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Abstract

People often make less risky decisions for themselves than others. We examined how people allocated risks (i.e., determining the ratio of uncertain outcomes to certain outcomes) between themselves and others. We also investigated gain (vs. loss) domain and social value orientation as predictors of risk allocations. The results of three experiments demonstrated that participants were more likely to share their risks equally between themselves and others than distribute risk unequally. In the gain (vs. loss) domain, participants allocated fewer risks to themselves and more risks to the other person for unequal risk allocations. Compared to proselfs, prosocials were more likely to allocate risks equally. We also found stronger domain effects on unequal risk allocations for proselfs than for prosocials. Therefore, our findings clarify the effects of risk distribution, domain, and social value orientation on interpersonal allocation decisions and highlight equal risk distribution between oneself and others.

Keywords: allocation decision, risk distribution, gain-loss domain, social value orientation, self-other

Gain-loss Domain and Social Value Orientation as Determinants of Risk Allocation Decisions

Research demonstrates that people sometimes have different risk preferences for themselves and others. A recent meta-analysis (*N* = 14,443, 128 effects) indicated significantly stronger risk-seeking for decisions on behalf of others than for one's own decisions (Polman & Wu, 2020). However, other researchers identified moderators or boundary conditions of the positive association between selection for others (vs. self) and risk-seeking choices. For example, another meta-analytic report indicated that people were more likely to make risk-averse choices for themselves than others in a gain domain (Batteux et al., 2019). By contrast, people were more likely to make risk-seeking choices for themselves than others in a loss domain (Batteux et al., 2019). Polman and Wu's (2020) meta-analysis also demonstrated that when decision outcomes were shared, the significant self-other difference in risk preference became negligible. Thus, a tendency to prefer risky choices for others (vs. self) may be weakened under certain circumstances.

To examine how individuals allocate risks between themselves and others, we investigate the antecedents of risk allocation behavior. Risk allocation occurs in our daily life. For instance, organizational managers determine how they and other employees receive their compensation (Devers et al., 2008), such as cash-based compensation (e.g., salary, without risk) and stock-based compensation (e.g., the number of stock shares, with risk). Furthermore, managers may determine their and other employees' medical insurance expenses. A greater insurance expense is associated with a higher level of fixed cost but may prevent organizational members from paying more money due to unpredictable diseases, which reflects a tendency to avoid risks (Briys & Schlesinger, 1990). These examples illustrate risk allocations for rewards and expenses between oneself and others.

In the present research, we aim to investigate the factors that influence the consistency of self-other differences in risk preferences. Specifically, we examine the tendency to allocate risk equally. However, risk preferences often differ between the domains of losses and gains (Kahneman & Tversky, 1979; Tversky & Kahneman, 1981), and therefore we investigate whether this tendency differs between gain and loss options. More importantly, we use social value orientation (SVO; Van Lange et al., 1997) to predict how people allocate risks between themselves and others. According to the SVO classification, individuals can pursue equal distributions and the best joint outcomes between themselves and others (i.e., prosocials) or seek to maximize their personal benefits (i.e., proselfs; De Cremer & Van Lange, 2001). Furthermore, we propose that compared to proselfs, prosocials are more likely to allocate risks equally between themselves and others because prosocials may prefer equal distribution to unequal distribution. By contrast, we hypothesize that compared to prosocials, proselfs are more likely to allocate risks according to domain because proselfs may adopt domain-specific strategies to avoid potential losses and pursue certain gains.

Risk Distribution

Messick and Schell (1992) proposed that people rely on an equality heuristic to make allocation decisions. This heuristic refers to a cognitive strategy that simplifies complex allocation processes by prescribing an even allocation among individuals. This allocation rule is simple, and therefore its fairness is socially defensible (Allison & Messick, 1990). Equality also serves as a dominant strategy when people intend to maintain or foster the quality of social relationships (Deutsch, 1975).

Others argue that outcomes should be allocated proportionally based on their corresponding inputs (i.e., equity rule; Adams, 1965; Deutsch, 1975), however, many people favor equality over equity. Research demonstrates that people allocate resources evenly among individuals despite their different contributions (Messick & Schell, 1992).

Furthermore, people choose to distribute outcomes equally even when the method of equal distribution benefits them less than does an alternative method (Selart & Eek, 2005). These findings suggest that people prefer equal allocations. When people determine a ratio of an uncertain outcome to a total outcome (i.e., a level of risk) allocated to themselves or another individual, they may also prefer an equal ratio between themselves and the other to unequal ratios, such as higher or lower levels of risk to themselves than the other. In our investigation, we use “50%[1] self-risk and 50% other-risk” to indicate equal risk allocation. By contrast, unequal risk allocation options were “100% self-risk and 0% other-risk” and “0% self-risk and 100% other-risk.” The former unequal option reflects uncertain self-outcomes and certain other-outcomes whereas the latter unequal option indicates certain self-outcomes and uncertain other-outcomes. Given that the previous studies find that individuals tend to distribute outcomes equally, they may prefer to allocate risks equally (i.e., select “50% self-risk and 50% other-risk” more frequently than “100% self-risk and 0% other-risk” or “0% self-risk and 100% other-risk”).

Additionally, however, research shows that risk preferences often differ between the domain of gains and losses (Kahneman & Tversky, 1979; Tversky & Kahneman, 1981). Individuals in a gain domain tend to prefer an option with certain outcomes (i.e., avoiding risk). By contrast, those in a loss domain tend to select an option with uncertain outcomes (i.e., risk-seeking). This effect of domain on risk preference has also been replicated in various situations, such as negotiation (Neale & Bazerman, 1985), organizational investment (Singh, 1986), online financial trading (Liu et al., 2014), and trust decisions in an economic game (Evans & van Beest, 2017).

Furthermore, a small amount of research finds a domain effect for self-other selection. The domain effect is larger when people choose for themselves than for a stranger (Zhang et

[1] For the options of risk allocation, a percentage refers to the proportion of an uncertain outcome to a total outcome allocated to oneself or another individual.

al., 2017; Ziegler & Tunney, 2015). Researchers have attributed the larger effect of self-relevant (vs. other-related) selections to stronger emotional involvement (Ziegler & Tunney, 2015) or smaller social distance (Zhang et al., 2017). Accordingly, we expect that domain will affect self-other allocations in our studies. That is, when compared with individuals in a loss domain, those in a gain domain may strive to minimize their risk by selecting "*0% self-risk* and 100% other-risk" rather than "*50% self-risk* and 50% other-risk" or "*100% self-risk* and 0% other-risk."

To reiterate, the notion of equality emphasizes an equal allocation of risk between oneself and the other. Moreover, self-other differences in the domain effect suggest that compared with individuals in a loss domain, those in a gain domain are more likely to minimize their risk rather than others' risk. These two viewpoints generate different predictions of risk distributions (see Table 1 for a summary of the predictions).

Social Value Orientation as a Predictor and Moderator

Social Value Orientation (SVO) may be a precursor of risk allocations. Compared to proselfs, prosocials may allocate risks more equally. Prosocials value equality and have a high willingness to cooperate with others whereas proselfs are predominantly concerned with maximization of self-interest and dominance over others (Bogaert et al., 2008). Research demonstrated that compared with proselfs, prosocials are more likely to pursue equal outcomes between themselves and others and reciprocate previous decisions made by others (De Cremer & Van Lange, 2001; Van Lange, 1999). Moreover, prosocials prefer equal allocations even when these allocations result in less optimal outcomes for all the participants than unequal allocations (Eek & Gärling, 2006). Prosocials also view an equal reward allocation as more fair than an unequal reward allocation when each participant makes an equal contribution (Anderson & Patterson, 2008). By contrast, proselfs tend to pursue unequal outcomes that benefit themselves more than others (De Bruin & Van Lange, 1999).

These results suggest that compared to proselfs, prosocials are more likely to follow the principle of equal allocations. This difference may also apply when people determine the ratio of uncertain outcomes to total outcomes allocated to themselves or others. Therefore, we propose that compared with proselfs, prosocials are *more* likely to select *"50% self-risk and 50% other-risk"* but less likely to select "*100% self-risk and 0% other-risk"* and "*0% self-risk and 100% other-risk*."

Moreover, SVO may moderate the domain effect. That is, proselfs are more likely to use different allocation strategies based on domain than are prosocials. As discussed previously, prosocials emphasize equal self-other allocations of risks, and therefore this inclination may exist regardless of whether outcomes are presented as gains or losses. By contrast, proselfs strive for their interest at the expense of others' benefits and therefore may utilize different risk distributions to avoid potential losses and pursue certain gains. To support this viewpoint, research has demonstrated that proselfs tend to take an ethical risk to mitigate their negative outcomes in a loss situation but feel reluctant to take the same risk in a gain situation. However, such differences become non-significant for prosocials (Reinders Folmer & De Cremer, 2012). These findings suggest that compared to prosocials, proselfs are more likely to increase their risks in a loss situation and decrease their risks in a gain situation. Thus, we propose that compared with prosocials, proselfs are more likely to allocate risks according to a domain effect (i.e., a tendency to select *"0% self-risk and 100% other-risk"* in a gain (vs. loss) domain but select "*50% self-risk and 50% other-risk"* and "*100% self-risk and 0% other-risk*" in a loss (vs. gain) domain; see predicted effects in Figure 1).

Overview of the Experiments

We investigated the differences in the selection likelihoods of three risk-distribution options and the domain effects on the selection likelihood of each risk-distribution option in three experiments. Moreover, we explored how SVO predicted three risk distribution choices and how SVO moderated the domain effects on the choices. We also examined the replicability of the results in situations with and without a financial incentive for decision-making behavior in Experiment 2 because previous research has demonstrated inconsistent effects of an incentive on risk preference. Furthermore, we used a different paradigm in Experiment 3 from those in Experiments 1 and 2 by separating SVO choices from risk allocation options to provide comparable risk allocation options in gain and loss domains. We conducted our experiments using the online survey tool from Qualtrics. To ensure appropriate research practices, we stopped the data collection within one batch of recruitment for each experiment and performed all the analyses only after the completion of data collection. Thus, our analyses did not influence the data collection. We report all manipulations, relevant measures, and data exclusions in our experiments.[2]

Experiments 1 and 2: Risk Distribution, Domain, and SVO

In Experiments 1 and 2, we examined the differences in the selection likelihoods of three risk-distribution options and the domain effect on the selection likelihood of each risk-distribution option. We also investigated the effects of SVO on three risk distribution choices and the moderating effects of SVO on the association between domain and choices.

Experiment 1 used an additional incentive associated with participants' decision-making behavior whereas Experiment 2 examined whether the findings of Experiment 1 would be replicable in situations with and without an additional incentive. Existing research finds inconsistent effects of financial incentives on risk preference. For instance, in auction experiments with a low-probability risk, the use of monetary consequences leads to more concern about the risk and more diligence toward spending the money than the use of

[2] We declare that there is no conflict of interest. We also confirm that the manuscript adheres to ethical guidelines specified in the APA Code of Conduct and our national ethics guidelines. Please see the data and analysis codes at https://osf.io/zmwfc/?view_only=95de83989f50460c97477aa6cb5239b0.

hypothetical payoffs (Irwin et al., 1992). Incentives also elicit risk aversion; incentives motivate individuals to choose sure gains over gambles (Cubitt et al., 1998). These studies suggest that participants may be more likely to select risky options (i.e., 100% self-risk and 0% other-risk) when there is no additional reward for the final allocation outcomes in Experiment 2. However, other research demonstrates non-significant effects of financial incentives on risk preference for the options of gambles (Camerer, 1989) or pricing decisions for trading risky assets (Weber et al., 2000), which suggests no differences will be found between situations with and without an additional incentive for the final allocation outcomes. Given the variable effect of incentives, Experiment 2 examined the replicability of the findings in Experiment 1 in both situations with and without a monetary reward associated with decision-making behavior.

Participants and Design

We used the TurkPrime website (Litman et al., 2017) to recruit 400 and 800 adults in Experiments 1 and 2, respectively. However, three of the participants in Experiment 2 did not submit their responses. The participants were different in Experiments 1 and 2, resided in the United States, and completed an experiment online for a monetary reward (i.e., \$0.4).

Experiment 1 included a (gain vs. loss condition) between-subjects design whereas Experiment 2 consisted of a two (domain: gain vs. loss) by two (monetary incentive: yes or no) between-subjects design. We randomly assigned the participants to one of the two conditions (gain: n = 201; loss: n = 199) in Experiment 1 and the four conditions (gain and incentive: n = 210; loss and incentive: n = 191; gain and no incentive: n = 202; loss and no incentive: n = 194) in Experiment 2. To enhance our data quality, we followed Goodman, Cryder, and Cheema's (2013) recommendation to remove 40 and 93 participants who did not correctly answer a manipulation comprehension question in Experiments 1 and 2, respectively. The final sample sizes were 360 (52.50% male; age: M = 37.36, SD = 11.63;

gain: n = 190; loss: n = 170) in Experiment 1 and 704 (57.24% male; age: M = 38.88, SD = 12.17; gain and incentive: n = 188; loss and incentive: n = 158; gain and no incentive: n = 188; loss and no incentive: n = 170) in Experiment 2.[3]

Procedures

Participants first read that they would be randomly paired with another participant and that their final points would depend on their and the other participant's allocation choices. We developed these instructions based on the instructions for the Social Value Orientation (SVO) scale (Van Lange et al., 1997). To associate participants' final points with monetary consequences in the incentive conditions, participants were informed that they would earn an additional award (i.e., 50% of the original compensation) if they were one of the top three performers who *gained the most points* in the *gain* condition or *lost the least points* in the *loss* condition. Participants were not informed of how many participants we recruited and therefore they could not estimate the probability of receiving the additional award. Consistent with our incentive instructions, other researchers only revealed the information about the number of an additional award without the number of total participants (e.g., Bendersky, 2014; Tsai & Li, 2020).[4] By contrast, participants in the no incentive conditions of Experiment 2 read that their and the other's allocation outcomes would not affect their compensation.

Next, the participants read different example items depending on their experimental condition. The example item illustrated one SVO question with three risk-distribution options (see the example items in the supplemental materials). For the gain domain, we used Van Lange et al.'s (1997) SVO measure which had one example item and nine formal items. For

[3] We conducted power analyses to demonstrate that our sample sizes have sufficient power in Experiments 1-3. We also ran additional analyses to demonstrate the even distribution of sample sizes across different conditions before and after filtering the data in Experiments 1 and 2. These are presented in the supplemental materials.
[4] We followed the incentive instructions to pair participants, calculate each participant's final points, and awarded the three participants accordingly in each condition with the incentive instructions (in Experiments 1 and 2).

the loss domain, we created the items by subtracting the point values from 600 for the items used in Van Lange et al.'s (1997) scale and presented the negative point values as losses.

After viewing the example item, participants read a manipulation comprehension question to indicate whether they and the other would have a chance of gaining or losing certain points. Participants should provide different answers depending on their experimental conditions. To ensure the effectiveness of our manipulation, we removed participants who did not answer the question correctly (i.e., those who indicated that they would have a chance of losing/[gaining] certain points in the gain/[loss] domain) from both domains.

Participants then completed nine formal items involving two-stage decisions. During the first-stage decisions, participants allocated the outcomes between themselves and others by selecting one of the three SVO options (i.e., prosocial, individualistic, and competitive; Van Lange et al., 1997). Prosocial options included equal outcome distribution between oneself and another individual with a maximum level of joint outcomes; individualistic options included the best outcomes for oneself without considering the other's outcomes; competitive options maximized one's relative outcomes compared to the other's outcomes. The initial outcome allocation determined whether participants were prosocials or proselfs based on existing research (e.g., Hu et al., 2017). Prosocials had at least six prosocial options out of the nine responses whereas proselfs had at least six individualistic/competitive options out of the nine responses.

After the first-stage SVO decision, participants were presented with a set of risk-distribution options based on their initial allocation selection. For instance, when participants selected the expected value option "YOU gain 500 points. OTHER gains 500 points," they were subsequently presented with three risk-distribution options (see the example of the gain domain in Figure 2). The first option was 50% self-risk and 50% other-risk in which a participant and the other gained 250 points (i.e., 50% of the points allocated to the participant and the other) for sure and had a 50% chance to receive zero points or receive 500 points (i.e., doubling the other 250 points). The second option was 100% self-risk and 0% other-risk in which all the points allocated to the participant were uncertain and all the points allocated to the other were certain. The third option was 0% self-risk and 100% other-risk in which all the points allocated to the participant were certain and all the points allocated to the other were uncertain. The participants' second-stage risk allocations were used to assess a preference for distributing risks between oneself and another. We also randomized the order of the items and options to counterbalance any order effects. In Experiment 2, participants also completed a manipulation check scale regarding the monetary incentive (1 = strongly disagree; 7 = strongly agree; $\alpha = 0.95$). The items were: "There is an additional incentive based on the number of final points," "My final number of points is relevant to an additional reward," and "My final number of points is related to possible additional compensation." Finally, participants indicated their demographics and read a debriefing paragraph.

Results and Discussion

Manipulation check for incentive in Experiment 2. To examine the participants' awareness of the monetary incentive manipulation in Experiment 2, we examined whether participants had different perceptions of the association between their final points and an additional reward between the incentive and no incentive conditions. Participants in the incentive condition ($M = 5.94$, $SD = 1.05$; i.e., agree) were more likely to associate their final points with an additional reward than were those in the no incentive condition ($M = 3.74$, $SD = 1.98$; i.e., slightly disagree; $t[545.44] = 18.49$, $p < .001$, 95% CI = [1.97, 2.43]), which supported the accurate perception of the monetary incentive manipulation.

Risk distribution type and domain as predictors of selection likelihood for each risk-distribution option. To examine the effects of risk distribution types (50% self-risk and 50% other-risk, 100% self-risk and 0% other-risk, or 0% self-risk and 100% other-risk) and domains (gain vs. loss) on the selection likelihood of each risk-distribution option, we used STATA (Version 17) to run a panel-data multinomial logit model (Hartzel et al., 2001) and used marginal analyses based on the model to estimate the probabilities of selecting specific risk-distribution options and compute the results of pairwise comparisons (Williams, 2012). The model allows for including a dependent variable with more than two categorical outcomes and considers repeated measures within a specific participant (i.e., nine responses to risk allocation options). In Experiments 1 and 2, we used a dependent variable with three different options of risk allocation and set up models using participant identification numbers to control for participant-specific effects. Furthermore, different participants might have different allocation outcomes during the first-stage decisions because they completed nine different allocation items, and each item has three options. To consider the differences in the allocation outcomes, we included two sets of dummy variables to control for the differences in the items and choices, respectively, in our subsequent multinomial logit models.[5] We also used the gain-loss domain as an independent variable. In Experiment 2, we included monetary incentive as an additional predictor in the model due to the incentive manipulation of Experiment 2.

The results of pairwise comparisons between Experiment 1 (E1) and Experiment 2 (E2) demonstrated the differences in the probabilities of selecting the risk-distribution options. Specifically, participants were more likely to select “50% self-risk and 50% other-risk” (E1: M = 0.48, SE = 0.01; E2: M = 0.45, SE = 0.01) than “100% self-risk and 0% other-risk” (E1: M = 0.21, SE = 0.01, z = 11.10, p < .001; E2: M = 0.21, SE = 0.01, z = 13.13, p < .001) and “0% self-risk and 100% other-risk” (E1: M = 0.30, SE = 0.01, z = 7.49, p < .001;

[5] We also ran additional analyses without the controls for the differences in the items and choices, and the results demonstrated consistent patterns between the results with and without controls, which suggests that the differences in the first-stage allocations did not significantly influence our results. Please see the relevant results in the section titled “Results without Controls for the Allocation Outcomes During the Initial Decisions in Experiments 1 and 2” in the supplemental materials.

E2: $M = 0.33$, $SE = 0.01$, $z = 5.96$, $p < .001$). Participants were also more likely to select “0% self-risk and 100% other-risk” than “100% self-risk and 0% other-risk” (E1: $z = 4.21$, $p < .001$; E2: $z = 7.33$, $p < .001$). In Experiment 2, the results also demonstrated non-significant effects of monetary incentive on the probabilities of selecting any of the three risk-distribution options (all *p*s > .10). Therefore, people prefer (1) an equal allocation of risks the most, then (2) a minimization of their risks and a maximization of others’ risks, and (3) a maximization of their risks and a minimization of others’ risks the least.

Furthermore, we used pairwise comparisons to examine the domain effect on the selection probability of risk distribution. Table 2 presents the estimated selection probabilities of risk distribution in the gain and loss domains in Experiments 1-3. The results demonstrated that the average choice probabilities of 50% self-risk and 50% other-risk were not significantly different between the gain and loss domains (E1: $z = 0.28$, $p = .780$; E2: $z = 1.59$, $p = .112$). Compared to participants with loss outcomes, those with gain outcomes were less likely to select “100% self-risk and 0% other-risk” (E1: $z = -4.59$, $p < .001$; E2: $z = -7.70$, $p < .001$) and were more likely to select “0% self-risk and 100% other-risk” (E1: $z = 4.29$, $p < .001$; E2: $z = 5.53$, $p < .001$). In Experiment 2, we also conducted separate models by adding the interaction term of the domain variable and monetary incentive to the previous models and did not find any significant moderating effects of monetary incentive on the associations between the domain variable and the selection probabilities of the three risk-distribution options (all *p*s > .10). These findings demonstrated partial support for the prediction of the domain effect. Therefore, the results supported the notion of equality by demonstrating a preference for equal risk allocation between oneself and another and partially supported the domain effect by selecting “100% self-risk and 0% other-risk” or “0% self-risk and 100% other-risk” according to the gain-loss domain in situations with and without a monetary incentive for decision-making behavior.

SVO as a predictor and moderator of risk distribution selections. To examine SVO (prosocial vs. proself) as a predictor of risk distribution selections, we used the same panel-data multinomial logit model as in the previous section except for including SVO as a predictor. Table 2 presents the estimated selection probabilities of risk distribution for prosocials and proselfs in Experiments 1-3. The results demonstrated that compared to proselfs, prosocials were more likely to select "50% self-risk and 50% other-risk" (E1: z = 16.68, p < .001; E2: z = 15.06, p < .001) and less likely to select "100% self-risk and 0% other-risk" (E1: z = -7.99, p < .001; E2: z = -5.74, p < .001) and "0% self-risk and 100% other-risk" (E1: z = -8.85, p < .001; E2: z = -10.05, p < .001). Consistent with predictions, these results suggest that compared to proselfs, prosocials are more inclined to allocate risks equally between themselves and others.

To examine SVO as a moderator of the associations between domains and risk distribution selections, we added an interaction term of SVO and the domain variable to the previous model. The results of marginal analyses demonstrated that SVO did not consistently moderate the domain effects on the selection probability of 50% self-risk and 50% other-risk using an alpha-value of .05 (E1: z = 1.83, p = .067; E2: z = 3.03, p = .002). In Experiment 2, proselfs were less likely to select the options of 50% self-risk and 50% other-risk (z = -3.24, p = .001) in a gain condition than in a loss condition (10%[6] difference) whereas such a domain effect was smaller (3% difference) for prosocials (z = 0.94, p = .347; see the pattern of the moderating effect in Figure 3), but we did not find the same pattern significant in Experiment 1. Despite the difference based on the alpha-value threshold, we did not find a significant difference in the average selection likelihood of the moderation effect in Studies 1 and 2 (E1: M = 0.10, SE = 0.05; E2: z = M = 0.12, SE = 0.04; z = -0.40, p = .689). The results suggested

[6] The percentage refers to the average difference of the selection likelihood of a specific risk-distribution option between the gain and loss conditions.

that the statistically significant moderation effect in Experiment 2 might be due to its larger sample size than the sample size of Experiment 1.

Moreover, SVO significantly moderated the domain effects on the selection probabilities of 100% self-risk and 0% other-risk (E1: $z = 3.74$, $p < .001$; E2: $z = 4.18$, $p < .001$) and of 0% self-risk and 100% other-risk (E1: $z = -5.87$, $p < .001$; E2: $z = -7.82$, $p < .001$). Specifically, compared to prosocials, proselfs were more likely to be influenced by the domain. In gain (vs. loss) conditions, proselfs were less likely to select “100% self-risk and 0% other-risk” (E1: $z = -4.46$, $p < .001$, by 21%; E2: $z = -7.67$, $p < .001$, by 24%) and more likely to select “0% self-risk and 100% other-risk” (E1: $z = 9.55$, $p < .001$, by 37%; E2: $z = 11.19$, $p < .001$, by 34%). By contrast, such domain effects were smaller for prosocials (100% self-risk and 0% other-risk: E1 or E2: $z = -0.52$ or -3.18, $p = .604$ or $.001$, by 1% or 8%; 0% self-risk and 100% other-risk: E1 or E2: $z = 2.24$ or 2.48, $p = .025$ or $.013$, by 7% or 5%; see the results of the moderating effects in Figures 4-5). We also conducted additional analyses in Experiment 2 to examine the main or moderating effects of monetary incentive in all the models with SVO as a predictor or a moderator and did not find any significant effects (all *p*s > .10), which suggested that all the significant effects of SVO hold regardless of whether or not participants were offered incentives for making decisions. Overall, the findings indicated that compared to prosocials, proselfs were more sensitive to the effects of the gain-loss domain on unequal risk distributions in situations with and without a monetary incentive for decision-making behavior. Taken together, prosocials tend to allocate risks equally between themselves and others whereas proselfs have different patterns of unequal risk allocations depending on the gain-loss domain.

Although we did not find significant differences in risk allocation decisions between the conditions with and without an incentive in Experiment 2, by offering incentives, participants might experience a sense of competitiveness or seek risks because only the most successful participants would receive the additional reward. To provide a clear test on the effects of incentives on risk allocations, researchers could associate monetary incentives with only risk allocation decisions, such as adjusting study compensation based on participants' risk allocations in gain or loss scenarios. To avoid any unintended consequences caused by the selective reward scheme in Experiments 1 and 2 as well as generalize our findings to situations without an additional reward, we conducted our next experiment without incentives.

Experiment 3: Separation between SVO and Risk Distribution Decisions

To address the issue of the inconsistent risk allocation options (selected by participants) in the gain and loss domains in Experiments 1 and 2, we conducted Experiment 3 by providing comparable sets of risk allocation options in the two domains and separating the SVO choices and risk allocation options. In Experiments 1 and 2, we cannot conclude whether participants in the gain and loss domains selected parallel options during the initial decisions of expected value allocations based on the SVO classification. Moreover, the participants' initial decisions determined risk allocation options, which might not provide fair comparisons in risk allocations between the gain and loss domains. Thus, Experiment 3 presented parallel risk allocation options in the gain and loss domains without participants' initial decisions. We only used the SVO choices to identify prosocials or proselfs.

Participants, Design, and Procedures

We used the same method as in Experiments 1 and 2 to recruit a different sample that included 562 adults (53.38% male; age: M = 41.14, SD = 10.78; \$1.3 compensation). Experiment 3 involved randomly assigning participants to one of the two domain conditions (gain: n = 281; loss: n = 281).

Participants first completed Van Lange et al.'s (1997) social value orientation (SVO) measure. We used the same methods as those in Experiments 1 and 2 and the participants' responses to this scale to identify prosocials and proselfs. Next, participants completed different risk allocation items depending on the experimental condition. They read one example item of risk allocation and completed four risk allocation items. We followed a similar procedure in the previous two experiments to create different items in the gain and loss domains. For the loss domain, we created the items by subtracting the expected point values from 1,000 for the items used in the gain domain and presented the negative expected point values as losses. All the items are presented in the supplemental materials. To control for order effects, we also randomized the order of the items and options within the 9-item SVO scale and the 4-item risk allocation scale, respectively. Finally, participants completed the manipulation check items (i.e., "My allocations allowed the other and me to have a chance to gain points." and "My allocations allowed the other and me to have a chance to lose points"; 1 = strongly disagree; 7 = strongly agree) and indicated their demographics.

Results and Discussion

Manipulation check for domain difference. To examine the effectiveness of our domain manipulation, we used *t*-tests to examine whether participants had different perceptions of allocation between the loss and gain domains. The results demonstrated that compared to participants in the loss domain ($M = 3.89$, $SD = 2.22$), participants in the gain domain ($M = 5.80$, $SD = 1.07$) were more likely to indicate that their allocations allowed themselves and others to have a chance to gain points ($t[403.86] = 13.00$, $p < .001$, 95% CI = [1.62, 2.20]). Moreover, compared to participants in the loss domain ($M = 5.86$, $SD = 1.13$), participants in the gain domain ($M = 3.83$, $SD = 1.77$) were less likely to indicate that their allocations allowed themselves and others to have a chance to lose points ($t[477.25] = -16.22$, $p < .001$, 95% CI = [-2.28, -1.79]). The findings supported the effectiveness of the domain manipulation.

Risk distribution type and domain as predictors of selection likelihood for risk distribution. We used the same analyses as in Experiments 1 and 2 to investigate the effects of risk distribution types and domains on the probabilities of selecting specific options. We also used the same analytical model setting in Experiment 1 except for including two sets of dummy variables to control for the differences in the items and choices in the first-stage decisions because the first-stage decisions were independent of risk distribution decisions in Experiment 3. To differentiate between the four risk allocation items, we also used a set of dummy variables as a control variable in the model to explain the differences in the risk allocation items. The results of pairwise comparisons demonstrated the differences in the probabilities of selecting the risk-distribution options. Specifically, participants were more likely to select "50% self-risk and 50% other-risk" (M = 0.50, SE = 0.01) than "100% self-risk and 0% other-risk" (M = 0.19, SE = 0.01, z = 14.91, p < .001) and "0% self-risk and 100% other-risk" (M = 0.31, SE = 0.01, z = 6.80, p < .001). Participants were more likely to select "0% self-risk and 100% other-risk" than "100% self-risk and 0% other-risk" (z = 6.07, p < .001). Thus, the results replicated the order of risk preference found in Experiments 1 and 2.

Furthermore, the results demonstrated that compared to participants in a loss domain, those in the gain domain were less likely to select "50% self-risk and 50% other-risk" (z = -8.21, p < .001) and "100% self-risk and 0% other-risk" (z = -4.35, p < .001) and were more likely to select "0% self-risk and 100% other-risk" (z = 12.06, p < .001). Overall, the findings of Experiment 3 replicated the findings of Experiments 1 and 2 regarding the domain effects on unequal risk allocations. In Experiment 3, we also detected the significant domain effect on equal risk allocations (i.e., the option of 50% self-risk and 50% other-risk), which was not found in Experiments 1 and 2 whereby risk-distribution options were presented based on participants' selections of the SVO options.

SVO as a predictor and moderator of risk distribution selections. To examine SVO as a predictor of risk distribution selections, we used the same analyses as in the previous section except for including SVO as a predictor and the gain-loss domain as a control variable. The results demonstrated that compared to proselfs, prosocials were more likely to select "50% self-risk and 50% other-risk" (z = 8.75, p < .001) and less likely to select "100% self-risk and 0% other-risk" (z = -3.84, p < .001) and "0% self-risk and 100% other-risk" (z = -5.72, p < .001). The results of Experiment 3 replicated the significant findings of Experiments 1 and 2 by demonstrating that compared to proselfs, prosocials are more likely to allocate risks equally.

To examine SVO as a moderator of the associations between domains and risk distribution selections, we added an interaction term of SVO and the domain variable to the previous model. The results of the marginal analyses demonstrated that SVO did not significantly moderate the domain effect on the selection probability of 50% self-risk and 50% other-risk (z = -0.96, p = .338). However, the results of Experiment 3 showed that SVO significantly moderated the domain effects on the selection probabilities of 100% self-risk and 0% other-risk (z = 4.93, p < .001) and of 0% self-risk and 100% other-risk (z = -3.80, p < .001). Specifically, the results showed stronger domain effects on proselfs than prosocials. In a gain (vs. loss) domain, proselfs were less likely to select "100% self-risk and 0% other-risk" (z = -6.71, p < .001, by 29%) and more likely to select "0% self-risk and 100% other-risk" (z = 11.82, p < .001, by 46%). By contrast, such domain effects were smaller for prosocials (100% self-risk and 0% other-risk: z = -1.49, p = .137, by 4%; 0% self-risk and 100% other-risk: z = 7.48, p < .001, by 26%; see the results of the moderating effects in Figures 4-5). The results of Experiment 3 replicated the significant findings of Experiments 1 and 2 regarding the moderating effects of SVO on the associations between domains and unequal risk distribution selections in a new study setting with separation between SVO and risk allocation options.

General Discussion

The results of three experiments consistently show that people prefer options that involve a relatively equivalent level of risk distribution to themselves and others (i.e., equal risk distributions) over those that involve a maximum or minimum level of risk distribution to themselves or others (i.e., unequal risk distributions). These results supported the notion of equality. Moreover, compared with a loss domain, a gain domain is more likely to increase choices that minimize one's own risk and maximize the other's risk and decrease choices that maximize one's own risk and minimize the other's risk. Compared with proselfs, prosocials are also more likely to favor equal risk distributions over unequal risk distributions. However, the significant domain effects on unequal risk distributions are stronger for proselfs than prosocials. Our findings suggest that prosocials prefer to follow the principle of equality whereas proselfs tend to distribute unequal risks based on the domain effects. Our results are also applicable in research settings with and without a monetary incentive for decision-making behavior. Therefore, our research elucidates how risk distribution, domain, and SVO influence interpersonal allocation decisions.

Theoretical Contribution

Our findings advance the literature regarding self-other differentiation and risk preference. Previous research has demonstrated that people avoid risks or seek risks when making decisions for themselves or others (Beisswanger et al., 2003; Wray & Stone, 2005). Our research demonstrates a similar pattern: participants prefer options that minimize their risks and maximize others' risks to those that maximize their risks and minimize others' risks. Hsee and Weber (1997) used the risk-as-feelings hypothesis to explain the differences in risk preference between oneself and others. Specifically, negative feelings regarding risks prevent people from pursuing risks but people may have difficulty considering others as sharing the same strong feelings toward risks and therefore assume others as more likely to pursue risks than themselves. Other research supports this hypothesis by demonstrating that when people experience anxiety, they tend to select more risk-averse options for themselves but not in decisions for others (Wray & Stone, 2005). However, our research complements previous research by demonstrating that the majority of participants prefer equal risk distributions between themselves and others to unequal risk distributions, including the options that minimize their risks and maximize others' risks. Our investigation offers a novel implication for risk preference and self-other distinction by suggesting that when distributing risks, people may have a similar and predominant risk preference for themselves and others – equal risk allocation. Moreover, research on allocation decisions focuses on equal outcome distributions (e.g., Messick & Schell, 1992) whereas our research serves as the pioneering investigation that highlights equal risk allocations.

Furthermore, our research contributes to the understanding of domain effects on risk preferences. Previous research mainly focused on the domain effects on individuals' risk preferences without making a self-other distinction; demonstrating the reflection effect of prospect theory: people seek risks in a loss situation to reduce possible losses and avoid risks in a gain situation to obtain certain gains (e.g., Liu et al., 2014; Tversky & Kahneman, 1981). In contrast to research regarding the domain effect on one's own risk preference, Andersson et al. (2014) found the inclusion of potential losses as outcomes reduces the similarity of risk preference for one's own and others' decisions. Specifically, when potential outcomes included both gains and losses, people were more risk-averse for their decisions than for the decisions on behalf of others. However, when potential outcomes included only gains, people took the same risks for themselves and others. Their findings suggest that potential losses increase risk aversion more significantly when individuals make decisions for themselves than for others. By contrast, other research demonstrated that individuals were more likely to seek risky options for themselves than others in a loss domain (Batteux et al., 2019). Consistent with the finding, our research demonstrates that a loss domain increases choices that maximize one's own risk and minimize the other's risk. Our findings may explain why people who made decisions for themselves were more risk-seeking than those who made medical surrogate decisions for severe medical conditions (Batteux et al., 2020) and pain relief options (Loued-Khenissi et al., 2022). That is, people may perceive an unhealthy situation as a loss and therefore would be more likely to accept a risky surgery to treat themselves. Future research can examine this potential explanation by presenting a health situation as a gain or a loss and evaluate whether people's treatment plans for themselves and others will differ based on the domain.

Our research also clarifies how SVO predicts risk preference in allocation tasks. Although most previous research demonstrates positive associations between prosocial (vs. proself) orientations and equal allocations, these previous studies focus on *certain* outcome distributions (e.g., Olschewski et al., 2019; Van Lange, 1999). Our research extends such associations to situations that require determining a ratio of uncertain outcomes to certain outcomes and demonstrates that prosocials (vs. proselfs) prefer an equal ratio for themselves and others. Our work also contributes to a growing body of research on SVO and risk preference for oneself and others. Previous research demonstrated that people with competitive orientations selected more risky options for themselves than for others whereas those with prosocial orientations selected similar options for themselves and others (Olschewski et al., 2019). Consistent with the prosocials' undifferentiated selections, our research shows that prosocials tend to allocate equal and moderate levels of risks to themselves and others. However, our findings suggest that proselfs are more likely to maximize their own risk-seeking in a loss domain than a gain domain. Thus, the domain may influence people with competitive orientations to produce different risk preferences for themselves and others.

Limitations and Future Research Directions

Although our research replicated the significant findings of risk allocation in situations with and without a monetary incentive, future research can consider magnifying the consequences of decision-making behavior and examine whether our findings can be generalized to situations with significant consequences. Even though previous research replicated the reflection effect predicted by prospect theory in both hypothetical and incentivized scenarios (Schoemaker, 1990), other research demonstrated that an increase in cash payoffs reduced the reflection effect (Laury & Holt, 2005); when decision outcomes were associated with increased cash payoffs, people became risk-averse in both gain and loss situations. These findings suggest that an increase in monetary incentives may reduce the domain effect on risk preference. Therefore, future research can examine whether and how different levels of monetary compensation will influence the domain effect on risk allocation.

Finally, future research can investigate relevant and situational predictors of risk allocation. Although our findings focus on a dispositional predictor (i.e., SVO) of risk allocation, our work implies that situational predictors of SVO influence risk allocation. Van Lange (2000) has proposed that social norms, relationship-relevant motives, and others' characteristics significantly influence SVO. For instance, an equality norm and relationship commitment promote a prosocial orientation. Moreover, perceptions of another individual's likability, closeness, and similarity activate a prosocial orientation and deactivate a proself orientation. Therefore, an equality norm, relationship commitment, and others' favorable characteristics may promote equal risk distribution and reduce unequal risk distribution.

Conclusion

By investigating multiple viewpoints on how risk distribution, gain-loss domain, and SVO influence allocation decisions, our research illustrates how people allocate risks between themselves and others. Our findings are applicable to various decisions in daily life which involve costly or rewarding outcomes that involve oneself and others, such as whether or not to accept an offer of going out on a date or what investments to include in a child's college fund. More importantly, many of these social situations have gains or losses that may occur with specific probabilities for oneself and another. Our findings demonstrate that people are more likely to select options that involve an equal and middle level of risk distribution to themselves and others (i.e., shared risks) over those that involve a maximum or minimum level of risk distribution to themselves or others (i.e., unshared risks). Our findings supported the notion of equality by demonstrating a preference for shared risks over unshared risks. Compared to individuals in loss domains, those in gain domains are also more likely to minimize one's own risk and maximize others' risk. We also propose important future research directions on risk allocation. In conclusion, our work clarifies the impacts of risk distribution, domain, and SVO on allocation decisions and demonstrates the prevalence of shared risk distribution between oneself and others.

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Table 1

Risk Distribution Type in the Gain and Loss Conditions

	50% Self-risk and 50% Other-risk		100% Self-risk and 0% Other-risk		0% Self-risk and 100% Other-risk	
	Gain	Loss	Gain	Loss	Gain	Loss
(1) Equality	High	High	Low	Low	Low	Low
(2) Domain Effect	Low	High	Low	High	High	Low

Note: The word "Low/High" indicates a low/high percentage of participants who selected the corresponding options.

Table 2

Risk Distribution Type (Estimated Selection Probabilities) in the Gain and Loss Domains and for Prosocials and Proselfs

	50% Self-risk and 50% Other-risk		100% Self-risk and 0% Other-risk		0% Self-risk and 100% Other-risk	
	Gain	Loss	Gain	Loss	Gain	Loss
Experiment 1	0.49_a	0.48_a	0.16_b	0.28_a	0.35_a	0.24_b
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)
Experiment 2	0.47_a	0.43_a	0.14_b	0.29_a	0.39_a	0.27_b
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)
Experiment 3	0.38_b	0.61_a	0.13_b	0.25_a	0.49_a	0.14_b
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)
	50% Self-risk and 50% Other-risk		**100% Self-risk and 0% Other-risk**		**0% Self-risk and 100% Other-risk**	
	Prosocials	Proselfs	Prosocials	Proselfs	Prosocials	Proselfs
Experiment 1	0.74_a	0.26_b	0.07_b	0.30_a	0.19_b	0.44_a
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Experiment 2	0.65_a	0.30_b	0.13_b	0.25_a	0.22_b	0.45_a
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
Experiment 3	0.60_a	0.35_b	0.15_b	0.24_a	0.25_b	0.40_a
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)

Notes: The estimated selection probabilities and standard errors are outside and in parentheses, respectively. Different subscript letters (i.e., a and b) indicate a significant difference between two mean scores ($p < .05$) within each risk distribution; a denotes a larger mean score than b. By contrast, the same subscript letters (i.e., a and a) indicate a non-significant difference between two mean scores ($p > .05$).

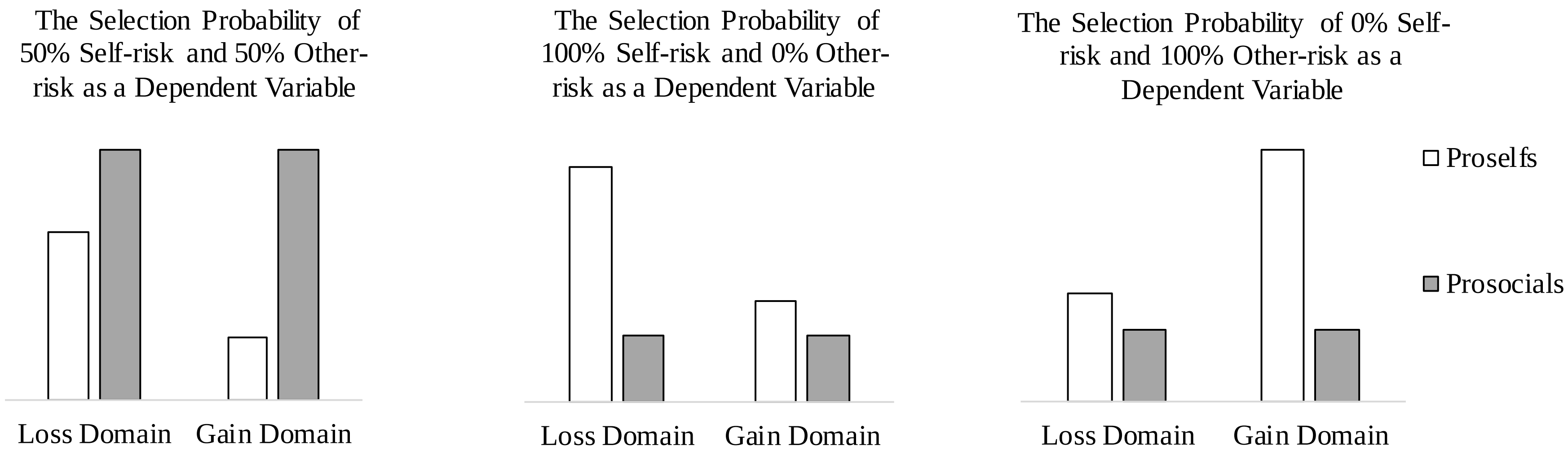

Figure 1. Predicted Interaction Effects of SVO and the Gain vs. Loss Domain on Risk Distribution Choices

	Domain					
	Gain Domain			Loss Domain		
Social Value Orientation	Prosocial Option	Individualistic Option	Competitive Option	Prosocial Option	Individualistic Option	Competitive Option
Expected Values	YOU: +500 OTHER: +500	YOU: +550 OTHER: +300	YOU: +500 OTHER: +100	YOU: -100 OTHER: -100	YOU: -50 OTHER: -300	YOU: -100 OTHER: -500
Risk Distribution (3 Options)						
50% Self-risk and 50% Other-risk	YOU: +750 (50%) +250 (50%) OTHER: +750 (50%) +250 (50%)	YOU: +825 (50%) +275 (50%) OTHER: +450 (50%) +150 (50%)	YOU: +750 (50%) +250 (50%) OTHER: +150 (50%) +50 (50%)	YOU: -150 (50%) -50 (50%) OTHER: -150 (50%) -50 (50%)	YOU: -75 (50%) -25 (50%) OTHER: -450 (50%) -150 (50%)	YOU: -150 (50%) -50 (50%) OTHER: -750 (50%) -250 (50%)
100% Self-risk and 0% Other-risk	YOU: +1000 (50%) 0 (50%) OTHER: +500 (100%)	YOU: +1100 (50%) 0 (50%) OTHER: +300 (100%)	YOU: +1000 (50%) 0 (50%) OTHER: +100 (100%)	YOU: -200 (50%) 0 (50%) OTHER: -100 (100%)	YOU: -100 (50%) 0 (50%) OTHER: -300 (100%)	YOU: -200 (50%) 0 (50%) OTHER: -500 (100%)
0% Self-risk and 100% Other-risk	YOU: +500 (100%) OTHER: +1000 (50%) 0 (50%)	YOU: +550 (100%) OTHER: +600 (50%) 0 (50%)	YOU: +500 (100%) OTHER: +200 (50%) 0 (50%)	YOU: -100 (100%) OTHER: -200 (50%) 0 (50%)	YOU: -50 (100%) OTHER: -600 (50%) 0 (50%)	YOU: -100 (100%) OTHER: -1000 (50%) 0 (50%)

Figure 2. An Example of Choices Including Social Value Orientation and Risk Distribution in Experiments 1 and 2

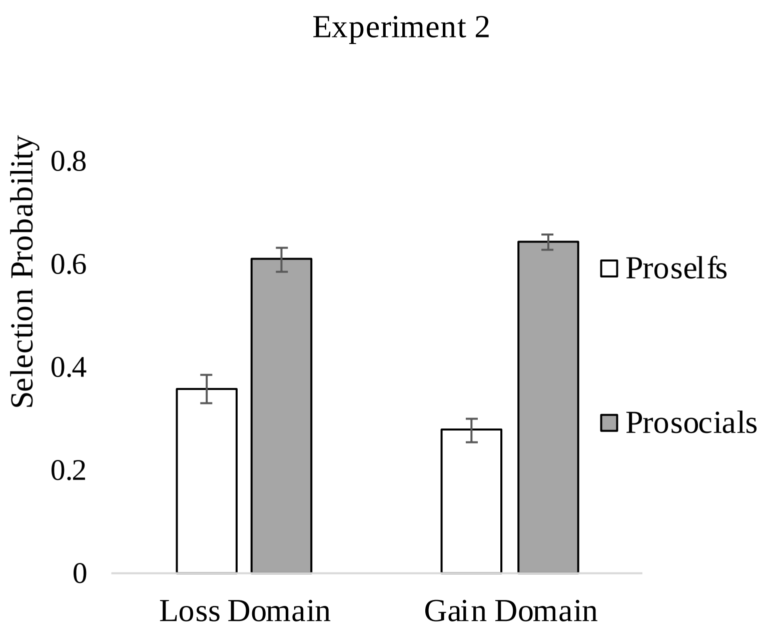

Figure 3. The Moderating Effect of SVO on the Association Between the Domain and the Selection Probability of 50% Self-risk and 50% Other-risk in Experiment 2.

Note: The vertical axis indicates the selection probability of "50% self-risk and 50% other-risk" in a specific condition. The error bar is depicted based on one standard error above and below the mean of the selection probability in each condition.

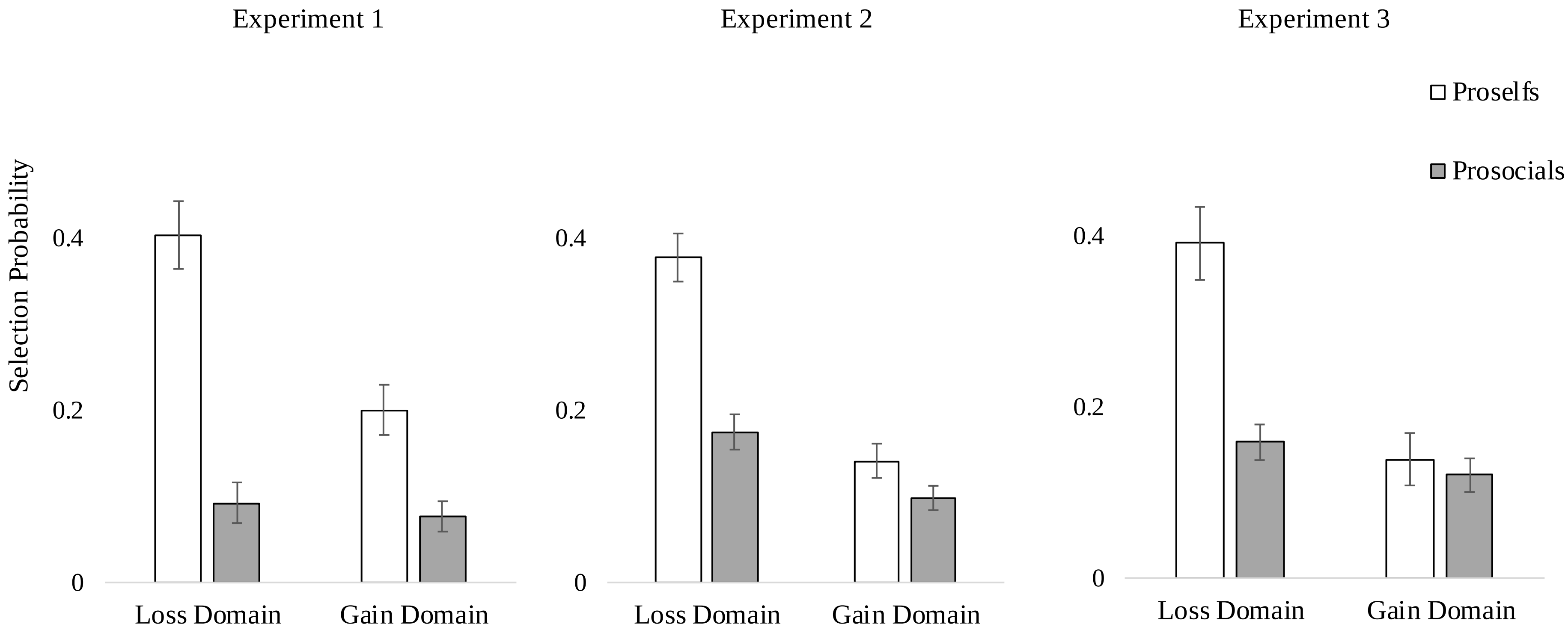

Figure 4. The Moderating Effect of SVO on the Association Between the Domain and the Selection Probability of 100% Self-risk and 0% Other-risk.

Note: The vertical axis indicates the selection probability of "100% self-risk and 0% other-risk" in a specific condition. The error bar is depicted based on one standard error above and below the mean of the selection probability in each condition.

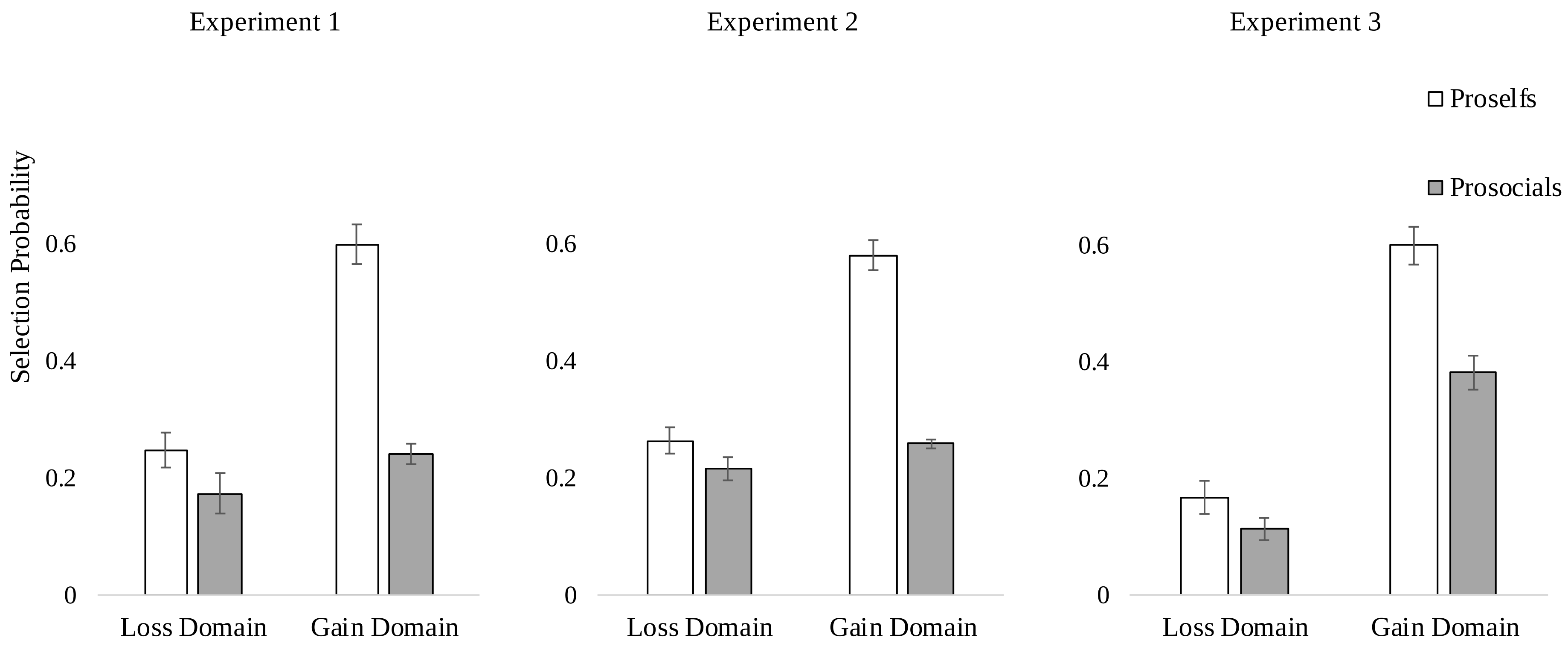

Figure 5. The Moderating Effect of SVO on the Association Between the Domain and the Selection Probability of 0% Self-risk and 100% Other-risk.

Note: The vertical axis indicates the selection probability of "0% self-risk and 100% other-risk" in a specific condition. The error bar is depicted based on one standard error above and below the mean of the selection probability in each condition.