

Human Beings as Evolved Nepotists Exceptions to the Rule and Effects of Cost of Help

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Abstract Inclusive fitness theory provides a compelling explanation for the evolution of altruism among kin. However, a completely satisfactory account of non-kin altruism is still lacking. The present study compared the level of altruism found among siblings with that found among friends and mates and sought to reconcile the findings with an evolutionary explanation for human altruism. Participants (163 males and 156 females) completed a questionnaire about help given to a sibling, friend, or mate. Overall, participants gave friends and mates as much or more help than they gave siblings. However, as the cost of help increased, siblings received a progressively larger share of the help, whereas friends and mates received a progressively smaller share, despite the fact that participants were closer emotionally to friends and mates than they were to siblings. These findings help to explain the relative standing of friends and mates as recipients of altruistic aid.

Keywords Altruism · Evolutionary psychology · Mating · Kin selection · Prosocial behavior

One of the great challenges of evolutionary biology has been to explain how selection could favor altruistic behavior—behavior that increases the reproductive success of the recipient but decreases that of the altruist. This question has inspired some of the field’s most important theories, among them Hamilton’s (1964) kin selection theory. Kin selection theory helps to explain a form of altruism that is common throughout the animal kingdom: altruism among genetic relatives. The basic idea is that a gene “for” altruism (i.e., a gene whose bearers exhibit higher average levels of altruism than do bearers of competing alleles) can have a positive impact on its own population frequency as long as the recipients of the altruism are more likely than chance to possess copies of the same gene. Kin meet this condition, and therefore a gene for kin-directed altruism will have a positive impact on its own

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population frequency. The circumstances in which such a gene will be selected over a non-altruistic variant are expressed in a simple inequality known as Hamilton's rule: $br > c$. According to this rule, an altruistic variant will be selected when the reproductive benefit (b) conferred on the recipient of the altruism, weighted for the coefficient of relatedness (r) between altruistic and recipient, is greater than the reproductive cost (c) of the altruism (i.e., the benefit that would have accrued to the altruist if it possessed the non-altruistic variant).

Hamilton's rule suggests various predictions, the most obvious of which is that individuals will tend to favor kin over non-kin, and close kin over more distant kin. This pattern has been documented in many nonhuman species, and a growing body of research suggests that the same pattern characterizes humans as well. The evidence includes self-report data on actual help given/received (Essock-Vitale and McGuire 1985; Neyer and Lang 2003) and on anticipated willingness to help in hypothetical situations (Burnstein et al. 1994; Korchmaros and Kenny 2001, 2006; Webster 2003); public records such as homicide and probate records (Daly and Wilson 1988); and observational data, including anthropological data (Berté 1988; Betzig and Turke 1986; Chagnon 1979, 1981; Chagnon and Bugos 1979; Flinn 1988; Gurven et al. 2001; Hames 1979). Taken together, these studies provide convergent evidence that people tend to help kin more than non-kin. Furthermore, the anthropological data suggest that this pattern is not unique to Western culture, industrialized nations, societies with a history of monotheistic religion, or the like.

Altruism among Non-Relatives

In much of the research on this topic, however, the category of non-kin has been represented only by acquaintances (Burnstein et al. 1994), or non-kin have been omitted altogether (Korchmaros and Kenny 2001). This is unfortunate because certain categories of non-kin are clear exceptions to the rule that people are more altruistic toward kin than non-kin. Perhaps the most important of these are friends and mates (i.e., romantic partners). More is known about altruism among the former than the latter. Existing research suggests that young adults are closer emotionally to their friends than to their siblings or other genetic relatives, and that they give comparable levels of help to friends as to siblings (Kruger 2003; Stewart-Williams 2007). Altruism among friends is typically explained in terms of Trivers's (1971) reciprocal altruism theory, according to which altruistic behavior can enhance direct fitness (i.e., personal reproductive success) as long as it is sufficiently likely that the altruism will be reciprocated. Consistent with this theory, altruism among friends appears to take place within a context of reciprocal exchange (Stewart-Williams 2007).

Less research has been devoted to exploring altruism between mates, or how it compares with that found among kin and friends. Evolutionary principles suggest, however, that these individuals will typically receive higher levels of help than that received by friends. This assertion is based on a number of considerations. To begin with, mates are potential reciprocal exchange partners, just like friends, so at a minimum one would expect them to receive comparable levels of help to friends. In addition, various factors could have selected for altruism between mates but not friends, therefore leading to a higher level of help for mates. These all revolve

around the fact that mates are sexual partners (or at any rate potential sexual partners), which means that they are potential parents for one's offspring.

First, altruism channeled toward a mate may amount to indirect investment in one's offspring (or future offspring). Because offspring represent a convergence of the parents' fitness interests (Alexander 1987), anything that benefits a mate—anything that increases a mate's ability to enhance his or her own fitness—may also ultimately enhance one's own fitness. Second, altruism may signal good parenting potential. An ideal mate chooser would be reluctant to choose a mate who had no concern for the chooser's welfare. In addition to being personally disadvantageous, it would raise the question: Would this individual have any concern for my offspring's welfare? Third and finally, altruism may function as a fitness display, with a functional role similar to that of the peacock's tail (Miller 2000). In many species, the males display and the females choose from among the displaying males. This is a result of the fact that males in these species invest very little in offspring whereas females invest a lot (Trivers 1972). However, humans are a relatively bi-parental species, with both sexes typically investing in offspring. As such, both sexes may have evolved to display fitness through altruistic behavior, and to prefer altruistic to nonaltruistic mates. Any or all of these factors could have created selection pressure for altruism between mates, a selection pressure that would not exist for friends. Therefore, one would expect that people would be more altruistic toward mates than friends.

Cost of Help

Although reciprocal altruism theory and the other ideas considered above go some way toward explaining altruism among non-relatives, they may not constitute a complete explanation. Another way of making sense of non-kin altruism involves postulating an evolved sensitivity to the cost of help, coupled with a tendency to channel help more readily to kin than to non-kin as the costs get higher (Stewart-Williams 2007). The rationale for expecting such a tendency is as follows. The greater the cost of help, the greater the net direct fitness cost if there is no return benefit to the helper (e.g., if the help is not reciprocated or if a mateship dissolves before any offspring are produced). This direct fitness cost is less of a problem when one is dealing with kin than with non-kin, because with kin the direct fitness cost can be compensated by the indirect fitness benefit that accrues to an individual who aids genetic relatives. In other words, the tendency can persist through kin selection rather than selection for personal reproductive success. These considerations lead to the expectation that, as the cost of helping increases, people will give a progressively smaller share of help to non-kin and a progressively larger share to kin.

A previous study looking at this question examined three levels of help: low-, medium-, and high-cost help (Stewart-Williams 2007). Low-cost help is help that is likely to have little or no impact on the fitness of the altruist or the recipient (e.g., emotional support). There is little reason that such altruism would *not* be directed toward friends or mates, and a number of reasons that it may be advantageous; in particular, it may help establish alliances and pave the way for larger reciprocal interactions. Medium-cost help involves the sharing of resources related to survival and reproductive success, such as access to housing or, in modern societies, money.

Because this form of help may have evolutionary ramifications for both altruist and recipient, relatedness is more of a concern than it is for low-cost help. Finally, high-cost help involves putting one's own life on the line to save the life of another individual. Such help is particularly precarious among non-relatives because, if the effort to help leads to the altruist's death, the possibility of a return benefit is effectively reduced to zero.

Previous work (Stewart-Williams 2007) found that, as the cost of help rose, the share of help channeled to kin tended to increase, whereas the share of help channeled to non-kin decreased. The decrease among non-kin was found not only among acquaintances but also among close friends. The comparison of siblings and friends was particularly illuminating. For low-cost help, people helped friends more than siblings. In contrast, for medium-cost help, they helped siblings and friends equally, and for high-cost help they expressed a greater willingness to help siblings than friends, despite the fact that they were emotionally closer to friends.

As yet, no research has explored the effects of the cost of help on the share of help given to mates. Although people may give more help to mates than to siblings, mates are nevertheless non-relatives. As such, one would expect that the cost of help would have the same effect on mates as it does on acquaintances and friends. That is, as the cost of helping goes up, the share of help given to mates would go down (this is the case, at least, among unmarried couples or couples without children).

Goals of the Present Study

Based on the above discussion, the following goals were formulated.

1. To replicate the finding that people are emotionally closer to friends than to siblings, and that people give comparable levels of help to siblings and friends.
2. To test the hypothesis that people are emotionally closer to mates than to either friends or siblings, and that people give more help to mates than to friends or siblings. This hypothesis was based on the idea that there have been factors selecting uniquely for altruism among mates.
3. To replicate the finding that as the cost of help increases, people give a progressively greater share of help to siblings, and a progressively smaller share to friends.
4. To test the hypothesis that as the cost of help increases, people give a progressively smaller share of help to mates.
5. To assess the relative standing of siblings, friends, and mates within each cost-of-help category.

Method

Participants

Participants were 319 undergraduate psychology students: 163 (51.1%) males and 156 (48.9%) females. The computer program GPOWER was used to determine the minimum number of participants needed for each experimental condition; alpha was

set at 0.05 and power at 0.8, and a medium effect size was assumed. The age range of the sample was 17 to 32 years ($M=18.46$; $SD=1.68$). There was no significant age difference between the sexes, $t_{317}=1.57$, $p=0.12$.

Materials and Procedure

Participants signed up for the study online and reported to a designated classroom. Most participants were tested in groups (median size=19 people), although 13 (4.1%) were tested alone. As participants arrived, they were given a booklet of questionnaires. They were then asked to sit spaced apart from one another, to avoid sitting near friends or people they know, and to refrain from talking while they completed the questionnaire. Participants received course credit for their involvement in the study.

Finding Person A

After providing some general biographical information, participants moved on to the “Finding Person A” questionnaire. The function of this questionnaire was to assign participants to one of five experimental conditions. Each condition involved answering questions about one individual from the participant’s social network. This individual was dubbed “Person A.” The five conditions were: (1) full sister ($r=0.5$); (2) full brother ($r=0.5$); (3) close female friend ($r=0$); (4) close male friend ($r=0$); and (5) mate (defined as a steady boyfriend or girlfriend; $r=0$). Siblings were chosen to represent kin because these individuals are typically similar in age to friends and mates, and of the same generation. For all categories, it was specified that Person A had to be 16 years of age or older. It was also specified that the category of friend did not include blood relatives or sexual partners.

The assignment of participants to experimental conditions was complicated by the fact that not everyone has a sibling, mate, or close friend. To deal with this, the Finding Person A questionnaire consisted of five questions, each of which asked participants whether they had a particular category of individual in their social network (e.g., “Do you have a full brother?” “Do you have a steady girlfriend?”) If the answer to the question was “yes,” participants were directed to a later section of the questionnaire and were informed that this individual would be their Person A (or, if they had more than one member of the given category, that the one whose first name came first in the alphabet would be Person A). On the other hand, if the answer was “no,” they simply moved on to the next question. Participants continued answering the questions until they came to an individual who could be their Person A. The order of the questions was varied across different versions of the questionnaire.

Social Relationships Questionnaire

Once participants had been assigned a Person A, they moved on to the Social Relationships questionnaire. This covered two main areas: their emotional closeness with Person A and the extent to which they helped Person A.

Emotional Closeness Emotional closeness was measured using two well-validated scales: the two-item Subjective Closeness scale (Berscheid et al. 1989) and the one-item

Inclusion of Other in the Self scale (Aron et al. 1992). These three items exhibited a high level of internal consistency ($\alpha=0.87$) and so were aggregated to form the emotional closeness variable.

Altruism The altruism scale asked participants about the level of altruism they had directed toward Person A over the preceding 2 months. Eight items were used, each of which was preselected as representative of one of three categories: low-, medium-, or high-cost altruism. The items were drawn from the existing literature on kin altruism (Burnstein et al. 1994; Cunningham 1986; Essock-Vitale and McGuire 1985; Lieberman et al. 2007; Neyer and Lang 2003). Low-cost altruism was measured using two items: emotional support (e.g., advice, comfort when feeling sad) and the granting of small favors. Responses were registered on a Likert-type scale spanning from 1 (“never”) to 9 (“often”). The two items exhibited a somewhat low level of internal consistency ($\alpha=0.55$). However, piloting had established that the two items were both viewed as examples of low-cost help, and the items correlated better with one another than they did with any other item. They were therefore aggregated to form the low-cost help variable.

Four items were used to assess medium-cost help: help with everyday living (e.g., household chores, shopping, errands); help during an illness; help with housing; and financial help (e.g., a loan or gift of money). Again, responses were registered on a Likert-type scale spanning from 1 (“never”) to 9 (“often”). The four items exhibited an acceptable level of internal consistency ($\alpha=0.69$) and were aggregated to form the medium-cost help variable.

The low- and medium-cost variables were based on measures of actual help given. This was not possible for high-cost help because of the relative rarity of situations that call for such help. Therefore, the high-cost help items asked participants about their willingness to help in a hypothetical scenario. Two items were used: willingness to help Person A in a life-or-death situation (for example, rescuing Person A from a burning building), and willingness to donate a kidney to Person A. Both items have been used in previous research (Burnstein et al. 1994; Lieberman et al. 2007; Stewart-Williams 2007). However, one change was made to the kidney donation item. In past research, it has not generally been specified whether the participant was a suitable donor for Person A. The problem with this is that people might believe that they have to be a genetic match in order to donate a kidney, which might artificially inflate their “willingness-to-donate” scores for kin but lower them for non-kin. To deal with this potential pitfall, participants in all conditions were told to assume that they were indeed suitable donors for Person A. Responses to both of the high-cost help items were registered on a Likert-type scale spanning from 1 (“not at all willing”) to 9 (“extremely willing”). The items exhibited an acceptable level of internal consistency ($\alpha=0.73$) and so were aggregated to form the high-cost help variable.

Results

Table 1 shows the means and standard deviations for each dependent variable as a function of relationship category. Note that scores on the high-cost help variable are

Table 1 Unstandardized ratings of emotional closeness and help given as a function of recipient relationship category

	Recipient relationship category					
	Sibling (<i>n</i> =129)		Friend (<i>n</i> =126)		Mate (<i>n</i> =64) ^a	
	<i>M</i>	SD	<i>M</i>	SD	<i>M</i>	SD
Emotional closeness	4.85	1.61	5.44	1.02	6.46	0.56
Low-cost help	5.76	2.12	6.43	1.88	7.83	1.30
Medium-cost help	3.31	1.79	2.90	1.72	4.41	2.00
High-cost help	8.45	1.06	7.41	1.53	8.37	0.92

^a There are around half as many mates as siblings and friends. This is because there were four experimental conditions for both siblings and friends (i.e., 2 [male vs. female participant] × 2 [male vs. female sibling/friend]), but only two for mates (i.e., male vs. female participant answering about a mate of the other sex). Around 30 participants were sought for each experimental condition

higher than those for low- and medium-cost help. This is presumably because the high-cost help items inquired about anticipated willingness to help as opposed to actual helping, and the frequency of the latter is limited by opportunity. The raw scores were converted to *t*-scores: standardized scores based on *z*-scores but centered on 50 rather than 0, and with a standard deviation of ten units rather than one unit. The rationale for using standardized scores was that they allow a comparison of the share of low-, medium-, and high-cost help given to members of each relationship category. For example, they allow one to ascertain whether the share of low-cost help given to siblings is greater or less than the share of low-cost help given to mates. The *t*-scores were used for all inferential statistical analyses.

Emotional Closeness

The hypotheses pertaining to participants' emotional closeness with Person A were addressed using a 3 × 2 × 2 (Relationship Category [sibling, friend, mate] × Sex of Participant × Sex of Target) ANOVA. This revealed a main effect of Relationship Category on emotional closeness ($F_{2, 316} = 36.40, p < 0.001, \eta_p^2 = 0.19$). Consistent with past research on this topic, participants were emotionally closer to friends than to siblings. Furthermore, consistent with the prediction, participants were emotionally closer to mates than to either siblings or friends. Overall, then, participants were closest to mates and least close to siblings, with friends intermediate between these extremes. Multiple comparisons using Dunnett's *C* confirmed that all differences within the main effect were significant (*p* values < 0.05).

Help Given

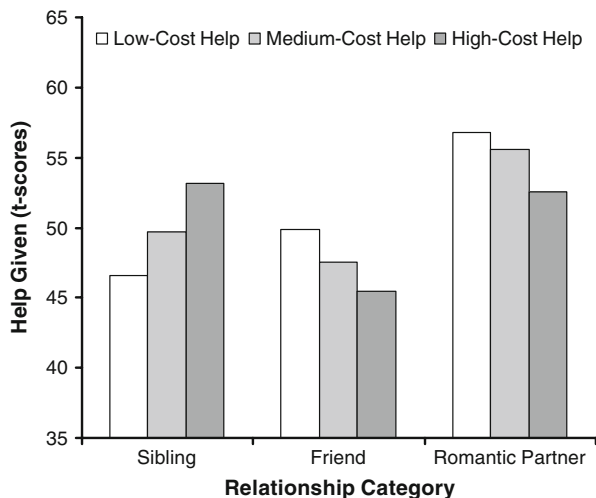
To address the remaining goals (those related to the level of help given to Person A), an ANOVA was performed using three between-group factors (Relationship Category, Sex of Participant, and Sex of Target), and one within-group factor (Cost of Help Given [low, medium, high]). Neither Participant Sex nor Target Sex interacted with any of the variables of interest, and therefore these variables are not considered in the remainder of the article. The analysis revealed a main effect of

Relationship Category ($F_{2, 304}=20.35$, $p<0.001$, $\eta_p^2=0.12$). Consistent with past research, participants gave comparable levels of help to siblings and friends (no significant difference with Dunnett's C; $p>0.05$). Furthermore, consistent with the prediction, participants gave more help to mates than to either siblings or friends (significant with Dunnett's C; p values <0.05).

Effects of Cost of Help

The main effect of Relationship Category was qualified by an interaction between Relationship Category and Cost of Help Given ($F_{4, 606}=17.57$, $p<0.001$, $\eta_p^2=0.10$; Fig. 1). To locate the source of the interaction, further within- and between-group analyses were conducted. The within-group analyses addressed the hypotheses pertaining to the effects of the cost of help within each relationship category. The expectation for siblings was that, as the cost of help increased, participants would give a progressively greater share of the help. Consistent with this expectation, siblings received a larger share of the medium-cost help than the low-cost help ($F_{1, 123}=15.93$, $p<0.001$, $\eta_p^2=0.12$), and a larger share of the high-cost help than the medium-cost help ($F_{1, 123}=10.35$, $p=0.002$, $\eta_p^2=0.08$). The expectation for friends was that, as the cost of help increased, participants would give a progressively *smaller* share of the help. Consistent with this expectation, friends received a smaller share of the medium-cost help than the low-cost help ($F_{1, 121}=8.50$, $p=0.004$, $\eta_p^2=0.07$), and a smaller share of the high-cost help than the medium-cost help (although the latter was only marginally significant; $F_{1, 121}=2.86$, $p=0.093$, $\eta_p^2=0.02$). Finally, the expectation for mates was that, as the cost of help increased, participants would give a progressively smaller share of the total help. Consistent with this expectation, mates received a smaller share of the medium-cost help than the low-cost help (although this was not significant; $F_{1, 61}=0.96$, $p=0.331$, $\eta_p^2=0.015$), and a significantly smaller share of the high-cost help than the medium-cost help ($F_{1, 61}=4.16$, $p=0.046$, $\eta_p^2=0.06$).

Fig. 1 Help given as a function of relationship category and cost of helping, expressed as t -scores (standardized scores centered on 50 and with a standard deviation of ten units)



The between-group analyses allowed an assessment of the relative standing of siblings, friends, and mates at each level of help. Looking first at low-cost help, there was a main effect of Relationship Category ($F_{2, 310}=25.28$, $p<0.001$, $\eta_p^2=0.14$). Mirroring the pattern for emotional closeness, participants gave the highest level of low-cost help to romantic partners, followed by friends and, finally, siblings (Fig. 1, white bars). Multiple comparisons using Dunnett's C indicated that all differences were significant (p values <0.05). There was also a main effect of Relationship Category for medium-cost help ($F_{2, 310}=14.62$, $p<0.001$, $\eta_p^2=0.09$). Again, participants gave the most medium-cost help to mates. However, whereas for low-cost help, friends had been in second place ahead of siblings, friends and siblings were now tied for second place, with Dunnett's C revealing no significant difference between them ($p>0.05$). In other words, siblings had risen in rank to the same level as friends (Fig. 1, light gray bars). Finally, there was a main effect of Relationship Category on participants' willingness to extend high-cost help to Person A ($F_{2, 310}=24.52$, $p<0.001$, $\eta_p^2=0.14$). Whereas mates had been in the number one position for both low- and medium-cost help, mates had now fallen to a tie for first place with siblings, with Dunnett's C revealing no significant difference between them ($p>0.05$). Furthermore, whereas for medium-cost help friends and siblings had been tied for second place, Dunnett's C revealed that friends were now the lowest ranked category, with participants significantly less likely to help friends than to help either siblings or mates ($p<0.05$; Fig. 1, dark gray bars). Overall, then, wherever there were changes in relative rank as the cost of help rose, siblings rose in rank whereas friends and mates fell.

Discussion

The results provided good support for the hypotheses. Friends and mates received a higher average level of help than did siblings. Consistent with an evolutionary analysis of this finding, the higher the cost of help, the smaller the share of help that the participants gave to these non-relatives, and the larger the share given to siblings. Furthermore, as the cost of help rose, the relative rank of siblings increased, whereas the rank of friends and mates tended to fall. In other words, though people gave a great deal of help to friends and mates, the higher the cost of help (and thus the more likely the help was to have evolutionary ramifications), the more prominent a place that siblings had as recipients of that help.

The finding that participants felt closer to their friends than their siblings, and that they gave comparable levels of help to friends and sibs, is consistent with some research in the area (e.g., Stewart-Williams 2007). However, these results differ somewhat from those of Neyer and Lang (2003), who reported that participants were closer to kin than to friends and received more help from kin. The difference may stem from the fact that the participants in Neyer and Lang's study were older adults. It seems plausible that, whereas early or pre-reproductive adulthood is characterized by a strong focus on extra-familial relationships, late adulthood is typically associated with a stronger focus on familial relationships (Salmon and Daly 1996). This includes relationships not only with genetic kin but also with mates. Neyer and Lang's participants reported being closer to mates than to anyone else, and receiving

more support from mates. This is consistent with the results of the present study and hints that the relative importance of mates, unlike that of friends, remains constant throughout the life span.

Although the present study suggests that friends and mates receive as much or more help than siblings, it also provides evidence that the psychology underlying kin altruism differs from that underlying altruism among non-kin. To begin with, as the cost of help increased, the share of help given to siblings increased too, whereas the share of help given to friends and mates fell. This makes sense in light of the fact that neither friends nor mates are relatives, and therefore as the cost of help goes up, the net direct fitness cost if there is no return benefit becomes increasingly problematic. However, an important caveat needs to be made in regard to the findings for mates. Although the cost-of-help variable had the same effect on mates as it does on other non-relatives, it must be remembered that the vast majority of the participants in this study were not in marital relationships and did not have children. The threat of defection and unreciprocated altruism is presumably lower among couples involved in a committed long-term relationship. Furthermore, given that children represent the shared genetic interests of both parents, it is conceivable that we have an evolved tendency to treat individuals with whom we have children as surrogate kin. If so, one might expect that, as the cost of help increases, the share of the help given to such individuals would increase, relative to that given to other non-relatives. This would be an interesting topic for future research.

Further support that the psychology of kin altruism differs from non-kin altruism came from the finding that the relative ranking of siblings, friends, and mates was dependent on the cost of helping. Consider first the comparison of siblings and friends. For low-cost help, people gave significantly more help to friends than to siblings; for medium-cost help, there was no difference between siblings and friends in the level of help given; and finally for high-cost help, people were more willing to help siblings than friends (a particularly interesting finding given that people reported being emotionally closer to friends than to siblings). This replicates the pattern found in previous research (Stewart-Williams 2007). The findings pertaining to the relative standing of mates at each level of help were also interesting. For low-cost help and medium-cost help, people helped mates more than they helped siblings or friends. For high-cost help, however, people were equally willing to help mates and siblings. In other words, people were no more willing to give high-cost help to mates than to siblings, despite being notably closer to mates.

One limitation of the present study pertains to the fact that self-report measures of actual helping were compared with self-reported willingness to help in hypothetical situations. A potential problem with this comparison is that actual helping is presumably a product of both willingness and opportunity to help, whereas responses to hypothetical scenarios provide a clearer window simply on willingness to help. To deal with the possibility that this accounts for the pattern of results found in the present study, a number of variables associated with opportunity to help were statistically controlled. This included residential distance between participant and Person A, as well as duration and frequency of contact over the prior month. Controlling for these variables made no difference in the overall pattern of results. This provides some reason to think that the comparison was a valid one. Note that there is still the problem that the hypothetical items are measuring anticipated

willingness, which may not correspond to actual willingness. As such, the results of the present study must still be considered tentative. Nonetheless, the high-cost help data continue the pattern observed for low- and medium-cost help, which increases the plausibility of the claim that the data are meaningful and the comparison appropriate.

Conclusion

In summary, the present study replicated and extended research on altruistic behavior among kin vs. non-kin. In particular, it provided further evidence for the view that as the cost of helping rises, the share of help given to kin increases whereas the share of help given to non-kin decreases. This pattern was replicated for siblings and friends, and it was shown that mates fall within the same generalization. These findings help to reconcile the high level of help given to both friends and mates with kin selection theory.

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