this cost increases, genetic relatedness becomes more influential. The fact that, in life-threatening situations, people with a shared genetic interest (i.e., a biological child) indicated greater estimated altruistic tendencies toward each other than people with non-genetic offspring (i.e., an adopted child) strongly supports this claim.

The results also indicated that neither emotional closeness nor genetic relatedness make any difference in people's perception of others' altruistic tendencies. As was discussed earlier, this lack of interaction has helped to show that participant social desirability bias does not interfere with altruism research – it merely inflates the scores. Overall, the present study has served to demonstrate greater support for inclusive fitness theory and altruism research methodology in general.

Received 16 March 2010; Revision submitted 05 May 2010; Accepted 09 August 2010

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