

# Asymmetrical friendships? People are willing to risk COVID-19 infection from friends but are reluctant to pass it on to them

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## Abstract

Although most protective behaviors related to the COVID-19 pandemic come with personal costs, they will produce the largest benefit if everybody cooperates. This study explores two interacting factors that drive cooperation in this tension between private and collective interests. A preregistered experiment ( $N = 299$ ) examined (a) how the quality of the relation among interacting partners (social proximity), and (b) how focusing on the risk of self-infection versus onward transmission affected intentions to engage in protective behaviors. The results suggested that risk focus was an important moderator of the relation between social proximity and protection intentions. Specifically, participants were more willing to accept the risk of self-infection from close others than from strangers, resulting in less caution toward a friend than toward a distant other. However, when onward transmission was the primary concern, participants were more reluctant to effect transmission to close others, resulting in more caution toward friends than strangers. These findings inform the debate about effective nonclinical measures against the pandemic. Practical implications for risk communication are discussed.

## 1 | INTRODUCTION

To curb the spread of the SARS-CoV-2 virus, governments have introduced regulations that put the wearing of face masks in the center of their efforts. Despite concerns that masking may instigate a “false sense of security” (WHO, 2020; but see Seres et al., 2021), protective masks have become compulsory for the general population in many places. While they protect both the wearers and the social environment, it is the primary goal to minimize onward transmission. To ensure maximum compliance with mask-wearing mandates (see also Eikenberry et al., 2020; Howard et al., 2021), it is important to find out how individuals can be motivated to engage in behaviors that benefit others and accept the personal costs they come with, in particular the inconveniences that are caused by wearing a mask. Thus, it must be

asked how compliance with masking and other voluntary protection behaviors can be effectively promoted.

A common framework for the study of how short-term personal interests (e.g., avoid the costs of wearing masks) are traded off against long-term public interests (e.g., effectively curb the spread of the virus) is the concept of “social dilemmas” (Dawes, 1980; Van Lange et al., 2013; Parks et al., 2013; Spadaro et al., 2022). Social dilemmas depict a conflict where everyone has an incentive to minimize one's personal costs of cooperation (both financial and psychological) while profiting from the compliance of the others. Mask-wearing and many other protective behaviors in the context of the COVID-19 pandemic seem to correspond to this particular type of conflict (Van Bavel et al., 2020). Hence, the social dilemma literature has been extensively referenced to provide advice for policy makers (Johnson et al., 2020; Korn et al., 2020). At the same time,

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there are doubts whether the social dilemma concept provides a useful model to guide policy-making in the pandemic (e.g., Romano et al., 2021).

Research on social dilemmas is strongly predicated on the economic theory of strategic games (von Neumann & Morgenstern, 1944; Rapoport, 1966). While classic game theory models cooperation in social dilemmas purely as a function of utility, more recent extensions also consider psychological processes (e.g., Camerer, 2003). Specifically, individuals' beliefs and experiences, affective states, personality, or the availability of cognitive resources have been considered in formal games (see also Van Lange et al., 2013; Parks et al., 2013).

While individuals' benefits of cooperation versus defection are typically fixed, like the prisoner's dilemma game (Dawes, 1980), they are more difficult to allocate in applied social dilemmas like those arising from the COVID-19 pandemic. This may be one reason why it is not always straightforward to translate experimental results from formal games into management advice for the COVID-19 pandemic response (Romano et al., 2021). For instance, the personal benefit of defection in the mask-wearing dilemma is determined by how strongly one feels inconvenienced. Also, the benefit of cooperative behavior like voluntary masking is determined by one's estimation of how big a common threat the pandemic poses, and how likely one thinks that protective masks may reduce the associated risks. Notably, the threats of the pandemic are rather complex because they not only comprise the danger of contracting the virus but also the subsequent risk of transmitting it to others (see also Brewer et al., 2007; Sheeran et al., 2014; for the role of risk perception in health behavior more generally).

Moreover, while there is no room for social preferences in classic game theory, more recent research on social dilemmas converges on the notion that trust and reputation are important drivers of cooperation (Krueger et al., 2020; Van Lange et al., 2013). Therefore, characteristics of the decision environment and the interacting partners are equally important to understand the dynamics of cooperative choice. Specifically, it can be expected that the relation between those who interact plays an important role. This relation, however, is rarely specified in laboratory studies on strategic games (but see, e.g., De Cremer & van Dijk, 2005; Krueger et al., 2016). Instead, their primary interest is to study the interaction of complete strangers to learn how trust and reputation develop over repeated interactions (Krueger et al., 2020; Van Lange et al., 2013).

In contrast, COVID-19 dilemmas often involve close others like friends or relatives. As there is ample evidence that the affective proximity of social relations is an important predictor of behavioral decisions (e.g., Akerlof, 1997; Baldwin, 1992; Trope & Liberman, 2010), it is vital to consider the proximity of relations among individuals who interact to understand when and why people fail to cooperate. The current research thus focuses on social proximity and risk perception as determinants of COVID-19 protection behaviors. We build on prior research in basic and applied social psychology to study the motivational forces that drive pandemic behavior in the area of conflict between personal and collective interests.

We propose that engaging in voluntary protective behaviors depends on both the quality of the relation with one's interaction partner and the specific allocation of risk. In essence, we suggest that a focus on the relative risk for oneself versus others moderates the relation between social proximity and voluntary protection behaviors. In more detail, if individuals focus on self-infection, we predict that they will report a higher readiness to practice protective behaviors when interacting with socially distant others, compared to close others (H1). In contrast, if onward transmission is in people's focus, a reverse pattern could emerge (H2).

This article reports an experiment to test these predictions. Before we explain our experimental approach in more detail, we provide more background for the above hypotheses. Note that we rely in part on the extant social dilemma literature to build our argument. However, our research was not designed to test any particular theory of cooperation in social dilemmas (e.g., Balliet et al., 2017; see Parks et al., 2013; for a review). Rather, we are convinced (see also Van Bavel et al., 2020; Johnson et al., 2020) that social dilemmas provide a useful conceptual framework to derive predictions about relevant factors that may drive individuals' behavioral response to the pandemic.

## 2 | PRESENT RESEARCH

The processing of social information, and thus, the behavior towards others, is at least partially determined by social proximity (Akerlof, 1997; Baldwin, 1992; Trope & Liberman, 2010). We define social proximity broadly as the closeness of the personal relation with another individual. That is, social proximity is high when an interaction involves a socially close other like family members or friends, while social proximity is low when interacting with socially distant others like strangers.

How does this closeness to others affect pandemic behaviors in everyday social interactions? Research on social dilemmas suggests that social proximity raises decision makers' cooperation expectations, which may in turn increase actual cooperation (Krueger et al., 2020; see also Bogaert et al., 2008). Thus, individuals should be more inclined to practice protection behaviors when interacting with close relatives or friends compared to interacting with unknown strangers. But importantly, we argue that cooperation with close versus distant others will depend at least in part on individuals' focus on their own versus others' risks, which adds an important qualification to basic assumptions from social dilemma research.

How could a divergent risk focus on self-infection versus onward transmission impact COVID-19 protection behaviors? Earlier research showed that increasing the salience of social connectedness enhanced cooperation in a social dilemma (Utz, 2004). In line with this finding, Cornelia Betsch et al. (2013) demonstrated that communicating the collective benefit of vaccination increased individuals' intentions to get inoculated. Hence, focusing on potential harm to others may be a viable strategy to promote protective behaviors.

Some preliminary evidence pointing to the benefits of directing people's attention toward the concrete risk of others within a COVID-19 context was provided by Lunn et al. (2020). In this study, participants viewed informational posters that highlighted either the possibility of multiple onward infections (i.e., exponential transmission rates) in an abstract fashion or the risk of infecting identifiable others. Compared with a purely information-based poster, participants in the personalized focus conditions reported higher intentions to practice social distancing. In addition, it was shown that prosociality predicted pandemic health behaviors like mask-wearing and social distancing (Campos-Mercade et al., 2021).

A second line of research also suggested beneficial effects of focusing on the risks of others (Atanasov et al., 2015; Garcia-Retamero & Galesic, 2012). Generally, people become more risk-averse when their choices would affect others, rather than themselves. Indeed, research on the self-other risk distinction documents that under some circumstances, decision makers were more cautious if they were choosing for others (see Polman & Wu, 2020; for a review and meta-analysis). Medical and safety decisions (e.g., mammography screenings, see Atanasov et al., 2015) were found to be more cautious, while other interpersonal choices that involve social risks (e.g., asking someone out on a date) were riskier for others than for the self (Polman & Wu, 2020).

This pattern is consistent with a more general tendency for illusory optimism regarding one's own future which implies that people often feel to be better off than the average (Zell et al., 2020). This optimism also manifests itself when people think about adverse future life events (Moutsiana et al., 2015; Oettingen et al., 2019; Sharot, 2011). A common finding in this area of research is that decision makers underestimate the likelihood of negative events even if they are presented with realistic information about the actual risks they face (e.g., Garrett & Sharot, 2017; Sharot et al., 2011). Responses are generally more accurate (i.e., to a lesser extent optimistically biased) when participants estimate the likelihood of the same event for others (e.g., Weinstein, 1980).

In the context of COVID-19, it was shown that risk perception is susceptible to this optimism bias (Druică et al., 2020; Park et al., 2021). Following this line of reasoning, a focus on the risks of others could lead to more accurate appraisal of the pandemic risks, and therefore in turn to more caution in handling one's own role during the pandemic. These considerations and further consistent evidence obtained recently in a COVID-19 context (e.g., Christner et al., 2020; Enea et al., 2022; van Hulsen et al., 2021; Jung & Albarracín, 2021) emphasize the potential of prosocial messages, that is, focusing on the pandemic risks of others, to motivate protective behaviors. However, more importantly for the present research, we argue that risk focus is an important moderator of the relation between social proximity and protective behaviors. Specifically, we expected more protection behaviors when individuals interact with a socially distant other (like a stranger) in a situation with salient risk of self-infection, but not when interacting with a friend in the same situation.

Our rationale was based on an extension of the optimism bias to close others. While risk estimations generally become less biased and

more risk-averse when made for others (Atanasov et al., 2015; Weinstein, 1980), there is also evidence to suggest that social proximity to the other person matters (Sharot, 2011; Weinstein, 1980; see also Kappes et al., 2018). Accordingly, the optimism bias may spread to socially close others. In other words, people not only estimate their own infection risk to be lower than that of peers, but they also believe that their close friends and family have a lower infection risk than the average peer.

This phenomenon is consistent with a social identity perspective on (pandemic) risk taking (Cruwys et al., 2020; Cruwys, Greenaway, et al., 2021). Cruwys, Stevens, et al. (2021) argue that a shared social identity (e.g., membership of the same group), through increasing trust toward in-group members, attenuates perceptions of pandemic risks. Hence, individuals would be expected to consider a situation as less dangerous when it involves interacting with a close other. As a consequence, the need to act cautiously and comply with protection recommendations would be reduced. We claim that this is the case if the self-infection risk is salient. In such situations, individuals can therefore be expected to interact less cautiously with friends than with strangers. Hence, H1 states that in a situation with salient risk of self-infection, participants will be less inclined to comply with protection recommendations (i.e., behave more recklessly) when interacting with a socially close compared with a socially distant other.

If onward transmission is the salient concern, illusory optimism may still lead individuals to think that friends pose a lesser risk than strangers. But earlier research shows that the anticipated negative consequences of a COVID-19 infection weigh heavier for close others than for strangers (Maaravi & Heller, 2020). People may think that their friends have lower infection risk than strangers, but if they contract the virus, the consequences would be harsher for them than for strangers. This may be an expression of higher empathic concern for friends than for strangers, which could result in more cooperative behavior (Pfattheicher et al., 2020).

On average, these counter-acting forces may cancel each other out resulting in comparable levels of recklessness among friends and strangers when individuals focus on onward transmission. Pondering the negative consequences for friends could also outweigh the influence of the optimism bias and result in comparatively more recklessness around strangers than if friends were involved. In a situation with salient risk of onward transmission, participants would then be more inclined to comply with protection recommendations (i.e., behave less recklessly) when interacting with a socially close compared with a socially distant other. Finally, possibly but perhaps theoretically less plausible, when focusing on onward transmission, participants may behave more recklessly toward friends than strangers.

Because the first two considerations seemed equally plausible to us, we did not preregister any prediction for the Move (onward transmission focus) scenario (see below). We note however that the idea of counter-acting forces canceling each other out on average essentially predicts a null effect for social proximity on the recklessness score in this situation. The experiment was not designed

to provide evidence for this null hypothesis. Our exploratory analysis, therefore, tests the alternative hypothesis that compliance with protection recommendations increases in interactions with socially close others, relative to socially distant others (H2).

### 3 | METHOD

#### 3.1 | Participants and design

In line with the preregistered sampling plan (see <https://osf.io/kab2p>), 303 participants residing in Germany were recruited via [www.prolific.co](http://www.prolific.co) (Prolific, Oxford, UK) to take part in a 5-minute online experiment hosted at [www.sosicurvey.de](http://www.sosicurvey.de) (SoSciSurvey, Munich, Germany) on February 25, 2021. Participation was compensated with €0.85. According to the preregistered exclusion criteria, four participants were removed because German was not their first language. So, the final sample size was  $N = 299$  ( $M_{\text{Age}} = 30.2$  years,  $SD = 9.4$ ; 115 female, eight participants indicated a sex other than female or male or did not wish to disclose). Thirty-four participants indicated being members of a high-risk group (two did not want to disclose). In our sample, around one-third of participants reported having had been tested for COVID-19 in the past months (97 out of 299 participants; one did not disclose). Only four participants reported a positive test result.

The experiment was run as a 2 (between, social proximity: friend vs. stranger)  $\times$  2 (within, risk focus: self-infection vs. transmission to others) mixed factorial design. Participants were randomly assigned to one of the two between-subjects conditions. The order of presentation of the within-subject conditions (i.e., the two choice scenarios; see below) was randomized to avoid sequence effects. The experiment received approval from the local ethics review committee before it was conducted. We report all manipulations, measures, and exclusions.

#### 3.2 | Materials and procedure

Participants were instructed to carefully read two situations describing everyday social interactions with some relation to the measures currently in place to curb the spread of the virus. After reading these scenarios, participants indicated on a slider scale between 0 and 100 which of two proposed actions they would prefer (the cautious action was coded 0, the more reckless one was coded 100, see below). This response, on each of the two scenarios, was our main dependent variable, to which we henceforth refer as the “recklessness score.” On the next page, participants answered questions about how they perceived the situation in terms of risks and potential consequences, before proceeding to the next scenario.

Two scenarios were designed to be tempting noncompliance with current recommendations. That is, we described everyday social interactions in which many people struggle to decide what the best course of action would be. First, the Park scenario (self-infection

focus) revolved around a conversation in a public park. It described a situation in which participants may ponder to wear a face-mask to reduce the personal risk of incurring an infection. Second, the Move scenario (onward transmission focus) described an individual's decision to cancel a meeting with others due to a suspected infection. In this case, participants were prompted to consider the possibility that they had incurred the virus, albeit with only very mild symptoms (a situation which, after all, many of us could find ourselves in without even knowing; Day, 2020; Gao et al., 2021).

The two scenarios varied along the risk focus variable. The risk of self-infection was more salient in the Park scenario, while the risk of transmitting the virus to others was more salient in the Move scenario. Participants in both social proximity conditions (friend vs. stranger) read the same scenarios. But the interaction partner differed. According to the conditions, participants either read about interacting with friends or about interactions with strangers in both scenarios (see Table A1 at <https://osf.io/kab2p>).

In both scenarios, one option (coded 0) was to behave rather cautiously and avoid any risks of infection or onward transmission. This option was costly in terms of one's personal interests or habits. The other option (coded 100) was more in line with one's personal motives or routines, but also riskier in terms of possible infection or transmission. Importantly, none of the alternative actions was strictly prescribed or prohibited by the regulator. In Germany at the time of testing, a common recommendation was to wear a face mask at all times when interacting with others. Confirmed infections were reportable to the health authorities, and caution was obliged when an infection was suspected. Hence, we crafted the two situations in a way that we could measure recklessness in terms of handling the *recommendations* in place to curb the spread of the virus, yet without running the risk of violating any governmental regulations or being fined for one's behavior.

Right after indicating their preference for one of the actions in each scenario, participants estimated the risk of infection in that particular situation (for themselves in the Park scenario, and for the other persons in the Move scenario), and how serious they thought the consequences of an infection would be (for themselves vs. others, 0–100 scale on both items). In addition, they rated on 7-point Likert scales (anchored at 0 = “completely disagree” and 6 = “completely agree”) to what extent they agreed with the following two statements “I feel obliged to be particularly careful in this situation” (reverse coded so that higher values reflect more recklessness) and “It would be okay for me to deliberately take some risk in this situation.”

Next, participants provided three estimates of the risk of contracting the virus in the upcoming four weeks (for themselves, their best friend, and an unknown stranger of the same age and gender) and rated on a slider 0–100 if they were more careful among people they did not know or people they were familiar with (the midpoint was labeled “both equally”). Moreover, participants rated on a 5-point Likert scale how fair, appropriate, and balanced they found the measures currently in place to curb the spread of the virus (0 = “completely disagree” to 4 = “completely agree”). These three items were aggregated to form a composite measure of attitudes

toward the current regulatory measures (Cronbach's  $\alpha = .85$ ). Participants further indicated if they had taken part in any events to protest these measures (only one out of 299 had). Participants then filled in a German version of the Fear of COVID-19 scale, FCV-19S ( $\alpha = .85$ ; Ahorsu et al., 2020; see Table A2 at OSF for the translation), which captured individual differences in the experience of fear, worries, and anxiety associated with the pandemic. Finally, participants provided demographic information, including risk group membership and whether they had been diagnosed with COVID-19 in the past weeks.

## 4 | RESULTS

All analyses were performed in R (R Core Team, 2022). Descriptive statistics for the main dependent variables are displayed in Table 1. To test our main hypothesis that people will behave less cautiously among friends than strangers in a self-infection risk situation (H1), we first performed a simple  $t$ -test on the mean recklessness scores in the Park scenario. Consistent with our prediction, mean recklessness was higher in the friend condition than in the stranger condition, Welch-test  $t(294.7) = 3.04, p = .003, d = 0.35$ , see also Figure 1 and Table 1.

As a manifestation of optimism bias, this recklessness discrepancy between social proximity conditions would be due to different risk estimations for situations in which friends versus strangers were present. Note that we preregistered this prediction as a secondary hypothesis to explain the mechanism behind the response pattern predicted by H1. However, there was no difference between infection risk estimations for the Park scenario,  $t(296.6) = 0.42, p = .677$ . By contrast, participants were more willing to deliberately take some level of risk in the Park scenario when meeting a friend rather than a stranger,  $t(296.8) = 2.19, p = .029, d = 0.25$ . Hence, individuals' willingness to deliberately accept the risk of self-infection increased with social proximity. There were no differences between

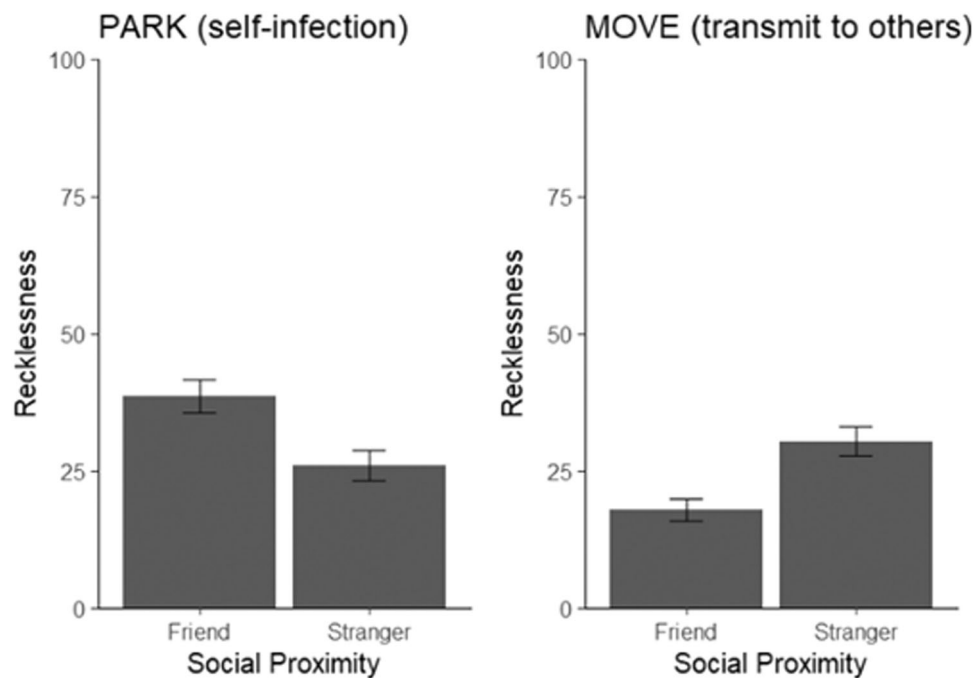
the perceived seriousness of infection from friends or strangers, or caution obliged toward friends or strangers (see Table 1).

These analyses were run analogously on the Move scenario, in which the risk of transmitting the virus to others was more salient than that of self-infection. We had not preregistered a hypothesis for the Move scenario and thus conducted an explorative test of H2. As opposed to the Park scenario, individuals were, on average, more reckless when around strangers compared with friends,  $t(278.9) = 3.79, p < .001, d = 0.44$ , see also Figure 1. This recklessness discrepancy cannot be explained by differential risk estimations. That is, the estimated risk of transmitting the virus to others was not different for friends and strangers,  $t(296.9) = 1.47, p = .142$ . However, we again observed a difference in individuals' willingness to deliberately take risks. People were more willing to accept the risk of onward transmission when this involved infecting strangers than when it concerned friends,  $t(292.1) = 3.12, p = .002, d = 0.36$ . In addition, participants felt more obliged to take caution when interacting with friends but rated the seriousness of an infection's consequences to be lower for a friend than for a stranger, see Table 1.

Next, we estimated a mixed-effects model for recklessness in the two scenarios to test if the interaction of social proximity and risk focus would hold when further variables were controlled for. Specifically, we were interested in the role of age, sex, fear of COVID-19, and attitudes toward the pandemic restrictions. A mixed-effect beta regression model was estimated on the recklessness score (transformed to a score ranging from 0 to 1) using the glmmTMB package (Brooks et al., 2017). The dependent variable was transformed as  $y = (y^*(n-1) + 0.5)/n$ , with  $n$  = sample size, following advice by Smithson and Verkuilen (2006). Random intercepts were entered for participants. We implemented a step-up procedure to determine the best fitting model (see Table A3 in the online supplement at <https://osf.io/kab2p> for the detailed report). As fixed effects, we first entered the experimental factors social proximity (between-subjects) and risk focus (within-subjects). We then added

**TABLE 1** Means and standard deviations (in parentheses) for the main dependent variables, and group comparison test statistics (Welch  $t$ -tests)

	Park scenario (risk focus: self-infection)		Move scenario (risk focus: onward transmission)	
	Friend	Stranger	Friend	Stranger
Recklessness	38.62 (27.45)	25.98 (34.49)	17.94 (24.31)	30.32 (31.77)
	$t(294.7) = 3.04, p = .003, d = 0.35$		$t(278.9) = 3.79, p < .001, d = 0.44$	
Risk estimation	25.23 (21.29)	26.28 (22.26)	58.88 (26.09)	54.38 (26.79)
	$t(296.6) = -0.42, p = .677, d = -0.05$		$t(296.9) = 1.47, p = .142, d = 0.17$	
Serious consequences	42.03 (28.89)	46.48 (29.89)	55.33 (27.24)	62.71 (28.60)
	$t(296.8) = -1.31, p = .192, d = -0.15$		$t(296.5) = -2.29, p = .023, d = -0.26$	
Caution obliged (reversed)	2.41 (1.56)	2.23 (1.66)	0.73 (1.01)	1.16 (1.35)
	$t(296.1) = 0.94, p = .347, d = 0.11$		$t(276.5) = -3.11, p = .002, d = -0.36$	
Deliberate risk-taking	2.76 (1.78)	2.30 (1.84)	1.26 (1.34)	1.77 (1.53)
	$t(296.8) = 2.19, p = .029, d = 0.25$		$t(292.1) = -3.11, p = .002, d = -0.36$	



**FIGURE 1** Mean recklessness scores depending on social proximity (friend vs. stranger) in the park (risk focus: self-infection) and the move scenarios (risk focus: onward transmission). Error bars indicate the standard error of the mean.

the interaction of these factors, fear of COVID-19, age, sex (participants outside the binary categories were excluded to avoid fitting problems), and the attitudes toward regulations index stepwise. Predictors were only retained for the next step if they improved the model fit, as indicated by a significant likelihood ratio test and a reduction of the Akaike Information Criterion (AIC) by  $\geq 2$  (see Burnham & Anderson, 2002).

The mixed-effect model results are summarized in Table 2. The above-reported effects held when controlling for additional variables. Importantly, the interaction between social proximity and risk focus was significant,  $\chi^2(1) = 12.38$ ,  $p < .001$ . People were more likely to act recklessly in the Park scenario (self-infection focus) when a friend was present than in the case of a stranger, odds ratio (OR) = 1.44 with 95% confidence interval (1.09, 1.91),  $p = .011$ . The reverse effect was found in the Move scenario (onward transmission focus). Participants were less likely to act recklessly around friends than strangers when they risked onward transmission, OR = 0.49 (0.33, 0.72),  $p < .001$ . Moreover, fear of COVID-19 predicted caution in pandemic-related behavior, OR = 0.78 (0.67, 0.90),  $p = .001$ . Also, individuals who agreed more strongly with the measures currently in place to curb the spread of the virus were less likely to act recklessly in both scenarios OR = 0.75 (0.68, 0.83),  $p < .001$ .

Finally, it is noteworthy that there was evidence for a more general optimism bias in our sample, even though this did not appear to be related to the effects of social proximity on recklessness. On average, participants believed to be less likely to contract the virus themselves in the upcoming four weeks ( $M_{\text{Self}} = 18.1$ ,  $SD = 18.1$ ) than their best friends ( $M_{\text{Friend}} = 22.1$ ,  $SD = 19.6$ ). A paired-sample  $t$ -test showed this difference to be statistically significant,  $t(293) = 4.70$ ,

**TABLE 2** Results of the mixed-effect beta regression model on recklessness

Predictors	Recklessness			
	OR	95% CI	z	p
Intercept	1.81	(1.14, 2.89)	2.51	.012*
Social proximity (friend)	1.44	(1.09, 1.91)	2.54	.011*
Risk focus (onward transmission)	1.14	(0.86, 1.50)	0.91	.365
Social proximity (friend) <sup>a</sup>	0.49	(0.33, 0.72)	-3.56	<.001***
Risk focus (onward transmission)				
Fear-of-COVID-19	0.78	(0.67, 0.90)	-3.29	.001**
Attitudes toward regulations	0.75	(0.68, 0.83)	-5.35	<.001***
$N_{\text{Participants}}$	291			
Observations	582			

Abbreviations: CI, confidence interval; OR, odds ratio.

<sup>a</sup>an interaction of predictors.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

$p < .001$ ,  $d = 0.27$ . As expected, participants also found themselves to be less at risk of contracting the virus than comparable others (i.e., unknown persons of the same age, gender, and living in the same vicinity;  $M_{\text{Other}} = 29.9$ ,  $SD = 22.5$ ),  $t(294) = 11.19$ ,  $p < .001$ ,  $d = 0.65$ . In line with the idea of the optimism bias spreading to socially close others, the difference between the estimated risk of contracting the virus for friends and for others was also significant,  $t(296) = 7.17$ ,  $p < .001$ ,  $d = 0.42$ .

## 5 | DISCUSSION

We tested the hypothesis that in a situation with a salient risk of self-infection, individuals would be less cautious if a social interaction involved a socially close person (a friend) compared to an interaction in the same situation with a socially distant person (a stranger). Our data supported this prediction. In addition, we found the reverse effect in a situation in which onward transmission was of primary concern. That is, people became more reckless with strangers than friends if they risked transmitting the virus to others. These results emphasized that the quality of the relation among interacting partners served as a cue for participants' decisions to act cautiously in pandemic situations of conflicting motivations. This may be considered as particularly harmful in the context of COVID-19 because social proximity triggers liking (e.g., Liviatan et al., 2008). If the affective states associated with close others are taken as cues for hazard judgments, this could further obscure sober assessments of the pandemic risks. These findings underline the importance of considering both the (self-infection vs. onward transmission) risk focus and social proximity of relations among interacting partners as motivational drivers of pandemic protection behaviors.

### 5.1 | Protective behaviors and “recklessness” in the pandemic

Consistent with earlier work in the context of COVID-19 (Druică et al., 2020; Park et al., 2021), there was evidence for an optimism bias in pandemic risk perception. Participants believed to have a lower risk of contracting the virus than others, and they also thought that their best friend had a lower risk than an unknown peer. Yet, this general optimistic illusion could not explain why participants were inclined to behave more recklessly around friends than strangers when self-infection was the primary concern (or the reverse pattern when onward transmission was salient). Importantly, estimations of the specific risks in each situation (i.e., the risk of contracting vs. transmitting the virus) did not differ across levels of social proximity. For both scenarios, the risk of contracting the virus from (or spreading it to) friends or strangers was estimated to be similar. Hence, the optimism bias (Sharot, 2011; Weinstein, 1980) was an unlikely candidate mechanism to produce this result.

Instead, our analyses suggested that recklessness varied as a function of social proximity because people were more willing to deliberately take the risk of contracting the virus from friends (rather than strangers), and they were more willing to accept the risk of onward transmission to strangers than to friends. This underlined the importance of taking into consideration the social relationship of interaction partners in the context of individuals' decisions to avoid pathogens (see also Tybur et al., 2020). It appeared that people were reluctant to risk spreading the virus to close others, but they were less concerned about onward transmission to strangers. This was also in line with the notion that the consequences of a COVID-19 infection were weighed heavier for friends than for socially distant

others (Maaravi & Heller, 2020), although our results suggested that, in line with “illusory optimism” for close others, the seriousness of an infection's consequences was rated to be lower for friends than for strangers.

These observations align with a social identity perspective on pandemic risk-taking (Cruwys et al., 2020; see also Cruwys, Greenaway, et al., 2021), which predicts that a shared group membership attenuates pandemic risk perception and thereby increases risk-taking. Our participants reported similar risk estimations for a given situation, regardless of whether it involved friends (with whom a common social identity is more likely) or strangers. Yet, they were more willing to accept a given risk of self-infection around friends, which presumably caused them to behave more recklessly. So, while our experiment did not replicate the differential risk perceptions predicted by social identity theory of risk-taking (Cruwys, Greenaway, et al., 2021), the results on pandemic recklessness were generally consistent with this perspective. Future research on this line of theorizing may benefit from distinguishing between distinct risk foci of self-infection versus onward transmission.

It is important to note that decision-makers are likely to trade off the risk of infection (or onward transmission) and the potential benefits of social interaction when making decisions whether to comply with protection recommendations. We focused on the appraisal of (self vs. other) infection risk and assumed that an optimism bias might distort risk estimations as a function of social proximity. Our experiment did not support this idea. However, it is also plausible to assume that the perceived benefit of social interaction correlates with social proximity and that this will influence protective behaviors (Tybur & Lieberman, 2016; Tybur et al., 2020). Put differently, participants expect to benefit more strongly from interacting with socially close others than with strangers and may thus be more inclined to accept a given self-infection risk in an interaction with a friend. This would also be in line with the importance of social support in preventing adverse mental health outcomes during the pandemic (e.g., Gray et al., 2020; Saltzman et al., 2020).

It seems plausible that on a higher level of abstraction (see e.g., Trope & Liberman, 2010), friends would be less likely to be cognitively associated with the concept of threat than strangers. This, in turn, could lead decision makers to feel more secure around friends when self-infection looms, but also be less concerned about the threat of transmitting a virus to a friend than to a stranger. Moreover, since trust is higher for friends than strangers, it seems less likely that decision-makers suspected their interaction partners in the Park scenario to knowingly expose them to pandemic risks by removing their mask when they were friends. Decision makers may have felt a stronger urge to reciprocate this behavior and engage in unmasked conversation when sitting next to a friend. Similarly, concerns about offending a respective other by not engaging were likely to be stronger in the case of a friend.

This experiment provided a first test of the hypothesis that social proximity interacts with self versus other risk focus in determining recklessness during the pandemic. While our study ruled out

optimism bias as an underlying psychological mechanism, it remains for future research to identify further causal influences. Our results suggest that participants deliberately decided to accept pandemic risks under some circumstances, but refused to do so in other situations. Future research may further consider the perceived benefit of social interaction, cooperation expectations, social norms (e.g., reciprocity), or self-presentation considerations.

## 6 | IMPLICATIONS FOR EFFECTIVE RISK COMMUNICATION

Building on social dilemma research and further insights from social psychology, we aimed to derive practical implications for those designing the communication about the pandemic, like policy makers, media professionals, and local protection officers. We hope that our research contributes to serve this aim. Based on the experimental results, our recommendations for designing effective risk communication and interventions targeted at promoting cooperation during the pandemic can be summarized as follows.

First, it is important to communicate more clearly that the closeness of the relation among interacting partners should not determine the protective measures one takes. As it is the case with judgmental heuristics (Tversky & Kahneman, 1974), such simplifications often entail serious errors. Given that private gatherings are a major contributor to the spread of the virus (Askatas et al., 2021), it seems important to remind the general public that the closeness of relations does not reduce transmission rates or the severity of the consequences of an infection. In a nutshell, people must be convinced that someone they know and like may be just as infectious or vulnerable as someone they meet for the first time.

Second, as our results suggested that people were more reluctant to spread the virus to close others than to strangers, it could be a viable strategy to customize persuasive messages depending on whether they are aimed to raise concerns about self-infection versus onward transmission. For instance, to promote protective behaviors in private gatherings, people should be prompted to act as cautiously around their friends and family members as if they were unknown others. On the other hand, in contexts in which controlling the source of transmission is of primary interest (e.g., in COVID-19 test centers or in retirement homes), individuals who are potential carriers of the virus should focus on the consequences that an infection could have for their close friends or relatives.

Finally, attention should be paid to the emotions elicited by the messages aimed to promote protective behaviors. For instance, Heffner et al. (2021) observed that the efficacy of threatening versus prosocial motivating messages during the pandemic was partly dependent on the intensity of the experienced emotions. While both types of messages were similarly effective in stimulating willingness to practice public health behaviors, the efficacy of threatening messages (“millions will die...”) depended to a lesser extent on the intensity of the emotional reaction, than the prosocial message

(“millions will be saved...”). Prosocial appeals produced the largest benefit when they evoked highly arousing, positive emotional reactions (Heffner et al., 2021; Pfattheicher et al., 2020). A risk focus intervention based on prosocial appeals could therefore be most effective when it elicits strong positive emotions.

This is an interesting perspective because the emotion most strongly associated with the pandemic is fear (Ahorsu et al., 2020; Harper et al., 2020; Mertens et al., 2020). In our study, too, fear of COVID-19 emerged as an important predictor of caution in specific situations. While it could be beneficial to make people “feel bad in some way about the situation” to promote cooperation in social dilemmas (Van Lange et al., 2013, p. 134), our results hold the promising implication that fear (e.g., of self-infection) should not be the primary remedy to design effective risk communication. Instead, prosocial appeals that elicit strong positive emotions may promote cooperation without the damaging impact of fear on mental health and beyond (Dumas et al., 2020; Fitzpatrick et al., 2020).

## 7 | LIMITATIONS

Of course, our study also has limitations. First, we note that we studied behavioral intentions in hypothetical scenarios and did not observe naturally occurring protective behaviors. There is also research to suggest that the social dilemma framing of pandemic protection decisions may not be a good model to inform policy making (Romano et al., 2021). Moreover, as we discussed above, most protective behaviors do not perfectly fit the classic social dilemma concept. For instance, mask-wearing not only has personal costs like inconvenience but also comes with more abstract collective disutility. While the idea that masking could instigate a false sense of security and thereby undermine compliance with other regulations was debunked (Seres et al., 2021), other research pointed to the difficulties that masks could cause in terms of interpersonal communication (Carbon, 2020). Making matters more difficult, mask-wearing has become an increasingly politicized issue (just like, for instance, vaccination, Weisel, 2021), which may contribute to strong convictions of disapproval that immunize against persuasion. Recent research on the issue highlighted how difficult it is to motivate behavior change in politically polarized issues like mask-wearing (Gelfand et al., 2022).

## 8 | CONCLUSION

In summary, our research highlighted the relevance of two interacting factors, the social proximity of interaction partners and the focus on self-infection versus onward transmission risk, to study the conflicting motivations that may promote or impede compliance with regulatory measures during the COVID-19 pandemic. We concluded that persuasive messages should be tailored to the target audience in terms of the quality of the relation between interacting individuals.



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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available on the OSF at <https://osf.io/kab2p>.

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