Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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COVID-19 Express Article

"It Won't Happen to Us": Unrealistic Optimism Affects COVID-19 Risk Assessments and Attitudes Regarding Protective Behaviour

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People generally believe that their own future will be better than the one of comparable others. Robust evidence documents such unrealistic optimism in many domains of life. Here, we examine how unrealistic optimism may affect people's risk assessments of COVID-19 infection as well as their attitudes regarding behaviours intended to protect against contagion. In two studies conducted in the USA (N = 160) and UK (N = 161), at different times during the pandemic, we show that participants considered the likelihood of contracting and carrying the infection lower for themselves and their close other compared to an acquaintance, while they considered the likelihood of engaging in protective behaviours higher for themselves and their close other than an acquaintance. The findings document unrealistic optimism in relation to COVID-19. Such biases are particularly critical in relation to infectious diseases, where underestimating the risk for both oneself and close others may reduce precautions and increase virus spreading.

Keywords: Unrealistic optimism, COVID-19, Protective behaviour, Positivity bias, Consumer behavior, Risk assessment

General Audience Summary

The COVID-19 pandemic has challenged every country around the world. To contain the spread of the virus, governments have issued restrictions affecting everyday social life and urging citizens to adopt protective behaviours, such as keeping physical distancing, use of facemasks, hand sanitizer, etc. Nonetheless, people are unrealistically optimistic when assessing their own risk for contracting a disease—or when evaluating other negative future outcomes. This is termed *unrealistic optimism* in the literature. Research addressing how unrealistic optimism may demean the severity of the current pandemic and the risk of ourselves getting infected with COVID-19 relative to close others and acquaintances has been scarce. In this article, we show that unrealistic optimism occurs for risk evaluations of getting infected with COVID-19 and that this unrealistic optimism also arises when assessing the risk of infection for another person they consider close relative to an acquaintance. That is, we show that people assessed their own risk for contracting COVID-19 or currently being infected as lower compared to an acquaintance. However, people evaluated the risk of infection and the likelihood of currently being infected as equally low for themselves and for a close other. Similarly, we show that people estimated that they themselves and their close others would contract the virus—if that were to happen—further into the future, whereas their acquaintance might get infected in the near future. Our findings provide scientific evidence related to enquiries suggesting that

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coronavirus cases appear to be driven to a significant degree by casual occasions with family and people we know well and which may feel deceptively safe. Our findings have practical relevance by providing a deeper understanding of the cognitive biases influencing risk assessments and compliance with COVID-19 protective behaviours.

People are not objective about their expectations for the future. We generally believe that our own personal future will be better, more positive, and successful than the one of comparable others. This bias is known as unrealistic optimism or optimism bias (Jefferson et al., 2017; Taylor & Brown, 1988), and it is a well-documented phenomenon (see Shepperd et al., 2013 for a review). Here, we examine how unrealistic optimism might affect people's risk assessments of COVID-19 infection as well as their attitudes regarding behaviours intended to protect against COVID-19 contagion.

Unrealistic optimism is found in many different domains of life (see Sharot, 2011, for a review), and it has also been found in relation to health. Specifically, college students estimate they are less likely than fellow students to contract venereal diseases or suffer a heart attack in the future (Weinstein, 1980). Other research has shown that smokers display an unrealistic optimism for longevity (Schoenbaum, 1997), that women might underestimate the likelihood of both an unwanted pregnancy (Gerrard et al., 1991) and their breast cancer risk (Waters et al., 2011), and that HIV+ men estimated a lower likelihood that they would develop AIDS than did men who were HIV- (Taylor et al., 1992).

Given these findings, it seems likely that an unrealistic optimism might lead people to underestimate the severity of the COVID-19 pandemic (Bottemanne et al., 2001) and their risk of infection, possibly leading to a relaxed attitude towards the adoption of behaviours aimed at containing the spread of the virus. Surprisingly, little research has been done on how optimism biases might affect risk assessment for COVID-19 infection and engagement in protective behaviours. We were able to identify just four published studies. Dolinski et al. (2020) compared Polish students' perceived risk for COVID-19 against their assessed risk for an average other person at three time points during spring 2020. They found a robust optimism bias for men and a less consistent bias for female participants. Wise et al. (2020) assessed risk perception in a North American sample, while Asimakopoulou et al. (2020) assessed risk perception in a British sample. Both studies found that participants perceived themselves as being at a lower risk of infection and as suffering less adverse health outcomes than the average person. Finally, in a French representative sample, Attema et al. (2021) found that risk perceptions for self in absolute terms (prevalence in the general population) were lower compared to others. However, three weeks after, participants' risk assessment increased significantly while the perception of others' risks remained stable. Other studies with preliminary findings (i.e., pre-prints) show a similar optimism bias in relation to COVID-19 risk perception (e.g., Globig et al., 2020; Kuper-smith et al., 2020; Raude et al., 2020).

To the best of our knowledge, no studies on COVID-19 risk assessment have examined unrealistic optimism in relation to both a comparable acquaintance and a person considered closed and intimate. Such comparison and distinction are particularly important in relation to an infectious disease. First, people are willing to engage in infection-risky acts with others they feel close to and who are considered trustworthy (Tybur et al., 2020). Second, to contain the spread of the virus, different governments and organizations (World Health Organization, 2020) have issued recommendations whereby social contact should be restricted to few close others (e.g., social bubbles). Thus, underestimating the risk for oneself and others who are considered close may lead people to reduce precautions (Brulliard, 2020) and thereby increase the virus spreading (e.g., Naufel, 2021).

To address this gap in the literature and building on previous work on unrealistic optimism, we tested the hypothesis that participants not only underestimate their perceived risk for COVID-19 against the assessed risk for a comparable other (cf. Dolinski et al., 2020) but that this optimism bias likely spills over to risk assessment for a person considered close (Helweg-Larsen & Shepperd, 2001). In addition, we tested the hypothesis that an optimism bias also affects the perceived likelihood of engaging in protective behaviour, such as wearing masks (Leung et al., 2020), using hand sanitizer (Pradhan et al., 2020), and keeping a physical distance (Wise et al., 2020).

We examine these questions in two studies with samples drawn from two different populations, the USA (Study 1) and UK (Study 2), both representing nations that have been strongly affected by COVID-19. The two studies were administered at different times during the pandemic, specifically, before versus during the second wave and before versus after the identifications of more contagious new coronavirus strains. Study 2 aims to replicate the findings of Study 1 and to control for further protective measures as well as a possible increase in infection rates. Replicating findings across different populations and different phases of the pandemic underscores the robustness of the effects.

The Present Studies

We extended the paradigm used in Salgado and Berntsen (2019) whereby participants, in three different conditions, imagine future events for themselves, for a person they consider close to them—a close other—and for a person who they do not consider close—an acquaintance. Then, they were asked about a set of their beliefs concerning the risk of infection with COVID-19 and also about attitudes towards protective

behaviour—that is, use and purchase of mask and hand sanitizer (Study 1), as well as keeping a physical distance (Study 2). We measured unrealistic optimism along a number of novel dimensions as well as dimensions that proved useful in previous work on unrealistic optimism, such as the perceived likelihood of contracting a disease (e.g., Taylor et al., 1992), the perceived likelihood of spreading the disease to others and thus inadvertently causing harm to them, the perceived likelihood of engaging in socially desirable (i.e., prosocial; Fetchenhauer & Dunning, 2006; Pfattheicher et al., 2020), protective behaviour preventing the virus from spreading, and the temporal distance to a potential negative encounter (being infected) in the future (e.g., Ross & Wilson, 2002).

We hypothesized an overall effect of the target of the thoughts. Specifically, we expected that beliefs about risk of infection would be assessed as higher for an acquaintance, than for self and a close other. If any differences were observed between self and close other, it would be in the direction of the self having a lower risk assessment. Correspondingly, we also anticipated that expectations regarding engaging in (responsible and prosocial) protective behaviour would be assessed higher for self and the close other, compared to the acquaintance. The studies, all hypotheses, and the plans for analyses were registered on the Open Science Framework (https://osf.io/rwx23).

Study 1

Method

Participants

A total of 164 participants were recruited through Cloud Research (Litman & Robinson, 2020). The sample size was determined a priori using G*Power (Faul et al., 2007), aiming to detect a small effect size ($f = 0.10$), using a single independent variable, and 21 measurements (seven dependent variables across three different targets; see procedure below for more details). Two participants were excluded because they were not native English speakers and two more because their answers to attention checks were not coherent (e.g., random text not related to the question). The final sample consisted of 160 participants (68 women, 91 men, and 1 other, $M_{age} = 39.01$, 95% CI [37.27, 40.75], age range 18–71 years old). All participants resided in the USA. The experiment received ethical approval from the local review board of the Center on Autobiographical Memory Research.

Design and Materials

Participants were presented with three equivalent tasks in a within-subjects design in random order to control for order effects. In the three conditions, they estimated COVID-19 risk and the likelihood of responsible protective behaviour for *self*, a *close other,* and an *acquaintance*.

Self versus Other Task. We used a modified version of the *Self versus other task* (cf. Ross & Wilson, 2002; Salgado & Berntsen, 2019) to examine whether an unrealistic optimism would influence beliefs about the risk of infection and attitudes towards COVID-19 protective behaviour. In three distinct tasks, participants were asked to evaluate both beliefs and attitudes regarding the risk of COVID-19 infection and protective behaviour for themselves (self condition), for a close other (close other condition), and for an acquaintance (acquaintance condition). In the close other and the acquaintance conditions (cf. Ross & Wilson, 2002; Salgado & Berntsen, 2019), participants were asked to choose individuals who were about the same age as themselves and who were either close to them or an acquaintance whom they knew only remotely, depending on the task. For the close other task, participants were instructed that this close other preferably should be a family member, a romantic partner, or a best friend. On the contrary, for the acquaintance task, they were asked to refrain from choosing a person close to them, but rather to choose a remote acquaintance consistent with instructions used in previous work (Ross & Wilson, 2002). Participants provided the age and gender of the close other and the acquaintance, indicated how long they had known them, and rated their liking and closeness to them on a rating scale from 1 to 7 (1 = *Not at all*; 7 = *Very much*). In what followed, all tasks were identical and the instructions were kept as similar as possible, changing only the words related to the target of the action/thoughts: self, close other, or acquaintance.

At the beginning of all tasks, participants were instructed to take a moment and think of themselves, the close other, or the acquaintance—depending on the task—to reflect on his/her behaviour, attitudes, and life conditions while answering a series of questions (see Table 1 for the wording of questions and the rating scales). Items assessing beliefs addressed the likelihood of at some point being infected with COVID-19, when in the future this most likely would happen, as well as the likelihood of currently being infected with COVID-19 without having symptoms. To assess attitudes regarding protective behaviour—use and purchase of masks and hand sanitizer—participants were presented with information about the use of facemask and hand sanitizer for protective purposes. Then, they were asked how necessary they thought it was for themselves/the close other/the acquaintance to wear/use a mask/hand sanitizer to prevent the virus from spreading to other people and how likely they/the close other/the acquaintance were to wear/use masks/hand sanitizer on a regular basis (see Table 1; the complete tasks instructions can be found at https://osf.io/rwx23).

Additional Questions. In an additional block of questions, we asked participants whether they have been infected with COVID-19 (yes/no). Only two participants indicated they had been infected, for which reason these data are not analysed any further. After completing this part, participants answered a series of questions addressing, among other things, health anxiety, personality, and consumption of protective equipment, which are to be reported elsewhere.

Procedure

The data were collected in late August 2020. A survey was created and advertised using Cloud Research (Litman & Robinson, 2020). It briefly described the details of the tasks participants would be required to complete, what was expected to be done, the approximate time that it might take, and the expected compensation they would receive if they completed

Table 1
Questions Assessing Beliefs About Risk of Infection With COVID-19 and Attitudes Towards Protective Behaviour

Items	Rating scale
Items assessing beliefs about COVID-19 infection	
1. How likely do you think it is that you yourself at some point will be infected with COVID-19?	*1 = Highly unlikely:* *7 = Highly likely*
2. If you were to get infected with COVID-19, when in the future would you estimate this would happen?	*1 = In the upcoming days* *2 = In the upcoming weeks* *3 = In the upcoming 2–3 weeks* *4 = In the upcoming month* *5 = In the upcoming 2–3 months* *6 = In the upcoming year* *7 = More than a year from now*
3. A person can carry COVID-19 without having symptoms. How likely do you think it is that you yourself currently is infected with COVID-19 without having symptoms?	*1 = Highly unlikely:* *7 = Highly likely*
Items assessing attitudes towards protective behaviour	
4. Wearing a **mask** can reduce the likelihood that someone infected with the virus spreads this to other people. Think of yourself: How necessary do you think it is for you to wear a mask to prevent the virus from spreading to other people?	*1 = Completely unnecessary:* *7 = Completely necessary*
5. How likely are you to buy and wear **masks** on a regular basis?	*1 = Highly unlikely:* *7 = Highly likely*
6. Using **hand sanitizer** can reduce the likelihood that someone infected with the virus spreads this to other people. Think of yourself: How necessary do you think it is for you to use hand sanitizer to prevent the virus from spreading to other people?	*1 = Completely unnecessary:* *7 = Completely necessary*
7. How likely are you to buy and use **hand sanitizer** on a regular basis?	*1 = Highly unlikely:* *7 = Highly likely*
8. *Keeping physical distance from other people can reduce the likelihood that someone infected with the virus spreads this to other people. Note: We understand that some specific situations or jobs might prevent people from keeping physical distance as much as they would want. However, we are interested in the attempt to comply with keeping physical distance.Think of yourself: How necessary do you think it is for you to try to keep **physical distance** from other people to prevent the virus from spreading to other people?	*1 = Completely unnecessary:* *7 = Completely necessary*
9. *How likely are you to try to keep **physical distance** on the regular basis?	*1 = Highly unlikely:* *7 = Highly likely*

Note. The wording of the questions in this table comes from the task whose target is the self. The wording of the questions changes to reflect the target of each task: self, close other, or acquaintance. Questions marked with * were created and presented only in Study 2.

the survey. Subjects who wanted to take part in the experiment were directed to an external website (Qualtrics) to complete the online survey. After providing informed consent and demographic information, participants were randomly presented first with either the task asking to evaluate themselves, a close other, or an acquaintance. Participants completed the following task after they successfully completed the previous one, and so on until they completed the three tasks. Immediately following this task, participants were presented with questions addressing their protective behaviour. A series of attention checks were distributed across the survey to secure high-quality data. For example, after participants were presented with the instructions for the *self versus other task*, in a new window, they were asked to select among different but similar choices the one choice that described best the instructions for the task. Participants who failed were made aware of their mistake and presented with the instructions again. If participants failed this attention check a second time, they were disqualified and their answers were not recorded. Participants were recruited from the approved workers panel from Cloud Research, and advance settings prevented participants who had been disqualified from the survey—due to failing attention checks—to take the survey again. Participants who completed the survey successfully were presented with a debriefing statement and were paid 2.50 USD for their time.

Results

Manipulation Checks

We ran initial analyses to corroborate that the manipulation of the target of the tasks worked as expected (see Table 2). A repeated-measure analysis of the age of the participants and the ages for their close other and their acquaintance demonstrated that participants did choose people similar to their own age, as requested by the tasks. Also, a series of paired t-test revealed that participants chose close others that they had known for significantly more years compared to their chosen acquaintance. They reported liking their close others significantly more than their acquaintance. And finally, participants felt significantly closer to their close other compared to their acquaintance. This series of analyses demonstrated that the target manipulations worked as intended. In addition, only two participants (1.25%) reported they themselves had or were currently infected with COVID-19 when answering the survey. Excluding them from the analyses did not change the results. All analyses and results are reported including the entire sample.

Main Analyses

We examined our main hypothesis that people's tendency to report both positive beliefs and positive attitudes for themselves compared to others extend to both beliefs on COVID-

Table 2
Means and 95% Confidence Intervals for Descriptives of the Close Other and Acquaintance Participants Chose

	Self		Close other		Acquaintance			
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Test statistic (*df*)	*d*
Study 1								
Age	39.01	[37.27, 40.75]	38.73	[36.75, 40.71]	38.34	[36.45, 40.22]	0.63 (1.7, 270.25)	0.13
Years of knowing			10.41	[9.99, 10.83]	6.06	[5.51, 6.62]	12.74 (159)***	1.01
Likeness			6.53	[6.41, 6.65]	4.49	[4.28, 4.71]	18.41 (159)***	1.46
Closeness			6.41	[6.26, 6.55]	2.98	[2.73, 3.22]	25.00 (159)***	1.98
Study 2								
Age	39.17	[37.18, 41.15]	40.42	[38.33, 42.51]	39.16	[37.17, 41.15]	3.82 (1.58, 27.84)*	0.21
Years of knowing			9.72	[9.21, 10.23]	6.09	[5.48, 6.71]	9.62 (160)***	0.76
Likeness			6.70	[6.59, 6.80]	4.78	[4.59, 4.97]	17.31 (160)***	1.36
Closeness			6.48	[6.35, 6.62]	3.15	[2.95, 3.35]	26.70 (160)***	2.11

Note. Test statistic for age is *F*. Data did not meet the assumption of sphericity, so degrees of freedom are reported from the Huynh-Feldt correction. Test statistic for the other items is *t*.
* $p < .05$. *** $p < .001$

19 risk of infection and attitudes towards protective behaviours against COVID-19. We ran a repeated measures MANOVA, with the target of the tasks as the independent variable, measured within subjects. The answers to the six key variables in the *self versus other task* were the dependent measures (Questions 1, 2, 4–6 in Table 1; i.e., two items assessing the perceived risk of being infected and four items addressing expectations regarding engaging in protective behaviour). Since our data did not meet the assumption of sphericity, we report from the Huynh-Feldt correction. The answers for the item assessing beliefs about when in the future participants expected themselves, their close other, or the acquaintance to likely get infected (if they ever were to contract the virus) were categorical (see Table 1, Question 3). Therefore we tested our hypothesis on this belief using non-parametric tests (see below for details). For the sake of clarity, we report the results in two sections, one addressing the beliefs about the risk of infection with COVID-19 and a second section addressing the attitudes towards responsible protective behaviour against COVID-19.

Beliefs About the Risk of Infection with COVID-19. In line with our hypotheses, the results indicated a significant main effect of target for both the likelihood of getting infected with COVID-19, $F(1.95, 310.29) = 17.95$, $p < .001$, $\eta_p^2 = .10$, and the likelihood of currently being infected with no symptoms, $F(2.00, 318.00) = 18.52$, $p < .001$, $\eta_p^2 = .10$. Analyses of the estimated marginal means revealed that participants assessed the likelihood of getting infected with COVID-19 as significantly higher for their acquaintance compared to both themselves and their close other, both *p*s < .001, but not significantly different between themselves and their close other, $p > .99$ (see the upper left panel in Figure 1). For the likelihood of currently being infected without symptoms, participants assessed this likelihood as significantly lower for themselves compared to both their close other and their acquaintance, both *p*s < .048, and their closer other significantly lower compared to their acquaintance, $p = .001$ (see the upper right panel in Figure 1).

We analysed when in the future participants believed they and the others might likely get infected with COVID-19 if they were to contract the disease. Of the seven categorical options (see Table 1) for the time of infection, participants rarely assessed the likelihood of infection in the immediate future ("in the upcoming weeks or months"; choices 1–4) or in the very distant future ("more than a year from now"; choice 7). Therefore, we recoded these data into two dichotomous variable encompassing the upcoming months (choices 1 through 5) versus the upcoming year and beyond (choices 6 and 7), representing the short versus distant future, respectively. For the upcoming months, 69 participants (43%) allocated themselves to this cohort, 75 (47%) designated their close others, and 96 (57%) assigned their acquaintances. To analyse whether participants estimated the time of infection statistically differently for themselves relative to their close and acquaintances, we ran a Cochran's Q test for dependent variables on these frequencies and follow-up tests with McNemar tests. We applied a Bonferroni correction for multiple comparisons and set the alpha value to $\alpha = .016$. Results from the Cochran's Q test showed that participants indeed assessed the time of infection differently for themselves, their close other, and their acquaintance, $\chi^2(2) = 21.16$, $p < .001$. Consistent with the hypotheses, the McNemar pairwise tests revealed that participants did not estimate the time of infection differently for themselves compared to their close other, $\chi^2(1) = 0.89$, $p = .35$. However, participants estimated the probability of being infected in the near future as higher for their acquaintance compared to both themselves, $\chi^2(1) = 15.72$, $p < .001$, and to their close other, $\chi^2(1) = 9.30$, $p = .002$, thus showing a distancing bias (Ross & Wilson, 2002; Salgado & Berntsen, 2019).

Attitudes Towards Protective Behaviour Against COVID-19. The pattern of the effect of the target on the attitudes towards the use and purchase of both facemasks and hand sanitizer were different (see Figure 2). Participants evaluated the necessity of wearing masks as very high and as highly equal for everyone, $F(1.72, 272.93) = 0.97$, $p = .37$, $\eta_p^2 = .006$. There were no significant differences in how they evaluated the necessity of wearing masks for themselves, their close other, and their acquaintance (see panel A1 in Figure 2). However, there was a main effect of the target on the likelihood of buying and wearing a facemask, $F(1.88, 298.97) = 50.50$, $p < .001$, $\eta_p^2 = .18$. Participants rated the likelihood of buying and wearing facemasks for

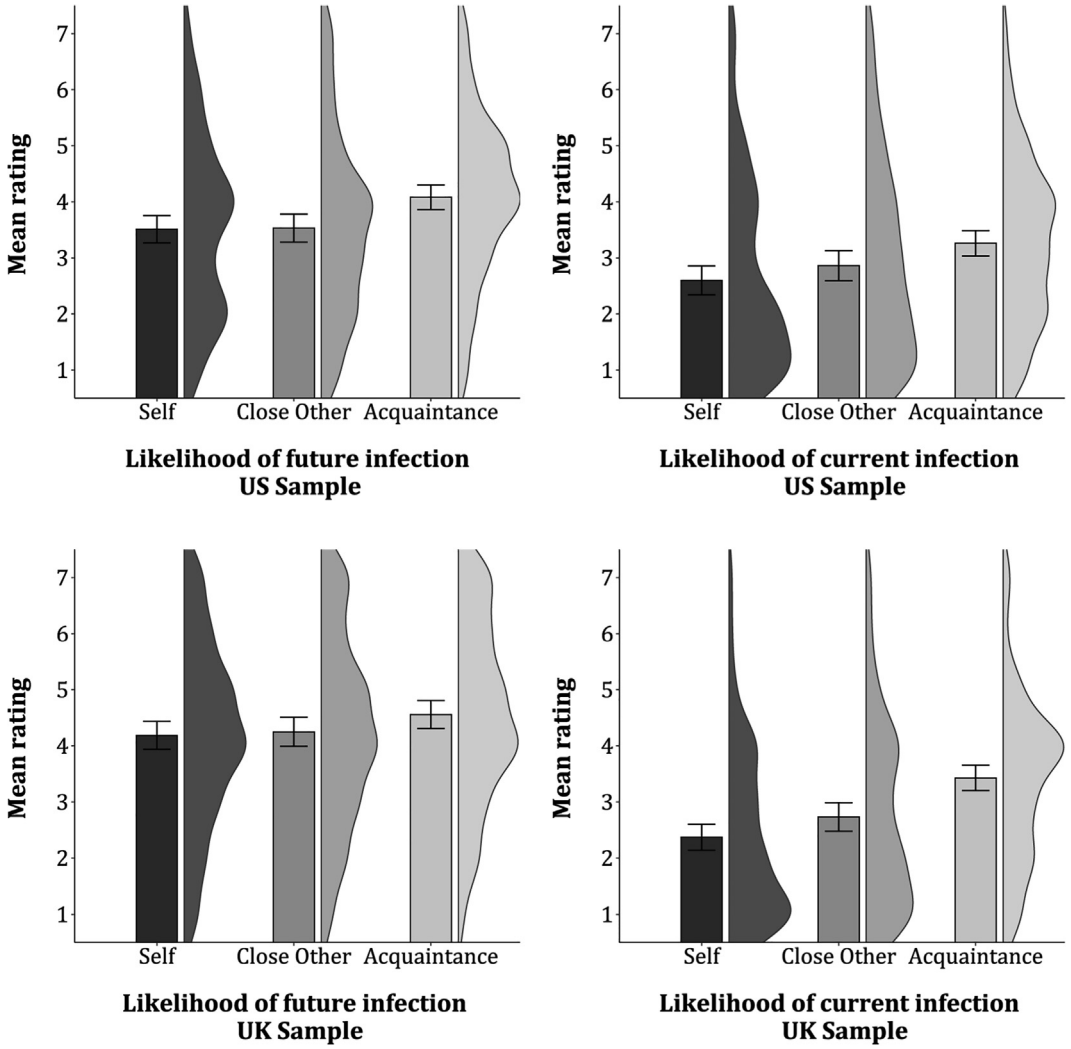

Figure 1. Left panels illustrates the likelihood of getting infected in the future. Right panels represents the likelihood of currently being infected without showing symptoms. Bars denote the group means, and error bars represent 95% Confidence Intervals of the mean. The shaded areas on the right hand side of the bars indicate the Kernel density estimation (Hintze & Nelson, 1998).

themselves and their close other as equally high, $p = .35$, but, consistent with our predictions, rated both as significantly higher compared to an acquaintance, ps < .001 (see panel A2 in Figure 2). For the evaluated necessity of using hand sanitizer, there was an effect of target, $F(1.76, 279.33) = 4.12$, $p = .022$, $\eta_p^2 = .025$ (see panel B1 in Figure 2). Participants estimated the necessity of using hand sanitizer higher for their close other relative only to their acquaintance, $p = .024$, and no other significant differences were found, all ps > .32. Findings on the likelihood of buying and using hand sanitizer paralleled those for wearing facemasks. There was a main effect of target, $F(1.88, 298.97) = 50.50$, $p < .001$, $\eta_p^2 = .18$. Participants rated the likelihood of buying and using sanitizer for themselves and their close other as equally high, $p > .99$, but rated them both as significantly higher compared to an acquaintance, ps < .001 (panel B2 in Figure 2).

Exploratory Analyses

The effect of the target on the risk assessments reported in the main analyses might potentially reflect the participants not having as much information available about their acquaintances as for their close others or themselves (see Kruger et al., 2008). Participants indeed reported knowing their close other for many more years than their acquaintance. We explored this possibility by relating the time participants have known their chosen others with how participants assessed the risk of infection for them. No significant correlation was found (all rs < .08, all ps > .05). Alternatively, the effects found might be due to a spillover effect whereby participants assess the risk of infection for their close other based on their own risks but assess the risk of infection for their acquaintance detached from themselves (see Klar et al., 1996). Correlational analyses (Diedenhofen & Musch, 2015) revealed that the correlation coefficients for the relation between risk assessment ratings for self and close other (risk for future infection, $r = .70$, $p < .01$; risk of currently being infected, $r = .67$, $p < .01$) were higher compared to those between ratings for self and the acquaintance (risk for future infection, $r = .54$, $p < .01$; risk of currently being infected, $r = .61$, $p < .01$). However, this difference in the correlation

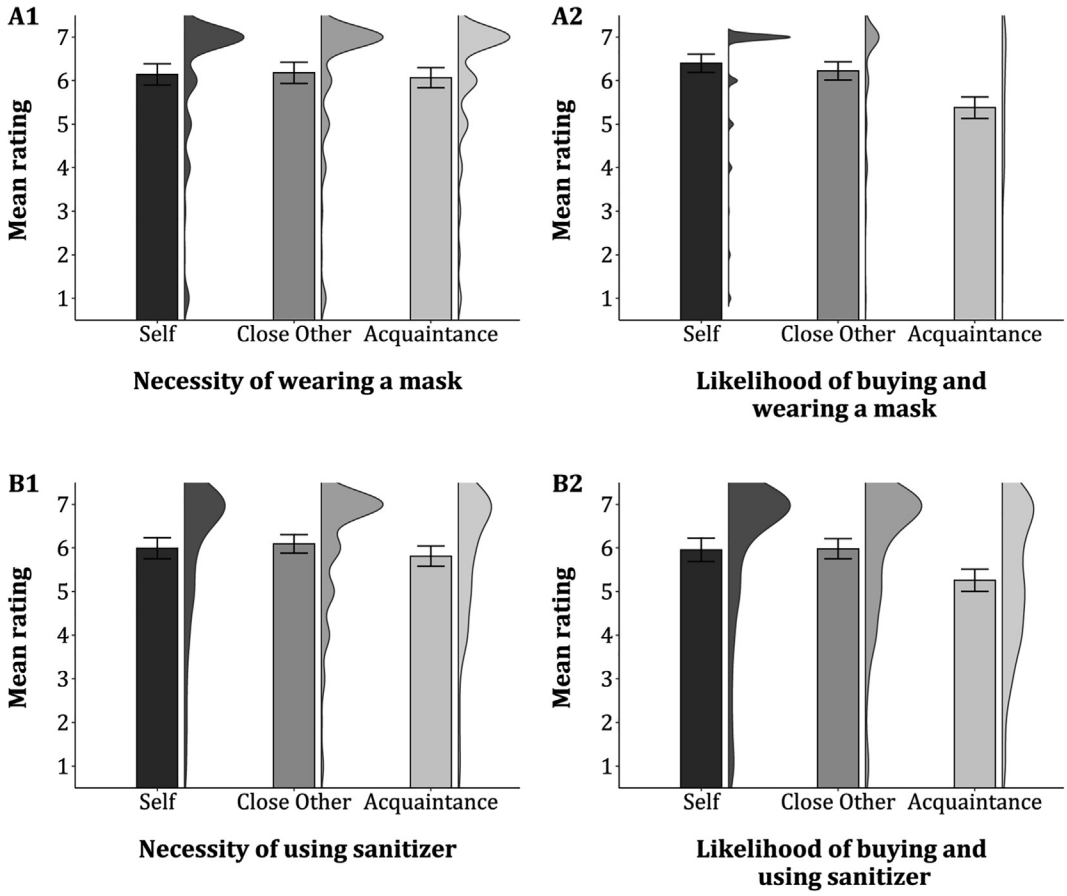

Figure 2. Left panels illustrate the necessity of using facemasks (A1) and hand sanitizer (panel B1). Right panels show the likelihood of buying and using facemasks (A2) and hand sanitizer (B2). All panels illustrate the data as a function of the target of the tasks: self, close other, and acquaintance. Bars denote the group means, and error bars represent 95% Confidence Intervals of the mean. The shaded areas on the right-hand side of the bars indicate the Kernel density estimation (Hintze & Nelson, 1998).

pattern was only significant for the assessment of future infection (risk for future infection, $z = 2.99$, $p < .01$; risk of currently being infected, $z = 1.17$, $p < .01$).

We also examined how participants' assessments for the likelihood of getting infected with COVID-19 were related to the attitudes and beliefs of protective behaviour across the three targets: self, close other, and acquaintance. This analysis revealed that protective measures were related only to the risk assessment of currently being infected with COVID-19. For self, the belief of currently being infected with COVID-19 was positively related to the necessity of both wearing masks ($r = .31$, $p < .01$) and using hand sanitizer ($r = .32$, $p < .01$), as well as to the amount of facemasks ($r = .21$, $p < .01$) and hand sanitizer ($r = .29$, $p < .01$) to buy and use. For both the close other and the acquaintance, current risk of being infected with COVID-19 was only related to the necessity of using masks (close other, $r = .33$, $p < .01$; acquaintance, $r = .19$, $p < .05$) and hand sanitizer (close other, $r = .32$, $p < .01$; acquaintance, $r = .20$, $p < .05$).

Summary and Discussion

The participants considered the likelihood of contracting and carrying the infection lower for themselves and their close other compared to an acquaintance. At the same time, they considered themselves and their close other to be more likely to engage in responsible, protective behaviour (using masks and hand sanitizer) compared with their acquaintance. The findings suggest that an unrealistic optimism likely drove participants' assessments for themselves and their close other.

Exploratory analyses showed that participants' perception of their own risk of infection correlated positively with their assessment of the risk of both close other and acquaintance, possibly reflecting their general estimate of COVID-19 infectiousness. However, these correlations were nonetheless significantly stronger for close other than for acquaintance when estimating the risk of future infection. This suggests that the participants' perception of their own risk for future infection may have influenced the risk assessments for their close other to a larger extent than for an acquaintance. Overall, risk assessment showed weak to moderate positive correlations with the likelihood of engaging in protective behaviour.

Study 2

Study 2 was undertaken to examine whether the results from Study 1 would replicate in a sample drawn from a different country and during a different phase of the pandemic. We elected a UK-based population due to the marked impact of

COVID-19 on British society at the time the present study was planned. In Study 2, we also controlled for whether the close other and the acquaintance participants were thinking of had been, or currently were, infected with COVID-19. In addition to measures used in Study 1, Study 2 examined whether an unrealistic optimism for self and close other would extend to attitudes and beliefs regarding the third type of protective behaviour against COVID-19, namely keeping a physical distance (Wise et al., 2020).

Method

Participants

A total of 164 participants were recruited through the crowdsourcing platform Prolific (www.prolific.co). The sample size was chosen to match that of Study 1 for comparative purposes. Two participants were excluded because they were not native English speakers and one more for not giving coherent answers to open-ended questions. The final sample consisted of 161 participants (120 women and 41 men, M_{age} = 39.17, 95% CI [37.18, 41.15], age range 19–80 years old). All participants resided in the UK. The experiment received ethical approval from the local review board of the Center on Autobiographical Memory Research.

Design and Materials

The materials were identical to Study 1 with a few additions. Each condition in the *self versus other task* contained two questions addressing one extra protective behaviour measurement: physical distance (see Table 1; Questions 8 and 9). Also, in addition to reporting whether they had been infected or currently were infected with COVID-19, participants reported whether their close other and acquaintance had been or currently were infected with COVID-19 (yes/no). The design and all other batteries of questions were exactly the same as those described in Study 1.

Procedure

The data were collected ultimo January 2021. The procedure was identical to the one in Study 1 except for the use of a different crowdsourcing platform to target a UK population. The survey was created and advertised in Prolific, briefly describing the study, as well as the expected compensation participants would receive if they completed the survey. Subjects were directed to an external website (Qualtrics) to complete the online survey. A series of attention checks were distributed across the survey to secure high-quality data. Participants who completed the survey successfully were presented with a debriefing statement and were paid £2 BGP for their time.

Results

Manipulation Checks

We ran initial analyses to corroborate that the manipulation of the target of the tasks worked as expected (see Table 2). Consistent with the instructions, participants chose close others and acquaintances who were around their own age. However, the close other was slightly older, as evidenced by a significant repeated-measures ANOVA (Table 2). In addition, a series of paired t-test revealed that participants had known their close other significantly longer compared to their acquaintance. They reported liking and feeling significantly closer to their close other compared to their acquaintance. This series of analyses demonstrated that the target manipulations worked as intended.

Main Analyses

We followed the same plan of analysis as in Study 1. This time, however, we scrutinized whether participants or any of their chosen others had been or currently were infected with COVID-19. Thirty-five participants (21.74%) reported that either they, their close other, or their acquaintance had been or were infected with COVID-19 at the time of answering the survey. The main analyses were originally run including a dichotomous variable to account for the presence of infection (infection present/not present) as a between-subjects variable. However, this factor did not show any significant effects on the results. Therefore, and for sake of clarity, the data were collapsed across this variable. Once again, our data did not meet the assumption of sphericity and we report from the Huynh-Feldt correction.

Beliefs About the Risk of Infection with COVID-19. In line with our hypotheses and with the results of Study 1, a repeated measures MANOVA revealed a significant main effect of target for both the likelihood of getting infected with COVID-19, $F(1.94, 310.67) = 5.08$, $p < .01$, $\eta_p^2 = .03$, and the likelihood of currently being infected with no symptoms, $F(1.77, 283.56) = 36.27$, $p < .001$, $\eta_p^2 = .19$. Inspection of the estimated marginal means revealed that participants assessed the likelihood of getting infected with COVID-19 in the future as significantly higher for their acquaintance only compared to themselves, $p = .015$. No other significant effects were found, $ps > .059$, (see lower left panel in Figure 1). For the likelihood of currently being infected without symptoms, participants assessed this likelihood as significantly lower for themselves compared to both their close other and their acquaintance, both $ps < .002$, and their close other was rated significantly lower compared to their acquaintance, $p = .001$ (see lower right panel in Figure 1).

For the item assessing when in the future a potential infection with COVID-19 might likely take place—were they to be infected—participants hardly considered the likelihood of infection in the immediate future or the very distant future, consistent with Study 1. Thus, we followed the same procedure as in Study 1 and recoded these data into two dichotomous variables representing the short versus distant future. For the upcoming months, 80 (50%) participants allocated themselves in this cohort, 76 (47%) designated their close others, and 100 (62%) assigned their acquaintances. We ran a Cochran's Q test for dependent variables in these frequencies, McNemar follow-up tests, and applied a Bonferroni correction for multiple comparisons ($\alpha = .016$). Results from the Cochran's Q test showed that participants indeed assessed the time of infection differently for themselves, their close other, and their acquaintance, χ^2 (2) = 18.37, $p < .001$. The McNemar pairwise tests revealed that, consistent with our hypotheses, participants did not estimate the time of infection differently for themselves compared to their close other, χ^2 (1) < 0.50, $p = .54$. However, partici-

pants estimated the probability of being infected in the near future as higher for their acquaintance compared to both themselves and their close other, χ^2s (1) > 8.60, *p*s > .003, replicating the distancing bias found in Study 1.

Attitudes Towards Protective Behaviour Against COVID-19. The pattern of the effect of the target on the attitudes towards the use and purchase of facemasks and hand sanitizer was analogous to that in Study 1 (see Figure 3). Participants evaluated the necessity of wearing masks and using hand sanitizer equally for everyone, *F*s (<1.81, 288.75) < 1.93, *p*s > .15, η_p^2s < .01. However, there was a main effect of target on the likelihood of buying and using both facemasks, $F(1.70, 272.44) = 38.60$, $p < .001$, $\eta_p^2 = .19$, and hand sanitizer, $F(1.66, 265.85) = 22.22$, $p < .001$, $\eta_p^2 = .12$. For the likelihood of buying and wearing facemasks, participants rated themselves as higher compared to their close other and their acquaintance, *p*s < .019. They rated their close other significantly higher than their acquaintance, $p < .001$ (see panel A2 in Figure 3). Similarly, for the likelihood of buying and using sanitizer, participants rated themselves and their close other as equally high, $p > .59$, but rated them both as significantly higher compared to an acquaintance, *p*s < .001 (see panel B2

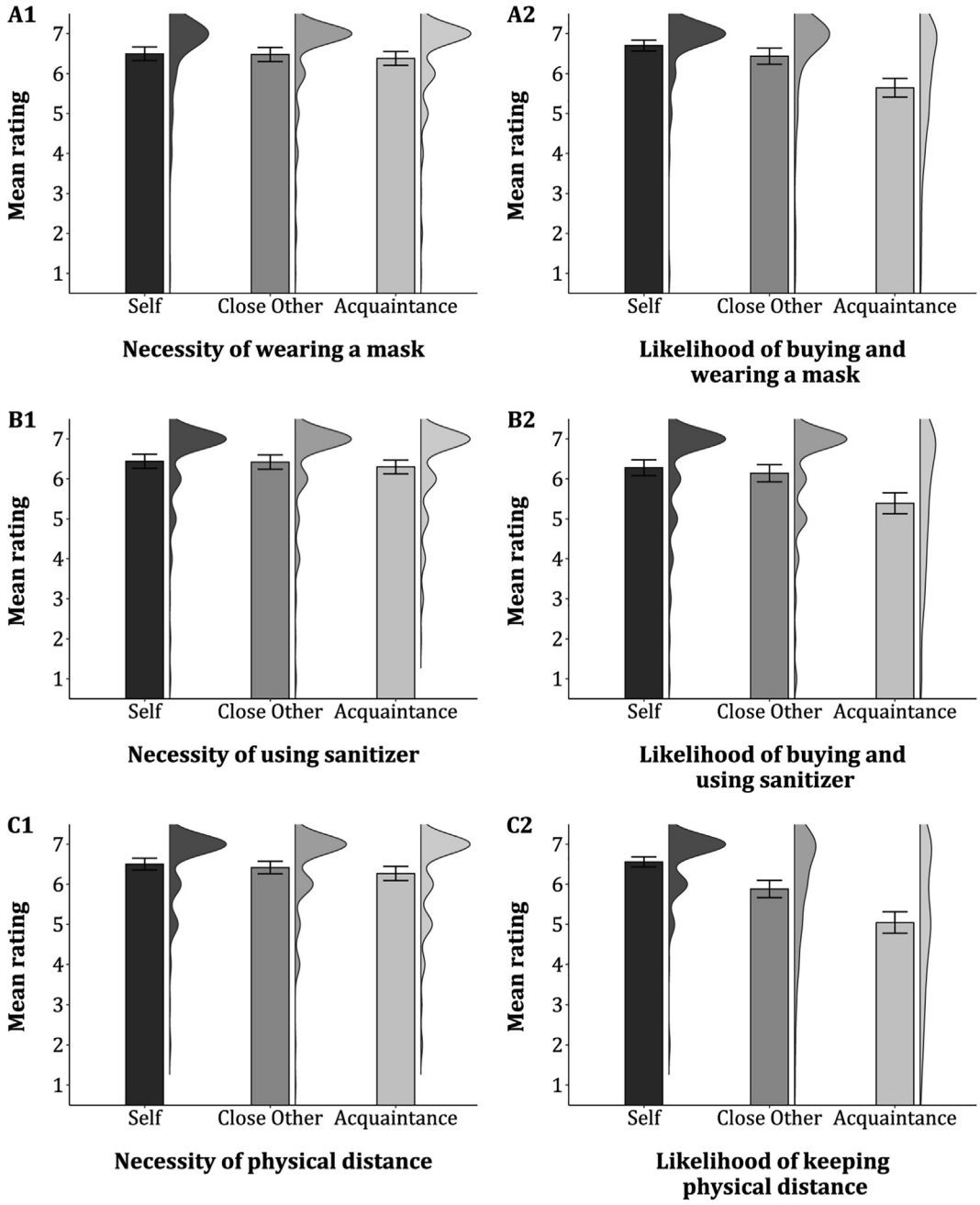

Figure 3. Left panels illustrate the necessity of using facemasks (A1), hand sanitizer (B1), and keeping a physical distance (C1). Right panels show the likelihood of buying and using facemasks (A2), hand sanitizer (B2), and the likelihood of keeping a physical distance (C2). All panels illustrate the data as a function of the target of the tasks: self, close other, and acquaintance. Bars denote the group means, and error bars represent 95% Confidence Intervals of the mean. The shaded areas on the right-hand side of the bars indicate the Kernel density estimation (Hintze & Nelson, 1998).

in Figure 3). Regarding keeping physical distance, and in contrast to the pattern for the necessity of using both facemasks and hand sanitizer, there was a main effect of target on the necessity of keeping physical distance, $F(1.90, 304.52) = 4.81$, $p = .010$, $\eta_p^2 = .029$. Participants assessed the need for keeping physical distance as significantly higher for themselves compared to their acquaintance, $p = .019$, and no other significant differences were found (see panel C1 in Figure 3). There was also a significant effect of target on the likelihood of keeping physical distance, $F(1.72, 275.12) = 63.94$, $p < .001$, $\eta_p^2 = .29$. Participants evaluated themselves as significantly more likely to keep a physical distance compared to both their close other and acquaintance. They evaluated the likelihood of their close other keeping a physical distance as significantly higher compared to the likelihood of their acquaintance, all ps $< .001$ (see panel C2 in Figure 3). These findings are parallel to those regarding the tendency to engage in other types of protective behaviour.

Exploratory Analyses

As in Study 1, participants reported knowing their close other for a longer time than their acquaintance. Again, we explore the possibility that the effect of the target on the risk assessments found in the previous sections might potentially be because participants knew their closer other for a longer time. No significant correlation was found between the time of knowing the other persons and the risk estimates that participants provided for them (all rs $< .06$, all ps $> .05$). Instead, and mirroring the findings of Study 1, correlational analyses (Diedenhofen & Musch, 2015) showed that the correlation coefficient for the relationship between risk assessment ratings for self and close other (risk for future infection, $r = .62$, $p < .01$; risk of currently being infected, $r = .66$, $p < .01$) were significantly higher compared to those for self and the acquaintance (risk for future infection, $r = .46$, $p < .01$; risk of currently being infected, $r = .37$, $p < .01$). Unlike Study 1, this pattern was statistically reliable for both risk of current and future infection (risk for future infection, $z = 2.57$, $p < .01$; risk of currently being infected, $z = 4.01$, $p < .001$).

For the relationship between the likelihood of future infection with COVID-19 and beliefs and attitudes towards protective behaviour measures, no significant relation was found for self. For close other, there was a significant negative relationship between the likelihood of future infection with COVID-19 and the number of masks to buy and use ($r = -.22$, $p < .01$), as well as compliance with keeping a physical distance ($r = -.24$, $p < .01$). Similarly, for the acquaintance, there was a significant negative relationship between the likelihood of future infection with COVID-19 and the amount of both masks ($r = -.26$, $p < .01$) and sanitizer ($r = -.28$, $p < .01$) to buy and use, as well as with how much they would comply with keeping a physical distance ($r = -.39$, $p < .01$). For the relationship between the likelihood of currently being infected with COVID-19 and protective behaviour measures, there was a significant positive relationship only with the number of masks ($r = .16$, $p < .05$) to use and buy for self, and with the necessity of hand sanitizer ($r = .18$, $p < .05$) for the close other. For the acquaintance, risk of currently being infected with COVID-19 was positively related to the necessity of using masks ($r = .23$, $p < .01$), negatively related to the amount of masks ($r = -.18$, $p < .05$) and hand sanitizer ($r = -.24$, $p < .01$) to buy and use, and to compliance of keeping a physical distance ($r = -.39$, $p < .01$).

Summary and Discussion

Study 2 replicated and extended the findings from Study 1 in a different sample, drawn from a different country, and during a different time of the pandemic. Again, we found clear evidence suggesting an unrealistic optimism whereby self and close other were perceived as being less likely to carry or contract the infection and more likely to engage in prosocial protective behaviour when compared with an acquaintance. In cases with differences between self and close other, the difference favoured the self, likely reflecting self-enhancement biases (Sedikides & Gregg, 2008).

Also replicating Study 1, exploratory correlational analyses showed stronger associations between risk assessments for self and close other than between self and acquaintance. This might suggest that participants estimated the risks for their close other using information or heuristics they used for estimating their own risks. As in Study 1, overall, we found weak to moderate correlations between risk perception and the likelihood of engaging in protective behaviour.

General Discussion

We examined unrealistic optimism in relation to the perceived risk of being infected with COVID-19, currently carrying the virus with no symptoms, estimated distance into the future for contracting a potential infection, and the perceived likelihood of engaging in three specific protective behaviours: the wearing of facemasks, the use of hand sanitizer, and keeping physical distance. The participants were asked to assess these different aspects while thinking about themselves, a close other (at their own age), and an acquaintance (at their own age).

The results were remarkably consistent. Across two studies, using samples from different populations (USA and UK) and conducted during different phases of the pandemic, we found evidence suggesting that participants were unrealistically optimistic when assessing their risk of infection and the likelihood of engaging in protective behaviour. First, the risk of infection was assessed as higher for an acquaintance than for self and a close other, both with regard to the likelihood of contracting the virus and currently carrying it without showing symptoms. Second, we found a temporal bias with regard to the possibility of being infected in the future, which was estimated as more temporally remote for oneself and close other than for an acquaintance. Third, the necessity of engaging in protective behaviours (buying and using masks and hand sanitizer, as well as keeping physical distance) was rated largely similar across the three conditions, whereas the likelihood of actually complying with these protective and prosocial behaviours was rated as higher for self, and close other than for an acquaintance. Fourth, exploratory analyses suggested that this unrealistic

optimistic assessment regarding self may spill over to people who are considered close.

Thus, consistent with an unrealistic optimism interpretation, the participants considered the likelihood of contracting and carrying the infection lower for themselves and a close other than for an acquaintance. At the same time, they expected themselves and their close other to be more likely to engage in protective behaviours compared with an acquaintance.

How should these findings be reconciled? One possibility is that participants perceived a causal connection between the two issues such that they would view themselves and close other as less likely carriers of the virus due to their enhanced precautious behaviour. This possibility is supported by some positive correlations between assessments of infection risk and the likelihood of engaging in protective behaviour. However, these correlations were generally weak and not consistent across studies and conditions, which speaks against a strong causal connection. Alternatively, complying with the use of masks, hand sanitizer, and physical distance is regarded as a responsible, prosocial behaviour (Cheng et al., 2020; Pfattheicher et al., 2020), in addition to being a (neutral) means of protection (Pradhan et al., 2020). Therefore, following a positivity bias, participants perceived themselves and their close other to be more likely to engage in this positive behaviour, compared with an acquaintance, consistent with our predictions. The fact that participants rated themselves as slightly (but significantly) higher in the necessity for keeping physical distance compared to an acquaintance might reflect that physical distancing likely includes self-serving motivations (Wise et al., 2020) while using masks and sanitizer are largely seen as prosocial (Pfattheicher et al., 2020).

Our results suggest that the disparity with which participants assess infection risks for people they consider close to them and their acquaintances may be due to motivational factors. This interpretation is supported by the findings that risk estimates for both close other and acquaintance were unrelated to the time these have been known to the participant. Moreover, risk assessments for self were more strongly associated with the risk assessments for the close other than for the acquaintance, suggesting risk assessment for self being carried over to closer other. This agrees with research (Aron et al., 1991; Kumashiro & Sedikides, 2005) demonstrating that people tend to view close others as part of their self. Thus, it is likely that the same motivational factors (e.g., self-enhancement and harm avoidance) that underlie the risk assessments for one's own self spill over to the assessments for those who are considered close, whereas acquaintances or similar average others are evaluated using different information (Klar et al., 1996), which might be more true—less optimistically biased—to the population infection rates accessible to the participant.

Unrealistic optimism is well-established in the literature also in relation to health issues (Shepperd et al., 2013). The present study extends this research in a number of important ways that are especially timely given the seriousness of the COVID-19 pandemic around the world. First, most previous studies on unrealistic optimism in relation to health typically have examined risk assessments in specific risk populations (e.g., HIV+ men and smokers). In such designs, risk evaluations for others relative to self can be biased by the fact that potential risk is not uniform for individuals inside and outside the specific population (see Shepperd et al., 2013). In contrast, the present study shows the relevance of optimism bias in relation to a pandemic, where the risk of infection is rather uniform at a global scale and across numerous individual characteristics. Moreover, according to previous research in lab settings (see Helweg-Larsen & Shepperd, 2001 for a review), unrealistic optimism is diminished when people evaluate events they think of as incontrollable. However, our findings suggest that unrealistic optimism for infection risk prevails and even seems to spill over the risk assessments to close others in the face of a relatively uncontrollable real life pandemic.

Second, and maybe more importantly, our results have practical implications. For example, a widely adopted measure by governments to control the spread of the virus requires people to limit physical contact with a few close others. However, as suggested here, unrealistic optimism about infection risk and its timing likely extend to close others, possibly leading people to think they and their close others are less likely to carry the virus. Thus, people might behave in ways that can spread the virus both within their close circle (families or social bubbles) and to people outside their group. Since the configuration of such "social bubbles" and "close others" are left to individual decisions, it would seem highly important to make people aware of the presence of these irrational biases concerning self and close other. This information might encourage people to reflect critically upon such biases and adjust their behaviour accordingly.

Third, and more speculatively, to the extent people generally underestimate the infection risk for self and close others and relax precautions accordingly, the virus would be more likely to spread in communities and (sub)cultures, where individual members conceive a larger group of people as their "close others," such as in more collectively and family oriented cultures and subcultures. More research would be needed to clarify these possibilities.

Finally, by including a close other condition, we add to previous work on unrealistic optimism more generally, where a standard method for measuring this bias has been to compare expectations regarding oneself against expectations for an average other (see Shepperd et al., 2013, for a review). This strategy, however, may yield interpretational ambiguities concerning what counts as an average person (Weinstein & Klein, 1995). In contrast, in the present research, the comparison groups were specific: close other and acquaintances at the same age of the participant, which likely led to more constrained evaluations.

Our work has limitations. We measured unrealistic *comparative optimism*. Another strategy would be to measure unrealistic *absolute optimism*, where subjective risk assessments are contrasted with objective measures of actual risk (Shepperd et al., 2013). Future work should address unrealistic absolute optimism in relation to COVID-19 if reliable objective risk estimates become available. Despite this caveat, the present

research has both scientific and practical relevance by providing a deeper understanding of the cognitive biases playing a role in risk assessments and in the adoption and compliance with protective behaviours.

Data Availability Statement

All data, analysis code, and materials are publicly available via OSF and can be accessed at https://osf.io/rwx23. The design and analysis plans for all studies were preregistered at https://osf.io/rwx23. Deviations from the preregistration are described in the text.

Author Contributions

Both authors contributed to the study design. S.S. produced the materials, performed the data collection and analyses. Both authors drafted the manuscript and approved the final version of the manuscript for submission.

Conflict of Interest

The authors declare that they have no conflict of interest.

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