

### Original Article

## Sex Differences in Violent versus Non-Violent Life-Threatening Altruism

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**Abstract:** Many studies on Hamilton's (1964) inclusive fitness theory have used the burning house and kidney donation examples of life-threatening altruism. However, these examples may not be sufficiently exhibiting the risk involved with life-threatening altruism that would have occurred in hunter-gatherer societies, such as fighting off attackers and/or predators. The present study examined participants' estimated likelihood to perform altruistic acts for specific kin members/friends in two violent life-threatening situations (i.e., being mugged and being chased) and two non-violent life-threatening situations (i.e., the burning house and kidney donation examples). Participants were 216 undergraduate students who completed a questionnaire on altruism toward an actual kin member/friend. Each questionnaire contained four life-or-death scenarios (two violent and two non-violent) in which either the participant's sibling, cousin, or best friend was in danger and needed help. Results indicated that people were more likely to help siblings than cousins and friends in both the violent and non-violent hypothetical scenarios. Participants indicated a greater likelihood to help people in violent situations than in non-violent situations. Women indicated a greater estimated likelihood than men to help people in non-violent situations while men indicated a greater estimated likelihood than women to help people in violent situations. Both male and female participants indicated a greater estimated likelihood to help women than men in violent situations.

**Keywords:** altruism, inclusive fitness, sex differences, violence

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### Introduction

Hamilton's (1964) inclusive fitness theory has argued that creatures possess a gene which is responsible for altruistic behavior. This behavior preserves the gene in other individuals when aid is extended to kin members – the individuals who are most likely to carry a copy of the same altruism gene. This is represented 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. From Hamilton's rule, researchers have found that people are more likely to risk their lives to aid close kin over both distant kin and non-kin in life-threatening scenarios (Burnstein, Crandall, and Kitayama, 1994; Fitzgerald and Colarelli, 2009; Kruger, 2001; Stewart-Williams, 2007, 2008), and people are also more likely to aid healthy kin over those with a disorder that inhibits reproduction of the altruism gene (Burnstein et al., 1994; Essock-Vitale and McGuire, 1985; Fitzgerald and Colarelli, 2009).

However, it seems like most, if not all, altruism research has used two specific examples when studying life-threatening altruism. These two examples are 1) the burning house – in which a participant is told to imagine that one or more kin members are trapped in a burning house and they need the participant to rescue them (Burnstein et al., 1994; Fitzgerald and Colarelli, 2009; Stewart-Williams, 2007, 2008), and 2) kidney donation – where a participant is told to imagine a kin member needs the participant to donate a kidney in order for that kin member to survive (Lieberman, Tooby, and Cosmides, 2007; Stewart-Williams, 2007, 2008). Both of these examples adequately portray the deadly risk involved in this type of altruism, but they may not be the most fitting examples of life-threatening situations. For instance, other altruism research has found that other animals (including non-human primates) take part in life-threatening altruistic acts to help their kin as well (Kaplan, 2005; Moehlman, 1979), which indicates that altruistic behavior may stem from a distant common ancestry and has therefore been surviving since before the development of organ donation and houses.

Although organ donation is a very new concept in human history and therefore is very unlikely to be an accurate representation of life-threatening altruism in hunter-gatherer societies, humans have been controlling fire and living in house-like residences for thousands of years. Therefore, it is possible that burning houses may have been occurring long enough in human history to shape altruistic behavior – allowing for generations of experience with life-threatening situations in which a kin member must be saved from a burning residence. However, life-threatening altruism in non-human primates and other animals indicate that fighting off predators and attackers should be examined to obtain potentially more accurate representations of life-threatening altruism.

Thus, although the burning house and kidney donation examples adequately display the life-or-death risk of the specific altruistic act involved, the acts themselves (especially the kidney donation example) may not be sufficiently exhibiting the risk associated with life-threatening altruism that would have occurred in early hominid environments (e.g., *Australopithecus*) or in non-human primate societies (e.g., chimpanzees), such as fighting off attackers and/or predators (Chagnon, 1988; Kaplan, 2005). Therefore, the current study focused on violent types of life-threatening altruism in which a person's kin member is being attacked by an aggressor, and the responses to these altruistic acts will be compared to the standard non-violent altruism scenarios (i.e., burning house and kidney donation examples).

#### *Sex Differences (or lack thereof) and Altruism*

Studies on non-violent altruism have found there to be no sex differences when it comes to performing these life-threatening acts (Burnstein et al., 1994; Fitzgerald and Colarelli, 2009; Kruger, 2001; Stewart-Williams, 2007, 2008). Men and women are both

equally likely to sacrifice their own lives to save a close kin member (Mills, Pedersen, and Grusec, 1989). However, due to the non-violent nature of the altruistic acts that are generally used, this finding may be incomplete.

Evolutionary theory and research have argued that males are more physically aggressive than females (Buss and Duntley, 2006; Daly and Wilson, 1988). This physical aggression in males may have evolved (among other reasons) from intrasexual competition (Buss and Duntley, 2006). Males compete with each other for the most attractive and/or desired mates (Buss, 1988; Darwin, 1871), so this competition has led to aggression. In fact, males are responsible for 99% of all same-sex murders worldwide (Daly and Wilson, 1988) – supporting the theory that physical aggression in males stems from intrasexual conflict. Conversely, females often resort to verbal aggression during instances of intrasexual competition (Buss and Dedden, 1990); therefore physical aggression has not developed in females to the extent that it has developed in males.

There is a plethora of data that support the theory of intrasexual competition and male aggression, but it is also possible that this intrasexual conflict has grown to intergroup conflict over the years. This would have led male aggression to develop as a means of protecting oneself, one's kin members, social status, reproductive status, and resources from attackers (Buss and Duntley, 2006). Intergroup conflict has led to warfare, pillaging, abduction and subsequent rape of females between opposing groups (Chagnon, 1988; Wrangham, 1999). If defensive physical aggression would not have developed, groups would have suffered severe injury, death, and loss of females – all of which would decrease and/or inhibit reproduction. Thus, it is possible that males may be more physically aggressive than females when it comes to defending themselves and/or kin members. If males and females are forced into a situation in which they have to perform a violent act to save a kin member (e.g., physically fighting off an armed attacker), the results may show a sex difference – something that has not been found in any previous altruism research.

Male altruists may be more likely to physically assault an attacker to save a kin member than female altruists. Of course, one possible exception to this theory centers on the mother-child kin relation. Because mothers invest a great deal of time and resources during gestation, and have complete maternal certainty, they are much more likely than fathers to tend to the needs of their offspring, which includes protecting them from predators, sharing precious resources (e.g., food, water, and shelter), and general interest in the offspring during development (Babchuck, Hames, and Thompson, 1985; Taylor et al., 2000). Also, multitudes of studies have found that paternity uncertainty decreases the likelihood of altruism and investment 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 not be surprising to find that females would be more likely than males to be violently altruistic to save their offspring. However, the current study examined the influence that violence may have on altruism toward siblings, cousins, and friends – siblings and friends are unaffected by the paternity uncertainty principle, and previous research on altruism toward cousins did not find any sex differences (Jeon and Buss, 2007).

## **Materials and Methods**

### *Participants and Design*

Participants consisted of 216 undergraduate students (108 males and 108 females) from Central Michigan University – a Midwestern-American university with an on-campus student population of about 20,000. The average age of the sample was 20.7 years ( $SD = 4.3$ ). Participants were given extra credit in one of their psychology courses for their participation.

The study design consisted of a 3 (genetic relatedness between participant and recipient) x 2 (types of altruism: violent vs. non-violent) x 2 (sex of target) x 2 (sex of participant) mixed design. Genetic relatedness, sex of the participant, and sex of the target were between-subject variables whereas type of altruism was a within-subject variable. The dependent variable was the estimated likelihood of performing the altruistic act.

### *Stimulus Materials and Measures*

A questionnaire containing four fictional scenarios in randomized order was used. Each questionnaire pertained to one specific target person that was related to the participant in some way. The target was described as being either the participant's sibling ( $r = .50$ ), cousin ( $r = .125$ ), or best friend ( $r = 0$ ). Each scenario depicted a situation in which the target person was in serious peril and would die if the participant did not act to save them. Two different examples were used for each type of altruism (creating a total of four altruism scenarios). Non-violent altruism consisted of the burning house example and the kidney donation example. Both examples yielded a reasonable level of internal consistency ( $\alpha = .70$ ) and were therefore aggregated to create the *non-violent altruism* variable. Violent altruism consisted of an example depicting the target person being mugged and another example depicting the target person being chased by an attacker. Both examples yielded a high level of internal consistency ( $\alpha = .85$ ) and were therefore aggregated to form the *violent altruism* variable. Within each scenario was a statement indicating to the participants that there is a great chance of dying if they choose to help the person in peril. After each scenario, there was a question asking "What is the likelihood of you helping this person?" Responses were recorded by circling a number on a 5-point Likert-type scale in which 1 = "definitely not helping," 2 = "probably not helping," 3 = "maybe helping," 4 = "probably helping," and 5 = "definitely helping."

### *Procedure*

Participants were given two copies of a consent form. They read and signed both consent forms, returned one to the experimenter, and kept the second for their own records. After the consent form, they were given a condition assignment form that consisted of six questions. Each question asked the participants if they had one of the following six kin members/friends – brother, sister, male cousin, female cousin, male best friend, female best friend. The participants were randomly assigned to a single condition based on the kin members/friends they indicated they had. For example, if a participant indicated they had a brother, sister, *and* a male best friend, then he/she was randomly assigned to only one of those conditions – either the brother, sister, or male best friend group. Each participant was only allowed to participate in one condition.

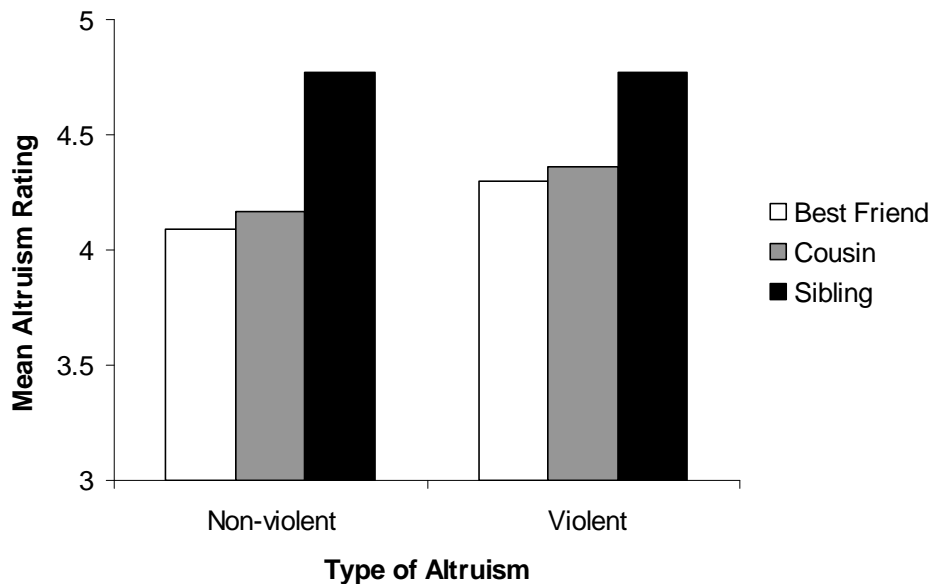
After being assigned to a condition, the participants were given the paper and pencil

altruism questionnaire and asked to think of the specific person to which they were assigned (e.g., their brother, sister, etc.). They were then asked to read the questionnaire and circle a number on the 5-point Likert-type scale below each of the four scenarios. After everyone had finished, the researcher collected the questionnaires and dismissed the participants.

## Results

A 3 (genetic relatedness) x 2 (type of altruism) x 2 (sex of target) x 2 (sex of participant) mixed-design ANOVA was performed on the participants' altruism ratings. The results revealed a significant main effect of genetic relatedness,  $F(2, 204) = 22.03, p < .001, \eta p^2 = .18$ . A Tukey post-hoc analysis found that people considering their siblings had a higher estimated likelihood of helping than people considering cousins and friends, but there was no significant difference in altruism ratings between people considering their cousins and people considering their friends. Genetic relatedness did not interact with any variables. See Figure 1 for the mean altruism ratings based on genetic relatedness.

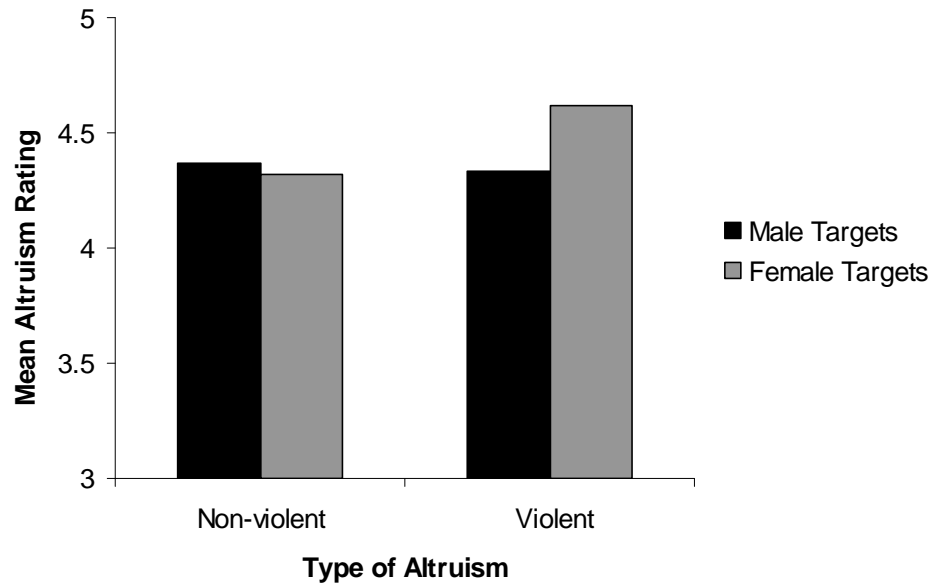
**Figure 1.** Mean likelihood of performing a life-threatening altruistic act as a function of altruism type and genetic relatedness.



A significant main effect for type of altruism was also found,  $F(1, 204) = 16.17, p < .001, \eta p^2 = .07$ , indicating people had a higher estimated likelihood of helping those in violent altruistic situations than non-violent ones. However, this main effect was qualified by a significant two-way interaction with the sex of the target,  $F(1, 204) = 13.59, p < .001, \eta p^2 = .06$ . Follow-up analysis found that people were just as willing to help male and female targets in non-violent situations ( $p = .51$ ), but they were more willing to help female targets than male targets in violent situations,  $F(1, 204) = 8.97, p = .003, \eta p^2 = .04$ . Sex of target did not elicit a main effect nor did it interact with any other variables. See Figure 2

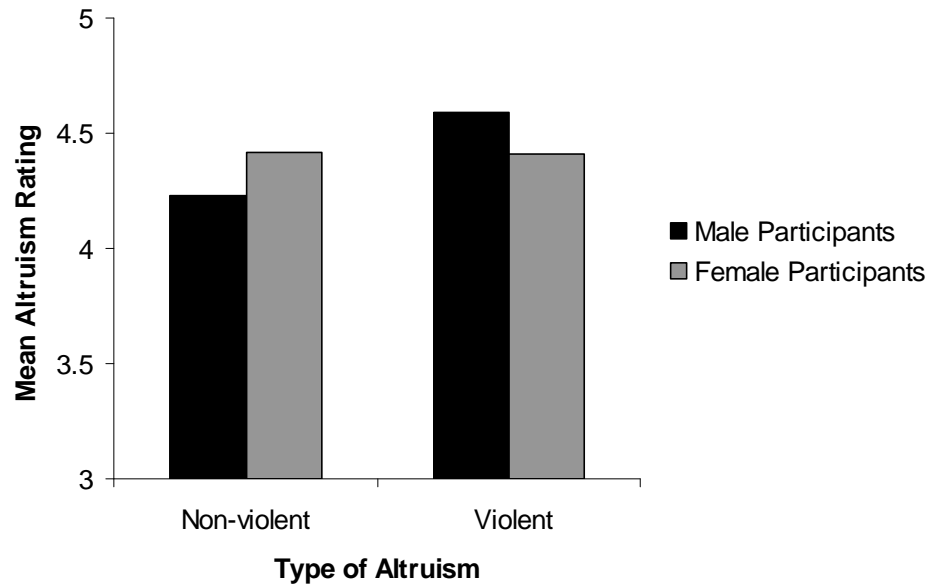
for mean altruism ratings based on sex of target and type of altruism.

**Figure 2.** Mean likelihood of performing a life-threatening altruistic act as a function of altruism type and sex of the target.



Type of altruism also interacted with the sex of the participant,  $F(1, 204) = 18.32, p < .001, \eta p^2 = .08$ . Follow-up analysis of this interaction revealed that women were more willing than men to aid people in non-violent situations,  $F(1, 204) = 4.52, p = .035, \eta p^2 = .02$ , but men were more willing than women to aid people in the violent situations,  $F(1, 204) = 4.39, p = .037, \eta p^2 = .04$ . Sex of participant did not elicit a main effect nor did it interact with any other variables. See Figure 3 for mean altruism ratings based on sex of participant and type of altruism.

**Figure 3.** Mean likelihood of performing a life-threatening altruistic act as a function of altruism type and sex of the participant.



## Discussion

The purpose of this study was to examine any possible differences between the non-violent (i.e., the burning house and kidney donation examples) and violent (i.e., fighting off an attacker) examples of life-threatening altruism among kin and non-kin. The estimated likelihood to help siblings more than cousins and friends in these life-threatening scenarios supports multitudes of previous altruism studies (Burnstein et al., 1994; Fitzgerald and Colarelli, 2009; Neyer and Lang, 2003; Stewart-Williams, 2007). Similarly, because the difference in the degree of genetic relation between distant kin and non-kin (in this case, cousins and friends) appear smaller than the difference in genetic relation between close kin and distant kin and/or non-kin (Burnstein et al., 1994; Neyer and Lang, 2003), it was not surprising to find that participants' estimated likelihood to help cousins and best friends were similar in these life-threatening situations – especially since emotional closeness between altruists and their friends have been shown to increase the likelihood of altruism (Korchmaros and Kenny, 2001, 2006; Kruger, 2003; Stewart-Williams, 2008).

Although the violent altruism examples yielded higher altruism ratings than the non-violent examples, the results show that people react pretty similarly when presented with both types of situations. For instance, the lack of interaction between genetic relatedness and type of altruism showed that people are just as willing to help a specific person in a non-violent life-threatening situation and in a violent life-threatening situation. In other words, a person is equally likely to give his or her sibling a kidney and save that sibling from an attacker. As is consistent with Hamilton's rule ( $c < br$ ), the biological costs of the non-violent and violent altruistic acts are quite similar (at least they were in the descriptions that were given to the participants in this study), so it is not surprising to see

that people are just as likely to help a sibling in non-violent and violent situations.

The increased estimated likelihood to help females in violent situations supported previous evolutionary theory (Chagnon, 1988). This result may reflect an evolved mechanism that developed as a means of protecting the females of a tribe during times of war and pillage between groups, when women would be taken by out-group members (Chagnon, 1988). This would explain why people were just as likely to help men and women in the non-violent situations – male and female kin are equally likely to possess the altruism gene (provided their genetic relation to the altruist is the same), but female kin were more likely to be kidnapped by invading tribes and male kin stood a stronger chance of fighting off these invaders.

The increased altruism ratings from male participants in violent situations also supported previous evolutionary theory and research on sex differences and aggression (Buss and Duntley, 2005; Daly and Wilson, 1988). These results do not support any claim that men are ‘better altruists’ than women; it merely reflects the violent tendencies that seem to be more prevalent in men than women.

However, the significantly higher altruism ratings from female participants in non-violent situations were interesting because they do not support any previous altruism research. Usually, a sex difference is not found when the non-violent altruism examples are used (Burnstein et al., 1994; Fitzgerald and Colarelli, 2009; Kruger, 2001; Stewart-Williams, 2007, 2008). It may be that female participants in the present study were aware of their decreased willingness to help kin and friends in violent situations and therefore compensated by circling greater altruism ratings for the non-violent situations. This seems unlikely, but it could be possible since all participants were presented with all altruism examples. Therefore this may represent a limitation of this study and perhaps future research could use altruism type as a between-subject variable to examine if this is the reason for the significant effect.

### *Conclusion*

Although Hamilton’s (1964) inclusive fitness theory has been supported time and time again, the present study helped to shed light on this theory as well as the studies that have supported it. Although previous studies have generally found no sex differences in altruism, the current study shows that there are certain facets of altruism that have not yet been studied – such as violent altruistic situations – which have left an incomplete picture of inclusive fitness theory. In addition, the present study used altruistic examples that may be more evolutionarily significant (e.g., fighting off an attacker) than the traditional examples that have been used, but still found a similar relationship between the examples and the likelihood of altruism, which indicated that the traditional examples, although they may not reflect one’s evolutionary past, are valid examples to use in altruism research. However, the violent altruism situations used in this study are just a couple examples of how different details in the altruistic situations used in altruism research can influence participants’ responses. Future research may be necessary to examine other possible types of altruistic examples that incorporate other events from our hunter-gatherer past, such as evading predators or hunting for survival in the wilderness.

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