No One Left Behind: How Social Distance Affects Life-Saving Decision Making

Yufeng Zhang (yufeng-zhang12@mails.tsinghua.edu.cn)
Department of Psychology, Tsinghua University
Beijing, 100084 China

Haotian Zhou (haotian.zhou@chicagobooth.edu)
Booth School of Business, University of Chicago
Chicago, IL 60637 USA

Mo Luan (luanmo_emma@163.com)
Department of Psychology, Tsinghua University
Beijing, 100084 China

Hong Li*(corresponding author) (lhong@mail.tsinghua.edu.cn)
Department of Psychology, Tsinghua University
Beijing, 100084 China

Abstract

This research explored how social distance affects risk preference in the life-saving domain. We found that decision-makers tend to be more risk-seeking when the lives of close others versus distant others are at stake. By analyzing the shape of value function, we showed that the underlying mechanism for this difference in risk attitude might be that decision-makers engage in feeling-based evaluation when close others' lives are at stake but calculation-based evaluation when distant others' lives are at stake.

Keywords: social distance; risk preference; decision making

Introduction

Social distance reflects relational closeness, of which the reference point is the self (Trope & Liberman, 2010). Social distance is a continuum, one end is the self and the other end might be closest others, family members, relatives, friends, acquaintances or strangers, people with different social distances or relational closeness with the self.

Previous studies on how social distance affects decision making mainly focused on self-other discrepancies (Polman, 2012). Some studies found that people are more risk-seeking when making decision for others or predicting others' risk preference than for the self (Beisswanger, Stone, Hupp, & Allgaier, 2003; Hsee & Weber, 1997), whereas others studies reported that people are less risk-seeking when choosing for others versus the self (Garcia-Retamero & Galesic, 2012). Although the answer to the question regarding the differences between deciding for others and for the self is inconclusive, we believe that there is another important question that has so far garnered scant attention. Few studies have explored people's risk attitude when deciding for different others with different levels of social distances. Specifically, in the present research we sought to explore this question: Are people more risk-seeking when different-social-distance others are in danger?

Give that people may experience different level of emotional arousal depending on who is in danger (mom or coworker), we aim to explore this question from the perspective of affect and risk. Slovic, Finucane, Peters, & MacGregor (2004) contended that there are two fundamental ways to comprehend risk, i.e., risk as analysis and risk as feelings. The most popular notions about the relation between affect and risk are *affect heuristics* (Slovic, Finucane, Peters, & MacGregor, 2007) and *risk-as-feelings* (Loewenstein, Weber, Hsee, & Welch, 2001). Previous studies on affect and risk mainly investigate how affect influences risk perception, judgments of risks and benefits (Finucane, Alhakami, Slovic, & Johnson, 2000), judgments of probability and frequency. For example, Baron (1997) found that the proportion of lives saved is more dominant than the actual number of lives saved, since a specified number of lives carry less precise affective meaning than the proportion. Some studies also found that specific emotion (e.g. fear, anxiety) would lead to cautious, risk-averse decision making (Lerner & Keltner, 2000). However, little work has been done to understand how affect intensity (affect-rich versus affect-poor) influences risky decision making.

Hsee and Rottenstreich (2004) found that when faced with affect-rich stimuli people rely on feelings, and they are insensitive to the variation of scope and only sensitive to the differences between zero and non-zero, and yet when faced with affect-poor scenario people rely on calculation and are relatively sensitive to change in quantity. It is not unreasonable to argue that when close ones are at stake people rely more on feelings, and yet when the ones to be saved are distant ones, people rely more on calculation. Therefore, in the former condition, people should be less sensitive to how many persons to be saved. For example, when the lives of four closest persons are at stake, one may show little sensitivity to whether one or three persons are to be saved, and both are equally unsatisfying rescue outcome. However, when the lives of four distant others are at stake, as the number of people to be saved increases, one might experience more and more satisfaction. In this way, we infer

that people would be more inclined to choose the risky option and be more risk-seeking when saving close social others than distant others. In other words, the present research proposes that people are more risk-seeking when the social distance between the ones to be saved and the decision maker is closer. We conducted three studies to test this hypothesis systematically and attempted to shed light on the underlying mechanism in the last study.

Study 1

The main purpose of this study is to see if the risk preferences will be different between different social distances, i.e., when the ones to be rescued are the decision maker's closest ones versus strangers .

Method

Ninety-seven Tsinghua University undergraduates (53 male, 44 female, mean age=19.7) were recruited in a public class for course credit. All respondents were randomly assigned to either of two conditions of social distance (close versus distant).

Participants were asked to imagine that a fire accident suddenly broke out and six persons were trapped and waiting to be rescued, and the participants had to choose one from the two alternative rescuing options in a series of binary choice questions.

In the close condition the ones to be rescued were described as the participant's *closest ones* (e.g., closest family members or friends), while in the distant condition they were described as the *strangers* to participants.

In either condition, participants answered a set of five binary-choice questions. The options for these questions are reproduced in Table 1. Questions in both conditions were presented in random order and only one question was visible to participants at a time.

Table 1: Questions in Study 1.

	Sure option	Risky option
1	5 persons die for sure	50% chance 6 persons die; 50% chance nobody dies.
2	4 persons die for sure	50% chance 6 persons die; 50% chance nobody dies.
3	3 persons die for sure	50% chance 6 persons die; 50% chance nobody dies.
4	2 persons die for sure	50% chance 6 persons die; 50% chance nobody dies.
5	1 person dies for sure	50% chance 6 persons die; 50% chance nobody dies.

Each participant was assigned a Risk Preference Index (RP Index for short) based on his or her choices in the set of questions. The RP Index, ranging from 1 (most risk-averse) to 6 (most risk-seeking), was defined as follows (Hsee & Weber, 1999). If a participant chose the sure option in all the five questions, the RP Index was defined as 1 (most risk-averse). If a participant chose the risky option in all five questions, the RP Index was defined as 6 (most risk-seeking). If a participant chose the risky option in Question 1 through Question *i*-1, and chose the sure option in Question *i* through Question 5, the RP Index was defined as *i* ($1<i<6$). Participants who showed inconsistent choice pattern across the five questions were assigned a missing value as their RP Index.

Results and discussion

According to the calculation of RP Index, there are eight participants whose choice pattern across the five questions was inconsistent, and their RP Indices were assigned a missing value. The results of the RP Index are reported in Table 2, with separate entries for the different social distance. We performed an independent-samples T-test on these data.

Table 2: Risk Preferences in Study 1.

Social distance	*Mean(SD)*
close	4.82(1.21)
distant	4.29(1.06)

The analysis revealed a significant effect for social distance, $t(87)=2.20$, $p=0.030$, and the respondents were more risk-seeking in the close condition than in the distant condition.

The results in this study support our proposition that decision-makers tend to be more risk-seeking when the lives of close others are at stake than distant others. In the next study, we sought to rule out an alternative explanation.

Study 2

One possible alternative explanation for the main findings in study 1 may be that in the close condition it is more difficult for people to select which ones to save and thus they are less willing to choose the sure options than in the distant condition. The main purpose of this study was to examine this explanation.

Method

One hundred and six Tsinghua University undergraduates (50 male, 56 female, mean age=19.6) were recruited in a public class for course credit. All respondents were assigned to a 2 (social distance: close versus distant)$\times$2 (selection: randomly-determined versus self-determined) mixed design, with social distance as a between-subjects factor and selection as a within-subjects factor.

The same scenario from Study 1 was used. Also the manipulation for social distance was the same as in study 1. In the randomly-determined condition, participants were informed that which ones to be saved will be randomly determined, while in the self-determined condition which ones to be saved were determined by the decision maker.

In addition, there were four persons to be saved instead of six in this study. The questions are exhibited in Table 3. The calculation of the RP Index was similar to that in study 1.

Table 3: Questions in Study 2.

No.	Sure option	Risky option
1	3 persons die for sure	50% chance 4 persons die ; 50% chance nobody dies.
2	2 persons die for sure	50% chance 4 persons die ; 50% chance nobody dies.
3	1 person dies for sure	50% chance 4 persons die ; 50% chance nobody dies.

Results and discussion

The results in terms of the RP Index are reported in Table 4, with separate entries for the different social distances and the different selections. There are six participants whose choice patterns across the three questions were inconsistent, so their RP indices were assigned as missing. We performed a 2(social-distance: close versus distant) × 2 (selection: randomly-determined versus self-determined) analysis of variance for repeated measure on these data.

Table 4: Risk Preferences in Study 2.

Selection	Social distance	
	close	distant
	Mean(SD)	*Mean(SD)*
randomly-determined	3.24(0.72)	2.90(0.81)
self-determined	3.26(0.96)	3.54(0.61)

The analysis revealed that the main effect for selection was significant, $F(1,98)=11.29$, $p=0.001$, $\eta^2=0.103$, and respondents in the self-determined condition were more risk-seeking than in the randomly-determined condition. The main effect for social distance was not significant, $F(1,98)=0.06$, $p=0.808$, $\eta^2=0.001$, and there was no differences in risk preferences between the close and distant conditions. More importantly, the social-distance × selection interaction was significant, $F(1,98)=9.97$, $p=0.002$, $\eta^2=0.092$.

Simple effect analysis revealed that for the close condition, respondents in the self-determined condition were not more risk-seeking than in the randomly-determined condition, $F(1,98)=0.02$, $p=0.886$, $\eta^2<0.001$. However, for the distant condition respondents in the self-determined condition were significantly more risk-seeking than in the randomly-determined condition, $F(1,98)=21.24$, $p<0.001$, $\eta^2=0.178$.

Simple effect analysis also revealed that for the randomly-determined condition, respondents in the close condition are significantly more risk-seeking than in the distant condition, $F(1,98)=4.92$, $p=0.029$, $\eta^2=0.048$. However, for the self-determined condition respondents in the close condition were less risk-seeking than in the distant condition, $F(1,98)=3.00$, $p=0.086$, $\eta^2=0.030$.

The results in this study have several implications. Firstly, for the selection manipulation, the results in the randomly-determined condition replicated the findings in study 1, and the results in the self-determined condition suggested a boundary condition for the effect. Specifically, this effect only occurs when the selection is randomly-determined rather than self-determined.

Secondly, the results ruled out the explanation mentioned at the beginning of this study, i.e., people are more risk-seeking in the close condition because they are more reluctant to select which ones to save. If this explanation stands, for the close condition, people would be more risk-seeking in the self-determined condition than in the randomly-determined condition. However, there was no difference between the two conditions. In addition, for the distant condition, people would be more risk-seeking in the self-determined condition than in the randomly-determined condition. It may imply that people are more reluctant to select which ones to save when the others are close rather than distant.

Study 3

The main purpose of this study is to manipulate social distance as a within-subjects factor to test the robustness of the effect. In addition, previous studies only adopted the loss domain, however, in the life-saving decision making, the gain framing is also very important (Kahnman & Tversky, 1979; Tversky & Kahneman, 1981). Therefore, in this study we also introduce framing as another variable.

Method

Forty-eight Tsinghua University undergraduates (28 male, 20 female, mean age=19.2) were recruited in a public class for course credit. All respondents were assigned to all four conditions of a 2(social distance: close versus distant) × 2(framing: gain versus loss) within-subjects design.

Table 5: Questions in the gain set in Study 3.

	Sure option	Risky option
1	1 person is saved for sure	50% chance 6 persons are saved; 50% chance nobody is saved.
2	2 persons are saved for sure	50% chance 6 persons are saved; 50% chance nobody is saved.
3	3 persons are saved for sure	50% chance 6 persons are saved; 50% chance nobody is saved.
4	4 persons are saved for sure	50% chance 6 persons are saved; 50% chance nobody is saved.
5	5 persons are saved for sure	50% chance 6 persons are saved; 50% chance nobody is saved.

Description of the scenario and manipulation for social distance were the same as in the previous studies. The options in the loss frame were the same as in Study 1. The questions in the gain frame are exhibited in Table 5. Note

that the options in the gain set were the same as in the loss set, except that the word "dies/die" was replaced by "is/are saved". The order in which participants answered gain and loss-frame sets were randomly determined, and so were the order of binary-choice questions in either set. Only one question was visible to participants at a time. The calculation of the RP Index was similar to that in study 1.

Results and discussion

The results of the RP Index are reported in table 6, with separate entries for the different social distances and the different domains. There are ten participants whose choice patterns across the five questions were inconsistent, so their RP indices were assigned as missing. We performed a 2(social-distance: close versus distant) × 2 (framing: gain versus loss) analysis of variance for repeated measure on the non-missing data.

Table 6: Risk Preferences in Study 3.

Domain	Social distance	
	close	distant
	Mean(SD)	*Mean(SD)*
gain	3.74(1.06)	3.29(1.21)
loss	4.82(1.06)	4.11(1.23)

The analysis revealed a significant main effect for social distance, $F(1,37)=14.61$, $p<0.001$, $\eta^2=0.283$, and the respondents were more risk-seeking in the close condition than in the distant condition. It also yielded a significant main effect for framing, $F(1,37)=27.50$, $p<0.001$, $\eta^2=0.426$, and the respondents were more risk-seeking in the loss condition than in the gain condition. In addition, the social-distance × frmae interaction was not significant, $F(1,37)=1.70$, $p=0.201$, $\eta^2=0.044$.

The results in this study replicate our proposition that decision-makers tend to be more risk-seeking when the lives of close others are at stake than distant others. It occurred regardless of the valence of frame.

For the gain frame, there is a possible explanation that when the close ones are at stake one would actually still consider the outcome as loss even if it is framed as gain, while when the distance ones are to be saved one would consider the outcome as gain as framed. Since people are more risk seeking in the loss frame than in the gain frame (Kahnman & Tversky, 1979), this proposition could explain the findings in the gain frame. However, for the loss frame, we also found that people are more risk seeking in the close condition than in the distant condition, which the previous proposition could not explain. In the next study, we sought to the potential underlying mechanism for our main effect.

Study 4

In this study we aimed to explore the underlying mechanism of the previous findings. According to the affective psychology of value (Hsee & Rottenstreich, 2004), we proposed that the differences in risk preference was because people rely on feeling-based evaluation in the close condition but calculation-based evaluation in the distant condition. Specifically, the negative feeling people experience when losing more close others is only a little more significant than when losing only one close person, and the feelings are both very negative. However, the negative feeling people experience when losing more strangers is more significant than losing only one stranger. In other words, the value function would be more akin to a step function in close condition but a linear function in the distant condition.

Method

One hundred Tsinghua University undergraduates (53 male, 47 female, mean age=19.7) were recruited in a public class for course credit. All respondents were randomly assigned to two conditions of social distance (close versus distant).

Manipulation for social distance was the same as in study 2. There were six persons to be rescued, and participants were asked to rate their feelings about losing 0 to 6 persons on a 7-point scale, in which 1 means very unsatisfying and 7 means very satisfying.

Results and discussion

The value functions of feelings in two conditions of social distance are displayed in Figure 1, where we plotted the average feeling ratings against the number of lost lives for the two distance conditions separately.

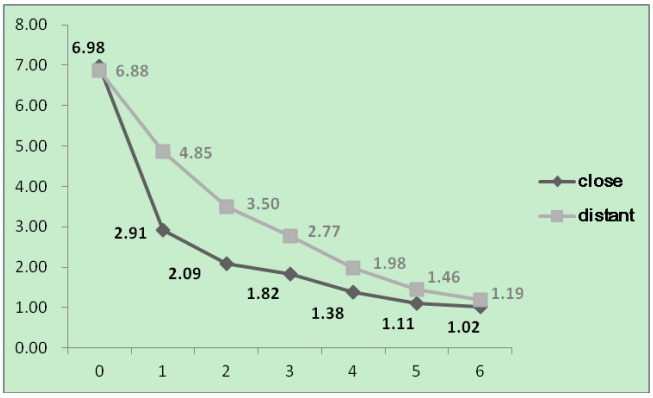

Figure 1: Value functions of feelings.

If participants indeed engaged in feeling-based evaluation when the lives of close others were at stake but calculation-based evaluation when the lives of distant others were at stake, then the value function would be more akin to a step function in the case of close others but a linear function in the case of distant others. To test this hypothesis, for each participant, we attempted to model the seven feeling ratings with a step function and linear function separately. In other words, we assessed how well the actual feeling ratings of a given participants could be predicted with a step function versus a linear one. Through this operation, we obtained two correlation coefficients for each participant, with one

measuring the fitness of the step function model and the other the fitness of the linear function model.

To analyze whether the relative superiority of the two models was conditioned on social distance manipulation, we first applied Fisher-transformation to convert the correlation coefficients to z-scores and then conducted a 2 (model type: step vs. linear) × 2 (social distance: close vs. distant) mixed ANOVA on the resultant z-scores. A significant two-way interaction between model type emerged, $F(1,91)=25.00$, $p<0.001$, $\eta^2=0.22$. Simple effect analysis revealed that the step function fitted the ratings of participants in the close condition (r = 0.98) better than those in the distant condition (r=0.81), $F(1,91)=25.59$, $p<0.001$, $\eta^2=0.25$. In contrast, the linear function fitted the ratings of participants in the distant condition better (r=0.93) than those in the close condition (r=0.83), $F(1,91)=12.24$, $p<0.001$, $\eta^2=0.12$. These results of statistical analysis were corroborated by visual inspection of the Figure 1.

The relative superiority of the step function over the linear function in the case of close others is consistent with the hypothesis that participants evaluated close others' lives via the feeling-based route. On the other hand, the relative superiority of the linear function over the step function in the case of distant others is consistent with the hypothesis that participants evaluated distant others' lives via the calculation-based route.

The value function of feeling could explain the differences in risk preference in different conditions of social distance between the decision maker and the ones to be saved. Since the value function resembled the step function more in the close condition, people were equally unsatisfied with the sure option even if the number of persons saved increases, and thus they would consistently prefer the risky option. On the contrary, since the value function resembled the linear function in the distant condition, people become more and more satisfied with the sure option as the number increases, and thus they would switch to the sure option from the risky option. Therefore, people are more risk-seeking when close others are at stake than distant others.

General discussion

The present research investigated the effect of social distance on risk preference and explored the underlying mechanism. We next discuss the relation of the present research and the existing literature, future directions and limitations of the present research.

In the present research we found that people are more risk seeking when social distance between persons in danger and the decision-maker is closer in the life-saving domain. It is much more different from the previous studies about how social distance affects risk preference, which mainly focus on self-other discrepancies. Firstly, in the present research we consider social distance as a variable between persons implicated in the decision context (life-saving tasks) and the decision-maker, while the previous studies consider social distance from the perspective of the role of decision-maker (deciding for others versus for the self). Secondly, here we investigated different-other differences rather than self-other discrepancies.

The findings of the present research suggest that people are more risk-seeking when the social distance is closer in the life-saving domain, which is consistent with Stone, Yates, & Caruthers (2002), who find that people are more risk-averse when deciding for others than for themselves in situations where risk aversion is valued (physical safety scenarios), but inconsistent with Beisswanger et al. (2003), who find that people are more risk-seeking when deciding for others than for themselves in the low-impact relationship scenarios. At first glance, it may be contradictory, but the difference can be reconciled after further analysis.

In different domains people reveal different risk preferences (Weber, Blais, & Betz, 2002). Furthermore, Stone, Choi, de Bruim, & Mandel (2013) find that people made more risk-averse decisions for others than for themselves in situations where risk aversion is valued (physical safety scenarios) but more risk-taking decisions for others than for themselves in situations where risk taking is valued (relationship scenarios). Beisswanger et al. (2003) report that the self-other difference occurs only for low life-impact decisions but does not occur when the decisions have particularly serious potential consequences in the relationship scenarios. Specifically, since the life-saving scenario we adopt in the present research is very important and of high-impact, and it may be another domain where the risk aversion is valued, so people would be more risk-seeking in the case of close social distance versus distant social distance. We surmise that in some domains when social distance is more distant people are more risk-seeking while in other domains people are more risk-averse. We may test this proposition in the future research.

More importantly, in the present research we provide one reasonable explanation in terms of affect and risk, specifically, feeling-based and calculation-based evaluation. In the last study we examined the value function of feelings, and found that the value function in the case of close others resembled a step-function and the one in the distant case resembled a linear function, which implies that people incline to adopt feeling-based rather than calculation-based evaluation when the social distance is closer. When the social distance is closer, people are not so sensitive to the number of persons to be saved as in the distant condition, unless they could save all the people, thus they would prefer the risky option to the sure option and reveal higher risk preference.

Some previous studies have shown that affect impacts the way we perceive and evaluate risk, for instance, when people feel bad, they will perceive the risk to be higher and might be more risk-averse (Finucane et al., 2000), and when people feel fearful, they will perceive the risk to be higher and be more risk-averse (Lerner & Keltner, 2000). In the life-saving domain, when faced with others in danger people may feel bad and fear. However, we found that when social distance is closer, people may feel worse and more fearful,

yet they are much more risk-seeking. Maybe the feelings people experience when faced with the scenario are complex, it is neither emotion with valence (i.e., goodness or badness) nor specific emotion (e.g., fear or anxiety). Further clarification requires future work. We could infer from the present research that affect-rich rather than affect-poor people are more risk-seeking.

There are also some limitations in the current research. One limitation is that we only studied decision-making in the life-saving domain, in future research we need examine whether our finding can be generalized to other domains, e.g., monetary domain, relationship domain and so on. Another limitation is that the nature of the choice scenarios is hypothetical. In the future, we will also investigate decision making in real context in different conditions of social distance.

References

Baron, J. (1997). Confusion of relative and absolute risk in valuation. *Journal of Risk and Uncertainty*, *14*(3), 301-309.

Beisswanger, A. H., Stone, E. R., Hupp, J. M., & Allgaier, L. (2003). Risk taking in relationships: Differences in deciding for oneself versus for a friend. *Basic and Applied Social Psychology, 25*(2), 121-135.

Finucane, M. L., Alhakami, A., Slovic, P., & Johnson, S. M. (2000). The affect heuristic in judgments of risks and benefits. *Journal of behavioral decision making*, *13*(1), 1-17.

Garcia-Retamero, R., & Galesic, M. (2012). Doc, what would you do if you were me? On self-other discrepencies in medical decision making. *Journal of Experimental Psychology: Applied, 18*, 38-51.

Hsee, C. K., & Rottenstreich, Y. (2004). Music, pandas, and muggers: On the affective psychology of value. *Journal of Experimental Psychology-General, 133*(1), 23-29.

Hsee, C. K., & Weber, E. U. (1997). A fundamental prediction error: Self-others discrepancies in risk preference. *Journal of Experimental Psychology-General, 126*(1), 45-52.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society*, 263-291.

Lerner, J. S., & Keltner, D. (2000). Beyond valence: Toward a model of emotion-specific influences on judgment and choice. *Cognition and Emotion, 14*, 473-494.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological bulletin, 127*(2), 267-286.

Polman, E. (2012). Self–other decision making and loss aversion. *Organizational Behavior and Human Decision Processes*, *119*(2), 141-150.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk analysis, 24*(2), 311-322.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2007).The affect heuristic. *European Journal of Operational Research*, *177*(3), 1333-1352

Stone, E. R., Choi, Y., de Bruin, W. B., & Mandel, D. R. (2013). I can take the risk, but you should be safe: Self-other differences in situations involving physical safety. *Judgment and Decision Making*, *8*(3), 250-267.

Stone, E. R., Yates, A. J., & Caruthers, A. S. (2002). Risk Taking in Decision Making for Others Versus the Self. *Journal of Applied Social Psychology*, *32*(9), 1797-1824.

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological review, 117*(2), 440-463.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 185*, 1124-1130.

Weber, E. U., Blais, A. R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of behavioral decision making*, *15*(4), 263-290.