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The effect of framing on surrogate optimism bias: A simulation study☆,☆☆

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ABSTRACT

Purpose: To explore the effect of emotion priming and physician communication behaviors on optimism bias.
Materials and Methods: We conducted a 5 × 2 between-subject randomized factorial experiment using a Web-based interactive video designed to simulate a family meeting for a critically ill spouse/parent. Eligibility included age at least 35 years and self-identifying as the surrogate for a spouse/parent. The primary outcome was the surrogate's election of code status. We defined optimism bias as the surrogate's estimate of prognosis with cardiopulmonary resuscitation (CPR) > their recollection of the physician's estimate.
Results: Of 373 respondents, 256 (69%) logged in and were randomized and 220 (86%) had nonmissing data for prognosis. Sixty-seven (30%) of 220 overall and 56 of (32%) 173 with an accurate recollection of the physician's estimate had optimism bias. Optimism bias correlated with choosing CPR ($P < .001$). Emotion priming ($P = .397$), physician attention to emotion ($P = .537$), and framing of CPR as the social norm ($P = .884$) did not affect optimism bias. Framing the decision as the patient's vs the surrogate's (25% vs 36%, $P = .066$) and describing the alternative to CPR as "allow natural death" instead of "do not resuscitate" (25% vs 37%, $P = .035$) decreased optimism bias.
Conclusions: Framing of CPR choice during code status conversations may influence surrogates' optimism bias.

Physicians ask relatives of incapacitated intensive care unit (ICU) patients to act as surrogates in the process of life-sustaining treatment decision making when prognosis for survival or functional recovery is poor. Unfortunately, surrogates often misinterpret or doubt physicians' prognostic estimates in these situations [1–3]. Specifically, they demonstrate "optimism bias"—predicting better outcomes than physicians—when presented with high mortality risk estimates, whereas they demonstrate concordant estimates when presented with low mortality risk estimates [3]. This suggests that factors other than surrogate numeracy account for misinterpretation [4].

The strong negative emotional states experience by surrogates, including fear, anxiety, and depression, in poor prognosis situations may play a role in optimism bias. Naturally occurring and experimentally induced negative emotional states such as fear and anxiety are known to decrease risk perception [5–7]. Physician communication behaviors designed to reduce such negative emotional states may, therefore, affect optimism bias.

The current study uses simulation to explore the effect of emotion priming and physician communication behaviors on optimism bias. We hypothesized that heightening attachment to the patient through emotion priming and framing decisions about cardiopulmonary resuscitation (CPR) in ways that increase emotional valence or culpability will increase optimism bias. Conversely, we expect that physician attention to emotion will decrease optimism bias.

1. Materials and methods

We conducted a cross-sectional between-subject randomized factorial experiment administered via the Web, which has been previously described [8]. The experiment asked the subject to consider the hypothetical situation in which their spouse or parent has been admitted to the ICU and is receiving life-sustaining treatment for pneumonia, severe sepsis, and acute lung injury. During an interactive video meeting with a physician, played by an actor, the surrogate asks questions and receives information about the patient's medical condition, prognosis, and treatment plan. At the close of the meeting, the physician asks the surrogate about the patient's code status in the event of cardiac arrest.

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1.1. Subjects

We recruited community participants 35 years and older who self-identified as the surrogate decision maker for a spouse or parent using advertisements on buses, in hospitals, and in community centers in Pittsburgh, delivered to University of Pittsburgh and Carnegie Mellon University research registries, and posted under "community > volunteers" on Craig's list in 8 US cities (Pittsburgh, Boston, New York, Atlanta, Denver, Dallas, Los Angeles, and San Francisco). Eligible subjects included those who had a digital photograph of their spouse or parent, access to the Internet, and English proficiency.

1.2. Experimental conditions

As described elsewhere [8], the factorial design resulted in 32 permutations of the 5 experimental conditions (emotional priming (yes/no): physician emotion handling (yes/no) and CPR decision framing (CPR/no CPR as the typical [normative] decision; surrogate's/patient's decision; and "do not resuscitate (DNR)"/"allow natural death (AND)" as CPR alternative]. We embedded a randomization table into the Web-based survey to assign 8 surrogates to each of the 32 combinations in equal blocks and we closed survey access after successfully randomizing 256 subjects.

1.3. Measures

After deciding code status, subjects completed a closed-ended survey, including a question about the physician's prognostic estimate for survival in event of cardiac arrest requiring CPR and a question about the surrogate's prognostic estimates. We defined optimism bias as a surrogate's estimate of survival greater (ie, more optimistic) than their recollection of the physician's prognostic estimate. In a sensitivity analysis, we restricted analyses to surrogates whose recollection of the physician's estimate of survival to discharge after CPR was consistent with what the physician actually said (10%).

The primary independent variables were experimental assignment (emotion priming, physician attention to emotion, and the 3 CPR decision framing manipulations). Other covariates included characteristics of the surrogate (age, race, sex, religiosity, trust in the medical profession, prior experience with a relative in the ICU, and beliefs about the morality of withholding or withdrawing life-sustaining treatments) and their spouse/parent (age, surrogate assessed health status [excellent, very good, good, fair, poor], and hospitalization in the last year).

1.4. Statistical analyses

We explored surrogate and spouse/parent characteristics associated with optimism bias using the t test or χ^2 test, as appropriate. We tested the relationship between experimental condition and optimism bias using the χ^2 test.

1.5. Human subjects and role of the sponsor

The University of Pittsburgh and Carnegie Mellon University institutional review boards reviewed and approved the research study as meeting exemption 2 for written informed consent. The National Institutes of Health, which funded the study, had no role in the design, execution, or analysis of the study or in the decision to seek publication.

2. Results

2.1. Subjects

As previously reported, the Web-based survey response rate was 69% and the completion rate was 98% [8].

Of 256 respondents, 220 (86%) had nonmissing data for both prognosis questions. There were no differences between item respondents and nonrespondents with respect to age, sex, race, ethnicity, or relationship to the person for whom they would be a surrogate decision maker. Of the 220 evaluable surrogates, 173 (79%) accurately recalled the physician's prognostic estimate. Sixty-seven (30%) of evaluable surrogates and 56 (32%) of 173 with an accurate recollection of the physician's estimate believed that their spouse/parent had better chances of survival than the physician estimated (ie, optimism bias). Being an adult child vs a spouse ($P = .04$) and making decisions on behalf of a younger ($P = .03$) and healthier ($P = .01$) patient were positively associated with optimism bias (Table 1). Optimism bias was strongly associated with the decision to choose CPR for their spouse/parent (79% vs 46%, $P < .001$).

2.2. Relationships between experimental manipulations and optimism bias

Randomization to emotion priming ($P = .397$), physician attention to emotion ($P = .537$), and framing of CPR as the social norm ($P = .884$) did not influence optimism bias. Randomization to framing the CPR decision as the patient's instead of the surrogate's nonsignificantly decreased optimism bias (25% vs 36%, $P = .066$), whereas describing the alternative to CPR as AND instead of DNR significantly decreased optimism bias (25% vs 37%, $P = .035$; Table 2). Optimism bias partially mediated the relationship between framing and CPR choice. Sensitivity analysis restricted to the 173 surrogates who accurately recalled that the physician's CPR estimate did not qualitatively change these results,

Table 1
Surrogate and patient (relative) characteristics, by presence or absence of optimism bias

Variable	Optimism bias (n = 67)	No optimism bias (n = 153)	P
Surrogate factors (n = 220)			
Adult child of patient, n (%)	40 (60)	113 (74)	.04
Spouse of patient, n (%)	27 (40)	40 (26)	
Age (y), mean (SD)	49.7 (1.6)	50.7 (1.0)	.58
Male, n (%)	29 (43)	53 (35)	.22
Female, n (%)	38 (57)	100 (65)	
White	54 (81)	117 (76)	.21
Black	9 (13)	15 (10)	
Other race	4 (6)	21 (14)	
Education			.31
High school/GED	8 (12)	10 (6)	
Some college	17 (25)	32 (21)	
4-y college degree (bachelor)	19 (28)	60 (39)	
Graduate degree	23 (34)	51 (33)	
Trust in medical profession, mean (SD)	15.0 (0.48)	14.1 (0.31)	.11
Prior experience with a relative in the ICU, n (%)			.65
Yes	53 (79.)	125 (82)	
No	14 (221)	28 (18.)	
Prior experience with a relative dying in the ICU, n (%)			.36
Yes	19 (28)	53 (35)	
No	48 (72)	100 (65)	
Religiosity (belief in God/spirit), n (%)			.53
Yes	49 (73)	118 (77.)	
No	18 (27)	35 (23)	
Always immoral to withhold or withdraw LSTs	18 (27)	31 (20)	.28
Not always immoral to withhold or withdraw LSTs	49 (73)	122 (80)	
Patient (spouse/parent) factors (n = 220)			
Age (y), mean (SD), y	66.1 (1.6)	71.3 (0.9)	.03
Health status, n (%)			.01
Excellent	9 (13)	9 (6)	
Very good	22 (33)	25 (16)	
Good	15 (22)	51 (33)	
Fair	14 (21)	48 (31)	
Poor	7 (11)	20 (13)	
Hospitalized last year, n (%)			.57
Yes	24 (36)	61 (40)	
No	43 (64)	92 (60)	

LST - life-sustaining treatment.
GED - General Educational Development (the process of earning the equivalent of a high school diploma by passing a standardized test).