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ORIGINAL ARTICLE

Caring about framing effects

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Abstract We explored the relationship between qualities of victims in hypothetical scenarios and the appearance of framing effects. In past studies, participants' feelings about the victims have been demonstrated to affect whether framing effects appear, but this relationship has not been directly examined. In the present study, we examined the relationship between caring about the people at risk, the perceived interdependence of the people at risk, and frame. Scenarios were presented that differed in the degree to which participants could be expected to care about the group and the extent to which the group could be construed as interdependent. A framing effect was found only for the scenario describing the victims as the participants' friends who did not know each other (high caring/low interdependence), and this went in the opposite direction from typical framing effects. Finally, perceived interdependence and caring affected choice both within and across scenarios, with more risky choices made by participants with high interdependence ratings and high caring ratings.

Keywords Framing effects · Group size effects · Value function · Interdependence · Caring · Risk

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1 Introduction

It has been known for several decades that people respond differently to losses versus gains when making decisions. Generally, relative to expected value, decision makers tend to be risk-averse for gains and risk-seeking for losses: Participants who receive gambles concerning gains will choose a less risky option, while those who receive mirror-images of the gambles (now involving losses of identical magnitude) will choose a more risky option (Markowitz 1952). Such reversals in preferences when outcomes are shifted from gains to losses are termed *reflection effects* (Kahneman and Tversky 1979).

In a 1981 paper, Tversky and Kahneman discuss another effect involving the different responses to gains and losses: the framing effect. Framing effects arise from wording objectively identical outcomes in a way which focuses on either gains or losses, depending on whether people are presented with the positive or negative frame (though the outcomes are, in reality, the same in both frames). For example, Tversky and Kahneman (1981) presented the Asian Disease problem:

Imagine that the US is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences are as follows:

Positive frame

- If Program A is adopted, 200 people will be saved.
- If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved.

Negative frame

- If Program C is adopted, 400 people will die.
- If Program D is adopted, there is 1/3 probability that nobody will die and 2/3 probability that 600 people will die.

The expected value of Programs A, B, C, and D are the same: 400 lives saved, 200 lives lost. Programs A and C are equivalent in terms of having the same probability of the same outcome, as are B and D. Despite this, in Tversky and Kahneman's study participants receiving the positive frame solidly preferred the certain option (72%) and those in the negative frame strongly preferred the risky option (78%).

Prospect theory (PT), developed by Kahneman and Tversky (1979), accounts for the framing effect through two factors: the shape of the value function for what is at risk and the *reference point* of the decision maker. PT describes an S-shaped value function representing the subjective value of objective value levels in the domains of gains and losses. The value function accounts for several ways in which gains and losses are treated differently (see Fig. 1). First, the function for gains is concave, and the function for losses is

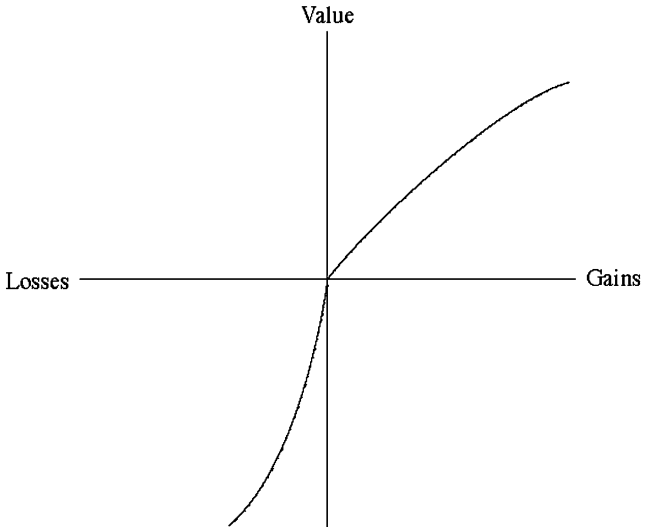

Fig. 1 Prospect theory's value function for gains and losses. Source: Kahneman and Tversky (1979)

convex. This represents the principle that people are risk-averse for gains and risk-seeking for losses: an increase in the objective value of a gain does not increase the subjective value of an outcome by an equal degree and an increase in the objective level of a loss does not decrease the value associated with the loss by an equal degree. Second, the function for losses is steeper than that for gains, which illustrates the idea that a loss of a given magnitude is more painful than a gain of that same size is pleasurable. The reference point determines how the outcomes are *coded*: outcomes above the reference point are coded as gains, and those below are coded as losses. Because the positive frame refers to saving lives, the reference point established is zero lives saved, and both options seem to present a gain; the negative frame, referring to people dying, establishes a reference point of zero lives lost, so both options are viewed as losses (Tversky and Kahneman 1981). Thus, the risky option is preferred in the negative frame, and the certain option is preferred in the positive frame.

Since Tversky and Kahneman (1981) documented the framing effect, multiple studies using the Asian Disease problem, and other problems patterned after it, have been conducted to better understand what contributes to the framing effect. The original framing effect has not been completely robust; few studies have found as large an effect of frame as Tversky and Kahneman (Fagley and Miller 1997). However, Kühberger (1998) reports that framing studies using Asian Disease-like scenarios generally demonstrate a moderate effect size for frame. However, several aspects of the topic of the scenario have been found to weaken or eradicate the framing effect. Some of these effects are predicted by PT (those involving changes in the shape of the value function), while others are not. In this paper, we analyze framing effects from

the perspective of how the resource under risk is conceptualised. To set the context for our research, we first review some related literature.

1.1 Caring and framing effects

Levin and Chapman (1990) found that participants did not show reliable framing effects when the victims of a new strain of AIDS were described as homosexual/bisexual men and IV drug users (50% preference for the risky option in the positive frame, 39% in the negative frame). Framing effects in the same direction and of the same magnitude as those of Tversky and Kahneman (1981) were found when the victims were described as hemophiliacs (22% preferred the risky option in the positive frame, 79% in the negative frame) and these findings were similar to those found for an unspecified group of victims (26% in the positive frame, 70% in the negative frame). Levin and Chapman explained these findings by surmising that participants had near linear value functions for ''devalued'' groups, such as AIDS patients who might be viewed as ''culpable'' for their disease. According to PT, it is the non-linearity of the value function that causes the preference reversal (Kahneman and Tversky 1979). Thus, a group for which participants have a near linear value function would result in a small or possibly non-existent reversal of preference from the gain to the loss frame.

In two additional studies using a forced-choice paradigm (where if the certain option was chosen for one group, the risky option would be assigned to the other group) Levin and Chapman (1990) found that participants showed framing effects for the lives of hemophiliacs when the alternative option would be applied to a group of IV drug users, and for Americans when the alternative option would apply to Iranians (for the hemophiliac group, 20% choice of the risky option in the positive frame and 71% in the negative frame; for the American group, 27% in the positive frame and 60% in the negative frame).

Wang et al. (2001) presented participants with a framing scenario describing a threat to the lives of six billion humans or six billion extraterrestrials. Participants who responded to the human life scenario showed typical framing effects (36% preferred the risky option in the positive frame, 66% in the negative frame). For the extraterrestrial scenario, participants did not show framing effects or a preference for the risky or certain option in either frame (52% preferred the risky option in both frames). Wang et al. interpreted these findings as arising from the lack of emotional involvement on the part of participants posed with the extraterrestrial scenario. As in the Levin and Chapman study, the absence of non-linearity in participants' value functions may have prevented frame from affecting choice, consistent with the predictions of PT.

1.2 Group size and framing effects

The size of the group at risk has also been shown to influence the framing effect. Wang and Johnston (1995) found that, while participants faced with a

group of 6,000 or 600 victims showed framing effects (41% choice of the risky option in the positive frame, 62% in the negative frame for 6,000; 40 and 68% for 600), framing effects did not appear for small groups of 60 or 6 (68% risky choices in the positive condition and 65% in the negative condition for group size 60%, 64% and 70% for group size 6). Wang (1996a–c) (see also Rode and Wang 2000) and Wang et al. (2001) explain the influence of group size on framing effects through an evolutionary hypothesis: he argues that the susceptibility of decision makers to the irrelevant information provided by framing arises from the decision situation being socially and ecologically novel. In this situation, there are no more important cues than the frame of the options to guide choice. Scenarios that describe small victim groups present the decision in a more relevant context (because humans evolved as members of small groups), so participants are not as susceptible to the irrational cue of frame (Wang et al. 2001). Wang (1996a) suggests that participants responding to small group scenarios prefer the risky option because they find the loss of 2/3 of a small group emotionally unacceptable: the gain of 1/3 of the members for sure is not seen as a viable option.

The effect of group size on preference for the risky option is not limited to human life. Bloomfield (in press) found that preference for the risky option in scenarios involving grizzly bears, turtles and wolves increased when the size of the group was six compared to when group size was 600 (58% choice of the risky option across frames for the small group scenarios; 26% for the large group scenarios). Findings using a human life scenario identical to that used by Wang and Johnston (1995) and Wang (1996a) found an effect of group size on choice of the risky option consistent with their findings (70% choice of the risky option in the small group condition, 50% in the large group condition). Although the preference for the risky option was not nearly as strong in the small group condition for the animal life scenarios as for the human life scenario, the amount of increase from the large to the small group scenario is similar in both cases.

Bloomfield (in press) also replicated the group size by frame interaction found by Wang and Johnston (1995): participants responding to the human scenario showed reliable framing effects for the large group scenario (73% preference for the risky option in the negative frame, 27% in the positive frame), but not the small group scenario (80% in the negative frame, 60% in the positive frame). For animals, however, this effect did not occur: framing effects were shown for neither the large nor the small group scenarios (29% choice of the risky option in the negative frame, 22% in the positive frame and 56% choice of the risky option in the negative frame, 60% in the positive frame, respectively). It is possible that participants in Bloomfield's study had a near linear value function for animal lives, similar to the value function Levin and Chapman (1990) participants had for IV drug users and Wang et al. (2001) participants had for extraterrestrial lives. If this is the case, Bloomfield's findings indicate that small group size affects choice (encouraging more choices of the risky option) even in situations where the value function for what is at stake is near linear and a framing effect would not be expected.

Thus, the effect of group size does not seem to be dependent on the value function being convex in the negative frame and concave in the positive frame, as represented by the S-shaped curve of prospect theory.

Some findings examining choice in a small group context demonstrate that framing effects can occur with a small group size. In Experiment 2, Wang and Johnston (1995) presented a scenario where a victim group of size six was described as being made up of the participants' own relatives. In this situation, framing effects reappeared, although preference for the risky option was demonstrated in both frames (72% choice of the risky option in the positive frame, a whopping 94% in the negative frame). This effect has been replicated by Wang (1996b)—67% choosing the risky option in the positive condition, 90% in the negative condition, and also replicated with Chinese participants by Wang (1996a)—63% choosing the risky option in the positive condition, 83% in the negative condition. Wang (1996a) argues that the reappearance of the framing effect for relatives is due to the negative frame augmenting the already strong negative interpretation of the decision situation. Thus, when the subject of the scenario creates an extremely negative emotional reaction on the part of participants (such as the feelings that arise from contemplating the death of six family members), frame can intensify majority preference, if not actually reverse it, even when the group size is small.

There may, however, be alternative explanation for the group size effect. Wang (1996a) argues that participants feel a small group cannot withstand a 2/3 loss like a large group, which leads them to be risk-seeking in both frames when considering a small group scenario. This explanation seems to imply that participants infer a considerable degree of interdependence between the group members, even when such a relationship is not explicit in the scenario. A group of six people, one located in Topeka, two in New York city, one in Atlanta, one in Detroit and one in San Francisco should not inspire participants to feel that the *group* cannot withstand a 2/3 loss unless these people are specifically described as connected in some way beyond their illness. For this reason, it seems that the magnitude of the victim group may not be the root of the group size effect, but rather the relationship that participants infer to exist between group members. Such an explanation could also account for Bloomfield (in press) findings if participants understood the small animal scenarios to be describing a family or social group, in which the survival of any of the animals was dependent on some minimal number of group members surviving.

There is also a problem that arises from Wang (1996a) explanation for why framing effects occur with a group made up of participants' relatives. It is not completely clear whether the framing effect in this case arose from the greater emotionality of the situation alone, as Wang argues, or if the very explicit interdependence between the group members also contributed. If greater interdependence between group members prompts a concern for the survival of the group as a whole, then any small group described as interdependent could induce a framing effect. The question remains as to what preference patterns in the positive and negative frame would look like for a small group

of people that does not constitute a coherent, interdependent group, and for a small group of people that is explicitly described as an interdependent group, but not in such a way that the emotionality of the scenario is more intense for the participants.

1.3 Ambiguity and the framing effect

In all of the studies discussed above, participants were presented with a certain option reading ''X will be saved/X will die'' and a risky option stating ''there is a 1/3 probability that all X will be saved/none of them will die, and a 2/3 probability that none of them will be saved/all X will die''. Kühberger (1995) and Mandel (2001) stated some well-founded objections to the balance of ambiguity between the certain and risky options. In the risky option, both sides of the outcome are described (1/3 all will survive, 2/3 none will survive), but in the certain option, only the positive or negative outcome associated with the option (depending on frame) is stated. The certain option does not inform participants that, while 200 people will be saved (or 400 people will die), 400 people will not be saved (200 people will not die).

According to Kühberger (1995), the wording of the certain option in the classic Asian disease problem allows, or even encourages, participants to interpret the certain option as meaning ''200 or more will be saved'' in the positive frame, and ''400 or more will die'' in the negative frame. In line with this idea, Mandel (2001, Experiment 2) found that 36% of his participants did not interpret the certain option to mean its complement outcome (i.e., they did not believe that ''200 people will be saved'' also meant that ''400 people would not be saved''). If participants do not interpret the certain option as implying that 200 people will certainly be saved/not die and 400 people will certainly die/not be saved, the motivations behind choosing the certain option in the positive frame, and not choosing it in the negative frame may arise more from the number of lives inferred to be preserved by the options than risk-aversion and risk-seeking.

Further, as Mandel argues, the ambiguity of the certain option is congruent with the wording used to describe the outcome for both the negative and positive frames. That is, while the risky option mentions both the possible negative and positive outcomes possible (though both are worded positively or negatively), the certain option only mentions the positive or negative result, for the positive and negative frame, respectively. He argues that this congruency may encourage choice of the certain option in the positive frame and discourage it in the negative frame.

The ambiguity issue is particularly worrisome given Wang (1996a) explanation for the results in the small group/family members' condition. Wang argues that participants show framing effects in this condition because they interpret the situation negatively, independent of frame; the negative frame then intensifies this interpretation, while the positive frame fails to eliminate it. Kühberger (1995, Experiment 2) found that participants rated ambiguity of the certain option as highest in the negative frame of the Asian disease

problem. If the negative frame in Wang and Johnston (1995) family members condition was truly *doubly* negative, this means that ambiguity may have played even a greater role in this condition than in the other small group conditions and could be an alternative explanation for the framing effects found with this scenario. In other words, participants responding to the negative frame for the family scenario may have been even more inclined to interpret the certain option as meaning ''four *or more* will die'', making this option even less appealing and leading to more choices of the risky option by these participants.

In the following study,[1], we investigate framing effects and overall risk preference by posing participants with small group scenarios (6 individuals) that differed in how explicitly related the group members were and in the groups' likelihood of arousing intense emotions from the participants. We also attempted to separate the effects of caring versus perceived interdependence between group members in framing and in overall risk preference. In an effort to rule out ambiguity-based explanations for our anticipated results, we decided to present participants with fully described (cf. Kühberger 1995) choice options. Although our decision to completely inform our participants about the choices they face has the negative aspect of making our results less comparable to many of those reported in the literature,[2] it has the potentially appealing feature of constituting a more conservative test of framing effects.

2 Method

2.1 Participants

Three hundred and sixty undergraduate students (181 women, 154 men and 25 participants who did not report their gender) participated either for partial course credit or were paid $2 for their participation.

2.2 Materials

Four different versions of the small group scenario designed by Wang and Johnston (1995) were used. Two of these versions were taken directly from Wang and Johnston: the small group (6) scenario (*strangers*) and the scenario describing the six victims as members of the participants' family (*own family*). Two other versions were also used: one derived from a scenario used by Wang (1996c) which described the six victims as members of someone else's family (*other family*) and an original scenario describing the six victims as six of the participants' best friends, who did not know each other (*friends*). The *strangers* scenario was intended to provide a situation where participants could infer interdependence between the group members, if so inclined, but would not be extremely emotionally engaged; the *own family* scenario was

[1] The data discussed here were collected for an honors' thesis by Josh Sager.
[2] We thank a reviewer for raising this point.

used to present a group both obviously interdependent and emotionally relevant for participants. The *other family* scenario was used to present a scenario where the members of the group were explicitly interdependent, but should not inspire greater emotional involvement for participants; the *friends* scenario was used to create a situation where participants would be emotionally involved in the task, but the members of the group were explicitly not interdependent. The victim group in the strangers scenario was expected to be construed as somewhere between the *own family* and *other family* groups and the *friends* group on the dimension of interdependence. The Appendix presents all four scenarios.

All scenarios were presented with two options patterned after those used by Kühberger (1995) in his completely described condition:

Positive frame

- If Plan A is adopted, two people will be saved, and four people will not be saved (which particular people will be saved or not be saved cannot be predicted in advance).
- If Plan B is adopted, there is a one-third probability that all six people will be saved and two-thirds probability that all six people will not be saved.

Negative frame

- If Plan A is adopted, two people will not die and four people will die (which particular people will die or not die cannot be predicted in advance).
- If Plan B is adopted, there is a one-third probability that all six people will not die and two-thirds probability that all six people will die.

A brief questionnaire was designed to estimate participants' interpretations of the groups in the scenarios, and the influences behind their responses. This questionnaire presented Likert scales for the following items: ''how much do you care about the people in the group?''; ''how interdependent is the group you imagined?'' The scale ranged from 1 (*don't care at all*) to 7 (*care a lot*) for the former item, and 1 (*not at all interdependent*) to 7 (*very independent*) for the latter. In addition, five open-ended items were presented inquiring as to how and why the participant made her decision, whether her decision was influenced by what she thought others might do/what others thought she should do, who the participant imagined as the victim group in the scenario, and how the participant felt about the decision she made. The questionnaire also elicited the participant's age and gender information.

2.3 Design and procedure

All materials were presented as paper and pencil tasks. Participants were presented with only one of the four scenarios. After reading the description of the situation, participants chose one of the two options. On a separate page, participants were presented with the questionnaire items. The scenario was always presented first, and questionnaire items were always in the same order.

Participants were given as much time as they needed to complete all items, and were then read the debriefing.

3 Results

3.1 Manipulation checks

Our results support our intended manipulation of caring, as can be seen from the left-hand column of Table 1.[3] Participants who responded to the *own family* scenario reported caring more, on average, than participants responding to the three other scenarios (6.77 vs. 6.34 for *friends*, 5.44 for *other family* and 5.48 for *strangers*). The direction of all the differences was as predicted. An ANOVA was performed, with caring rating as the dependent variable and scenario as the independent variable. This analysis revealed a significant effect of scenario, F (3, 351) = 30.28, $P < .01$. By t-tests, the caring ratings for the *friends* and *own family* scenarios differed significantly [t (178) = 3.28, $P < .01$], and the ratings for the *friends* and *other family* scenarios differed significantly [t (179) = 5.00, $P < .001$], but the ratings given for *other family* and *strangers* scenarios did not significantly differ [t (178) < 1, n.s.]. Participants cared more about their own family than their friends, and cared more about these two groups than either someone else's family or an unspecified group of strangers.

Our results also demonstrate that the manipulation of interdependence was successful. Interdependence ratings varied by scenario [F (3, 352) = 24.30, $P < .01$]. Participants rated the *other family* and *own family* scenarios as more interdependent than the *strangers* or *friends* scenarios. The ratings given to the *own family* and the *other family* scenarios did not significantly differ [t (177) < 1, n.s.]. Interdependence ratings given to the *own family* scenario differed from ratings given to the *friends* scenario [t (178) = 4.49, $P < .001$], and ratings given to the *other family* scenario also significantly different from those given to the *friends* scenario [t (178) = 4.48, $P < .001$]. Somewhat surprisingly, friends were rated as more interdependent than strangers [t (179) = 2.18, $P < .05$], even though the friends were described as people who did not know each other. Perhaps Ps construed these friends as an interdependent social web inasmuch as each friend knows the decision maker (placing the decision maker in the center of the web). What is important for this analysis is just that the other family and own family scenarios were rated as more interdependent than the *strangers* or *friends* scenarios, as predicted.

3.2 Effects of frame

Choice differed between frames only for the *friends* scenario (see Table 2). Surprisingly, we find a reverse framing effect here: choice in the positive frame

[3] One participant neglected to respond to the scaled caring item so only 359 responses are used in the caring analyses.

Table 1 Average caring and interdependence ratings by scenario

Scenario	Average caring	Average interdependence
Own family	6.77	5.39
Other family	5.44	5.35
Friends	6.34	4.21
Strangers	5.48	3.60

was 73% in favor of the risky option, while choice in the negative frame was only 49% in favor of the risky choice.

Chi-square analyses were used to test for an effect of frame for each scenario individually. A significant effect of frame was found only for the *friends* scenario, $\chi^2 = 5.66$, $P < .05$. In the other three scenarios, choice of the risky option did not differ significantly between frames.[4] Possible reasons for the presence of an atypical framing effect for the *friends* scenario will be described in Sect. 13.

3.3 Interdependence ratings, caring ratings and choice

Although the comparisons of caring and interdependence ratings demonstrate that we successfully manipulated these factors with the four scenario topics, the relationship between caring, interdependence and choice can be more directly examined through looking across the four scenarios. In order to examine the relationship between perceived interdependence, caring, and choice, we used Ps' ratings on these dimensions to predict their choices.[5] The more interdependent participants perceived the victims to be, the more likely they were to choose the risky option, as was confirmed by a logistic regression using Ps' interdependence ratings to predict their choices across all scenarios ($\chi^2 = 16.57$, $P < .0001$). This relationship was also significant within three of the four scenarios when we used standardised ratings to predict choice ($\chi^2 = 5.42$, $P < .05$ for the *strangers* scenario, $\chi^2 = 2.77$, $P = .096$, $\chi^2 = 2.88$, $P = .089$ for the *friends* and *other family*, respectively). Put another way, Ps who chose the risky option tended to view the victims as more interdependent ($M = 4.95$, $SD = 1.81$) than Ps who chose the certain option [$M = 4.12$, $SD = 1.81$, $t\ (358) = 4.16$, $P < .0001$].

Similarly, across all scenarios, the more Ps reported to care about the victims, the more likely they were to choose the risky option ($\chi^2 = 6.86$, $P < .0001$). This relationship also obtained for the *strangers* scenario when we used standardised ratings to predict choice for each of the items ($\chi^2 = 4.20$,

[4] Percentage of risky choices across both frames did not differ significantly between any of the four scenarios; comparing the two scenarios that received higher interdependence ratings (*own family* and *other family*) with the other two scenarios did not yield a significant effect on choice, nor comparing the two scenarios that received higher caring ratings (*own family* and *friends*) with the other two scenarios. However, comparing the two scenarios given higher interdependence ratings with the other two scenarios did yield a significant effect on choice in the negative frame, with these scenarios prompting more risky choices ($\chi^2 = 3.89$, $P < .05$).

[5] It is always a possibility that the scales for interdependence and caring may have been measuring another trait in participants, such as the way they use scales. We thank a reviewer for bringing this issue to our attention.

Table 2 Proportion of participants choosing the risky option by scenario and frame

Scenario	Frame		Total
	Positive	Negative	
Own family	0.58	0.67	0.62
Other family	0.68	0.67	0.67
Friends	0.73	0.49	0.61
Strangers	0.54	0.56	0.55

$P < .05$ for the *strangers* scenario). In other words, those Ps who chose the risky option reported caring more about the victims ($M = 6.14$, $SD = 1.25$) than Ps who chose the certain option [$M = 5.78$, $SD = 1.25$, t (358) = 2.66, $P < .01$].[6]

It appears that the more interdependent one perceives the victims to be, and/or the more one cares about the victims, the more likely one is to choose the risky option. For illustrative purposes, we dichotomised Ps' ratings of both types by coding responses at or below the midpoint of the scale (i.e., 1–4) as ''low'' and the others (i.e., 5–7) as ''high''. Consistent with the role that both caring and interdependence ratings play in increasing choice of the risky option, the proportion of participants choosing the risky option was lowest in the low caring coding/low interdependence coding cell (see Table 3). Further, the proportion was highest in the high caring coding/high interdependence coding cell. It appears that whether a participants' caring coding was high or low did not affect choice when his or her interdependence coding was high. For the low interdependence coding cells, however, caring more appears to lead to more choices of the risky option. Although caution should be used in interpreting these findings (see footnotes 5 and 6), they suggest that beliefs about interdependence may have a stronger effect on choice than caring.

4 Discussion

In this study, we used a fully described certain option instead of the ambiguous certain option typically used in framing studies, a practice which has been found to eliminate framing effects (Kühberger 1995). Consistent with these past findings, no framing effects appeared for three of our four scenarios. However, there was a significant difference in preference between frames for the *friends* scenario which was, as stated above, in the opposite direction to typical framing effects. Reverse framing effects such as this have occasionally been found: Fagley and Miller (1990) found a significant effect for frame in this direction for men responding to a scenario involving cancer victims, and Fagley and Miller (1997) found trends in the same direction for

[6] There is the possibility that the relationship between caring and interdependence ratings and risky choice arose from an order effect. Participants may have provided higher ratings for the interdependence and caring scales in order to justify having made a risky choice. Even if this is true, however, it still demonstrates that participants feel that a risky choice is more appropriate for more interdependent groups and for those groups about which they care more.

Table 3 Risky choice by caring and interdependence coding combination

Caring code	Interdependence code	
	Low	High
Low	0.29	0.67
High	0.52	0.72

men responding to three human life scenarios. However, no attempt has been made to explain them, and such situations are usually counted as times when a framing effect failed to appear.

In this study the one scenario that produced the reverse framing effect differed in an important way from the other three scenarios that were used: the group members were explicitly described as not knowing each other. One possible explanation is that decisions differ when they are made for a group that is a coherent unit compared to when they are made for a group that is not. With no concerns about maintaining the group itself (in the *friends* scenario, there actually was no group to maintain, only six individuals), participants may take a different attitude to losses and gains. Further, the group members in the *friends* scenario are heterogeneous: presumably one's best friends are not interchangeable, unlike the six abstract individuals in the *strangers* scenario.

Another possible explanation is that the focus of concern for the *friends* scenario was not on the members of the group itself, but rather their relationship to the decision maker. These victims were described in a way that made their role in the life of the decision maker their most salient quality. In the negative frame, participants may have been attracted to the certain option because it offered them a chance to keep two of their friends around. This type of selfishness on the part of decision makers is shown by one of the justifications provided by a person responding to the *friends* scenario, who chose the certain option in the negative frame because ''it's better to cut your losses''. The use of the word ''your'' suggests that this participant was taking a self-centered approach to the problem. Choice in the positive frame, on the other hand, was near chance (49% choice of the risky option). Participants here may have been torn between the comfort of saving two friends for sure and the possibility of saving all their friends.

It should be noted that, although not significant, the difference in risky choice between frames for the *own family* scenario was in the same direction as Wang and Johnston (1995) findings. Again, it is likely that this effect did not reach significance in our study because of our use of the fully described certain option. To better evaluate the effects of the interdependence of the group at risk and participants' level of caring about the group it may be useful to go back to the more ambiguous paradigm.

The findings of the present study also indicate that caring and interdependence are related to choice. Perceived interdependence of the group was significantly related to choice both when it was manipulated directly, through the way the victim group was described, and when it was assessed from participants' ratings independently of which scenario they received. Participants

responding to either the *own family* or the *other family* scenario (those which elicited the highest interdependence ratings) chose the risky option more often in the negative frame than participants responding to one of the other two scenarios. Interdependence ratings also significantly predicted choice across frames and scenarios. Further, within three of the four scenarios interdependence ratings predicted choice. Even when interdependence ratings were not directly manipulated through the scenario topic (e.g., the strangers scenario), higher interdependence ratings were associated with more risky choices.

Caring had a weaker relationship to risk-seeking, and the scenarios for which participants provided the highest caring ratings (*own family* and *friends*) failed to differ significantly from the other two scenarios in either frame. However, across the four scenarios and both frames, caring was a significant predictor of risky choice. This relationship between caring and choice is consistent with past findings that more risky choices are made when human life is at stake than when other things, such as money, are at risk (e.g., Fagley and Miller 1997).

The relationship between interdependence and risky choice in our study agrees with Wang's (1996a) idea that participants choose the risky option more for small group scenarios because they feel that a small group cannot withstand a 2/3 loss. However, as stated before, the interdependence explanation for why participants prefer the risky option for small group scenarios neither presupposes an evolutionary basis, nor implies that it is the magnitude of the group alone that determines the group size effect. Our findings, combined with those of Bloomfield (in press), suggest that the group size effect may arise from an inferred interdependence between group members, and not because the small group scenario is a more socially or ecologically valid decision situation.

However, caring also plays a role in choice, and it is possible that it has a role in the group size effect as well. In the *own family* scenario, there was a trend for participants to show a framing effect of the same kind as found by Wang and Johnston (1995); no trend of this kind was present for the *other family* scenario, which was rated as equally interdependent. Risky choice may be increased by the perceived interdependence of the group at risk, but it may be caring that determines the appearance of a framing effect.

The present study offers support for the idea that factors that are influenced by qualities of the group at risk, such as the perceived interdependence of the group or participants' caring for the group, influence choice. In future studies, it would be useful to employ a greater range of scenarios that vary on these dimensions. It is also important that measures of caring and perceived interdependence are taken, especially in framing studies where scenario topics are designed to invoke greater caring on the part of participants. To fully investigate the factors that affect risky choice, and interact with frame, direct measures should be used to ensure that these factors are being successfully manipulated.

5 Conclusion

Our results suggest that the effects of frame may differ for heterogeneous groups of individuals, or when the focus of the decision is shifted to the interests of the participant. Our study also finds support for the idea that decision makers are more risk-seeking in the realm of losses when addressing scenarios describing groups that are highly interdependent (i.e., families). Further, people are more risk-seeking for gains and losses of life when they perceive a group to be highly interdependent, even if the group is not explicitly described as interdependent. Also, greater caring about a victim group encourages more risk-seeking in choice, in accordance with past findings showing greater risk-taking across both frames for human lives as compared to other outcome arenas. However, interdependence seems to play a more important role in encouraging risky choice.

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6 Appendix

6.1 *Own family scenario*

Imagine that six of your immediate family members are infected by a fatal disease. Without treatment, they will all die. Two medical treatments to treat the disease have been proposed. Assume that the exact scientific estimates of the consequences of each plan are as follows:

6.2 *Other family scenario*

Imagine that six of someone else's family members are infected by a fatal disease...

6.3 *Friends scenario*

Imagine that six of your friends who do not know one another are infected by a fatal disease...

6.4 *Strangers scenario*

Imagine that six people are infected by a fatal disease...

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