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The Number of Fatalities Drives Disaster Aid: Increasing Sensitivity to People in Need

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Abstract
In the studies reported here, an analysis of financial donations in response to natural disasters showed that the amount of money allocated for humanitarian aid depends on the number of fatalities but not on the number of survivors who are affected by the disaster (i.e., the actual beneficiaries of the aid). On the basis of the experimental evidence, we discuss the underlying cause and provide guidelines to increase sensitivity to people in need.

Keywords
prosocial behavior, validity, reliability, disaster donation, heuristics, policy making, decision making

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> [In Peru,] the rainy weather and flooding have caused 15 deaths across the country and affected another 30,000 residents. (Reuters, 2012)

In the aftermath of a disaster, authorities estimate the number of fatalities and affected individuals. Financial aid to the disaster-stricken area ideally depends on the number of affected people, because these will be the beneficiaries of humanitarian aid. The Centre for Research on the Epidemiology of Disasters (CRED), a World Health Organization Collaborating Centre, defines affected people as those "requiring immediate assistance during a period of emergency" (CRED, 2009). The United Nations Office for Coordination of Humanitarian Affairs (UNOCHA) does not rely on the number of fatalities but on the number of affected people to estimate the required financial aid.[1] In an ideal world, financial aid depends on the number of survivors who need immediate assistance.

In the real world, however, this may not be the case. In December 2003, the Bam earthquake in Iran killed 26,796 people and affected 267,628 more. Private individuals responded by donating $10.7 million. In January 2000, the Yunnan earthquake in China killed 7 people and affected 1.8 million more. Donors contributed only $94,586. These observations suggest that donors may be sensitive to the number of fatalities and much less so to the number of persons affected. As a consequence, money may be raised inefficiently, and a humanitarian disaster could follow a natural disaster. In the studies reported here, we investigated factors that influence the amount of donations following a natural disaster. Our research question was twofold. First, are donors sensitive to the number of affected survivors? And second, if not, how can their sensitivity to those in need be increased?

Study 1

Method

In Study 1, we analyzed actual data on natural-disaster relief for the period between January 1, 2000, and July 31, 2011. To qualify as a disaster, an event has to fulfill at least one of the following criteria established by CRED: (a) 10 or more people reported killed (i.e., persons confirmed as either dead or missing but presumed dead) or (b) 100 or more people reported affected (i.e., persons requiring immediate assistance during an emergency situation). We

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Table 1. Descriptive Statistics of the 381 Natural Disasters Included in Study 1

Variable	*M*	*SD*	Range
Amount of financial aid received (conditional on receiving aid)	$53,127,212	$371,000,000	$63–$3,890,357,783
Number of fatalities	2,351	18,704	0–226,096
Number of affected people	2,148,611	12,401,049	12–151,346,000

Note: The following types of natural disaster were included in the study: flood or landslide (212; 55.6%), cyclone or tropical storm (80; 21%), earthquake (60; 15.8%), volcano (15; 3.9%), avalanche or winter storm (11; 2.9%), and wildfire (3; 0.8%). The disasters occurred in Asia (159; 41.7%), Africa (70; 18.4%), South America (50; 13.1%), North and Central America (47; 12.3%), Europe (33; 8.7%), and Oceania (22; 5.8%). An appeal for financial aid was filed in 43 (11.3%) cases; financial aid was allocated for 124 (32.5%) disasters.

obtained information about the characteristics of natural disasters from the International Disaster Database managed by CRED.[2] Data on financial donations by private donors was obtained from the Financial Tracking Service managed by UNOCHA.[3] Independent variables in our analysis were the number of fatalities and the number of affected people. Control variables were whether an appeal for financial aid was filed, the location of the disaster, and the type of disaster. Table 1 shows descriptive statistics for all natural disasters included in our sample.

We modeled disaster aid as a two-stage process. In the first stage, we estimated the probability that a disaster would receive financial aid. In the second stage, we estimated the amount of financial aid. To correct for selection bias (i.e., the second stage only takes places when aid is granted), we applied Heckman's two-stage selection model (Heckman, 1976, 1979). Donation likelihood was estimated with a maximum-likelihood logistic regression, whereas donation amount was estimated with a corrected ordinary-least-squares model that took into account information from disasters for which financial aid was not given.

Results

Our analysis yielded a significant effect of the number of fatalities in both stages of the model. We obtained a significant main effect of the number of fatalities on donation probability (b = 0.0009893, 95% confidence interval = [.0004411, .0015374]; Heckman z = 3.54, $p < .001$) as well as on donation amount (b = 9,324, 95% confidence interval = [7,945, 10,704]; Heckman z = 13.25, $p < .001$; Table 2). The latter coefficient indicates that more than $9,000 was donated for each additional person killed in a disaster.

Table 2. Results From the Two-Stage Model Used in Study 1

Predictor	Donation probability (β)	Donation amount (β)
Constant	–0.754* (0.180)	–66,400,000 (95,800,000)
Number of fatalities	0.0009893* (0.0002797)	9,324.49* (703.603)
Number of affected people	–0.000 (0.000)	–3.871 (2.756)
Appeals for financial aid	1.491* (0.275)	52,900,000 (75,100,000)
Disaster type		
Cyclone	–0.058 (0.210)	–54,400,000 (58,800,000)
Earthquake	0.272 (0.228)	–1,757,212 (63,500,000)
Volcano	0.064 (0.372)	–21,700,000 (118,000,000)
Avalanche	–0.341 (0.460)	95,300,000 (192,000,000)
Wildfire	–4.543 (1,250.877)	—[a]
Disaster location		
Asia	–0.283 (0.216)	17,500,000 (60,400,000)
South America	0.273 (0.257)	8,107,038 (68,400,000)
North and Central America	–0.023 (0.284)	–17,500,000 (74,300,000)
Europe	–0.612 (0.357)	–46,200,000 (144,000,000)
Oceania	0.456 (0.343)	37,900,000 (94,200,000)

Note: For the model analyzing donation probability, 381 observations were included. For the model analyzing donation amount, 124 observations were included (correcting for selection bias). Standard errors are given in parentheses. The baseline group for disaster type was flood. The baseline group for disaster location was Africa.
[a]This variable was omitted because of collinearity.
*$p < .001$.

In contrast, our analyses yielded no effect of the number of affected people on donation probability or donation amount.[4] In our sample of natural disasters, there was no significant correlation between the number of fatalities and the number of people who required immediate assistance ($r = .056$, $p > .27$). We conclude that donors are more likely to provide financial aid when more people die, but donors remain largely insensitive to those in need (Fig. 1).

Correlational data are invaluable because they allow us to examine behavior in natural settings, but they may be problematic because there offer limited control over the conditions that lead to the observed effects. In a series of experimental studies (2a through 2c), we next tested the robustness of the correlational results and examined participants' sensitivity to values (high vs. low) associated with attributes (people affected vs. people killed). To avoid experimental artifacts, we varied definitions of "fatalities" and "affected people" across studies, as well as the type and location of the disaster and the values associated with these attributes.

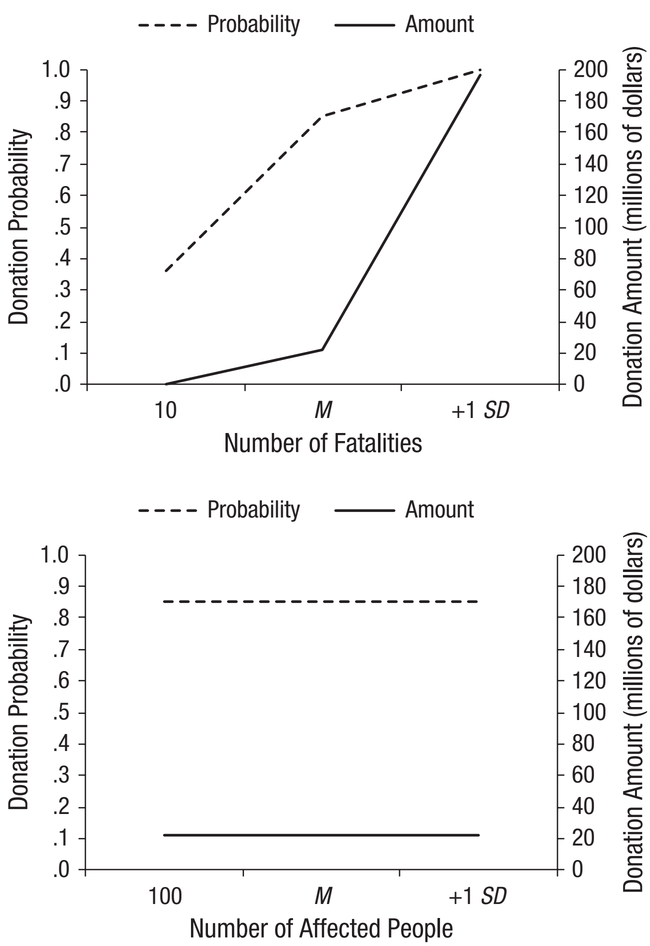

Fig. 1. Probability that money would be donated for disaster relief (left *y*-axes) and estimated amount of money that would be donated (right *y*-axes) as a function of (a) the number of fatalities and (b) the number of affected people. Other predictors were held at their mean value.

Studies 2a through 2c

Method

In three independent studies, we employed a 2 (number of fatalities: low vs. high) × 2 (number of people in need: low vs. high) between-subjects design with donation amount as the dependent variable.

Study 2a. Participants of Study 2a were 127 students (59% male, mean age = 21 years) at a large Western European University who took part in exchange for course credit or money. Participants read a short (three sentences in length) text on floods, along with the definitions of the number of people killed and affected ("when a flood occurs, local authorities estimate the number of people killed, which consists of those confirmed or presumed dead, and the number of [people] affected, which consists of those requiring immediate assistance during an emergency situation"). Participants were then asked to imagine that a flood has taken place in a town of 50,000 people in South America and that the event is broadcast by major national information networks. Local authorities estimated that 4,000 (or 8,000) people were killed and 4,000 (or 8,000) were affected. We asked participants to indicate the total amount of money they thought should be donated to victims of the flood (in euros). Reference material stated that in a similar flood in the same region in 2010, which resulted in 3,000 dead and 3,000 affected, the total amount donated was €1 million. The reference material was the same across all four conditions (Hsee & Rottenstreich, 2004).

Study 2b. In Study 2b, we tested whether participants were sensitive to the number of beneficiaries when the beneficiaries' need was made concrete. To this end, we replaced the term "affected" with "survivors" in our paradigm and defined the latter as "persons in need of assistance such as food, shelter, sanitation, and/or medicine." Participants were 90 individuals (67% male, mean age = 29 years) recruited through Amazon's Mechanical Turk. They first read a short (three sentences in length) text on earthquakes, along with the definitions of people killed (same as in Study 2a) and survivors. Participants then imagined that an earthquake has taken place in a city in Asia and that the event is broadcast by major national information networks. According to local authorities, 4,000 (or 8,000) people were killed and 4,000 (or 8,000) survived. We asked participants to indicate the total amount of money they thought should be donated to victims of the earthquake (in U.S. dollars, or USD). Reference material stated that "in a similar earthquake in the same region in 2010, which resulted in 3,000 dead and 3,000 survivors, the total amount donated was 2 million USD."

Study 2c. In Study 2c, we tested whether participants were more sensitive to the number of beneficiaries when the beneficiaries' need was made more salient. Instead of providing definitions of fatalities and survivors before presenting the values (high vs. low), we included the definitions immediately after the values. Participants were 86 individuals (67% male, mean age = 28 years) recruited through Amazon's Mechanical Turk. We first gave the participants a short text on floods. Participants were then asked to imagine that a flood has taken place in a city in Africa and that the event is broadcast by major national information networks. According to local authorities, 6,000 (or 11,000) people were killed (persons confirmed dead, presumed dead, and/or missing) and 6,000 (or 11,000) survived (persons in need of assistance such as food, shelter, and/or medicine). We asked participants to indicate the total amount of money they thought should be donated to victims of the flood. Reference material stated that "in a similar flood in the same region in 2010, which resulted in 5,000 dead and 5,000 survivors, the total amount donated was 4 million USD."

Results

Across Studies 2a through 2c, participants indicated that significantly more money should be allocated for a disaster with a high number of fatalities than for a disaster with a low number of fatalities (see Table 3). Although there seemed to be a weak trend, the effect of the number of affected people failed to reach significance in all three studies. We conclude that, irrespective of attribute definition, concreteness or saliency of the need, and type and location of disaster, individuals asked to allocate money to disaster victims are more sensitive to the number of fatalities than to the number of people in need.

Pilot studies

To assess our theoretical framework, we conducted two pilot studies. In one pilot study, we asked 58 respondents (72% male, mean age = 28 years) to rank order two disasters—i.e., (a) 8,000 fatalities, 4,000 affected; (b) 4,000 fatalities, 8,000 affected—based on the total amount that should be donated. The majority of respondents (78%) indicated that a "low fatalities, high affected" disaster deserved more financial aid than a "high fatalities, low affected" disaster. Respondents realized that the number of affected people was a valid cue to determining financial aid when they evaluated multiple disasters. However, they did not weigh cue validity when they learned about a single disaster. Cue validity refers to whether a cue allows for correct or appropriate inferences (Gigerenzer & Gaissmaier, 2011; Gigerenzer & Goldstein, 1996). Instead of a valid cue, respondents in Studies 2a through 2c relied on the number of fatalities, an invalid but reliable cue. Cue reliability, according to the psychometric definition of the term (Hair, Black, Babin, Anderson, & Tatham, 2006), refers to the degree to which the measurement of a cue is error free and, thus, whether different values represent true differences in scores (York, Doherty, & Kamouri, 1987). In the second pilot study, we measured the reliability and validity of the two cues (Table 4).

We contend that the number of fatalities is an invalid, but reliable, cue because its estimation is perceived to be error free. Respondents assumed that it is relatively easy to assess whether someone is dead or alive (i.e., there is low measurement error). Conversely, we contend that the number of affected people is a valid, but unreliable, cue because its estimation is perceived to have high measurement error. Respondents assumed that different values (low vs. high) may not necessarily represent true

Table 3. Results From Studies 2a Through 2c: Mean Amount of Money Donated (in Millions) and Comparisons Between Means

Study	Low number of fatalities		High number of fatalities		Comparison between means for fatalities	Comparison between means for affected people
	Low number of affected people	High number of affected people	Low number of affected people	High number of affected people		
Study 2a	€1.57 (€0.74)	€2.18 (€1.36)	€2.69 (€1.94)	€2.99 (€2.00)	$F(1, 123) = 11.48$, $p = .001$, $\eta_p^2 = .09$	$F(1, 123) = 2.56$, $p > .11$, $\eta_p^2 = .02$
Study 2b	$3.26 ($2.74)	$4.24 ($2.05)	$4.91 ($3.53)	$6.08 ($4.56)	$F(1, 86) = 6.20$, $p = .015$, $\eta_p^2 = .07$	$F(1, 86) = 2.34$, $p = .13$, $\eta_p^2 = .03$
Study 2c	$4.53 ($1.23)	$5.19 ($2.05)	$6.51 ($2.94)	$7.39 ($2.91)	$F(1, 82) = 16.52$, $p = .000$, $\eta_p^2 = .17$	$F(1, 82) = 2.25$, $p > .13$, $\eta_p^2 = .03$

Note: Standard deviations are given in parentheses. There was no statistically significant interaction between the number of fatalities and the number of affected people in any of these three experimental studies ($p > .14$).

Table 4. Results of a Pilot Study: Mean Reliability and Validity of Cues Used to Determine Financial-Aid Allocation and Comparison Between Cues

Measure	Number of people killed	Number of affected people	Comparison between cues
Reliability	5.10 (1.39)	4.68 (1.37)	$F(1, 62) = 3.98$, $p = .05$, $\eta_p^2 = .06$
Validity	4.52 (1.35)	6.16 (0.95)	$F(1, 62) = 71.22$, $p = .000$, $\eta_p^2 = .54$

Note: $N = 63$ (59% male, mean age = 29 years; participants were recruited through Amazon's Mechanical Turk). Standard deviations are given in parentheses. Reliability was assessed by asking participants how reliable authorities' estimates of the number of people killed and affected were (1 = *not at all reliable*; 7 = *extremely reliable*). Validity was assessed by asking participants to what extent donations to disaster victims should depend on the number of people killed and the number of affected people (1 = *not at all*; 7 = *very much*).

differences in actual need (food, shelter, sanitation, medicine). Therefore, we propose that cue validity needs to be primed (Study 3) or that cue reliability needs to be enhanced (Study 4) to increase sensitivity to people in need.

Study 3

Method

We recruited 345 individuals (58% male, mean age = 30 years) through Amazon's Mechanical Turk. We used a 2 (number of fatalities: low vs. high) × 2 (number of affected: low vs. high) × 2 (cue validity: control vs. primed) experimental design with all factors manipulated between subjects and donation amount as the dependent variable.

The setup of the study was identical to that in previous experiments. Participants were provided with the same attribute definitions as in Study 2a and were asked to imagine that an earthquake has taken place in a city in Asia and that the event is broadcast by major national information networks. According to local authorities, 5,000 (or 8,000) people were killed and 5,000 (or 8,000) were affected. Participants had to indicate the amount "they thought should be donated to victims of the disaster." Reference material stated that "in a similar earthquake in the same region in 2010, which resulted in 4,000 dead and 4,000 affected, the total amount donated was 3 million USD."

Half of the participants were exposed to a choice problem prior to responding to the main dependent measure. In the primed-validity condition, we first asked participants to "imagine that two earthquakes have taken place in the world: For earthquake A, local authorities estimate that 4,500 people were killed and 7,500 were affected, whereas for earthquake B, local authorities estimate that 7,500 people were killed and 4,500 were affected." Participants had to "rank the two earthquakes based on the total amount that should be donated to their victims." Note that this problem is similar to the one in our pilot study. When individuals face such a dilemma, they should consider attribute validity to resolve the trade-off (Tversky, Sattath, & Slovic, 1988). We assumed that this choice problem would prompt participants to weigh cue validity in a subsequent decision. Participants in the control condition were exposed to the exact same choice problem, but after the dependent measure.

Results

Our manipulation of validity was successful. Two out of 3 participants (66.7%) indicated that more money should be allocated for a disaster with a high number of affected people and a low number of fatalities than for a disaster with a high number of fatalities and a low number of affected.[5]

When validity was not primed, we replicated prior findings. We observed a significant effect of the number of fatalities, $F(1, 337) = 7.46$, $p = .007$, $\eta_p^2 = .02$. Participants indicated that more money should be allocated after an earthquake with a high number of fatalities (M = \$6.08 million, SD = \$2.75 million) than after an earthquake with a low number of fatalities (M = \$4.92 million, SD = \$2.58 million; see Fig. 2). The effect of the number of affected people was not significant, $F(1, 337) = 1.45$, $p = .23$. Participants did not indicate that significantly more money should be allocated for a disaster with a high number of affected people (M = \$5.68 million, SD = \$2.66 million) than for a disaster with a low number of affected people (M = \$5.19 million, SD = \$2.77 million).

In sharp contrast, when validity was primed, we found a significant effect of the number of affected people, $F(1, 337) = 9.02$, $p = .003$, $\eta_p^2 = .03$. Participants believed that more money should be allocated for a disaster with a high number of affected victims (M = \$6.20 million, SD = \$2.64 million) than for a disaster with a low number of affected victims (M = \$5.01 million, SD = \$2.43 million; see Fig. 2). In contrast, the effect of the number of fatalities was not significant, $F(1, 337) = 0.03$, $p > .85$.

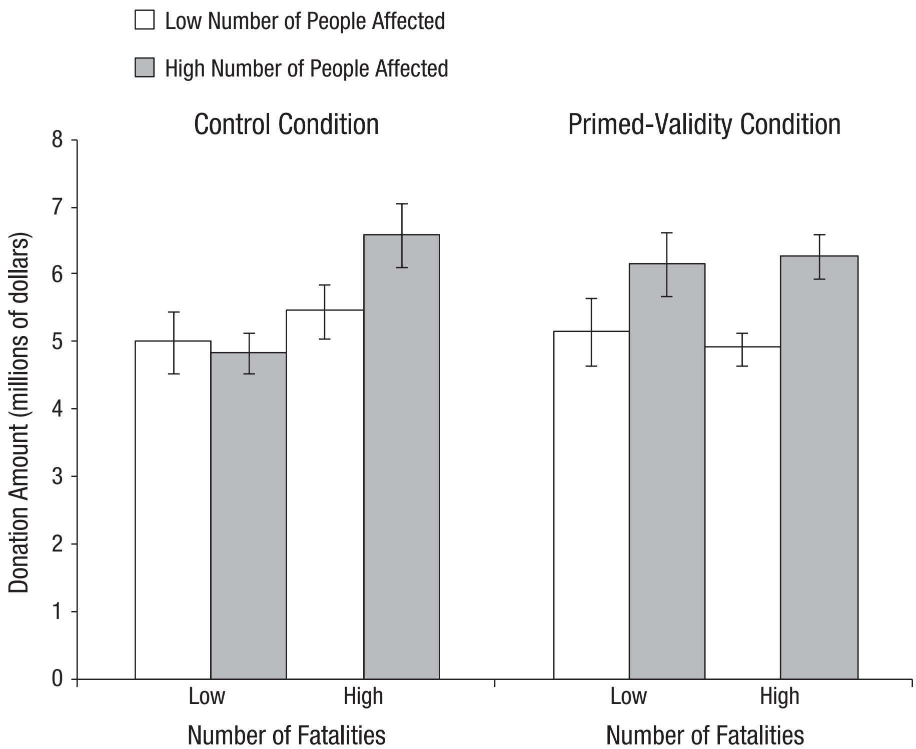

Fig. 2. Results from Study 3: mean amount of money that participants said should be donated for disaster relief as a function of the number of fatalities and the number of affected people. Results are shown separately for the control condition and the primed-validity condition. Error bars show standard errors.

Participants did not indicate that more money should be allocated for a disaster with a high number of dead people (*M* = \$5.46 million, *SD* = \$2.02 million) than for a disaster with a low number of dead people (*M* = \$5.68 million, *SD* = \$3.13 million).

Not all interactions implied by our patterns of simple effects were statistically significant. Although the interaction of validity prime and number of fatalities was significant, $F(1, 337) = 4.36$, $p = .038$, $\eta_p^2 = .01$, the interaction of validity prime and number of affected people, $F(1, 337) = 1.50$, $p > .22$, as well as the three-way interaction among the validity prime, the number of fatalities, and the number of affected people was not statistically significant, $F(1, 337) = 0.66$, $p > .41$.

Study 3 suggests that donors become insensitive to the number of fatalities when cue validity is primed (see the Supplemental Material available online for additional evidence). In the fourth and final study, we tested whether sensitivity to people in need can be increased by enhancing the perceived reliability of a cue. More specifically, we manipulated reliability by replacing a valid but unreliable cue (i.e., the number of affected people) with an equally valid but more reliable cue (i.e., the number of homeless people). To test our assumption that the estimation of the number of homeless people is less prone to measurement error (i.e., differences in values reflect true differences in need), we conducted a pretest. We provided definitions of people killed ("confirmed and presumed dead"), people affected ("those requiring immediate assistance during an emergency situation"), and homeless people ("those whose house was completely destroyed and [who] are in need of immediate assistance in the form of shelter"), and we asked participants to rate all cues on perceived reliability and validity. Results confirmed our predictions (see Table 5). The number of affected people was seen as a more valid but less reliable cue than the number of dead people, whereas the number of homeless people was perceived to be an equally reliable cue as the number of dead people and an equally valid cue as the number of affected people. We hypothesized that participants would be sensitive to people in need when cue reliability was high (survivors were referred to as "homeless") rather than low (survivors were referred to as "affected").

Study 4

Method

A total of 244 students at a large Western European University (53% female, mean age = 21 years) took part in the study in exchange for course credit. We used a 2

Table 5. Results of the Pretest for Study 4: Mean Reliability and Validity of Cues Used to Determine Financial-Aid Allocation

Measure	Number of people killed	Number of affected people	Number of people homeless
Reliability	4.95_a (1.48)	4.25_b (1.62)	4.82_a (1.33)
Validity	4.05_b (1.89)	5.43_a (1.56)	5.73_a (1.47)

Note: N = 44 (54% male, mean age = 33 years; participants were recruited through Amazon's Mechanical Turk). Standard deviations are given in parentheses. Within a row, means with different subscripts differ significantly ($p < .04$). Reliability was assessed by asking participants how reliable they thought estimates of the number of killed, affected, and homeless are (1 = *not at all reliable*; 7 = *extremely reliable*). Validity was assessed by asking participants how much the number of people in each of these categories should influence the decision of how much money to donate to victims of the disaster overall (1 = *not at all*; 7 = *extremely*).

(number of fatalities: low vs. high) × 2 (number of people in need: low vs. high) × 2 (cue reliability: low vs. high) experimental design with all factors manipulated between subjects and donation amount as the dependent variable. The experimental setup was identical to that used in our prior studies. We provided definitions of fatalities and people in need, and we manipulated the reliability of the latter cue by defining survivors as either "affected" (low reliability) or "homeless" (high reliability). Participants were then asked to imagine that a tornado has taken place in a city in Eastern Asia and that the event is broadcast by major national information networks. Local authorities estimate that 2,000 [or 4,000] people were killed and 2,000 [or 4,000] were affected [or left homeless]. We asked participants to indicate the amount "they thought should be donated to victims of the disaster." For half the participants, the reference material stated that for a similar disaster in the same region in 2010, which resulted in 1,500 killed and 1,500 affected, the total amount donated was €500,000. For the other half, the reference material made the same statement but "affected" was replaced with "homeless."

Results

Because cue validity was not primed, we expected and found a significant main effect of the number of fatalities, $F(1, 236) = 9.29$, $p = .003$, $\eta_p^2 = .04$. Participants believed that more money should be allocated for a disaster with a high number of fatalities (M = €1.47 million, SD = €0.94 million) compared with a disaster with a low number of fatalities (M = €1.01 million, SD = €1.13 million; see Fig. 3). There was no significant effect of cue reliability,[6] $F(1, 236) = 2.14$, $p > .14$. Participants indicated that a similar amount of money should be donated when the survivors were described as homeless (M = €1.34 million, SD = €1.27 million) compared with when they were described as affected (M = €1.10 million, SD = €0.77 million). Further, the analysis yielded a significant main effect of the number of people in need, $F(1, 236) = 8.42$, $p = .004$, $\eta_p^2 = .03$, but this effect was qualified by a two-way interaction between the number of people in need and cue reliability, $F(1, 236) = 3.74$, $p = .054$, $\eta_p^2 = .02$. We carried out planned comparisons to explore the main effect of the number of people in need at low and high levels of cue reliability.

Replicating our prior studies, results of Study 4 showed that there was no significant effect of the number of people in need when cue reliability was low (i.e., survivors were described as "affected"), $F(1, 236) = 0.46$, $p > .49$. Participants indicated that a similar amount of money should be donated when the number of affected people was high (M = €1.20 million, SD = €0.66 million) compared with when it was low (M = €1.02 million, SD = €0.86 million; see Fig. 3). However, when the more reliable cue "homeless" was used, we obtained a significant main effect of the number of people in need, $F(1, 236) = 11.86$, $p = .001$, $\eta_p^2 = .05$. Respondents believed that more money should be allocated for a disaster with a high number of homeless people (M = €1.65 million, SD = €1.47 million) than for one with a low number of homeless people (M = €0.92 million, SD = €0.80 million).

General Discussion

The studies reported here suggest that donation decisions are based primarily on the number of fatalities instead of the number of survivors (i.e., the actual beneficiaries). This constitutes a potential societal problem because (a) disasters with many victims might be receiving less funding than needed when fewer people die, and (b) disasters with a few victims may be receiving more funding than needed when more people die. Our experimental data provide a potential remedy for this problem: Participants became insensitive to the number of fatalities when cue validity was primed (Study 3) and sensitive to the number of people in need when cue reliability increased (Study 4).

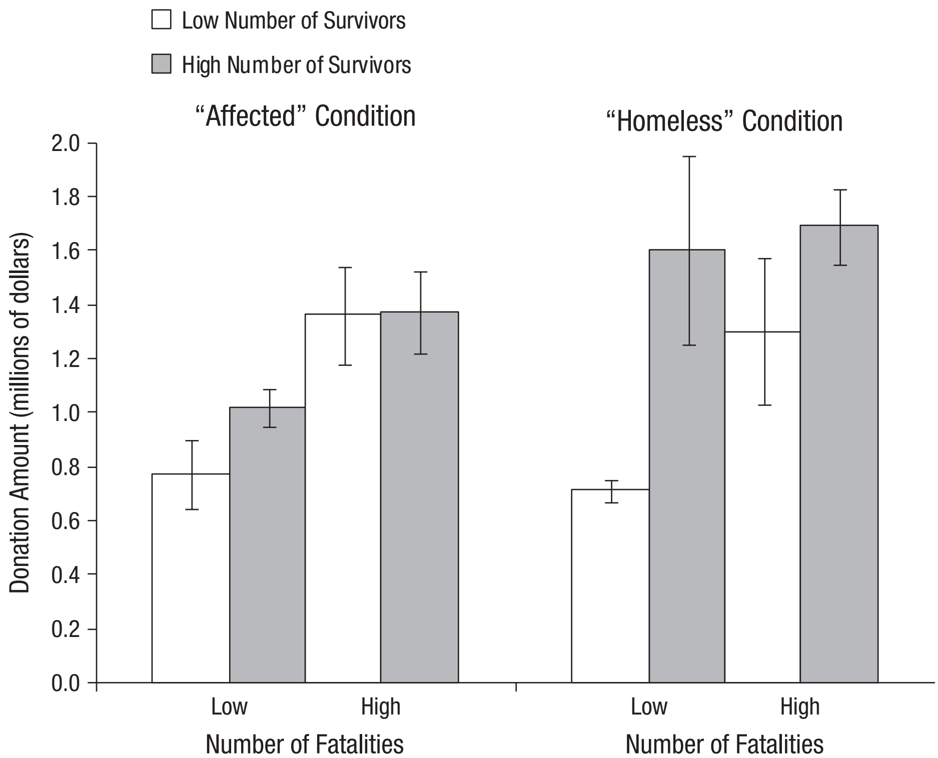

Fig. 3. Results from Study 4: mean amount of money that participants said should be donated for disaster relief as a function of the number of fatalities and the number of survivors. Results are shown separately for the conditions in which survivors were described as "affected" and the conditions in which they were described as "homeless." Error bars show standard errors.

These findings complement previous research on biases in prosocial decision making. Prior work has shown that one identifiable victim elicits stronger responses than thousands of statistical victims do (Kogut & Ritov, 2005; Schelling, 1968; Small & Loewenstein, 2003) and that people become more reluctant to save the same number of lives when those lives originate from a larger population (Fetherstonhaugh, Slovic, Johnson, & Friedrich, 1997; Slovic, 2007). Such effects, which are contingent on the way people process informational input (Kahneman, 2003; Kruglanski & Gigerenzer, 2011; Simon, 1955) are detrimental because humanitarian aid is misallocated.

Although we acknowledge that our manipulations may have changed more than reliability and validity alone, we are convinced that our work has meaningful contributions for theory on decision making. Most prior research emphasized that cue validity is the main driver of decisions (Gigerenzer & Gaissmaier, 2011; Newell, Rakow, Weston, & Shanks, 2004; Slovic, 1966; York et al., 1987). Our research, however, suggests that in some cases, reliable cues (e.g., fatalities) may be favored over valid cues (e.g., beneficiaries). When solving a trade-off between apportioning aid to two disasters, donors are more likely to consider validity than reliability. However, in the absence of a trade-off, as when responding to a single disaster, a reliability rule is more likely to be employed. Future research should identify other factors that favor the use of reliable versus valid cues.

In conclusion, our findings have important implications for the development of appeals in response to disasters and humanitarian crises. Policymakers and campaign managers should strive to ensure that cues representing the beneficiaries are viewed as reliable or that cue validity is considered. Above all, attention should be diverted from the number of fatalities to the number of survivors in need. We are optimistic that these insights will enhance aid to victims of future disasters.

Author Contributions

I. Evangelidis developed the study concept. I. Evangelidis and B. Van den Bergh jointly designed the study. Testing, data collection, and data analysis were performed by I. Evangelidis under the supervision of B. Van den Bergh. Both authors drafted the manuscript and approved the final version for submission.

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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Supplemental Material

Additional supporting information may be found at http://pss.sagepub.com/content/by/supplemental-data

Notes

1. Appeal reports filed by the UNOCHA are publicly available (www.unocha.org/cap/).
2. Data are available at www.emdat.be. Droughts were excluded from our data because the number of associated fatalities was unavailable.
3. Data are available at fts.unocha.org.
4. We examined whether the ratio of fatalities to survivors may be a significant predictor of donation in our data. We found no support for either donation probability ($p > .39$) or donation amount ($p > .33$).
5. This belief was stronger (72%) when validity was primed (i.e., asked first) than when it was not (61%), $\chi^2(1) = 3.90$, $p = .048$. This finding may be explained by cognitive-dissonance theory (Festinger, 1954): Participants who originally demonstrated sensitivity to the number of fatalities may have been reluctant to admit that the number of people affected is a valid cue. We analyzed the main effects of the two cues within each validity condition.
6. Recent research suggests that target specificity increases generosity (Cryder, Loewenstein, & Scheines, 2013). This account predicts that people donate more when the target is more specific, whereas our pattern of findings suggests that people rely on numerical values only when they believe they are reliable. More specifically, a concreteness account would predict a main effect of beneficiary description: When beneficiaries are described as homeless, rather than affected, individuals should donate more. We found no such effect. The absence of such an effect combined with the interaction between cue reliability and number of people in need supports an explanation of cue reliability.

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