Property damage and exposure to others in distress differentially predict prosocial behaviour following a natural disaster

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Supplementary material

S1. Religious priming

Religious primes consisted of three painted icons on coloured cloth (See figure S2). As in the reference groups for the dictator game, the coreligionist prime differed depending on the village in which one lived- Christian icons in the Christian village and Kastom icons in the Kastom village. The Christian icons were pictures of a holy bible, a church house, and a necklace with a cross. The Kastom icons were pictures of three items commonly used in Kastom dance ceremonies- a Wilgen (stack of sticks), Nou (Feathered stick), and Toka (ceremonial stick). As only the Christians were primed with outgroup, the outgroup prime was three Kastom icons. The Neutral prime consisted of two images of flowers. Primes were placed on top of a plastic tray in the testing area and the cups for the first game and a stack of 10 coins was placed on top of the prime prior to the participant entering (as below). The prime remained in place until all games had been completed and was then removed prior to starting any further surveys. We used the same priming protocol when testing participants before and after the cyclone.

A

B

C

Figure S1- Prime images with example game setup. A) Christian, B) Kastom, C) Neutral.

S2. Principal Component Analysis

Table S1. Principle component analysis of affectedness items with oblique rotation. Four components were extracted.

Item	Damage to property	Need for resource aid	Injury to self and loved ones	Exposure to others in distress
I had to relocate because my house became structurally unsafe to live in	0.87			
My home was damaged in the cyclone	0.87			
In the days following the cyclone I had to spend the night somewhere other than in my home	0.72			
I needed shelter after the cyclone	0.51			
I needed financial assistance from others because of hardships caused by the cyclone		0.84		
I suffered financial difficulties because of the cyclone		0.83		
I needed food and water aid after the cyclone		0.69		
I became dependent on others because of the physical injuries/losses I suffered?		0.46		
Members of my family/loved ones were physically injured in the cyclone			0.78	
I lost relatives/loved ones (e.g., aunts, uncles, cousins, grandparents) in the cyclone			0.76	
I was physically injured in the cyclone			0.67	
I was involved in rescue work				0.73
There was a period when I was uncertain about the welfare of loved ones, when I was unable to establish contact or unable to locate them				0.68
I heard sounds and cries for help from individuals in distress				0.67
A/some loved one[s] became dependent on me for physical care because of their injuries[a]			0.41	0.43
I lost some of my belongings in the cyclone[a]	0.39			0.41
Eigenvalue	4.57	2.22	1.40	1.13
Percentage of variance explained	17%	16%	13%	13%

Note: Factor loadings for individual affectedness using principle components analysis with oblique (direct oblimin) rotation.
[a]These variables loaded to a small degree (<0.5) onto two factors and were therefore not included in any composite variables for this study.
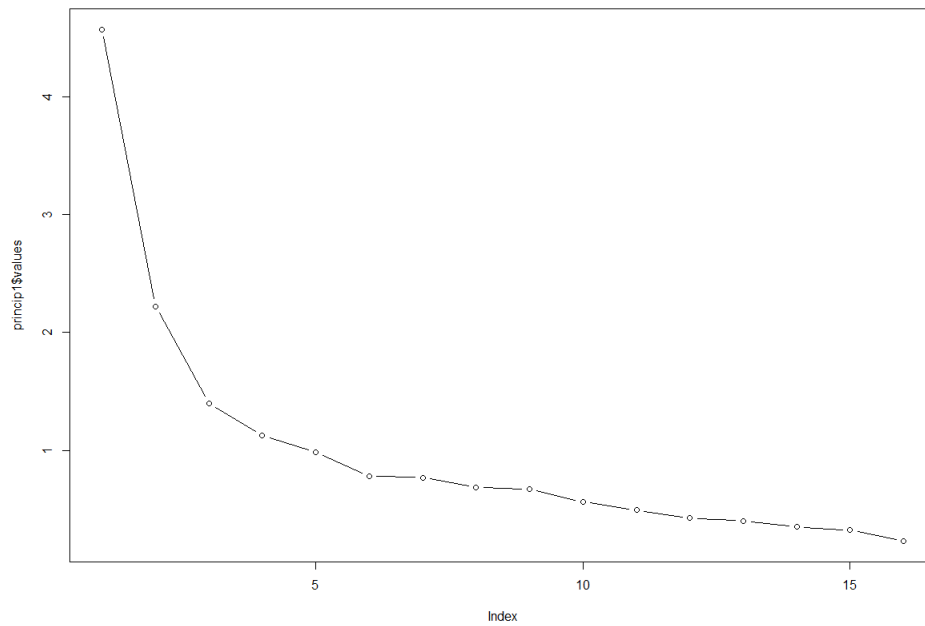
Fig. S2- *Scree plot of Eigenvalues for each component of cyclone affectedness. Based on an eigen cutoff of 1, this plot suggests that four components can be extracted.*

S3. Testing changes in prosocial giving before and after the cyclone at each site.

Table S2- Change in the number of coins allocated to the distal cup in each post-cyclone game compared to each pre-cyclone game, at each site.

	Christian	Kastom	Wilcoxon Rank sum
Self-Corel game	-0.48 (0)	-0.65 (0)	W = 3305.5, $p = 0.671$
Self-Outgroup game	-0.74 (0)	-0.51 (0)	W = 2954.5, $p = 0.438$
Village-Corel game	-0.29 (0)	-0.05 (0)	W =3028.5, $p = 0.594$
Corel-Outgroup game	-0.40 (0)	-0.65 (0)	W= 3247, $p = 0.736$

Note: Values represent the mean change in number of coins allocated to the distal cup after the cyclone. The median change is shown in parentheses. Positive values indicate higher allocations to the distal cup after the cyclone compared to before. Negative allocations indicate reduced allocations to the distal cup after the cyclone compared to before.

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S4. Individual-level results- Tobit regressions

Table S3- Multiple Tobit regressions predicting coin allocations to the distal cup after the cyclone.

	1 Self-Corel game	2 Self-Corel game	3 Self-Corel game	4 Self-Corel game	5 Self-Corel game	6 Self-Outgroup game	7 Self-Outgroup game	8 Self-Outgroup game	9 Self-Outgroup game	10 Self-Outgroup game
Intercept	2.41** [0.67, 4.15]	2.56** [0.82, 4.31]	2.34** [0.60, 4.09]	3.65*** [1.74, 5.56]	1.54 [-0.87, 3.95]	2.52** [0.92, 4.11]	2.74*** [1.13, 4.34]	2.46** [0.88, 4.04]	3.17*** [1.42, 4.91]	1.85 [-0.37, 4.06]
Affectedness										
Damage to property	-0.27 [-0.61, 0.08]	-0.26 [-0.61, 0.08]	-0.27 [-0.61, 0.07]	-0.29† [-0.62, 0.05]	-0.28 [-0.64, 0.08]	-0.50** [-0.82, -0.18]	-0.50** [-0.81, 0.18]	-0.50** [-0.82, -0.19]	-0.50** [-0.82, 0.19]	-0.48** [-0.82, -0.15]
Need for resource aid	-0.22 [-0.59, 0.16]	-0.21 [-0.59, 0.16]	-0.20 [-0.57, 0.18]	-0.23 [-0.60, 0.13]	-0.18 [-0.58, 0.22]	-0.37* [-0.72, -0.02]	-0.37* [-0.71, -0.02]	-0.34† [-0.68, 0.01]	-0.37* [-0.72, -0.03]	-0.37† [-0.75, 0.01]
Injury to self and loved ones	-0.09 [-0.55, 0.36]	-0.09 [-0.54, 0.36]	-0.12 [-0.57, 0.34]	-0.06 [-0.51, 0.38]	-0.11 [-0.60, 0.37]	0.03 [-0.40, 0.45]	0.03 [-0.39, 0.45]	-0.01 [-0.43, 0.41]	0.04 [-0.38, 0.46]	0.00 [-0.45, 0.46]
Witnessing others in distress	0.50* [0.01, 0.99]	0.45† [-0.04, 0.94]	0.44† [-0.06, 0.94]	0.40† [-0.08, 0.89]	0.53* [0.02, 1.04]	0.58* [0.12, 1.04]	0.53* [0.07, 0.99]	0.49* [0.02, 0.96]	0.53* [0.07, 0.99]	0.60* [0.12, 1.08]
Demographics and controls										
Pre-cyclone allocations to distal cup	0.35*** [0.16, 0.54]	0.34*** [0.16, 0.53]	0.35*** [0.16, 0.54]	0.31*** [0.13, 0.50]	0.38*** [0.18, 0.58]	0.44*** [0.25, 0.64]	0.42*** [0.23, 0.61]	0.43*** [0.24, 0.62]	0.43*** [0.24, 0.62]	0.44*** [0.24, 0.64]
Site	-0.41 [-1.31, 0.49]	-0.47 [-1.37, 0.43]	-0.42 [-1.31, 0.48]	-0.78 [-1.73, 0.18]	-0.18 [-1.33, 0.97]	0.06 [-0.79, 0.91]	-0.01 [-0.86, 0.83]	0.03 [-0.81, 0.88]	-0.22 [-1.14, 0.70]	0.38 [-0.71, 1.48]
Age		0.28 [-0.12, 0.69]					0.31 [-0.07, 0.69]			
Sex			0.42 [-0.41, 1.25]					0.64 [-0.14, 1.42]		
Corel prime				-0.70, [-1.60, 0.20]					-0.26 [-1.11, 0.59]	
Outgroup prime				-1.63** [-2.77, 0.49]					-1.02† [-2.11, 0.07]	
Log of pre-cyclone annual income					0.12 [-0.19, 0.42]					0.12 [-0.16, 0.41]
BIC	741.95	745.163	746.0638	744.1928	685.8269	717.6539	720.2103	720.159	724.4932	669.4687
McFadden's pseudo R^2	0.04	0.04	0.04	0.05	0.12	0.07	0.07	0.07	0.07	0.14
n	163	163	163	163	149	163	163	163	163	149

Note: For these Tobit models we report unstandardized coefficients and 95% confidence intervals. Age was centred at its mean. The reference categories for Sex and Prime were Women and Neutral prime, respectively. †$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$

Table S4- Multiple Tobit regressions predicting coin allocations to the distal cup after the cyclone.

	11 Village-Corel game	12 Village-Corel game	13 Village-Corel game	14 Village-Corel game	15 Village-Corel game	16 Corel-Outgroup game	17 Corel-Outgroup game	18 Corel-Outgroup game	19 Corel-Outgroup game	20 Corel-Outgroup game
Intercept	3.65***	3.65***	3.56***	3.24***	4.03 ***	4.03***	4.10***	3.99***	4.25***	4.04***
	[2.03, 5.26]	[2.03, 5.27]	[1.95, 5.17]	[1.46, 5.03]	[1.89, 6.18]	[2.73, 5.34]	[2.79, 5.41]	[2.70, 5.29]	[2.84, 5.66]	[2.24, 5.84]
Affectedness										
Damage to property	-0.22	-0.22	-0.22	-0.21	-0.29†	-0.36**	-0.36**	-0.36**	-0.36**	-0.34*
	[-0.52, 0.08]	[-0.52, 0.08]	[-0.52, 0.08]	[-0.51, 0.09]	[-0.59, 0.02]	[-0.62, -0.11]	[-0.61, -0.10]	[-0.61, -0.11]	[-0.62, -0.11]	[-0.60, -0.07]
Need for resource aid	-0.11	-0.11	-0.09	-0.10	-0.11	0.13	0.13	0.14	0.13	0.08
	[-0.44, 0.22]	[-0.44, 0.22]	[-0.42, 0.24]	[-0.44, 0.23]	[-0.46, 0.23]	[-0.16, 0.41]	[-0.15, 0.41]	[-0.14, 0.42]	[-0.15, 0.41]	[-0.22, 0.39]
Injury to self and loved ones	-0.22	-0.22	-0.25	-0.23	-0.19	0.05	0.05	0.03	0.05	0.09
	[-0.62, 0.18]	[-0.62, 0.18]	[-0.65, 0.16]	[-0.64, 0.17]	[-0.60, 0.21]	[-0.29, 0.39]	[-0.29, 0.39]	[-0.31, 0.37]	[-0.29, 0.39]	[-0.27, 0.45]
Witnessing others in distress	0.30	0.30	0.24	0.32	0.23	0.05	0.03	-0.01	0.03	0.05
	[-0.14, 0.73]	[-0.14, 0.74]	[-0.21, 0.68]	[-0.11, 0.76]	[-0.21, 0.66]	[-0.31, 0.42]	[-0.34, 0.40]	[-0.38, 0.36]	[-0.34, 0.40]	[-0.33, 0.44]
Demographics and controls										
Pre-cyclone allocations to distal cup	0.28**	0.28**	0.28**	0.29**	0.20†	0.19*	0.19*	0.18*	0.20*	0.17†
	[0.07, 0.49]	[0.07, 0.49]	[0.07, 0.49]	[0.08, 0.50]	[-0.02, 0.42]	[0.02, 0.36]	[0.02, 0.36]	[0.01, 0.35]	[0.03, 0.37]	[-0.02, 0.35]
Site	0.17	0.17	0.16	0.22	0.00	-0.62†	-0.65†	-0.64†	-0.75*	-0.49
	[-0.62, 0.97]	[-0.63, 0.97]	[-0.63, 0.96]	[-0.64, 1.09]	[-0.97, 0.97]	[-1.30, 0.06]	[-1.33, 0.03]	[-1.31, 0.04]	[-1.48, -0.02]	[-1.36, 0.37]
Age		0.02					0.14			
		[-0.34, 0.38]					[-0.17, 0.44]			
Sex			0.45					0.45		
			[-0.29, 1.19]					[-0.17, 1.08]		
Corel prime				0.38					-0.09	
				[-0.43, 1.20]					[-0.78, 0.59]	
Outgroup prime				0.45					-0.47	
				[-0.59, 1.48]					[-1.34, 0.40]	
Log of pre-cyclone annual income					0.06					0.02
					[-0.20, 0.31]					[-0.20, 0.25]
BIC	746.5417	751.6248	750.2181	755.5874	681.6684	700.8875	705.2216	703.9499	709.9387	652.3328
McFadden's pseudo R^2	0.03	0.03	0.03	0.03	0.12	0.04	0.04	0.04	0.04	0.11
n	163	163	163	163	149	162	162	162	162	148

Note: For these Tobit models we report unstandardized coefficients and 95% confidence intervals. Age was centred at its mean. The reference categories for Sex and Prime were Women and Neutral prime, respectively. †$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$

S4. Logistic regressions

Table S5- Multiple logistic regressions predicting whether one gave a fair or higher offer to the distal cup after the cyclone.

	21 Self-Corel game	22 Self-Corel game	23 Self-Corel game	24 Self-Corel game	25 Self-Corel game	26 Self-Outgroup game	27 Self-Outgroup game	28 Self-Outgroup game	29 Self-Outgroup game	30 Self-Outgroup game
Intercept	0.65 [0.17, 2.40]	0.66 [0.17, 2.46]	0.63 [0.17, 2.31]	1.65 [0.36, 7.56]	0.33 [0.05, 2.04]	0.36 [0.09, 1.35]	0.36 [0.09, 1.38]	0.34 [0.08, 1.32]	0.48 [0.10, 2.23]	0.34 [0.05, 2.13]
Affectedness										
Damage to property	0.73 * [0.54, 0.97]	0.73* [0.54, 0.97]	0.73* [0.53, 0.97]	0.70* [0.51, 0.95]	0.72* [0.52, 0.97]	0.57*** [0.40, 0.78]	0.57*** [0.40, 0.78]	0.56*** [0.40, 0.78]	0.57*** [0.40, 0.78]	0.61** [0.43, 0.84]
Need for resource aid	0.86 [0.63, 1.17]	0.86 [0.63, 1.17]	0.88 [0.64, 1.20]	0.84 [0.61, 1.16]	0.90 [0.64, 1.25]	0.88 [0.62, 1.24]	0.88 [0.62, 1.24]	0.91 [0.64, 1.30]	0.88 [0.62, 1.25]	0.86 [0.60, 1.22]
Injury to self and loved ones	0.96 [0.66, 1.39]	0.96 [0.66, 1.39]	0.94 [0.64, 1.36]	0.99 [0.68, 1.44]	0.94 [0.63, 1.40]	1.06 [0.70, 1.58]	1.06 [0.70, 1.59]	1.00 [0.66, 1.52]	1.06 [0.70, 1.59]	1.05 [0.69, 1.59]
Witnessing others in distress	1.71* [1.13, 2.67]	1.70* [1.11, 2.66]	1.60* [1.05, 2.53]	1.62* [1.05, 2.55]	1.81** [1.17, 2.91]	1.93** [1.22, 3.20]	1.92** [1.21, 3.20]	1.72* [1.07, 2.89]	1.88* [1.18, 3.12]	1.90** [1.20, 3.15]
Demographics and controls										
Pre-cyclone allocations to distal cup	2.35* [1.19, 4.73]	2.34* [1.18, 4.72]	2.27* [1.14, 4.60]	2.05* [1.01, 4.20]	2.71* [1.31, 5.76]	5.44*** [2.52, 12.50]	5.40*** [2.49, 12.53]	4.93*** [2.26, 11.41]	5.13*** [2.36, 11.89]	5.31*** [2.42, 12.43]
Site	0.72 [0.34, 1.52]	0.72 [0.34, 1.51]	0.71 [0.33, 1.49]	0.55 [0.24, 1.25]	0.72 [0.28, 1.83]	0.85 [0.36, 1.95]	0.84 [0.36, 1.96]	0.79 [0.34, 1.85]	0.74 [0.30, 1.82]	0.90 [0.32, 2.50]
Age		1.04 [0.74, 1.46]					1.02 [0.69, 1.49]			
Sex			1.57 [0.78, 3.13]					2.07† [0.95, 4.57]		
Corel prime				0.56 [0.26, 1.20]					0.90 [0.39, 2.08]	
Outgroup prime				0.30* [0.10, 0.80]					0.61 [0.20, 1.82]	
Log of pre-cyclone annual income					1.08 [0.85, 1.39]					1.00 [0.77, 1.31]
BIC	238.6153	243.6463	242.0874	242.6014	221.5395	206.6402	211.7222	208.371	216.0356	202.7573
McFadden's pseudo R^2	0.12	0.12	0.13	0.15	0.14	0.23	0.23	0.25	0.23	0.22
n	163	163	163	163	149	163	163	163	163	149

Note: For these logistic models we report odds ratios and confidence intervals of the odds ratios. Age was centred at its mean. The reference categories for Sex and Prime were Women and Neutral prime, respectively. †$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table S6- Multiple logistic regressions predicting whether one gave a fair or higher offer to the distal cup after the cyclone.

	31 Village-Corel game	32 Village-Corel game	33 Village-Corel game	34 Village-Corel game	35 Village-Corel game	36 Corel-Outgroup game	37 Corel-Outgroup game	38 Corel-Outgroup game	39 Corel-Outgroup game	40 Corel-Outgroup game
Intercept	3.09 [0.69, 15.95]	3.08 [0.69, 15.90]	3.11 [0.70, 16.07]	2.30 [0.43, 13.66]	1.13 [0.16, 8.81]	1.46 [0.38, 5.82]	1.50 [0.39, 6.06]	1.43 [0.37, 5.71]	1.83 [0.41, 8.45]	1.07 [0.17, 6.71]
Affectedness										
Damage to property	0.59** [0.38, 0.85]	0.59** [0.38, 0.85]	0.59** [0.38, 0.85]	0.58** [0.37, 0.85]	0.56** [0.35, 0.82]	0.47*** [0.31, 0.67]	0.47*** [0.31, 0.67]	0.47*** [0.31, 0.67]	0.46*** [0.30, 0.66]	0.50*** [0.33, 0.71]
Need for resource aid	0.95 [0.67, 1.34]	0.95 [0.67, 1.34]	0.95 [0.67, 1.34]	0.96 [0.67, 1.35]	0.99 [0.69, 1.43]	1.47* [1.05, 2.11]	1.48* [1.05, 2.12]	1.49* [1.06, 2.14]	1.48* [1.05, 2.12]	1.37† [0.96, 1.99]
Injury to self and loved ones	0.80 [0.53, 1.17]	0.80 [0.54, 1.18]	0.80 [0.54, 1.19]	0.79 [0.53, 1.17]	0.79 [0.51, 1.18]	0.88 [0.59, 1.31]	0.89 [0.59, 1.31]	0.87 [0.58, 1.30]	0.90 [0.60, 1.33]	0.94 [0.63, 1.41]
Witnessing others in distress	1.54† [0.98, 2.45]	1.55† [0.99, 2.48]	1.55† [0.98, 2.49]	1.58* [1.01, 2.54]	1.40 [0.88, 2.25]	1.44 [0.93, 2.26]	1.42 [0.92, 2.25]	1.40 [0.90, 2.23]	1.43 [0.92, 2.27]	1.46† [0.94, 2.31]
Demographics and controls										
Pre-cyclone allocations to distal cup	3.16** [1.50, 6.77]	3.14** [1.49, 6.75]	3.17** [1.51, 6.83]	3.33** [1.56, 7.30]	3.06** [1.39, 6.88]	2.89** [1.37, 6.30]	2.86** [1.35, 6.25]	2.83** [1.34, 6.20]	2.86** [1.36, 6.25]	2.61* [1.19, 5.90]
Site	0.68 [0.31, 1.49]	0.68 [0.31, 1.51]	0.68 [0.31, 1.49]	0.74 [0.31, 1.75]	0.97 [0.36, 2.65]	0.42* [0.19, 0.90]	0.41* [0.19, 0.89]	0.41* [0.19, 0.89]	0.43* [0.19, 0.99]	0.58 [0.22, 1.50]
Age		0.96 [0.67, 1.39]					1.06 [0.74, 1.52]			
Sex			0.93 [0.45, 1.94]					1.23 [0.59, 2.54]		
Corel prime				1.22 [0.55, 2.73]					0.72 [0.32, 1.59]	
Outgroup prime				1.52 [0.54, 4.49]					0.88 [0.31, 2.46]	
Log of pre-cyclone annual income					1.28† [1.00, 1.66]					1.05 [0.82, 1.34]
BIC	219.3217	224.3738	224.3794	228.832	206.4489	223.7025	228.6873	228.4868	233.2238	216.1858
McFadden's pseudo R^2	0.14	0.14	0.14	0.14	0.17	0.20	0.20	0.20	0.20	0.17
n	163	163	163	163	149	162	162	162	162	148

Note: For these logistic models we report odds ratios and confidence intervals of the odds ratios. Age was centred at its mean. The reference categories for Sex and Prime were Women and Neutral prime, respectively. †$p < .10$. *$p < .05$. **$p < .01$. ***$p < .00$

S5. Change in giving among unaffected individuals

We used a series of ordinary least squares regression models to quantify the effects of each affectedness measure on change in cooperation, where change in cooperation for each game was operationalised by subtracting pre-cyclone coin allocations from post-cyclone coin allocations to the distal cup, in each game. If the model intercepts (the predicted change in coin allocation when all four affectedness measures are set to zero) do not differ from zero, this supports the assumption that levels of cooperation would not have changed had the cyclone not occurred. If the intercepts are significantly different from zero, the departure could still be attributable to the cyclone, since it is unlikely that we have measured all possible types of cyclone affectedness. This means the test can offer support for the assumption of no change in the absence of Cyclone Pam, but a failed test would not disconfirm the assumption of no change.

Our analysis shows that in each game the intercept is not significantly different from zero (p>0.05), supporting the assumption that unaffected individuals will behave consistently, and hence that the population-level change in giving that we observe is attributable to the cyclone (See Table S7). One game (the self-corel game) did show a borderline significant intercept. If we take this as a real departure from zero, it may suggest a change in cooperation in this game independent of the cyclone, or it could be attributable to other, unmeasured forms of cyclone affectedness not captured by our scales.

Table S7- Multiple ordinary least squares regressions predicting change in coin allocations to the distal cup pre to post cyclone.

Predictor	Self-Corel	Self-Outgroup	Village-Corel	Corel-Outgroup
	b-Est	b-Est	b-Est	b-Est
Intercept	-1.28 [-2.73, 0.17]†	-0.17 [-0.59, 0.98]	-0.00 [-1.31, 1.31]	0.16 [-1.10, 1.42]
Affectedness				
Damage to property	-0.07 [-0.43, 0.30]	-0.32 [-0.64, 0.00]†	-0.14 [-0.47, 0.19]	-0.44 [-0.76, -0.13]**
Need for resource aid	-0.04 [-0.43, 0.36]	-0.25 [-0.60, 0.10]	-0.02 [-0.38, 0.33]	0.14 [-0.21, 0.48]
Injury to self and loved ones	-0.06 [-0.51, 0.39]	-0.07 [-0.47, 0.32]	-0.15 [-0.55, 0.26]	0.07 [-0.32, 0.46]
Witnessing others in distress	0.46 [-0.06, 0.98]†	0.58 [0.12, 1.04]*	0.18 [-0.29, 0.65]	0.12 [-0.33, 0.57]
R^2	0.02	0.08	0.01	0.05
n	163	163	163	162

Note: For these ordinary least square models we report unstandardized coefficients and 95% confidence intervals. †$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$

It is worth noting that the above test regarding the interpretation of population level change in cyclone affectedness is orthogonal to our interpretation of the main regression analyses reported in Tables 1 and 2. The effect of each affectedness measure on individual differences in cooperation reported in these tables is meaningful whether or not mean levels of cooperation might also have increased, decreased or stayed the same in the absence of Cyclone Pam. This is because our multiple regressions quantify the effect of each affectedness measure, controlling for other affectedness measures, pre-cyclone giving and mean levels of giving post cyclone. We see this combination of individual affectedness measures and pre- post- measures of cooperation as a unique strength of our paper.